Concern that simulation modelling does not produce 100% accurate results	Noise modelling has been used as a tool to assist with the identification of potential issues associated with the construction works, the prioritisation of appropriate noise mitigation measures, and the need for further investigation when project details become available. The EIS acknowledges that the noise impact assessment modelling is indicative of noise levels which could be expected during construction.
Results of baseline noise monitoring at Duncan Road	The EIS presents the results of noise monitoring undertaken at three locations, including H3 at Duncan Road. The monitoring results indicate a quiet rural environment, with rating background noise levels varying from 31 dB(A) during the daytime to around 25 dB(A) during the night time. Further information on the daily variation in noise levels at this location can be found in Appendix F.12.1 of Volume 4 of the EIS.
Does the noise modelling account for varying building structure and materials?	The level of attenuation provided by a building façade will depend on the building structure, materials and insulation, area of glass, seals around windows and doors and the like.
If monitoring shows unacceptable noise and vibration levels during construction, what management measures would be employed to minimise impacts on residents	The noise and vibration management section of the EMP (Section 19 of the Draft Environmental impact Statement) outlines a process for noise monitoring, investigation and implementation of further mitigation measures, as required, to maintain noise and vibration levels within the Project goals in adjacent sensitive receiver locations.
Permanent noise, vibration and dust monitoring should be conducted at nearest residents and locations further away	The noise, vibration and dust management programs will include monitoring at locations representative of the nearest off site sensitive places in order to assist with the development of mitigation measures for the project. The nature of noise, vibration and dust emissions from construction works of this type is such that if controls are incorporated to maintain levels within Project construction noise goals at nearest off site residences, the levels would also be within the goals at residences located further from the works.
Daily air quality, noise and vibration monitoring data to be made available on an internet	The environmental management plan for construction works will include commitment to ongoing monitoring and monthly reporting of air quality, noise and vibration levels. The monthly reporting would include analysis of compliance with Project performance goals and a summary of community complaints and issues associated with the Project, along with information on actions taken to address these complaints. The Alliance will consider making these reports available to the community on the Project website.

3.12 Transport and Roads

A number of submissions raised concerns relating to the traffic generated by construction of the Project and the ability of the local roads to accommodate traffic volumes given the configuration proposed following completion of the dam. This section provides responses in relation to the issues raised.

3.12.1 Existing Traffic

Existing Traffic Volumes

To describe the traffic volumes on the local access roads around the dam area, traffic counts were conducted at two locations as follows:

Spillway Road (road across dam wall)

A 2-way classified 7-day count was conducted on Spillway Road between Saturday 2nd December and Friday 8th December 2006 to determine the volume of traffic accessing the dam site over a week period. **Table 25** describes the traffic volumes on Spillway Road during each period for the entire week.

- **Table 25 Traffic volumes across dam**

Time Period	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	Week day peak	Week end Peak
AM[1]	8	14	13	20	14	18	31	**20**	**31**
Day[2]	35	43	78	34	38	64	150	**78**	**150**
PM[3]	21	24	24	28	31	44	49	**31**	**49**
Daily Total	305	380	449	341	342	512	975	**449**	**975**
Daily %CV[4]	8.9%	3.4%	6.2%	7.0%	6.4%	1.6%	1.8%	**8.9%**	**1.8%**

[1]7:00 to 8:00am
[2]highest hour outside AM and PM Peak

[3]4:00 to 5:00pm
[4]Commercial (Heavy Vehicle) Percentage

As can be seen in the above table, Sunday is the busiest day on the dam representing the strong weekend demand by tourism traffic.

An assessment of the daily and weekly flow profile indicates the following factors:

- 95% of the daily traffic occurs between the hours of 6:00am and 7:00pm
- the maximum number of trips accessing the dam on a weekday is 449vpd;
- the maximum number of trips accessing the dam on a weekend is 975vpd;
- the maximum number of trips accessing the dam in the Day peak hour on the weekend is 150vph; and
- the maximum weekday peak hour trips are 20vph in the AM peak and 28vph in the PM on the same day.

These values, in conjunction with intersection counts, have been used to calculate the flows along Advancetown Road.

It should be noted that the count conducted tallies each pass over the dam uniquely therefore volumes provided above treat trips over and back across the dam as two separate trips. This may not accurately reflect the actual number of vehicles accessing the site as some may be double counted leading to overestimation. Further, it does not distinguish between trips accessing the dam from Advancetown Road or Gilston Road. For the purpose of this analysis, it is assumed that the trips recorded on Spillway Road, are unique one-way trips (i.e. no doubling back).

Intersection of Advancetown Road and Nerang-Murwillumbah Road

A 13hr manual classified intersection count was conducted at the intersection of Nerang-Murwillumbah Road and Advancetown Road on the 8th August 2007 during the hours of 6:00am-7:00pm. **Figure 19** describes the traffic volumes for each movement during the AM, PM and Day peak hours and 13hr volumes on that day.

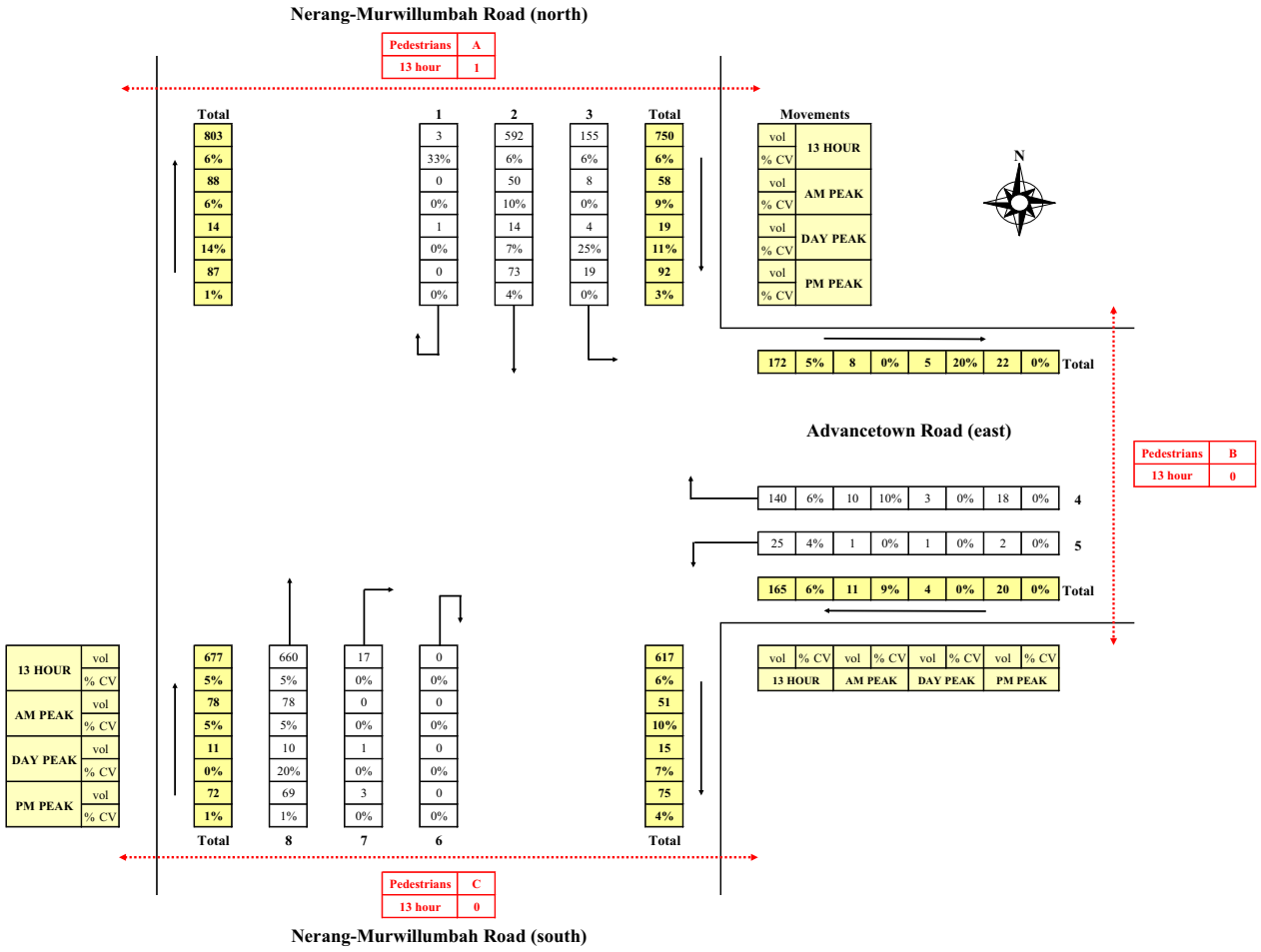
As access across the dam wall had been closed for some time on this day, this count provides a representation of the baseline local traffic using Advancetown Road during Construction Stage (essentially no recreation traffic). The traffic volumes witnessed however, would still contain a number of construction vehicles due to geotechnical testing and limited tourist traffic accessing the site and lookouts. An earlier morning and evening count was conducted on the 27th of March 2007 which confirmed the volumes under the same conditions.

From analysis of the traffic counts the following was identified:

- the peak hours for the intersection were determined to be 7:15-8:15am in the AM, 3:30-4:30pm in the PM and 10:45am-11:45am in the Day;
- total 13 hour daily volume on Advancetown Road was 337 vpd;
- total AM peak hour volume on Advancetown Road was 19 vph ;
- total PM peak hour volume on Advancetown Road was 42 vph; and
- total day peak hour volume on Advancetown Road was 9 vph (outside the AM and PM peaks).

It should be noted that only 3 pedestrians were recorded travelling through the intersection throughout the 13hr duration of the count and therefore these are not considered a factor in the analysis of the intersection.

- **Figure 19 Existing Peak hour Traffic volumes at Advancetown Rd / Nerang-Murwillumbah Rd intersection – 8th August 2007**



As shown in **Table 25**, the highest recorded 2-way flow over the dam wall was recorded from traffic counts as 150 vehicles for an hour during Sunday 11:00am to 12:00pm. It is assumed that this traffic could occur in conjunction with the above count with the weekday Day peak being the baseline traffic for the analysis hour. Similarly from **Table 25**, the highest recorded 2-way flow over the dam wall on a weekday was recorded as 20 vehicles in the AM and 28 vehicles in the PM peaks.

For the purpose of calculating the traffic at the intersection of Advancetown Road and Nerang-Murwillumbah Road on a weekend and weekday it has been assumed that while Spillway Road was open, a conservative 60% of traffic currently arrives from Gilston Road and 40% from Advancetown Road. Therefore, applying this directional split to the additional traffic on a weekend:

- for a weekday AM peak, 8vph extra trips access the dam from Advancetown Road (20vph x 40%);
- for a weekday PM peak, 11vph extra trips access the dam from Advancetown Road (28vph x 40%); and
- for a weekend DAY peak, 60vph extra trips accesses the dam from Advancetown Road (150vph x 40%).

These trips were further broken down into inbound and outbound by 50% will be arriving and 50% departing within the each peak hour. This is considered a conservative approach to model the worse case scenario that might occur.

For additional traffic using Advancetown Road and Nerang-Murwillumbah Road intersection on a weekend and weekday, the traffic was further assigned as follows:

- 75% to Nerang-Murwillumbah Road North; and
- 25% to Nerang-Murwillumbah Road South.

Table 26 shows the estimated additional existing traffic at the intersection of Advancetown Rd and Nerang-Murwillumbah Road on a weekday and weekend.

- **Table 26 Estimated Additional Weekend Day peak hour traffic volumes – Existing**

Route	Trips[1]											
	Light Vehicles						Heavy Vehicles[3]					
	Weekday				Weekend		Weekday				Weekend	
	AM[2]		PM[2]		DAY[2]		AM[2]		PM[2]		DAY[2]	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Nerang-Murwillumbah Rd – north (75%)	3	3	4	4	23	23	1	1	1	1	2	2
Nerang-Murwillumbah Rd – South (25%)	1	1	2	2	7	7	1	1	1	1	1	1
Total on Advancetown Rd	4	4	6	6	30	30	2	2	2	2	3	3

[1]These trips are in addition to the AM, PM or DAY peak hour volumes counted at the intersection
[2]AM Peak, PM peak and DAY peak

An assessment of the weekday link traffic volumes has been undertaken using the intersection and 7-day traffic count data. On the assumption that 95% of the daily traffic occurs during the hours of 6:00am and 7:00pm, the baseline traffic on Advancetown Road (excluding tourist traffic etc,) equates to 355 veh/day when applied to the 13hr traffic volume on the road (337 vehicles). The total estimated AADT for Advancetown Road inclusive of heavy vehicles is

For the purpose of calculating the AADT on Advancetown Road on a weekend it has been assumed that a conservative 60% of traffic arrive from Gilston Road and 40% from Advancetown Road. Therefore, applying this split to the traffic accessing the dam, of the 449 vehicles that access the dam on a weekday approximately 180 vehicles travel along Advancetown Road in additional to the vehicles from the August traffic count. Of the 975 vehicles on the weekend, approximately 390 additional vehicles travel on Advancetown Road when the dam was open.

