

# Executive Summary

## Project Background

The Hinze Dam Stage 3 Project (the project) involves the raising of the existing Hinze Dam located on the Nerang River at 36.4km AMTD. The dam is located approximately 15km south west of Nerang in the Gold Coast City Local Government Area.

The project was declared a significant project for which an Environmental Impact Statement (EIS) is required on 20 October 2006, pursuant to s.26 of the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

The project was referred to the Commonwealth Government under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). On the 16 January 2007, the project was determined to be a “controlled action” due to the potential likely impacts/effects on matters of national environmental significance. The “controlling provisions” under the EPBC Act have been identified as: listed threatened species and communities. The project will therefore require Commonwealth approval under Part 9 of the EPBC Act.

## Queensland Legislation and Approvals

Gold Coast City Council and Gold Coast Water sought to have the environmental and planning approvals required for this project to be carried out under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) thereby providing independent environmental evaluation of the project. This EIS has been prepared to satisfy the requirement of the SWPWO Act.

Although the project has been declared a Significant Project, this ‘status’ does not negate the legislative requirements to obtain all relevant planning and environmental approvals under State legislation. The Hinze Dam Stage 3 works, while requiring a range of development approvals, it is exempt development under the GCCC Planning Scheme and therefore does not require a development application for a material change of use.

## Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), actions that have or are likely to have, a significant impact on a matter of national significance (i.e. are deemed to be “controlled actions”) require approval from the Commonwealth Environment Minister.

The proposed action to raise Hinze Dam was declared a controlled action under s.75 of the Act on the 16 January 2007 (EPBC 2006/3211). The Part 3 Division 1, controlling provisions being:

- Sections 18 and 18A (listed threatened species and communities)

Under s. 87 of the Act the Commonwealth Environment Minister has decided that assessment of the relevant impact on the controlling provisions will be by accredited assessment process. This is in recognition from the Commonwealth Environment Minister through bilateral agreement that the state impact assessment process addresses the Commonwealth Government’s needs of impact assessment.

## The Proponent

The proponent of the Hinze Dam Stage 3 project is Gold Coast City Council. Gold Coast City Council (GCCC) and Gold Coast Water (GCW) (a directorate of GCCC with responsibility for the provision of water and waste water services to the Gold Coast community) are involved in many water resource and management projects across the Gold Coast.

GCCC undertakes and delivers a wide range of business activities and services. All activities of Council are to service and support the community of the Gold Coast. GCCC has the responsibility to set local laws, collect rates and deliver municipal services to the community. Services provided by Council include animal control, building

and development planning and control, cemetery management, disaster management, community health, laws and regulations, libraries, lifeguard services, parking, rate collection and management, waste management, cleaning and recycling and water and wastewater management. All activities of GCCC occur within the boundaries of the Gold Coast Local Government Area (LGA).

GCCC has extensive experience in the delivery of significant water infrastructure projects. These include the Gold Coast Desalination project, the Pumps and Pipes project, the Northern Wastewater and Reclaimed Water Scheme, the Merrimac Wastewater Treatment Plant project and the Helensvale Reservoir upgrade.

Contact details of the proponent are as follows:

**Chief Executive Officer**  
**Gold Coast City Council**  
**PO Box 5042 GCMC Qld 9729**

### **Objectives of the Project**

The primary objectives of the project are:

- reduce flooding in the lower Nerang River catchment by increasing the flood mitigation capability of Hinze Dam;
- increasing the storage capacity of the dam and the water supply available from Hinze Dam; and
- ensuring that the dam complies with current safety standards and guidelines.

The purpose of this Environmental Impact Statement is to examine the potential environmental and social effects of the proposed project and to formulate appropriate environmental management plans to minimise adverse impacts and to enhance project benefits.

### ***Flood Mitigation***

The lower Nerang River flows through dense residential, community and commercial areas in the suburbs of Carrara, Nerang, Burleigh Waters, Benowa, Miami, Surfers Paradise, Mermaid Waters, Main Beach, Robina, Mudgeeraba and Burleigh Heads. Major rainfall events in the Nerang River catchment can cause flooding to properties and infrastructure in this area. The flood mitigation component of the dam upgrade will reduce peak flood flows and delay the release of floodwater into the lower reaches of the floodplain. By reducing the rate at which floodwater is released from the dam, the number of properties potentially affected by flooding in the lower catchment would be reduced, as would peak flood levels and flooding damage.

Currently 4,441 properties downstream of Hinze Dam could be affected in a 1 in 100 year Average Recurrence Interval (ARI) flood event. The effect of raising the dam in respect to flood mitigation is a reduction of 3284 affected properties.

The personal costs of flooding can be immense – in terms of potential loss of life, financial and personal losses. Personal losses include damage to homes and valued items, loss of family possessions, and damage to fittings, whilst the psychological effects can include anxiety, stress and depression. Older people may be particularly at risk in floods, both from the perspective of personal losses, and from a personal safety perspective due to a higher level of frailty and disability. One quarter of the Gold Coast’s population is aged over 55 years, and this proportion will reach about 32% in 2021.

Flooding also currently has significant impacts on commercial and industrial properties, public utilities and infrastructure on the Nerang River floodplain. The reduction in flooding risk represents a significant community benefit to downstream areas and the broader community through the reduction in the economic, social and environmental impacts associated with flooding.

### ***Water Supply***

The Hinze Dam is the main bulk water supply source for the Gold Coast region. The project constitutes an augmentation of the water supply within the South East Queensland Region, which is particularly significant given the effect of recent drought conditions decreasing dam levels across South East Queensland, and subsequent water restrictions placed on residents and businesses.

The Gold Coast Water Futures report (GCWF) (GCCC 2005c) outlined strategies and options for increasing water supply to the Gold Coast region over the next 50 years and identified the raising of Hinze Dam as a key element in the overall security of supply for the region. The South East Queensland Regional Water Supply Strategy (SEQRWSS) (DNRW and BCC 2004/2005) has identified a need for a range of measures that will provide enough water for short, medium and long term needs for the South East Queensland region. The raising of Hinze Dam is one of the medium to long term initiatives identified in the strategy to increase water availability and security.

In response to the current water supply emergency in South East Queensland, the State Government passed a Regulation to secure the essential water supply needs of the region. An emergency Regulation under the *Water Act 2000* was made on the 9th August 2006 (*Water Amendment Regulation (No. 6) 2006*). Within the *Regulation*, Schedule 10B: Measure 11 – Hinze Dam Stage 3 requires that the Stage 3 raising of the dam deliver a target of 16 ML/d of additional yield by 31st December 2010. It also requires that the project prepare for associated water harvesting. Water harvesting is the diversion of run off from adjacent catchments into Hinze Dam.

The Gold Coast Local Government Area (LGA) population was projected to reach more than half a million people by December 2006, and will continue to grow by an average of 2.4% per year between 2001 and 2026<sup>1</sup>. Increased supply of water, and confidence that supply is adequate, will support the forecast population increase, and allow urban development to proceed as outlined in the South East Queensland Regional Plan (Queensland Government, 2005) and detailed in Gold Coast City Council's Local Growth Management Strategy (draft).

The Hinze Dam Stage 3 project will increase the available yield from the dam to 225 ML/d.

### ***Upgrade to Meet Current Dam Safety Standards***

The *Water Act 2000* provides the regulatory framework for dam safety of water dams in Queensland and requires that the owners of referable dams must operate and maintain dams in accordance with the Guidelines on Acceptable Flood Capacity for Dams (DNRW 2007c). By virtue of its height and storage capacity Hinze Dam is a referable dam. Recent revisions to dam safety requirements and design inputs (extreme flood events hydrology) requires elements of the upgrade of Hinze Dam for compliance with these guidelines and standards.<sup>2</sup>. In order to comply with these guidelines and standards the raised dam and modified spillway must be capable of passing the Probable Maximum Flood (PMF) determined for the dam without overtopping of the dam crest.

### **Relationship to other Projects**

The raising of Hinze Dam is integral to both local and regional water supply strategies.