Existing Traffic Performance Assessment

To identify the impacts on Advancetown Road during construction and operational stage, the follow periods have been analysed under existing traffic conditions in this report:

- Weekday AM and PM for intersection analysis – worst case Construction Stage;
- Sunday DAY Peak for intersection analysis – worst case Operational Stage;
- Weekday daily for link analysis – worst case Construction Stage; and
- Sunday daily for link analysis – worst case Operational Stage.

Intersection Performance Assessment

The weekday AM and PM traffic volumes counted at the intersection of Advancetown Rd and Nerang-Murwillumbah Road have been used to model weekday traffic performance. For weekend, traffic identified in **Table 26** has been used in addition to that on a weekday Day peak from the count.

The Intersection of Advancetown Road and Nerang-Murwillumbah Road has been tested using the aaSIDRA Intersection V3.0 computer package for intersection analysis to identify construction impacts.

The outputs from the 2007 'without the development' or existing scenario is summarised in **Table 27**.

- **Table 27 Advancetown Rd/Nerang-Murwillumbah Rd 2007 existing intersection performance**

Intersection				Mox DoS	Queue Length (m)	Average Delay (sec)	LoS
Advancetown Rd/Nerang-Murwillumbah Rd	Give way	W'day	AM	0.086	4	1.9	**A**
			PM	0.084	4	2.6	**A**
		W'end	DAY	0.024	1	6.5	**A**

1. The Degree of Saturation (DoS) represents the ratio of demand to available capacity for the most critical movement at the intersection. A DoS of 0.90 represents a desirable maximum for acceptable operation of signalised intersection and roundabouts. For priority intersections a DoS above a .80 indicates that more formal control is warranted.
2. Maximum 95th percentile queue length for intersection.

Link Performance Assessment

The performance criterion for road links is the Level of Service (LoS) as it is defined in Austroads *Guide to Traffic Engineering practice (GTEP) – Part 2 - Roadway Capacity*. In rural areas, LoS 'C' can be considered minimum standard, changes between the LoS ranking above LoS 'C' imply remedial measures to maintain the existing LoS would be sought.

For the purpose of this project, the following assumptions have been made:

- AADTs levels for various LoS for rolling terrain, two-lane, two-way rural roads; and
- the ratio between the design hour volume and the annual average daily traffic (AADT) of 0.1.

The results of the link assessment for Advancetown Rd and a comparison between the 'without the dam' or existing scenario is shown in **Table 28**.

- **Table 28 Advancetown Road Existing Link Performance**

Road	Section		AADT	Heavy Vehicles (%)	LoS[2]
Advancetown Road	Hinze Dam to Nerang-Murwillumbah Road	W'day	535[1]	5% (26)	**A**
		W'end	745	5% (38)	**A**

[1]Note that this figure was indicated as 345 in Table 13-10 of section 13.4.7 of the EIS. This figure has been revised using assumptions outlined in this supplementary report and additional traffic count data.

[2]0 < LoS A <900veh/day, 900 < LoS B <2,100veh/day, 2,100 < LoS C < 4,000veh/day, 4,000 < LoS D < 6,100veh/day, 6,100 < LoS E < 11,400veh/day, and 15,200 < LoS F

3.12.2 Construction Stage Traffic

Comments regarding construction workforce numbers and how they were derived were received. The Alliance has prepared a detailed construction program and associated documentation in order for the construction works to commence in October. The information provided in the programs has enabled the Alliance to prepare realistic estimates of the construction workforce required for each of the phases of the project.

Traffic estimates have assumed that the construction workforce will stay onsite for the entire shift. Given the isolation in relation to commercial facilities, arrangements for catering may be made available on the work site.

Detailed Traffic assessments have been conducted and are presented in the Draft EIS. These studies have indicated that there will be no impact on Worongary Road as a result of construction traffic.

Construction Stage Traffic Volumes

Since submission of the EIS, planning has progressed for a bus service to be provided to carry workers from site between the Nerang train station and the Hinze Dam site along Nerang-Murwillumbah Road. As such the

principles of Option 1 as outlined in Section 13.4.2 of the EIS has been adopted in assuming the estimated vehicle traffic generated by the project during construction.

The total estimated number of vehicle trips to and from the site during the construction phase has been reviewed and is summarised in **Table 29**. Daily traffic during the construction peak is estimated as vehicle trips per day (vpd). It is proposed that all traffic identified in **Table 29**will access the site via Advancetown Road.

The following factors have been used in the revised calculation of the values in **Table 29**:

- workforce will on average total 185 personnel (revised from 240 as this is an estimated peak number that would be present for only a short period of time);
- it is assumed 40 of these personnel will utilise the bus service each day;
- a vehicle occupancy factor of 1.5 has been used to the remainder of private vehicle trips (car pooling will be advocated by the Alliance amongst the workforce); and
- the proportion of heavy vehicles using the road has been revised (refer Note 2).

- **Table 29 Estimated vehicle traffic generated during Construction Phase**

Generation Type	Daily Traffic Generation (vpd) (Peak Construction Period)			Total Heavy Vehicles During Construction (construction equipment) (vehicles) (all periods)
	Light Vehicles (Option 1)	Buses (Option 1)	Heavy Vehicles	
Workforce	193	4	-	-
Visitors	6	-	-	-
Concrete materials (including ash, cement and sand)	-	-	10	-
Equipment	-	-	-	259
Service Vehicles	-	-	4	-
Materials	-	-	8	-
Total	**199**	**4**	**22**	**259**

The traffic generation and distribution for the operational phase is depicted in **Table 30**.

- **Table 30 Estimated daily construction associated traffic along Advancetown Road**

Route	Trips (vpd)	
	Light Vehicles	Buses + Heavy Vehicles
Advancetown Road	199[1]	34[2]

[1]This figure was identified as 526 in the EIS however due to the assumption of the bus service being in operation and car pooling occurring, Option 1 has been used to model impacts in this supplementary report.

[2]Figure assumes that from a total of 259 trips generated over the whole construction period, a maximum of approximately 3% would occur on a single day due to 8 deliveries being the maximum manageable on top of normal deliveries. This differs from assumptions made in section 13.4.6 of the EIS due to more recent information available.

The traffic generated during construction as outlined in **Table 30** has been disaggregated over the peak hour periods to provide input data for construction stage analysis of the Advancetown Rd/Nerang-Murwillumbah Rd intersection. **Table 31** indicates the construction traffic during peak periods.

For the peak hour assessment purpose, the traffic has been distributed as follows:

- for light vehicles – 100% for entry (AM Peak with 95% arriving within a 30 minute period) and 100% for exit (PM Peak with 95% departing within a 30 minute period) of the daily volumes; and
- for construction equipment movements – It is expected that no more then 2 heavy vehicles would both arrive and depart in both the AM and PM periods plus bus movements.

- **Table 31 Additional Peak hour traffic volumes on Advancetown Road during - Construction Phase**

Route	Trips[1]							
	Light Vehicles				Heavy Vehicles (including buses)			
	AM[2]		PM[2]		AM[2]		PM[2]	
	In	Out	In	Out	In	Out	In	Out
Nerang-Murwillumbah Rd – north (100%)	100	-	-	100	4	4	4	4
Total on Advancetown Road	100	-	-	100	4	4	4	4

[1] These trips are in addition to the AM and PM peak hour volumes counted at the intersection
[2]AM and PM Peak

All construction traffic is assumed going to and coming from Nerang-Murwillumbah Road to the north.

Construction Stage Traffic Impact Assessment

Intersection Impact Assessment

The Intersection of Advancetown Road and Nerang-Murwillumbah Road has been tested using the aaSIDRA Intersection V3.0 computer package for intersection analysis to identify construction impacts.

The outputs from the 2007 'without the development' and 2007 'with the construction traffic in place' scenarios are summarised in **Table 32**.

- **Table 32 Advancetown Rd/Nerang-Murwillumbah Rd intersection performance comparison – Construction Phase - weekday**

Intersection			Background Traffic (2007)				Construction Phase Traffic (2007)			
			Mox DoS	Queue Length (m)	Av Delay (sec)	LoS	Mox DoS	Queue Length (m)	Av Delay (sec)	LoS
Advancetown Rd/Nerang-Murwillumbah Rd	Give way	AM	0.086	4	1.9	**A**	0.086	4	4.2	**A**
		PM	0.084	4	2.6	**A**	0.097	4	4.8	**A**

1. The Degree of Saturation (DoS) represents the ratio of demand to available capacity for the most critical movement at the intersection. A DoS of 0.90 represents a desirable maximum for acceptable operation of signalised intersection and roundabouts. For priority intersections a DoS above a .80 indicates that more formal control is warranted.
2. Maximum 95th percentile queue length for intersection.

The intersection analysis for 2007 (with the construction traffic) for AM and PM peak hours indicates that the intersection operates within the acceptable Degree of Saturation (DoS) range and there is considerable spare capacity and no other remedial works in order to improve the intersections' performance are required.

It should be noted that since the writing of the EIS document, the intersection of Advancetown Road and Nerang-Murwillumbah Road has undergone an upgrade to improve the safety and efficiency of the intersection. Further, baseline traffic volumes used do not take into the consideration the reduction in traffic volumes on Advancetown Road due to the closure of the dam.

Link Impact Assessment

The performance criterion for road links is the Level of Service (LoS) as it is defined in Austroads *Guide to Traffic Engineering practice (GTEP) – Part 2 - Roadway Capacity*. In rural areas, LoS 'C' can be considered minimum standard, changes between the LoS ranking above LoS 'C' imply remedial measures to maintain the existing LoS would be sought.

For the purpose of this project, the following assumptions have been made:

- AADTs levels for various LoS for rolling terrain, two-lane, two-way rural roads; and
- the ratio between the design hour volume and the annual average daily traffic (AADT) of 0.1.

The results of the link assessment for Advancetown Rd and a comparison between the 'without the dam' and 'operational phase of the dam' scenarios are shown in **Table 33**.

- **Table 33 Road Link Impact Assessment - Construction Stage - weekday**

Road	Section	Background Traffic (veh/day) (2007)			Construction Phase Traffic (veh/day)		
		AADT	Heavy Vehicles (%)	LoS	AADT	Heavy Vehicles (%)	LoS
Advancetown Road	Hinze Dam to Nerang – Murwillumbah Road	535	5% (26)	**A**	588[1]	9% (52)	**A**

[1] Baseline daily traffic volume of 355 vpd has been used in conjunction with construction traffic

The operational phase of the project is not expected to have significant impact on traffic operations of Advancetown Road. The Level of Service (LoS) for the operational stage phase scenario has remained at level A in line with the background traffic volumes. Due to the closure of the access over the dam wall, the traffic diverted along Advancetown Road will not significantly impact its capacity.

3.12.3 Mitigation of Construction Traffic Impacts

Road Re-alignment

Due to the introduction of construction traffic on the road changing the mix of vehicle type, it is proposed to re-align Advancetown Road through horizontal curves and provide localised pavement widening. This will allow traffic during Construction Phase to travel safely with adequate pavement width for passing oncoming vehicles. Road widening will be adequate to allow for two Austroads Class 10 vehicles to pass safely at a controlled speed. Design will be carried out in consultation with local residents to ensure any impacts are minimised.

Ongoing monitoring of the condition of Advancetown Road will be carried out to ensure the road is maintained satisfactorily.

Drainage

Where proposed widening will occur along Advancetown Road, adequate drainage will be provided as table drains when embankment is in cut. Cross culverts currently exist to transfer stormwater flow through the road continuing the natural drainage path. Stormwater drainage on the road is consistent with its non-urban environment. All culverts impacted by the proposed widening are proposed to be extended.

A large bank of culverts exists on Advancetown Road at chainage 706.4m from Nerang-Murwillumbah Road (refer **Figure 20**). This culvert structure consists of 5 cells of 2700x1200 (approx) slab box culverts. Analysis has been carried out on the culvert to determine it has approximately just less than 1 in 20 year Average Recurrence Interval

(ARI) flood immunity with surface flow over the road at a depth of 144mm for 16minutes. During a 1 in 50 year ARI storm the critical velocity and depth across the road is still within safe limits as defined by the Queensland Urban Drainage Manual.

- **Figure 20 Advancetown Road major culvert a chainage 706.4m**

Adjacent Properties

All property accesses and entry treatments along Advancetown Road impacted by the proposed road widening will be reinstated in accordance with Gold Coast City Council standard details or to existing quality. All property owners impacted will be consulted prior to construction proceeding to ensure any impacts are minimised.

As part of the widening works, signage will be incorporated to provide warning to the location of concealed driveways. This is to be provided in conjunction with a reduced speed limit to address the safety due to introduced traffic on the road.

Road Lighting

Road lighting is not proposed to be provided consistent with Advancetown Road's non-urban setting and volume of traffic on the road. The majority of construction traffic will travel during daylight hours.

Speed controls

It is proposed to control speed along Advancetown Road to a maximum of 50km/h during the construction period, which will be reviewed on an ongoing basis in consultation with residents on the grounds of safety. This will improve safety and accessibility for residents and traffic along Advancetown Road by reducing the required sight distance for stopping and manoeuvring safety.

Pedestrian and Cyclists

The design for the widening of Advancetown Road has allowed for the opportunity to provide a 1.5m off-road pedestrian/cycle track along entire length of the road. If provided by Gold Coast City Council, the path will allow for improved safety and amenity of pedestrians and cyclists. Further, it has the potential for equestrian traffic to use the facility as the majority of its length is separated considerably from the road.

3.12.4 Operational Stage Traffic

Operational Stage Traffic Volumes

The closure of access across the dam wall is expected to effect traffic patterns by redirecting all traffic accessing the dam from Gilston Rd over to Advancetown Road. As such it is expected that traffic volumes along Advancetown Road will increase as a result of this. However, it should be noted that with the closure a number of commuter trips from Gilston Road residents using Advancetown Road will no longer occur counteracting this change to a degree.

To identify the impacts on Advancetown Road during Operational Phase, the follow periods have been analysed in this report:

a) Sunday Day Peak for intersection analysis – worst case

b) Weekday daily for link analysis

c) Sunday daily for link analysis

For the purpose of this analysis, it is assumed that the trips recorded on Spillway Road, are unique one-way trips (i.e. no doubling back).

As shown in **Table 25**, the highest recorded 2-way flow over the dam wall was recorded from traffic counts as 150 vehicles for an hour during Sunday 11:00am to 12:00pm.

For the purpose of calculating the traffic at the intersection of Advancetown Rd and Nerang-Murwillumbah on a weekend, it has been assumed that a conservative 60% of traffic currently arrives from Gilston Road and 40% from Advancetown Road. Therefore, applying this directional split to the additional traffic on a weekend:

- for a weekend Day peak 90vph extra access the dam from Advancetown Rd (150vph x 60%).

These trips were further broken down into inbound and outbound by 50% will be arriving and 50% departing within the Day peak hour. This is considered a conservative approach to model the worse case scenario that might occur.

For additional traffic using Advancetown Road and Nerang-Murwillumbah Road intersection on a weekend, the traffic was further assigned as follows:

- 75% to Nerang-Murwillumbah Road North; and
- 25% to Nerang-Murwillumbah Road South.

Table 34 shows the traffic re-diverted to the intersection of Advancetown Rd and Nerang-Murwillumbah Road in the operational stage due to the closure of access across the dam wall.

- **Table 34 Additional Day peak hour traffic volumes on Avancetown Road – Operational Stage – weekend**

Route	Trips[1]			
	Light Vehicles		Heavy Vehicles (including buses)	
	DAY[2]		DAY[2]	
	In	Out	In	Out
Nerang-Murwillumbah Rd – north (75%)	56	56	2	2
Nerang-Murwillumbah Rd – South (25%)	19	19	1	1
Total on Advancetown Road	75	75	3	3

[1] These trips are in addition to the AM and PM peak hour volumes counted at the intersection plus the additional traffic on Sunday stated in **Table 26**

[2]Day Peak

As shown in **Table 25**, the highest recorded 2-way flow over the dam wall was recorded from traffic counts as 975 vehicles per day. Further, the highest number of trips over the dam recorded on a weekday is 449vpd.

For calculating the weekday and weekend daily volumes, it is assumed that currently 60% are using Gilston Road and would now be diverted along Advancetown Road due to the closure of Spillway Road. Therefore applying this assumed split for traffic diverted along Advancetown Road:

- an additional 269 trips will be diverted along Advancetown Road on a weekday (449 x 60%); and
- an additional 585 trips will be diverted along Advancetown Road on a weekend day (975 x 60%).

It should be noted that rowing activities have been taken from the dam as decided by Gold Coast City Council and as such, the large amount of trips accessing the dam for this purpose will no longer occur. This should result in a significant decrease in peak event traffic.

Operational Stage Traffic Impact Assessment

Intersection Impact Assessment

The intersection of Advancetown Road and Nerang-Murwillumbah Road has been tested using the aaSIDRA Intersection V3.0 computer package for intersection analysis to identify construction impacts.

The outputs from the 2007 'without the development' and 'operational traffic in place' scenarios are summarised in **Table 35**.

- **Table 35 Advancetown Rd/Nerang-Murwillumbah Rd intersection performance comparison – Operational Phase – Weekend**

Intersection			Background Traffic (2007)				Operational Phase Traffic			
			Mox DoS	Queue Length (m)	Av Delay (sec)	LoS	Mox DoS	Queue Length (m)	Av Delay (sec)	LoS
Advancetown Rd/Nerang-Murwillumbah Rd	Give way	Week end Peak	0.024	1	6.5	**A**	0.046	1	7.4	**A**

1. The Degree of Saturation (DoS) represents the ratio of demand to available capacity for the most critical movement at the intersection. A DoS of 0.90 represents a desirable maximum for acceptable operation of signalised intersection and roundabouts. For priority intersections a DoS above a .80 indicates that more formal control is warranted.
2. Maximum 95th percentile queue length for intersection.

The intersection analysis for the operational phase for AM and PM peak hours indicates that the intersection operates within the acceptable Degree of Saturation (DoS) range and there is considerable spare capacity and no other remedial works in order to improve the intersections' performance are required.

Link Impact Assessment

The performance criterion for road links is the Level of Service (LoS) as it is defined in Austroads *Guide to Traffic Engineering practice (GTEP) – Part 2 - Roadway Capacity*. In rural areas, LoS 'C' can be considered minimum standard, changes between the LoS ranking above LoS 'C' imply remedial measures to maintain the existing LoS would be sought.

For the purpose of this project, the following assumptions have been made:

- AADTs levels for various LoS for rolling terrain, two-lane, two-way rural roads; and
- the ratio between the design hour volume and the annual average daily traffic (AADT) of 0.1.

The results of the link assessment for Advancetown Rd and a comparison between the 'without the dam' and 'operational phase of the dam' scenarios are shown in **Table 36.**

- **Table 36 Road Link Impact Assessment – Operational Phase**

Road	Section		Background Traffic (veh/day) (2007)			Operational Phase Traffic (veh/day)		
			AADT	Heavy Vehicles (%/ volume)	LoS[1]	AADT	Heavy Vehicles (%/ volume)	LoS[1]
Advancetown Road	Hinze Dam to Nerang – Murwillumbah Road	W'day	535	5% (26)	**A**	804	5% (40)	**A**
		W'end	745	5% (38)	**A**	1330	5% (67)	**B**

[1] 0 < LoS A <900veh/day, 900 < LoS B <2,100veh/day, 2,100 < LoS C < 4,000veh/day, 4,000 < LoS D < 6,100veh/day, 6,100 < LoS E < 11,400veh/day, and 15,200 < LoS F

The operational phase of the project is not expected to have significant impact on traffic operations of Advancetown Road. The Level of Service (LoS) for the operational stage phase scenario has remained at Level A on a weekday and has changed to level B in comparison to A for the background traffic volumes on Sunday. Due to the closure of the access over the dam wall, the traffic diverted along Advancetown Road will not significantly impact its congestion.

3.12.5 Mitigation of Operational Stage Traffic Impacts

Advancetown Road Re-alignment

The Road widening provided during Construction Phase will be maintained to allow for the additional traffic along Advancetown Road due to the closure of Spillway Road. This will allow traffic accessing the site following construction to travel safely with adequate pavement width for passing oncoming vehicles.

Road widening will be adequate to allow for two Austroads Class 10 vehicles to pass safely at a controlled speed.

Road Lighting

Road lighting is not proposed to be provided consistent with Advancetown Road's non-urban setting and volume of traffic. The greatest amount of traffic will occur during daylight hours. Further, upon completion the upgraded recreation facilities are proposed to be closed at night.

Pedestrian and Cyclists

The design for the widening of Advancetown Road has allowed for a 1.5m off-road pedestrian/cycle track along entire length. If provided by Gold Coast City Council, the path will allow for improved safety and amenity of pedestrians and cyclists during Operational Phase. Further, it has the potential for equestrian traffic to use the facility.

Closure of Spillway Road

Spillway Road will be closed upon completion of the project for reasons identified in Section 13.6.6 of the EIS. This is expected to consolidate tourist traffic to the Dam by Advancetown Road only. This is expected to have a positive effect on Gilston Road as Gilston Road's poor alignment, length and capacity are not conducive to high volumes of heavy and light vehicles. This is expected to significantly improve the safety along Gilston Road with Advancetown Road being more appropriate access road once the proposed widening has been provided.

Gilston Road to Advancetown Rd Connection

The Proponent has consulted with the community on this matter and resolved that this connection will not be provided as part of Hinze Dam Stage 3 works. This proposal has been based on the issues discussed in Section 13.6.6 of the EIS

Traffic Management

To avoid un-controlled access along Advancetown Road for tourists accessing the dam, directional and service signage will be provided on Nerang-Murwillumbah Road and surrounds. This will direct traffic along Advancetown Road to the recreation facilities and lookouts to be provided as identified in the EIS. Tourists will have the opportunity to access high quality aspect views from lookouts at this location.

3.12.6 Alternative Access via Old Advancetown Rd

Introduction

A number of submissions identified the possibility of utilizing Old Advancetown Road as an alternative access to the site both during construction and upon completion. An alternative access from Nerang-Murwillumbah Road connecting from the intersection with the Old Advancetown Road to the proposed western saddle dam has been investigated in concept. An assessment of the impacts, issues/risks and costs in comparison to the works proposed to be completed on Advancetown Road as part of the Project has been carried out to determine its feasibility.

Methodology

An alignment was developed using Aerial Laser Survey (ALS) topographical information with the objective of providing a road between the intersection of Nerang-Murwillumbah Road and the Old Advancetown Road up to the proposed western saddle dam. 3D computer added design software was used to define the design and quantities for the proposal to aid the decision making process into its feasibility. The alignment adopted had similar characteristics to an alignment presented in one of the submissions received.

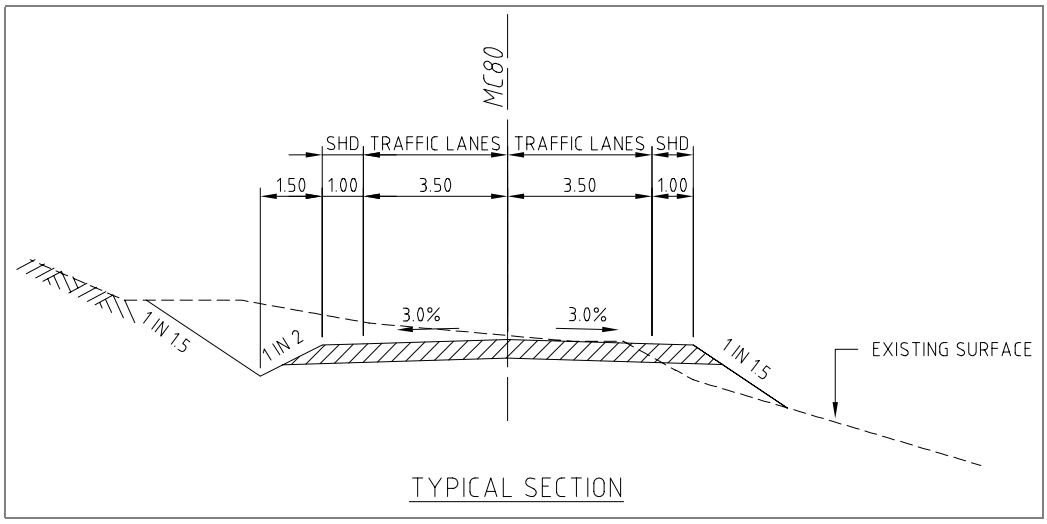
Design Standards

Design was carried out in accordance with the Queensland Department of Main Roads' Road Planning and Design Manual. The design speed adopted was 60km/hr which allows for a posted speed limit of 50km/hr if it were adopted as a permanent access to the dam. The low speed environment selected was to manage the steep topography in the area and allow tighter road geometry.

Figure 21 illustrates the typical cross-section that was adopted, consisting of a 2-lane 2-way semi-rural carriageway of 3.5m lanes and 1m shoulders. The shoulders widen out to 2m where guardrail exists to allow for a 1m clear zone behind.