At the regional level the South East Queensland Regional Water Supply Strategy (SEQWRSS) has been developed with the intention of providing a secure water supply for future regional growth. It aims to do this through three strategies:

- high value and best use of water;
- efficient use of water; and
- development of additional water supplies;

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<sup>1</sup> Gold Coast City Council (2006) Population Projections to 2026, prepared for the Priority Infrastructure Plan, by Planning Information Forecasting Unit, DLGPSR

<sup>2</sup> NRW – Draft guidelines on the selection of acceptable flood capacity for dams (Information note)

The proposed additional water supplies include desalination, recycled water, new storages and the upgrading of existing storages. Hinze Dam has been identified by the SEQWRSS as one of the dams to be raised as part of the regional water supply strategy. It is predicted to supply of the order of an additional 6000 ML/a.

At the local level, the Gold Coast Water Futures Strategy 2006-2056 (GCWF) has predicted a future water requirement for the Gold Coast of 466 ML per day by 2056<sup>3</sup>. In order to meet this need a suite of initiatives has been identified. Key initiatives include:

- water conservation;
- leakage and pressure management;
- rainwater tanks;
- recycled water;
- southern regional water pipeline;
- raising Hinze Dam; and
- desalination.

These represent investment in a diverse integrated range of water sources in order to provide a more robust water supply system. The water supply component of this project is a key element in the GCWF Strategy to meet future water requirements.

The State Government has identified that purified recycled water (PRW) will be a permanent and ongoing part of the potable water supplies to South East Queensland. The Gold Coast Waterfuture Recycled Water Strategy is a long-term plan that will identify ways to use and manage recycled water over the next 50 years. The Strategy is currently being developed by Gold Coast Water in partnership with a community-based Recycled Water Strategy Advisory Committee. The introduction of PRW into Hinze Dam is **NOT** part of the scope of this project. However potential elements of a strategy may influence the future operation of the dam. Such elements may include the introduction of a volume of PRW into the storage or the replacement of releases from the dam with PRW. The influence of the introduction of such elements has been factored into design process of the project.

## Project Alternatives

The Gold Coast City Council has undertaken significant investigations over the last 15 years into the most appropriate flood mitigation strategy for the Nerang Floodplain. Numerous studies have been undertaken over the years to identify possible means of reducing flood damage and risk and a number of structures are in place today that provide a level of flood mitigation benefits.

The Merrimac/Carrara Floodplain Advisory Committee was established in 1996 to advise Council on planning, development and management of the floodplain and to produce a Hydraulic Master Plan and Structure Plan for the Merrimac/Carrara floodplain. Together, these two documents define how to maintain and enhance the storage and passage of floodwater in the floodplain. The principals have been adopted into Planning Codes under the Draft Planning Scheme and are strictly applied when development applications are assessed.

The Merrimac / Carrara Floodplain Advisory Committee also recommended further investigations into physical flood mitigation works. Detailed assessment of a range of physical flood mitigation options have been undertaken through numerous studies. These options can be broadly summarised as follows:

- improvements to the Benowa flood channel;
- dredging of the Nerang River;
- improvements to bridges on the Nerang River to increase flow capacity; and

- providing increased flood storage in Hinze Dam.

Preliminary economic social and environmental impact assessment of the range of options described above identified that the most effective physical flood mitigation measure was the raising of Hinze Dam. GCCC adopted the raising of Hinze Dam as the preferred option on the 5 March 2004.

In relation to water supply, the Gold Coast City Council (GCCC) has investigated a broad range of water supply alternatives for the region. In addition to the raising of Hinze Dam, a significant range of other options were and these are outlined below:

Supply Options	Description
Additional ponding upstream of Hinze Dam	Construction of a series of weirs upstream of Hinze dam to provide additional storage volume
Cloud seeding	Artificial generation of rainfall
Damming the Broadwater	Construction of embankments across the Broadwater to create a freshwater storage separated from the ocean
Dams and yields	Investigation of additional dam sites and the evaluation of potential yields
Desalination	Conversion of seawater to potable water
Evaporation control	Covering the surface of water storages in order to reduce the amount of water lost as evaporation
Greywater	Reuse of household wastewater (on a personal scale)
Groundwater	Water extracted from underground sources
Indirect potable reuse	Highly treated wastewater is pumped back into Hinze dam and mixed into the drinking water supply. (The water is treated again at the time of extraction)
Rainwater tanks	On site rainwater collection from roof tops
Recycled water for non potable use	Treatment and reuse of wastewater for non potable purposes, e.g. industrial
Recycled water for environmental flows	Treatment and reuse of wastewater for river flow (as a substitute for current environmental releases from the dam)
River barrages	Construction of weirs across coastal river estuaries in order to harvest freshwater flows
Stormwater harvesting	Capture of stormwater runoff for later reuse
Water conservation	Reduction of user demand through a variety of initiatives
Water pressure and leakage management	A range of measures designed to reduce consumption associated with excessive pressure and system failures.

Source: Gold Coast Water Futures Strategy 2006-2056

These options were evaluated by the Gold Coast Waterfuture Advisory committee with community consultation. Consideration was given to economic, social and environmental impacts as well as the diversity and adaptability of the options. The raising of Hinze Dam for water supply is one element of a diverse and integrated range of water sources that has been adopted in the GCWF strategy in order to provide a robust water supply system for the region. GCCC adopted that the raising of Hinze Dam include provision for water supply on the 22 November 2004.

The “No Project” alternative is not an acceptable option for the community. If the project does not proceed it is unlikely a significant reduction in flood risk could be achieved via any alternative.

The economic and social consequences of a major flood on the Nerang River floodplain would remain significant at local regional and national levels. Not only would the flood affect the residents of the area but it would also impact tourists and the tourism industry and could have the potential of damaging the reputation of the region in that market. The assessment for the 1 in 100 year ARI flood event for the do nothing case indicates net economic losses in the region of approximately \$120 million. The social impacts of a major flood would also be significant given the large population at risk on the flood plain and the resources available to manage such an emergency.

If the project did not proceed then Gold Coast City Council would be in breach of the subordinate legislation made under the *Water Act 2000* titled “*Water amendment regulation (No.6) 2006*”. This legislation specifically requires that the Stage 3 raising of the dam delivers a target of 16 ML/d of additional yield by 31st December 2010. Financial penalties are associated with such non compliance. If the dam is not raised for water supply the State Governments ability to deliver the South East Queensland Regional Supply Strategy would also be compromised. Elements of the *Water Resource (Gold Coast) Plan 2006* and *Water Resource (Logan Basin) Plan 2007* would also be unlikely to be delivered in full, particularly in relation to accessing the strategic reserve that has been identified. The GCWF strategy would also have to be revised as Hinze Dam stage 3 plays a major role in delivering the desired water supply outcomes. Overall there would be a reduction in available future water supply to the Gold Coast and the entire South East Queensland region which would amount to between 16 000 and 26 000 ML/a.

Whilst the dam is intrinsically safe, the current dam configuration is no longer compliant with the recently upgraded Guidelines on Acceptable Flood Capacity (NRM 2007). The magnitude of the Probable Maximum Flood, the design flood that the dam must be able to pass without overtopping has also increased due to revisions of Bureau of Meteorology estimates of extreme rainfall in the dam catchment. The Dam Safety Regulator in Queensland has advised that under the requirements of the *Water Act 2000* the dam owner, Gold Coast City Council must make the dam compliant by 2015. Therefore if this project does not proceed the Council will still be required in the near future to undertake substantial works to the dam’s embankments and spillways. From a dam safety perspective the “no project” alternative is not a viable option.

## Description of the Project

### *Location*

Hinze Dam is located within hinterland of the Gold Coast in South East Queensland approximately 18 km from Nerang and downstream of the confluence of the Nerang River and Little Nerang Creek. The major streams of the Nerang River catchment are the Nerang River, Little Nerang Creek and Mudgeeraba Creek. The total area of the catchment is 495 km<sup>2</sup>.

The headwaters for the Nerang River catchment streams are in the McPherson ranges, which have forested, close to natural conditions. The Nerang River and Little Nerang Creek flow north easterly, through predominantly agricultural land, before converging at Hinze Dam. Downstream of the dam the river continues north east through foothills and the township of Nerang before heading east across floodplains towards the coast. Mudgeeraba Creek joins the Nerang River a few kilometres upstream of the Southport broad water, where the river enters the ocean.