While no detailed geotechnical analysis was carried out due to the preliminary nature of the investigation, embankment batters were adopted at a slope of 1 in 1.5. This is consistent with the embankment slopes on similar roads in the area and was considered acceptable for the purposes of this concept design. A slope of 1 in 2 was trialled however, the road embankments extended significantly in most locations chasing the steep natural terrain. With the extent of some cuttings there may be a requirement to provide intermediate benching of the slopes, however, this was not included in the design but would increase the quantities used in the feasibility analysis.

- **Figure 21 Alternative Access Typical Cross-section**



Alignment

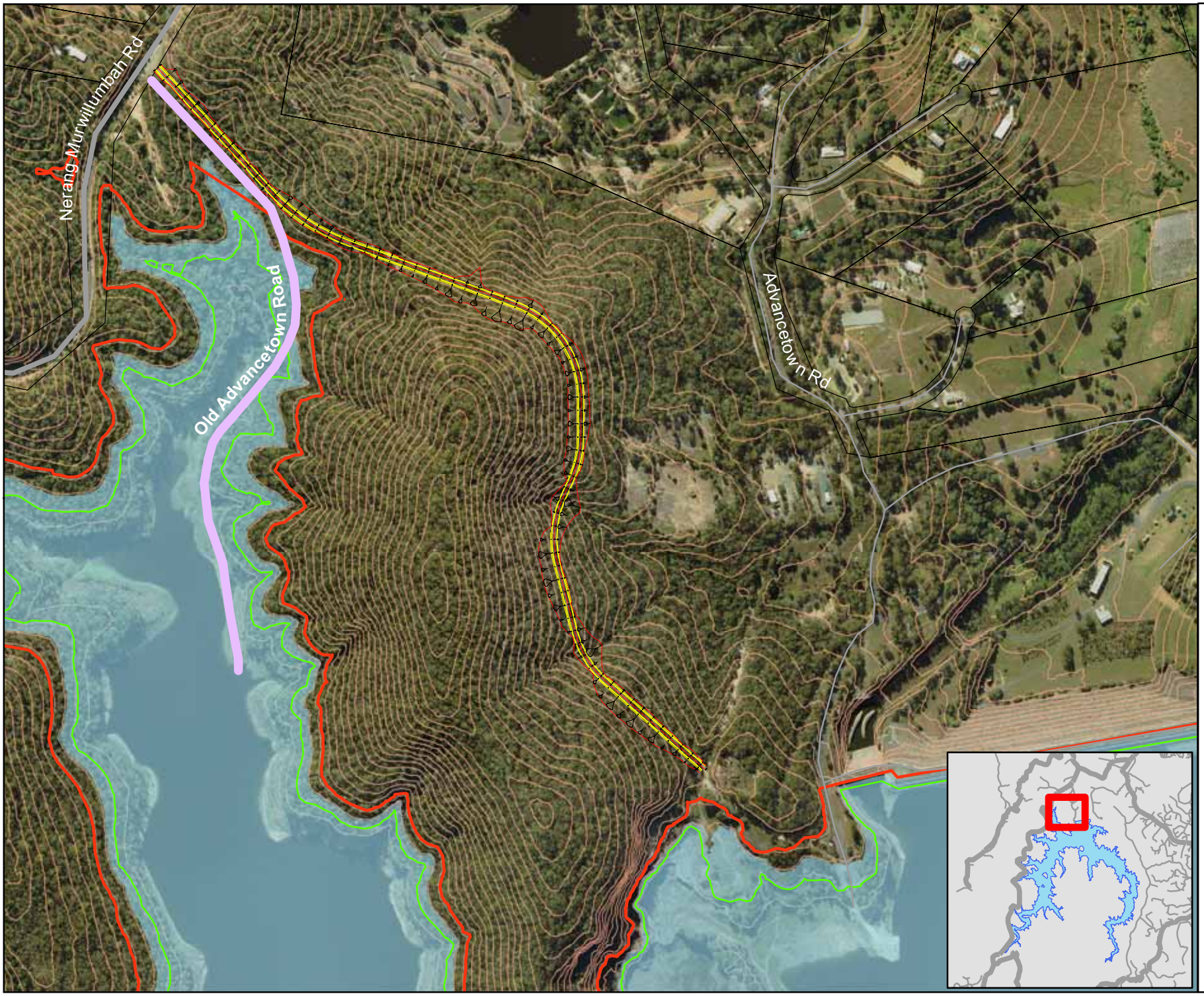
The investigated horizontal alignment for the alternative access is shown in **Figure 22.**

The alignment runs parallel to Old Advancetown Road for approximately 250m after which it deviates east to cross the saddle and follow the contours to the proposed western saddle dam. The use of the Old Advancetown Road was not feasible as the road quickly enters into the current Full Supply Level and the extremely steep topography did not allow for its relocation east up above the proposed new Full Supply Level or1 in 100 year ARI flood level.

The end point of the alignment was considered indicative only at this stage as further analysis would need to be carried out on the internal road network and how the investigated access road would interact with it. This would incur additional construction cost and realignment.

Due to the topography in the area, the investigated alignment resulted in some significant embankments with fill batters up to between 4m and 12m and cut batters up to between 3m and 4m in height. Gully crossings with significant overland stormwater flow catchments require major culvert drainage crossings for at least 3 locations.

The vertical alignment of the road can be seen in **Figure 23.**



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Meters

Scale -1:7,500
Projection: MGA Zone 56

Legend

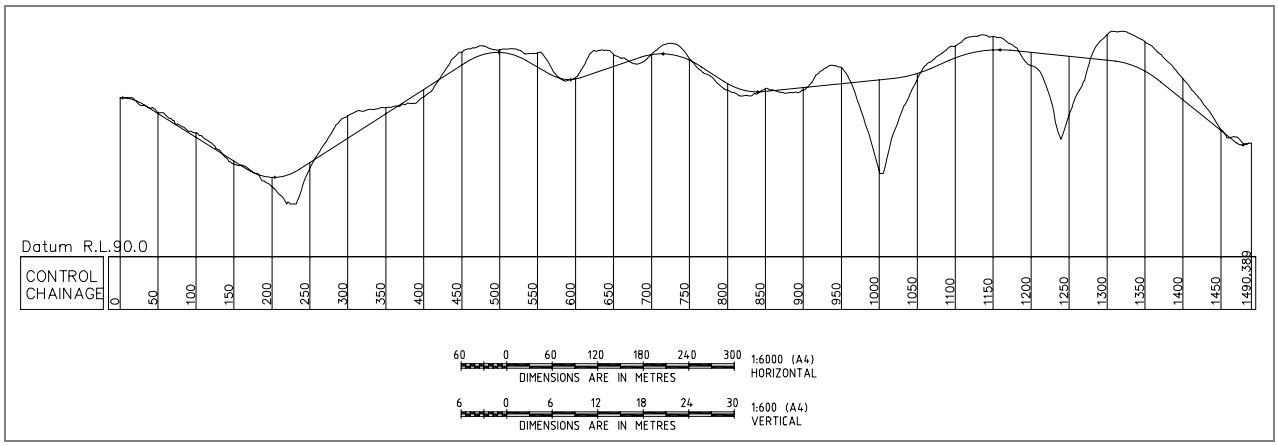
- Investigated alternative site access route
- Road
- Stage 3 Q100 (101.1m)
- Stage 3 FSL (94.5m)
- Contours (5m)
- DCDB

HINZE DAM STAGE 3 EIS SUPPLEMENTARY REPORT

FIGURE 22

Alternative Access Investigated Alignment

- **Figure 23 Alternative Access Investigated Vertical Alignment**



Construction Quantities

The **Table 37** presents the key quantities used in the analysis of the feasibility of the investigated alignment.

- **Table 37 Alternative Access Approximate Key Quantities**

Item	Quantity
Clearing and Grubbing	55,400 m^2
Cut	59,000 m^3
Fill	29,000 m^3
Area of road surface	13,300 m^2
Volume of Pavement[1]	7,400 m^2
Length of guardrail	~700m
Major Culvert crossings	3 No.

[1] Assuming 450mm depth pavement – detailed pavement design not carried out

Program

Due to the complexities of the investigated alignment and the volume and extent of earthworks, the construction period for this road would expect to be approximately 6-9 months in duration. The lead-in time for planning and design would be expected to proceed this period by a further 2-4 months. During this period, all traffic would have to utilise Advancetown Road.

Residual Issues

Due to the preliminary nature of the investigated alignment, detailed field investigations have not been carried out. It is expected that there will be a number of risks that will increase the complexity and hence cost, program and impacts of the construction of the road. **Table 38** presents some key issues that would have to be investigated in further detail during detailed design for their impact on the feasibility of the investigated alignment.

- **Table 38 Alternative Access Issues and Risks**

Issue/Risk	Detail
Rock excavation	Rock is expected to be encountered during excavation which may require blasting and breaking. This will significantly add to the cost and program and subsidiary environmental issues.
Survey	No land survey has been carried out with Aerial Laser Survey being relied upon for topographical information. Land survey would more accurately define the land topography and reveal additional earthworks as a result.

Issue/Risk	Detail
Embankments	No geotechnical investigations have been carried out to determine the stability of slopes in the area. Detailed investigations may show the requirement for flatter embankments and/or benching. This would increase the cost of the investigated alignment.
Drainage	No detailed hydraulic analysis has been carried out. The full extent of drainage requirements has not been accurately determined. This would be an increase on the cost of the investigated alignment. The effect on overland flow patterns and afflux may impact on adjacent properties.
Pollution	During construction, noise and air pollution will be generated due to possible blasting and general construction activities. These issues would require separate mitigation strategies.
Fauna and Flora	Approximately 55,400m^2 of vegetation would require clearing for the construction of the investigated alignment. This would have significant impact on the natural environment which would require separate mitigation strategies.
Access	The access is proposed to intersect with Nerang-Murwillumbah Road at the existing location of the Old Advancetown Road. Approval for such an access would be subject to Main Roads and their requirements being met on the grounds of safety and operation. Planning has not investigated the intersection layout in detail. Such an access would require further widening on Nerang-Murwillumbah Road to allow for protected turning movements. Further, intersection site distance requirements would have to be met which may be an issue for the southern approach.

Indicative Cost Estimate

In consideration of the quantities and possible risks that may be encountered during detailed design and investigations, an indicative cost estimate has been developed indicating the investigated alignment would cost approximately $5M to $6M to construct. The variation in cost indicated is dependant on the risks and opportunity encountered during the delivery of the works.

Feasibility

The investigated alignment presents a number of significant issues and risks that may increase the complexity and cost during detailed design and construction. These may lead to social and environmental impacts requiring additional mitigation strategies.

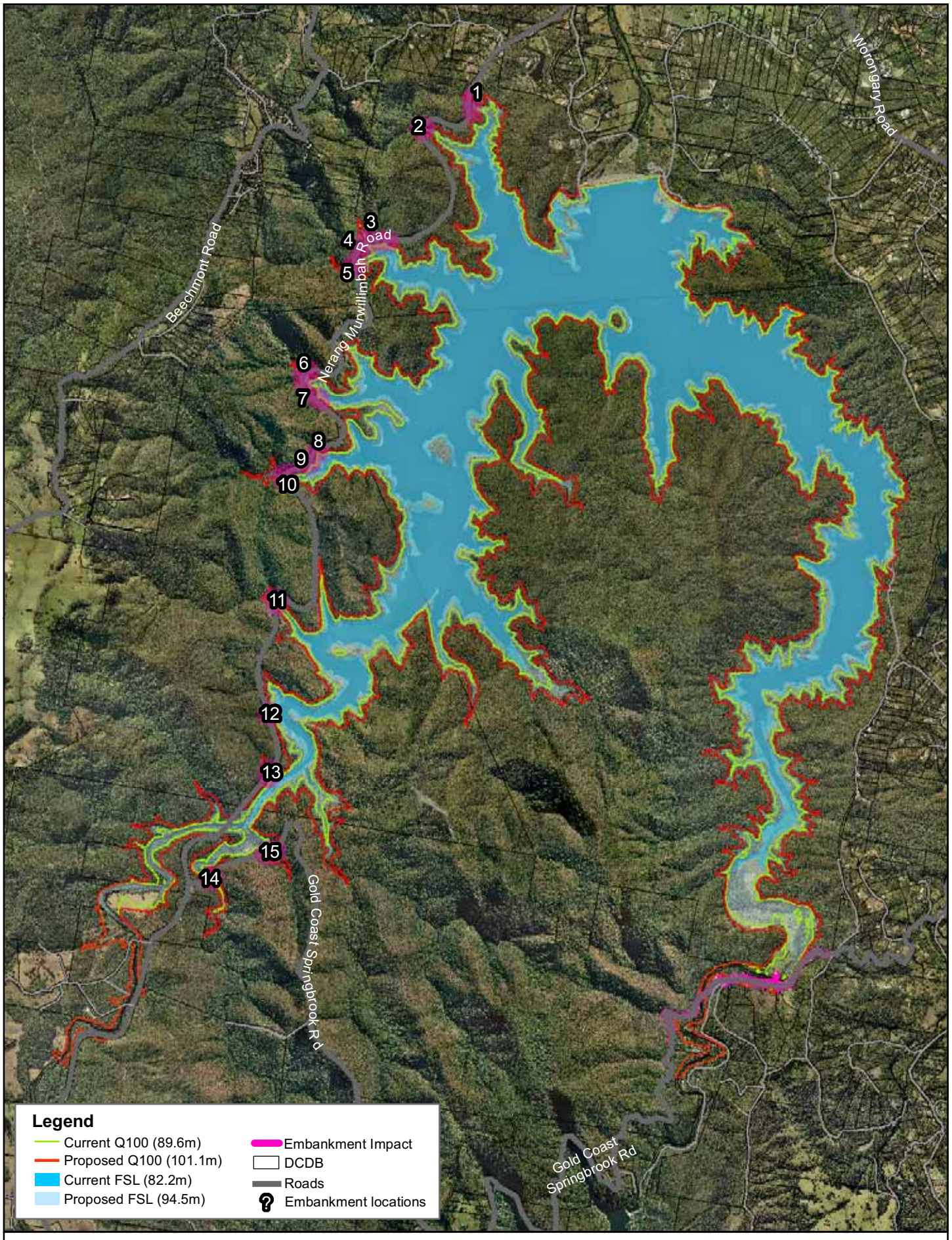
Analysis of the impacts during construction and operation along Advancetown Road has indicated no significant changes in Level of Service warranting no intervention works for capacity improvements. Strategies to mitigate social, safety and traffic impacts have been proposed along Advancetown Road which is expected to cost 3-5% of the alternative access investigated.

In consideration of the above, the Alliance proposes to maintain the existing access road to the site during construction and upon completion as Advancetown Road. The residents in the area will be consulted during the design of the road upgrade works to allow input into the final configuration.

3.12.7 Partial Embankment Inundation

Impact

The EIS has identified that the embankment of Nerang-Murwillumbah Road and Gold Coast-Springbrook Road will be inundated in a 1 in 100 year ARI (Average Recurrence Interval) flood in 15 separate locations. **Figure 24** shows the locations at which this occurs. Each location is shown in detail on drawing series INF-100 to INF-134 previously submitted to the Department of Main Roads (South Coast Hinterland District).



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Projection: MGA Zone 56

HINZE DAM STAGE 3 EIS SUPPLEMENTARY REPORT

FIGURE 24

Embankment Inundation Locations

Table 39 describes the extent or locations where embankment is affected, issues identified during preliminary visual geotechnical investigations and further investigations and possible remedial treatments proposed.

- **Table 39 Inundation locations and treatments**

Location	Extent[1] (DMR[2] Chainage)	Issues	Design Implications	Further Investigations[3]
Nerang-Murwillumbah Road				
1	LHS 6.45km to 6.61km	Inundated by 100yr ARI	Possible stabilisation berm	Invasive geotechnical investigations required
2	LHS 7.17km to 7.26km RHS 7.18km to 7.25km	Foundation saturated by FSL. General fill possibly inundated by 100yr ARI.	Possible stabilisation berm	Invasive geotechnical investigations required
3	LHS 8.84km to 8.95km	Foundation saturated by FSL. General fill possibly inundated by 100yr ARI.	Possible stabilisation berm	Invasive geotechnical investigations required
4	LHS 9.03km to 9.15km RHS 9.05km to 9.11km	Foundation saturated by FSL. General fill possibly inundated by 100yr ARI.	Possible stabilisation berm	Invasive geotechnical investigations required
5	LHS 9.26km to 9.40km RHS 9.35km to 9.41km	Foundation saturated by FSL. General fill possibly inundated by 100yr ARI. Culvert erosion apparent.	Possible stabilisation berm	Invasive geotechnical investigations required
6	LHS 11.09km to 11.26km RHS 11.07km to 11.18km	Foundation saturated by FSL. General fill possibly inundated by 100yr ARI. Culvert erosion apparent.	Possible stabilisation berm	Invasive geotechnical investigations required
7	LHS 11.43km to 11.53km	Foundation saturated by FSL. Culvert erosion apparent.	Culvert outlet reinstatement and toe gabion.	Invasive geotechnical investigations required
8	LHS 12.26km to 12.36km	Foundation saturated by FSL.	Possible toe gabion.	Invasive geotechnical investigations required
9	LHS 12.41km to 12.47km	Foundation saturated by FSL.	Possible toe gabion.	Invasive geotechnical investigations required
10	LHS 12.65km to 12.79km RHS 12.7km to 12.77km	Foundation saturated by FSL.	Possible toe gabion.	Invasive geotechnical investigations required
11	LHS 14.52km to 14.62km RHS 14.54km to 14.58km	Foundation saturated by FSL. Culvert erosion apparent.	Culvert outlet reinstatement and toe gabion.	Invasive geotechnical investigations required
12	LHS 15.71km to 15.79km RHS 15.75km to 15.77km	Inundated by 100yr ARI	Possible stabilisation berm	Invasive geotechnical investigations required
13	LHS 16.36km to 16.45km RHS 16.35km to 16.41km	Foundation saturated by FSL.	Possible toe gabion.	Invasive geotechnical investigations required
Gold Coast-Springbrook Road				
14	LHS 30.14km to 30.2km RHS 30.13km to 30.21km	Foundation saturated by FSL.	Possible toe gabion.	Invasive geotechnical investigations required
15	LHS 29.43km to 29.56km RHS 29.44km to 29.59km	Foundation saturated by FSL.	Possible toe gabion.	Invasive geotechnical investigations required

[1] Shown as LHS (Left Hand Side) or RHS (Right Hand Side) with gazettal
[2] DMR (Department of Main Roads)
[3] Extent of geotechnical investigations is to be appropriate for each situation

Mitigation

The Proponent will undertake to carry out geotechnical investigations at each location as identified in the above table to a level appropriate to the site. The Proponent will make available to Main Roads the full geotechnical

investigations factual reports. The appropriate stabilisation method for each site will be designed in consideration with these geotechnical reports and in consultation with Main Roads.

Detailed design will be carried out in consultation with Main Roads with detailed design plans submitted in accordance with Main Roads Drafting and Design Presentation Standards to be approved by Main Roads prior to construction proceeding. All necessary engineering and environmental investigations undertaken will be made available to Main Roads.

3.12.8 Culvert Inundation

One submission requested the location of culvert S-B. The location of Culvert S-B as discussed in Section 13.6.3 of the EIS is shown in **Figure 25**.

Impact

The Proponent has submitted to Main Roads the following reports detailing the data, assumptions, calculations, and outputs for the modelling of this culvert:

- civil Structures Hydraulic and Hydrologic Analysis;
- Hinze Dam Stage 3 - DMR Structures - AWE vs AR&R Rainfall Data;
- structure S-B – Tailwater Probability Analysis; and
- relevant CulvertW input/output files.

Mitigation

The mitigation strategy in relation to this culvert was detailed in Section 13.6.3 of the EIS.

3.12.9 Gold Coast-Springbrook Road Realignment

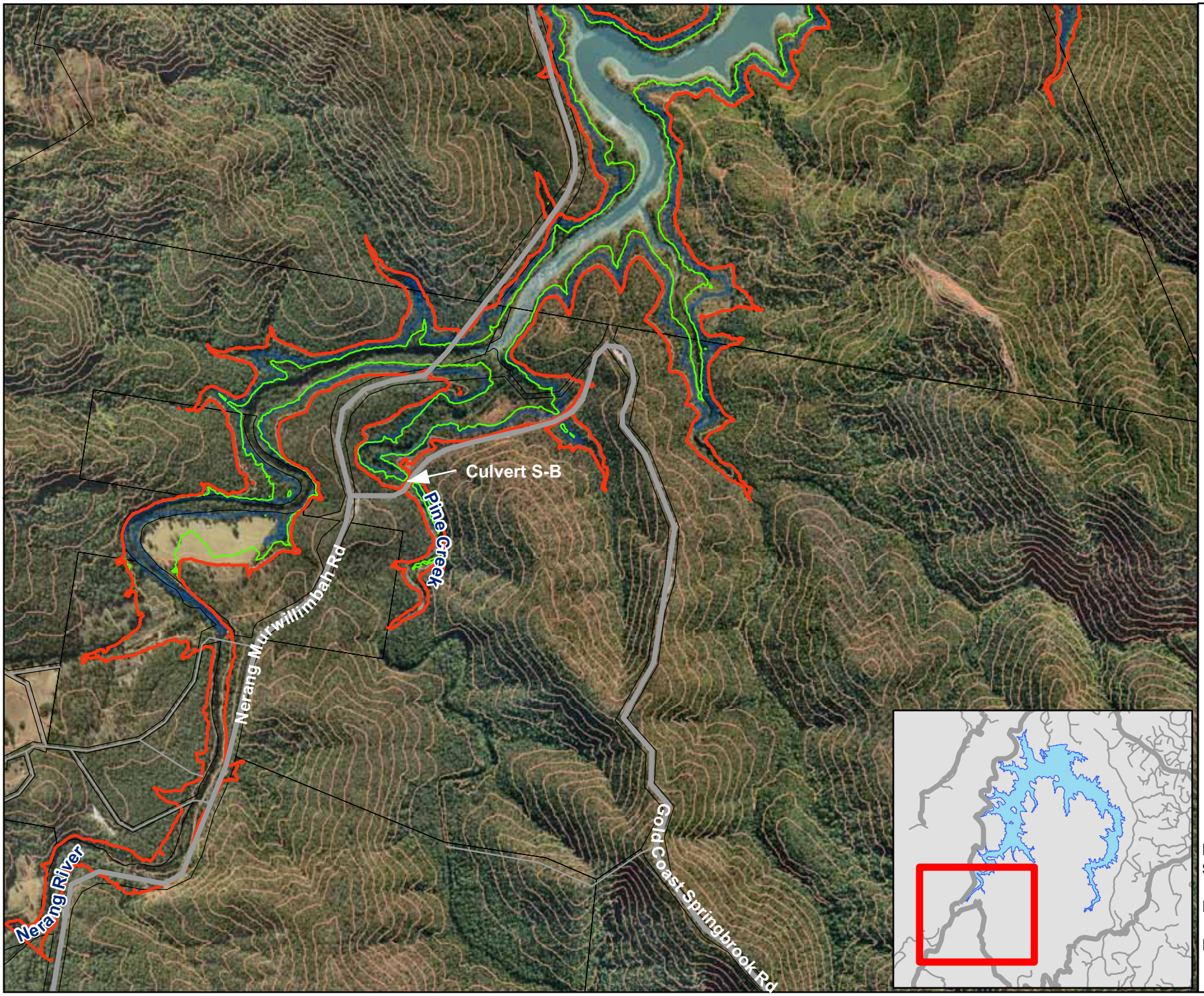
Impact

The Proponent has submitted concept drawings INF-200 to INF-212 to Main Roads for their comment. These drawings outline the concept for the vertical realignment of Gold Coast-Springbrook Road between 250m and 950m east of Little Nerang Creek to achieve 1 in 50 year ARI flood immunity for the road.

Mitigation

It is proposed to re-align Gold Coast-Springbrook Road as outlined in Section 13.6.4 of the EIS to the satisfaction of Main Roads.

Detailed design will be carried out in consultation with Main Roads with detailed design plans submitted in accordance with Main Roads Drafting and Design Presentation Standards to be approved by Main Roads prior to construction proceeding. All necessary engineering and environmental investigations undertaken will be made available to Main Roads.



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Meters

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Projection: MGA Zone 56

Legend

- Current Q100 (89.6m)
- Current FSL (82.2m)
- Proposed Q100 (101.1m)
- Proposed FSL (94.5m)
- DCDB
- Road

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FIGURE 25

Location of Culvert S-B

3.12.10 Bridge on Pocket Road

Impact

The Proponent has submitted concept drawing INF-401 to Main Roads for their comment. This drawing outlines in concept the proposed upgrade of the bridge on Pocket Road over the Nerang River.

Pocket Road is a rural residential cul-de-sac serving approximately 7 residential properties. As such it is not expected to generate any significant tourist traffic and the peak hour traffic generated by the residents is not expected to warrant any upgrade to the existing intersection treatment.

The alignment of Pocket Road is being corrected to become a direct straight approach to Nerang-Murwillumbah Road and will alter the existing conditions at the intersection and approach.