### *Land Use*

The dam site is used primarily for municipal water storage purposes while also providing for a number of event based and passive recreational, sporting and community based activities. The area to the north of the dam comprises large allotments predominantly used for rural residential purposes, being a residence and a small scale rural activity such as hobby farming, cattle grazing, or horse training facilities. To the west and east of the site is bounded by steep ridges where there is a mix of rural residential style development and reserve areas. Numinbah Forest Reserve is located to the south of the dam and extends from the Gold Coast Springbrook Road in the east to the Nerang Murwillumbah Road to the west. The Land Warfare Centre, a military training facility for the Australian Defence Force, is located on the western boundary of the study area and extends west into Beaudesert Shire.

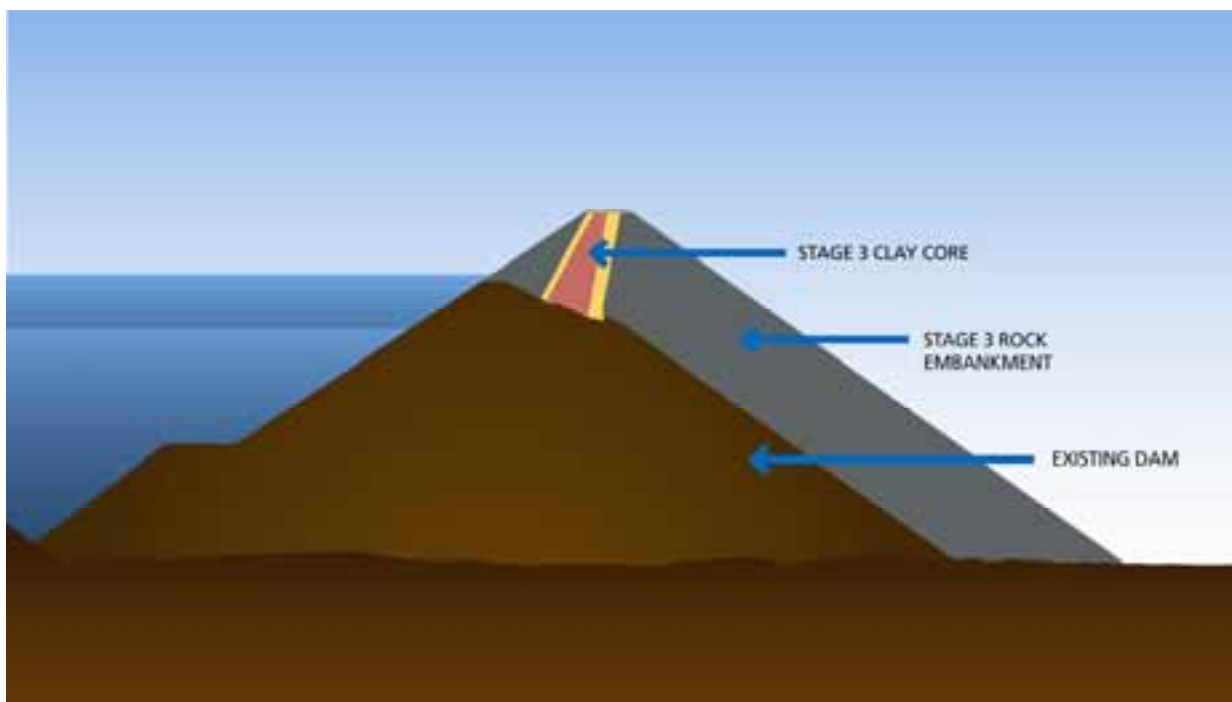
**Description of the Dam**

The main properties of Hinze Dam following the Stage 3 works are:

Element	Hinze Dam Stage 3
Full Supply Level (FSL)	94.5m AHD
Storage Capacity	309 700 ML
Surface Area	1505ha
Catchment Area	209.1km <sup>2</sup>
Dam Crest Level (DCL)	108.5m AHD
Dam Yield	225 ML/day
Maximum Depth	69.5m
Average Depth	20m
Spillway Capacity	3900 m <sup>3</sup> /s at PMF level 108.35m AHD
Design Flood	PMF
Maximum Flood level	108.35m AHD
Peak Outflow	3900 m <sup>3</sup> /s
AEP of Flood	>1 : 5 000 000 yr
Freeboard	0.15m
Peak Outflow Q100 Flood	550 m <sup>3</sup> /sec
Mean period between spills	1.7 years
Dead Storage Level	45.6m AHD