Mitigation

The design of the proposed intersection with Nerang-Murwillumbah Road will be in accordance with Main Roads' Road Planning and Design Manual. To address the safety concerns at the intersection due to the change in existing conditions, adequate advance warning and delineation will be provided as appropriate. The proposed works will be subject to a detailed design safety audit prior to construction commencing with findings to be provided to Main Roads.

Detailed design will be carried out in consultation with Main Roads with detailed design plans submitted in accordance with Main Roads Drafting and Design Presentation Standards to be approved by Main Roads prior to construction proceeding. All necessary engineering and environmental investigations undertaken will be made available to Main Roads.

3.12.11 Impacts on Road Pavements During Construction

Impact

The Proponent has assessed the pavement impacts according to the Guide for Assessment of Road Impacts of Development (GARID) as outlined in Section 13.4.9 of the EIS.

On an assumed 20 year pavement design life, the pavement impacts during the construction period are below the 5% threshold requiring a full pavement impact assessment to be carried out. However, the project will be generating an additional traffic mix of heavy vehicles particularly Austroads Class 9 and 10 which may have impacts on the road surface inducing accelerated wearing course deterioration. This issue has been highlighted in Section 13.4.9 Table 13-13 of the EIS.

Mitigation

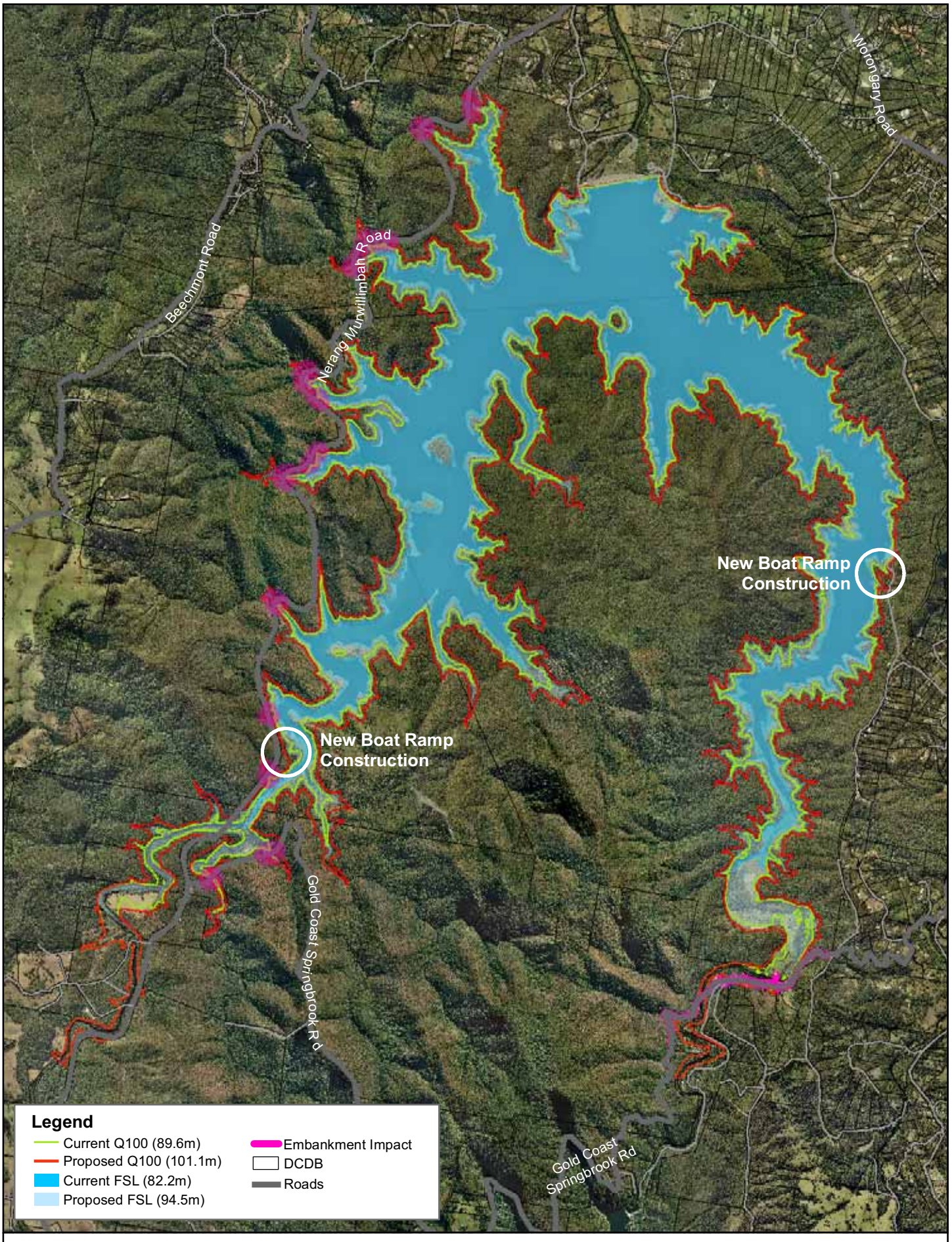
The Proponent will continue to engage Main Roads to identify the cost contribution to address the impact of construction traffic on the State-controlled roads.

The Proponent, in consultation with Main Roads, will establish the proportion of impact on the pavement surface and associated accelerated or increased routine and programmed maintenance program.

3.12.12 Upgrade of Existing Boat Ramps

It is proposed to upgrade the existing boat ramp facilities at the southern end of the dam. The eastern ramp located off Little Nerang Road will be upgraded and will provide the capacity to serve 30 car and trailers. It is proposed to be located just upstream of the upper intake tower and existing boat ramp. The western ramp off Nerang-Murwillumbah Road will be upgraded to provide the capacity to serve 10 car and trailers. It is proposed to be located just upstream of the existing ramp. The location of these ramps is shown in **Figure 26**.

The Proponent has submitted concept drawings INF-351 to 352 to Main Roads for their comment. This drawing outlines in detail the arrangement of the boat ramp and its access to Nerang-Murwillumbah Road. The Proponent will continue to consult with Main Roads to ensure their requirements are met in relation to access.



This figure must be read in conjunction with the data disclosure in Appendix H of this document

3.13 Hazard, Safety and Risk

3.13.1 Bushfire

Concerns were raised in submissions regarding the potential increase in bushfire hazard resulting from activities associated with felling trees in the inundation area. The concerns raised by the submitters assume that the clearing and stockpiling of vegetation would increase fire risk. A rapid appraisal of risk factors (vegetation type, slope and aspect) indicates that the residences in question are already located in a medium to high bushfire risk area. Bushfire hazard is determined by the area of vegetation, type of vegetation, slope, fire history and aspect. Localised concentrations of fuel would not significantly increase the overall bushfire hazard of a particular vegetation patch.

Any burning carried out would be subject to a fire management plan and would be strictly monitored and controlled.

3.13.2 Terrorism/Security

Like all major public infrastructure, a potential risk of terrorist attack exists at Hinze Dam both currently, during the project's construction and during the dam's continued operation.

Relative risk can be assessed, based on:

- Relative target attractiveness (an assessment of the target's importance and consequences);
- Relative likelihood of occurrence (likelihood of occurrence as compared to the other scenarios); and
- Vulnerability (a measure of how likely the terrorist is to achieve the threatening act given that an attempt is made).

Although the likelihood of a terrorist attack on Hinze Dam occurring is considered low, the consequence has a potentially high rating. The Alliance commits to implementing a range of countermeasures to mitigate both the potential threat and consequences.

Countermeasures to be used can be grouped into actions or technologies which deter attack, deny access, detect presence and defend the facility. These non-design countermeasures often prove the most appropriate and cost-effective solutions for a facility such as Hinze Dam.

The following approaches will be implemented to mitigate the threats of a terrorist attack:

- Establishing a secure perimeter using physical barriers;
- Inspection, surveillance, detection and enforcement; and
- Visible security presence including after hours security patrols.

In addition to these approaches, relevant human resources strategies in staff recruitment process will be adopted.

Additional appropriate terrorist counter measures are to be developed and incorporated into the Dam Safety Emergency Plan and the construction and operational environmental management plans.

The cost of security for the project has been incorporated into the project budget.

3.14 Socio-Economic

3.14.1 Impact on Property Values

Concerns were raised with regard to the impact of the project on property values and the ability of owners to sell their properties, particularly during construction. The projects potential impacts on air quality, noise and visual amenity were some of the proposed reasons for concerns regarding decreased property values.

Community concern regarding the potential impact on property values resulting from the upgrade of Hinze Dam, specifically due to the impacts listed above, was identified and discussed in section 16.2.2 of the EIS.

The properties potentially impacted are limited to those along the transport route and/or in direct sight lines of the work site.

The actual impact realised by the landholder is expected to be mitigated by a number of factors. Most notably, there is not expected to be any impact realised unless the affected property is sold during the construction period, or there is a change of lease during this period, as beyond the construction period the market would cease to be influenced by the activities of the dam upgrade.

Even where a property is sold or leased, for a relatively short construction period (three years), property owners, buyers and tenants who adopt a longer term perspective are unlikely to weight the impact of the construction period heavily in their purchase decision. Given the lifestyle nature of the region is it expected that the majority of purchasers and tenants would have a longer perspective or horizon.

Typically, rental yields and house prices do not significantly fluctuate with nearby construction activity.

It should be noted that the long-term value of the property would have had the Stage 3 upgrade incorporated in its initial sale/purchase price as this information is publicly available.

Comment was also made during the public submission period questioning whether the project is financially viable. The economic impact of the project was discussed in detail in Section 16 of the EIS. The Department of Employment and Industrial Relations has reviewed the EIS and in particular the socio economic section. The department has advised that they agree with the comment in the EIS (16.3.2) that the economic impact of the design and construction phase of the project is positive. Section 16 of the EIS also identified significant post construction benefits to the community delivered by the reduction of the flooding impacts on the Nerang River floodplain.

3.14.2 Compensation

Comments were received in relation to various compensation matters. The Alliance will consider compensation claims on a case by case basis and will provide compensation if appropriate.

3.15 Cultural Heritage

3.15.1 Clay Borrow Area – Cultural Heritage

The impacts of the clay borrow area and adjoining haul road on objects of cultural heritage significance were raised in submissions to the EIS. Specifically concerns were raised about the preservation of historical trees (Crow's Ash) planted by the Duncan family. Unfortunately due to the location of these trees, they will be impacted upon during construction. Consultation with concerned community members will occur and appropriate measures implemented to ensure that the remnants of the trees are used in a matter deemed suitable by interested parties.

Concern was also raised regarding the resumption of land at Gilston road and the potential implication of this on culturally significant objects such as grave sites and old macadamia nut trees. Currently no property has been acquired on Gilston Road. Discussions are currently being undertaken with the owners of a property on this road and if the property is acquired, the future land use/s of the property would give due consideration to culturally significant objects.

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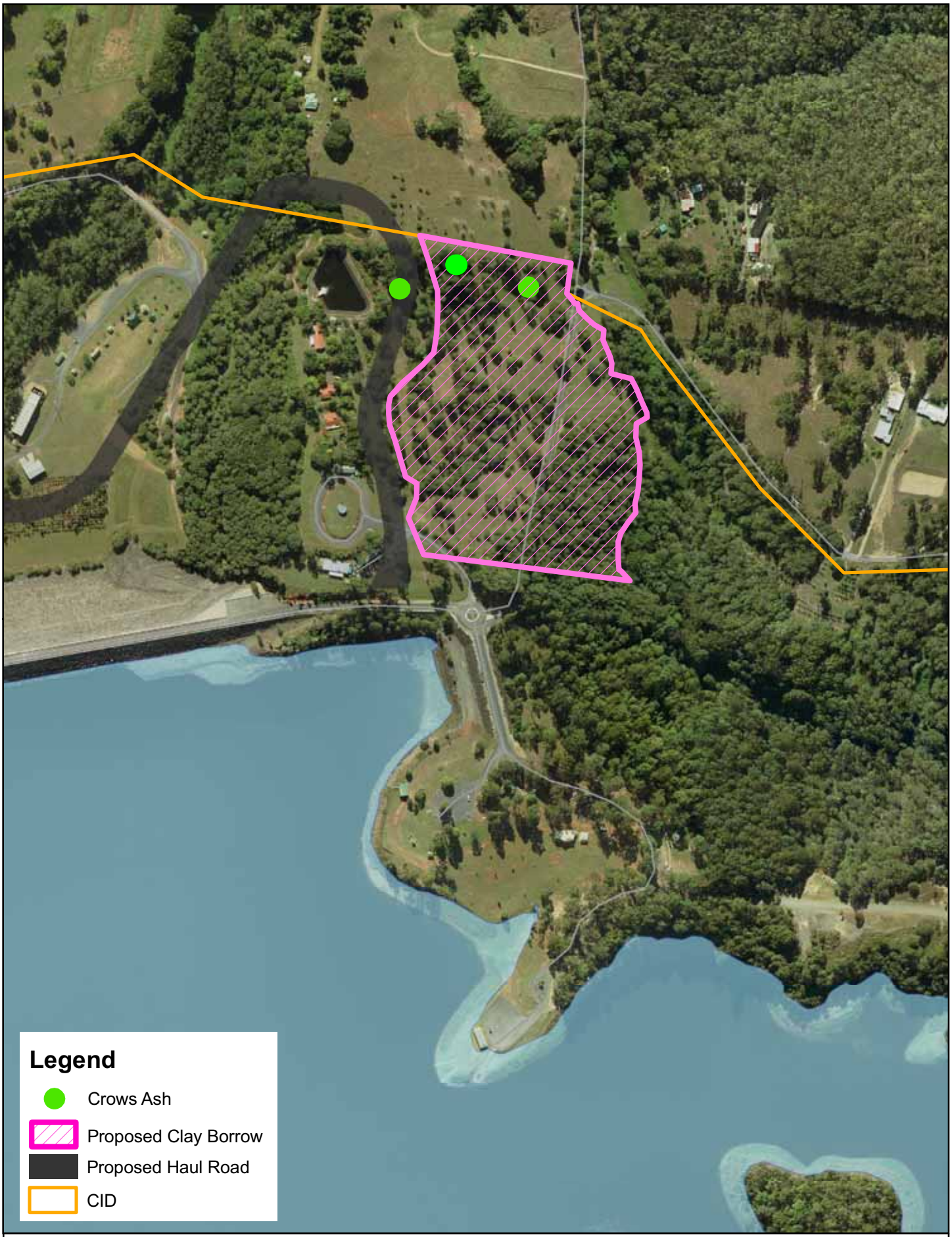