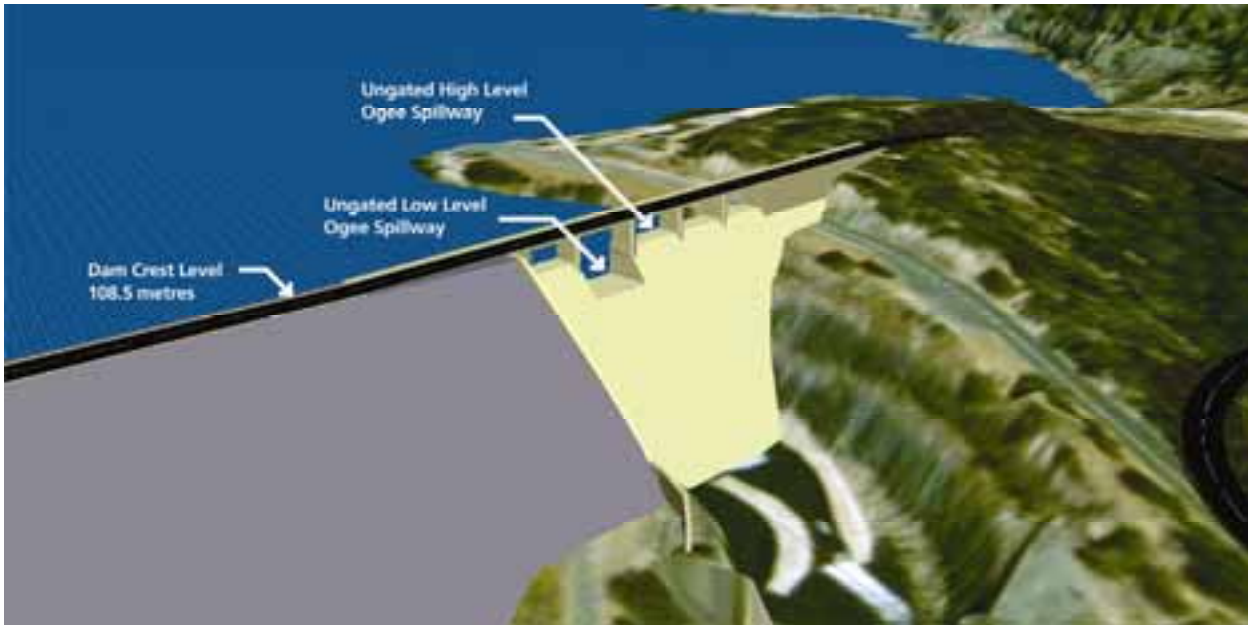
The embankment works for the project involve raising the dam crest level 15m from its present elevation of 93.5m AHD to 108.5m AHD. The works comprise a 1700m long embankment up to 80m in height on the eastern side of the spillway. This structure incorporates a main embankment and saddle dam, and a low height embankment in the saddle area to the west of the spillway.

■ **Hinze Dam Stage 3 Embankment Cross Section**



The modifications to the main spillway are a key element of the project and consist of raising the existing mass concrete spillway to accommodate for the raised full supply level (FSL), flood mitigation and dam safety requirements. For the raised FSL and raised embankment, modifications are required to the intake towers and outlet works.