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Scale - 1:5,000
Projection: MGA Zone 56

HINZE DAM STAGE 3 EIS SUPPLEMENTARY REPORT

FIGURE 27

Trees of Cultural Heritage Significance

This figure is to be read in conjunction with the data disclosure in Appendix H of this document

3.16 Visual Amenity

An assessment of the existing visual environment and the impact of the Project on the visual amenity of the area surrounding Hinze Dam were undertaken as part of the preparation of the EIS. Following the receipt of submissions raising concerns about the impact of the Project on the visual amenity of the area, the visual environment has been reviewed for the sensitive receivers located at Red Oak Drive, Duncan Road and Mottee Court.

3.16.1 Existing Visual Environment

The existing visual environment at Red Oak Drive, Duncan Road and Mottee Court is described in **Table 40**.

Table 40 Existing Visual Environment

Location	Existing Visual Environment
Red Oak Drive	■ Residences have significant views to the south and west with some residents located on the northern side of the street also having views towards the coastline ■ The views towards Hinze Dam from this location include foreground views of the impoundment, some views of the dam infrastructure including the dam wall and buildings located in this vicinity, and a longer viewing horizon encompassing the surrounding mountains. ■ Views from residences are often framed or partly obscured by mature vegetation **View of Hinze Dam from 70 Red Oak Drive**  **View of Hinze Dam from 28 Red Oak Drive** 

Location	Existing Visual Environment
Duncan Road	■ Limited views of existing dam infrastructure ■ Existing views dominated by vegetation located in the current walking/mountain bike track area (south of Duncan Road and east of Gilston Road) ■ Some residences have views of the current impoundment ■ Views over the park and other recreation areas located downstream of the dam and to the east of the dam wall **View towards Hinze Dam from 47 Duncan Road** 

Location	Existing Visual Environment
Mottee Court	■ Some residences in this location have views of the existing dam wall ■ There are also views of the parkland areas located downstream of the dam wall **View of Hinze Dam infrastructure from Mottee Court**  

It is from this assessment of the existing visual environment that the assessment of the both the construction and operation impacts of the proposal have been undertaken.

3.16.2 Visual Assessment – Construction

The following table details the view of the construction work and the impact of these works on the view for the residents of Red Oak Drive, Duncan Road and Mottee Court. Part of the existing view shed from residences in all three locations will change during the construction operations. The proposed mitigation measures are commitments that are made by the Alliance to assist in the mitigation of the identified impacts. An assessment of the construction view, construction impacts on the view shed, and proposed mitigation measures are detailed in **Table 41**.

Table 41 Visual Impacts – Construction

Location	Construction View	Construction Impacts	Mitigation Measures
Red Oak Drive	Construction activity occurring within the site will be visible from the residences located on the southern side of Red Oak Drive. The construction activities visible from this location are: ■ Clearing and operation of the clay borrow area ■ Operation of the quarry, including associated vegetation clearing. This includes further benching of the quarry and more exposed rock faces ■ Dam wall and saddle dam construction activities, including associated vegetation clearing ■ Vegetation clearing required for areas below the new full supply level ■ Other site activities such as haul roads and construction buildings	■ Vegetation removal in the clay borrow area will expose red soil that will be visually prominent ■ Machinery and changes to ground profile will be visible within the clay borrow area ■ The quarry operations, including associated vegetation removal will result in increased visual prominence of this activity. This is primarily due to the colour of the new exposed areas and the differentiation of these from the existing quarry operations ■ Vegetation removal for the construction of the saddle dam will expose red soil that will be visually prominent ■ The saddle dam construction will result in the creation of a rock wall that will be visible in part or as a whole from some residences of Red Oak Drive ■ Dam wall construction will be visible from some residences in Red Oak Drive, with the visual prominence of the wall increasing as the height of the wall increases ■ Vegetation clearing required below the full supply level will expose earth which will be visually prominent until grass establishes. Due to the dam water levels during construction the area between the water and the new cleared FSL will appear greater than at present ■ Earthworks required for the construction of site haul roads, workshops and other associated site activities may be visible from some residences. The visual impact will result from a change of the current view and the visual prominence of areas of exposed earth	■ Hinze Dam Alliance will, investigate opportunities within the safety and operational requirements of the project, to incorporate design features to assist in minimising the visual prominence of the dam wall and saddle dam ■ Existing vegetation should be retained on site and only removed where necessary for construction operations ■ Progressive clearing and rehabilitation of the clay borrow area will be undertaken where possible to minimise the extent of earth exposed at any time ■ Re-profiling of the clay borrow area prior to rehabilitation works ■ Planting of fast growing, endemic species, in the cleared area below the saddle dam. This planting is to occur at the earliest possible time during the construction phase of the project ■ Progressive clearing of the vegetation below the new full supply level to ensure the visual impact of soil exposure at any one time is minimised ■ Removal of vegetation below the full supply level in visually prominent areas to minimise the extent of area where dead or dying trees are visible ■ Locate night lights as required for safety and security, but ensure lights are focussed on the areas required, with shields around the globes to limit extraneous light where necessary. Lighting of the site should conform to the relevant Australian standards.

Location	Construction View	Construction Impacts	Mitigation Measures
Duncan Road	Some construction activity occurring within the site will be visible from residences in Duncan Road. The construction activities visible from this location are: ■ Clearing and operation of the clay borrow area ■ Saddle dam construction activities, including associated vegetation clearing ■ Vegetation clearing required for areas below the new full supply level ■ Other site activities such as haul roads and construction buildings	■ Duncan Road residences are located within close visual proximity of the clay borrow area and saddle dam construction area ■ Vegetation removal in the clay borrow area will expose red soil that will be visually prominent ■ Machinery and changes to ground profile will be visible within the clay borrow area ■ Vegetation removal for the construction of the saddle dam will expose red soil that will be visually prominent ■ The saddle dam construction will result in the creation of a rock wall that will be visible from some residences of Duncan Road ■ Vegetation clearing required below the full supply level will expose earth which will be visually prominent ■ Earthworks required for the construction of site haul roads, workshops and other associated site activities may be visible from some residences. The visual impact will result from a change of the current view and the visual prominence of areas of exposed earth	■ Hinze Dam Alliance will, investigate opportunities within the safety and operational requirements of the project, to incorporate design features to assist in minimising the visual prominence of the dam wall and saddle dam ■ Existing vegetation should be retained on site and only removed where necessary for construction operations. In particular, a vegetated screening buffer will be retained between the construction operations and Duncan Road ■ Progressive clearing and rehabilitation of the clay borrow area ■ Re-profiling of the clay borrow area prior to rehabilitation works ■ Planting of fast growing, screening endemic species in the cleared area below the saddle dam. This planting is to occur at the earliest possible time during the construction phase of the project ■ Rehabilitation of the site office and haul road areas as soon as practicable following the completion of the construction works ■ Locate night lights as required for safety and security, but ensure lights are focussed on the areas required, with shields around the globes to limit extraneous light where necessary. Lighting of the site should conform to the relevant Australian standards ■ Waste generated during construction will be collected and stored neatly on the construction site and removed from site as soon as possible

Location	Construction View	Construction Impacts	Mitigation Measures
Mottee Court	■ Construction activities associated with the raising of the dam wall and other site establishment works located downstream of the dam wall will be visible from some residences in Mottee Court. ■ The construction activities visible from some or all of the residences in Mottee Court are: - Dam wall construction activities - Vegetation removal downstream of the dam wall - Haul road construction and operation - Site offices	■ Mottee Court residences are within very close visual proximity of the dam wall and construction works immediately downstream of the wall ■ Vegetation removal will expose red soil that will be visually prominent and may remove vegetation that currently screens the dam infrastructure ■ The dam wall will become more visually prominent as both the height and footprint increase during construction ■ Construction activities such as haul roads and sheds will be visible from some residences	■ Hinze Dam Alliance will, investigate opportunities within the safety and operational requirements of the project, to incorporate design features to assist in minimising the visual prominence of the dam wall and saddle dam ■ Rehabilitation of the site office and haul road areas as soon as practicable following the completion of the construction works ■ Locate night lights as required for safety and security, but ensure lights are focussed on the areas required, with shields around the globes to limit extraneous light where necessary. Lighting of the site should conform to the relevant Australian standards ■ Waste generated during construction will be collected and stored neatly on the construction site and removed from site as soon as possible

3.16.3 Visual Assessment – Operation

Visual Assessment

The following table details the view of the dam and its surrounds following the completion of construction works and during the operation of the dam from the residences located on Red Oak Drive, Duncan Road and Mottee Court. The proposed mitigation measures are commitments that are made by the Alliance to assist in the mitigation of the identified impacts. An assessment of the view of the dam during its operation and proposed mitigation measures are detailed in **Table 37** and **Table 44** .

Photomontages have been prepared for views from Red Oak Drive and Duncan Road, identifying the current view from the nominated locations and the view following the completion of the dam construction works and site rehabilitation. These are presented following the visual impacts tables. Additional photomontages will be prepared for the project for residents of Duncan Road and Mottee Court and will be communicated to the owners of the properties during this process.

Table 42 Visual Impacts Red Oak Drive – Operation

Location	Operation View	Mitigation Measures
Red Oak Drive	■ The rehabilitated former clay borrow area will be visible. This area will be characterised by: - change of landform from that currently existing - revegetated area the view of which will change over time as the vegetation grows and a canopy establishes ■ Exposed rock and cleared areas associated with the quarry will be visible, but the higher water levels of the dam will cover the currently exposed area at the base of the quarry ■ The rehabilitated areas at the top of the quarry will establish over time and re-establish the canopy view ■ The construction of the lakeside park will be visible in the quarry foreground and will screen some of the exposed quarry area ■ The interpretative centre will be visible ■ The dam wall will have increased visual prominence due to increased height ■ Part, or all, of the saddle dam will be visible from some residences in Red Oak Drive. The saddle dam will add a horizontal element into the lower part of the visual horizon. Rehabilitation planting undertaken below the saddle dam will, over time, screen part of this structure ■ The water level in the impoundment will increase expanding the extent of water visible from Red Oak Drive. At times when the dam is at or near FSL the water will dominate the middle viewing horizon ■ There may be some dead or dying vegetation in areas below the FSL that have not been cleared, however the extent of this visible from Red Oak Drive will be limited ■ Rehabilitated site office and haul road areas	■ Hinze Dam Alliance will, investigate opportunities within the safety and operational requirements of the project, to incorporate design features to assist in minimising the visual prominence of the dam wall and saddle dam ■ Management of the rehabilitated areas to replace plants that have died and to control weeds ■ Locate night lights as required for safety and security, but ensure lights are focussed on the areas required, with shields around the globes to limit extraneous light where necessary. Lighting of the site should conform to the relevant Australian standards

3.16.4 Visual Assessment – Operation

Visual Assessment

The following table details the view of the dam and its surrounds following the completion of construction works and during the operation of the dam from the residences located on Red Oak Drive, Duncan Road and Mottee Court. The proposed mitigation measures are commitments that are made by the Alliance to assist in the mitigation of the identified impacts. An assessment of the view of the dam during its operation and proposed mitigation measures are detailed in **Table 43** and **Table 44** .

Photomontages have been prepared for views from Red Oak Drive and Duncan Road, identifying the current view from the nominated locations and the view following the completion of the dam construction works and site rehabilitation. These are presented following the visual impacts tables. Additional photomontages will be prepared for the project for residents of Duncan Road and Mottee Court and will be communicated to the owners of the properties during this process.

Table 43 Visual Impacts Red Oak Drive – Operation

Location	Operation View	Mitigation Measures
Red Oak Drive	■ The rehabilitated former clay borrow area will be visible. This area will be characterised by: - change of landform from that currently existing - revegetated area the view of which will change over time as the vegetation grows and a canopy establishes ■ Exposed rock and cleared areas associated with the quarry will be visible, but the higher water levels of the dam will cover the currently exposed area at the base of the quarry ■ The rehabilitated areas at the top of the quarry will establish over time and re-establish the canopy view ■ The construction of the lakeside park will be visible in the quarry foreground and will screen some of the exposed quarry area ■ The interpretative centre will be visible ■ The dam wall will have increased visual prominence due to increased height ■ Part, or all, of the saddle dam will be visible from some residences in Red Oak Drive. The saddle dam will add a horizontal element into the lower part of the visual horizon. Rehabilitation planting undertaken below the saddle dam will, over time, screen part of this structure ■ The water level in the impoundment will increase expanding the extent of water visible from Red Oak Drive. At times when the dam is at or near FSL the water will dominate the middle viewing horizon ■ There may be some dead or dying vegetation in areas below the FSL that have not been cleared, however the extent of this visible from Red Oak Drive will be limited ■ Rehabilitated site office and haul road areas	■ Hinze Dam Alliance will, investigate opportunities within the safety and operational requirements of the project, to incorporate design features to assist in minimising the visual prominence of the dam wall and saddle dam ■ Management of the rehabilitated areas to replace plants that have died and to control weeds ■ Locate night lights as required for safety and security, but ensure lights are focussed on the areas required, with shields around the globes to limit extraneous light where necessary. Lighting of the site should conform to the relevant Australian standards

70 Red Oak Drive – Current View

70 Red Oak Drive – At Completion of Construction

70 Red Oak Drive – View of Completed Dam with Rehabilitation Works

94 Red Oak Drive – Current View

94 Red Oak Drive – At Completion of Construction

94 Red Oak Drive – View of Completed Dam with Rehabilitation Works

Table 44 Visual Impacts Duncan Road & Mottee Court – Operation

Location	Operation View	Mitigation Measures
Duncan Road	■ The rehabilitated former clay borrow area will be visible. This area will be characterised by: - change of landform from that currently existing - revegetated area the view of which will change over time as the vegetation grows and a canopy establishes ■ Part, or all, of the saddle dam will be visible from some residences in Duncan Road. Rehabilitation planting undertaken below the saddle dam will, over time screen part of this structure ■ Views of the impoundment may be impacted upon by the construction of the saddle dam, however the new FSL will increase the depth of the impoundment and increase the surface extent of the water	■ Hinze Dam Alliance will, investigate opportunities within the safety and operational requirements of the project, to incorporate design features to assist in minimising the visual prominence of the dam wall and saddle dam ■ Management of the rehabilitated areas to replace plants that have died and to control weeds ■ Locate night lights as required for safety and security, but ensure lights are focussed on the areas required, with shields around the globes to limit extraneous light where necessary. Lighting of the site should conform to the relevant Australian standards ■ Management of the site to ensure that waste generated is collected and stored neatly on-site and removed as soon as possible
Mottee Court	■ Dam wall will appear more prominent due to the increase in the height and the footprint. In some instances the view of the dam wall will extent beyond the height of the existing screening vegetation and create a horizontal element in the skyline. This will alter the current vegetation dominant outlook from some residences ■ The rehabilitated areas downstream of the dam wall will be visible from some residences. The view of this area will change over time as the vegetation establishes and tree canopy cover is formed	■ Hinze Dam alliance will, where possible within the safety and operational requirements of the project, incorporate design features to assist in minimising the visual prominence of the dam wall and saddle dam ■ Management of the rehabilitated areas to replace plants that have died and to control weeds ■ Locate night lights as required for safety and security, but ensure lights are focussed on the areas required, with shields around the globes to limit extraneous light where necessary. Lighting of the site should conform to the relevant Australian standards ■ Management of the site to ensure that waste generated is collected and stored neatly on-site and removed as soon as possible

47 Duncan Road – Current View

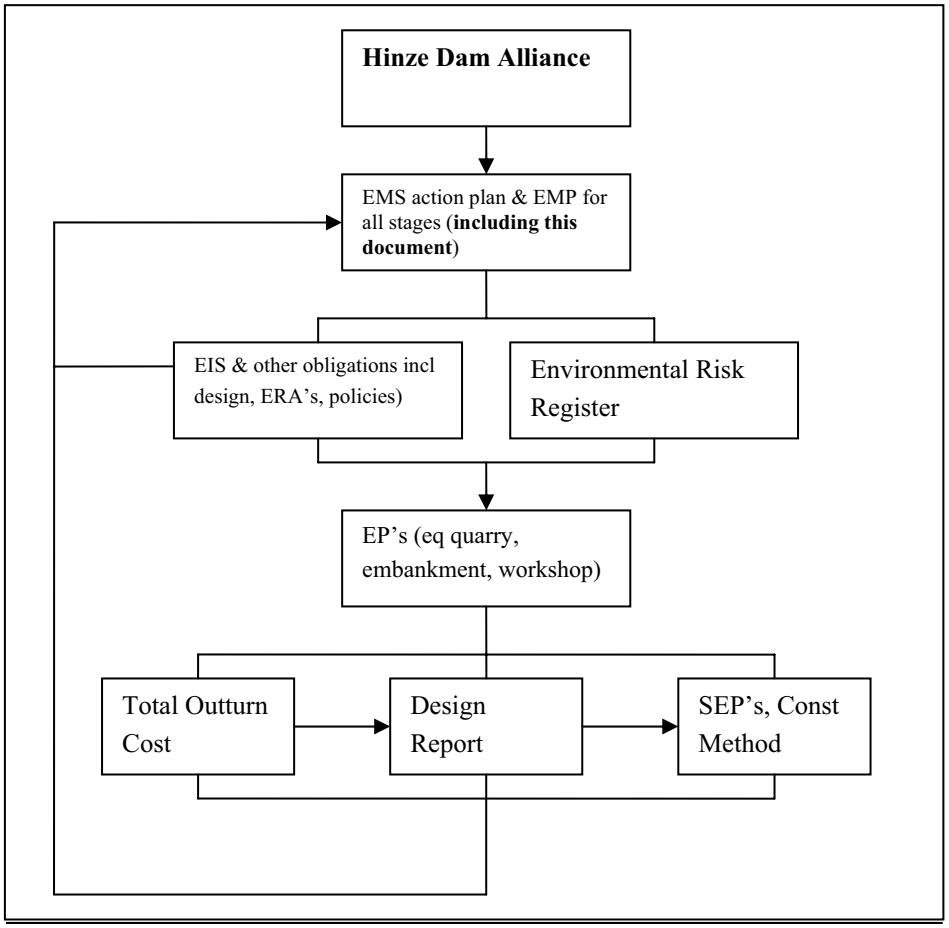
47 Duncan Road – View of Completed Dam with Rehabilitation Works

3.17 Management Plans

3.17.1 Environmental Management Plans

Comments were received regarding the need for environmental management plans that specifically address the Environmentally Relevant Activities. Section 19 of the Draft EIS details the structure of the Environmental Management System, and provides specific detail regarding responsibilities, communication and specific environmental management programs for each environmental element. The structure of the management document is presented below in **Figure 28**.

- **Figure 28 Environmental Management Document Map (Construction)**



The Alliance is currently preparing the following management plans as detailed in Section 19 of the Draft EIS, which will be submitted with the Material Change of Use Application for the Environmentally Relevant Activities:

- Construction Environmental Management Plan (CEMP);
- Environmental Programs (EPs);
- Site Environmental Plans (SEPs); and
- Operational Environmental Management Plans (OEMP).

Each environmental management program will specifically address the environmental management measures to be implemented for each ERA.

Section 3.3 of this report also details each of the proposed ERAs, and provides a summary of environmental management measures that will be implemented through each of the respective Environmental Programs.

3.17.2 Groundwater Monitoring

The existing groundwater level monitoring program being undertaken for geotechnical purpose at the dam site will continue throughout the construction phase of the project. The monitoring plan is currently conducted by GCCC. The existing plan, including locations and frequencies will be provided to the EPA with the ERA applications.

3.17.3 Rehabilitation Plans

Comments regarding the provision of a detailed rehabilitation plan for the quarry and clay borrow area were received. The Alliance is unable to prepare a detailed rehabilitation plan for these areas, as the exact volume of materials to be extracted and the final landforms are unknown at this stage. Appendix G of the Draft EIS identified the following proponent commitments that relate to rehabilitation on the site:

4.1 Rehabilitation of the site following construction will be undertaken using soils capable of supporting vegetation communities suitable to the local environment. The disturbed land will be rehabilitated to a condition that is self – sustaining or to a condition where the maintenance needs are consistent with the post construction land use

4.2 A rehabilitation plan for the clay borrow area will be developed that considers mountain biking as an end use.

4.3 A topsoil management plan will be developed for the clay borrow area to assist with re-establishment of the area.

4.4 A quarry rehabilitation plan will be developed that reduces the impacts identified in the visual amenity section and facilitates use consistent with the Recreation master plan.

4.5 A landscaping plan for the new recreation area will be designed to accommodate the recreation activities described in the Recreation master plan.

4.6 Erosion and sediment control plans will be developed and implemented as part of construction EMPs for any vegetation clearing and/or soil disturbance as part of the construction activities

4.7 The Engineering Guidelines for Queensland for Soil Erosion and Sediment Control (IEAust 1996) will be applied.

The Alliance is also committed to the preparation of such plans in consultation with the respective government agencies.

3.18 Community Consultation

Comments provided during the public submission period for the EIS regarding community consultation generally centred on the quality of consultation and communication provided to date. This section addresses specific comments made.

Considerable community consultation and communication activities have occurred as part of the Hinze Dam Stage 3 project EIS process. The Alliance has proactively communicated to the community through several channels and in an open and transparent process. The communication channels employed by the Alliance include:

- Letter box drops;
- Mail-outs including mailing out fact sheets with rates notices;
- Public Notices placed in the local newspapers;
- Newspaper advertisements;
- Door-knocking campaign;
- Public meetings including meeting with impacted residents street by street;
- An on-site office and Community Liaison Officer;
- A detailed project website;
- A Community Advisory Committee made up of community representatives; and

- Regular briefings with the Divisional Councillor.

Specific comment was made on the public meeting channel, in particular the community information session of 20 June 2007. Criticism was made that the session was poorly organised and uninformative.

Due to the magnitude of the issues addressed in the EIS the option of conducting an information session was considered the best option. The information session was structured to provide the opportunity for interested community members to have their issues or concerns addressed on a one-to-one basis, hence the session had no formal structure as such. In that regard the session was appropriately staffed with several members of the Alliance EIS team as well as other senior Alliance team members. Further, community members were provided with information in several forms including:

- detailed maps;
- information posters and poster books;
- copies of the EIS in hardcopy and on CD-ROM; and
- the opportunity to interact directly with the authors of the EIS.

An additional comment was made regarding the perceived failure of the Alliance to provide information on visual amenity for Duncan Road residents and information regarding the use of Old Advancetown Road. The Alliance has produced a static 3-D model of the proposed embankment wall, including the saddle dam. This model has been made available to the community for viewing at all public meetings since 20 June 2007. The model is available for viewing at the Alliance's on-site office. The community also have the opportunity to have this issue discussed with the Alliance's on-site community liaison officer.

Information on the reactivation of Old Advancetown Road has not been stalled and due to the detailed investigation being conducted on the merits of such a proposal, has only just been finalised.

Concern was raised that when accessing the EIS by internet, some estimated numbers on the noise modelling results for each scenario are indistinct or difficult to read. Unfortunately, due to the considerable amount of text and images contained within the EIS, the size of the individual EIS section files were a very large size at the highest resolution. As there are size restrictions stipulated within the ToR to aid in ensuring the files are easily downloadable by interested parties, the resolution of the files had to be dropped. This unfortunately has affected the quality of the noise modelling images. The numbers on the noise modelling results images can be clearly viewed in the hard copy version of the EIS.

Finally, comment was made regarding the perceived non-professional response and rectification of sediment and erosion control issues. All responses to, and rectification of, sediment and erosion control has complied with all regulatory requirements. The Alliance has not only complied with these requirements, it has made every effort to exceed mandated environmental controls to ensure that the Hinze Dam environment is preserved as much as possible for future generations.