■ **Hinze Dam Stage 3 Spillway**



■ **Hinze Dam Stage 3 with Full Supply Level**





### Construction

The major activities undertaken for the construction of the dam and associated facilities are:

Activity	Details
Quarrying	<ul style="list-style-type: none"> <li>■ removal of overburden</li> <li>■ extraction of rock for dam wall using excavators and drill and blast operations</li> <li>■ stabilisation of the quarry face and rehabilitation of the quarry surrounds at the completion of quarry activities</li> </ul>
Clay Extraction and Conditioning	<ul style="list-style-type: none"> <li>■ excavation of clay using scrapers</li> <li>■ conditioning of clay to increase the moisture content for use in embankment and saddle dam construction</li> <li>■ rehabilitation of the clay borrow area following the completion of extraction activities</li> </ul>
Dam Embankment and Saddle Dam Construction	<ul style="list-style-type: none"> <li>■ construction of the main embankment</li> <li>■ construction of saddle dam</li> <li>■ use of dozers, excavators and vibrating rollers used to compact and shape the wall</li> </ul>
Concrete manufacturing	<ul style="list-style-type: none"> <li>■ operation of an on-site concrete batching plant</li> <li>■ crusher will operate near the quarry to produce aggregate for use in concrete mix</li> </ul>
Material Haulage	<ul style="list-style-type: none"> <li>■ most of the materials required for construction will be sourced from the site with the use of trucks to transport materials around the site</li> <li>■ truck haulage of additional construction materials not sourced from the site. this includes materials such as sand, cement and reinforced steel to the site</li> </ul>
Construction of Intake Towers	<ul style="list-style-type: none"> <li>■ raising of the structures by 15 m</li> <li>■ increase in the number of off-takes from 8 to 11</li> <li>■ upgrading of the access road to the upper intake tower</li> </ul>
External Infrastructure	<ul style="list-style-type: none"> <li>■ road and culvert upgrading</li> <li>■ bridge upgrading works</li> </ul>
Internal Infrastructure	<ul style="list-style-type: none"> <li>■ fish transfer device</li> <li>■ internal permanent road network</li> <li>■ reinstatement of services, such as water supply and power where required</li> </ul>
Clearing of Vegetation	<ul style="list-style-type: none"> <li>■ vegetation clearing for the establishment of site infrastructure and for the commencement of site operations such as the quarry and clay borrow area</li> <li>■ clearing for the construction of boat ramps and road upgrading</li> <li>■ vegetation removal below the full supply level. this clearing will occur in selected areas around the perimeter of the dam</li> </ul>
Recreation Area Construction	<ul style="list-style-type: none"> <li>■ haul trucks used for the transfer of material for the creation of the lakeside park</li> <li>■ use of dozers and scrapers to shape the area</li> <li>■ reinstatement and upgrading of park areas below dam wall</li> <li>■ re-establishment of multi-purpose recreation trails</li> </ul>
Site Rehabilitation	<ul style="list-style-type: none"> <li>■ rehabilitation of area disturbed for the clay borrow activities</li> <li>■ rehabilitation and reinstatement of the parkland area and other disturbed areas around the construction site</li> </ul>

The construction component of the program commences in October 2007 and continues through to November 2010. The main elements of construction are the main embankment, the saddle dam, the spillway, the upper and lower intake towers, and the construction of the supporting infrastructure.

The construction workforce will peak at approximately 240 people between April 2008 and August 2009. It is anticipated that the workforce will be sourced from the Gold Coast and Brisbane communities.

The project is estimated to cost \$382 million.

## ■ Site Construction Works



### ***Dam Operation***

Following completion of the project the operation of the dam will be similar in nature to current operations. Water will be supplied from the upper and lower intake towers to be treated at the Molendinar and Mudgeeraba Water Treatment Plants for potable use. Releases will also be made for environmental flows and compensation flow. Operations will be in accordance with the *Water Resource (Gold Coast) Plan December 2006* meeting the environmental flow objectives and water allocation security objectives set out in the plan.

Recreation facilities available to the community and managed by GCCC will be reinstated and in some instances enhanced. For safety and security reasons access to parts of the dam such as the spillway and embankments will be restricted. Access along the dam crest will be limited to pedestrian and bicycle traffic.

### ***Decommissioning***

The nominal engineering life of the upgraded Hinze Dam is expected to be 100 years, though it is likely to be maintained after that period provided that it continues to meet dam safety requirements and remains an integral part of the South East Queensland regional water supply strategy. The dam may be decommissioned during or after the initial engineering design life if:

- it suffers significant damage that cannot be repaired to meet safety standards; or
- it is no longer required to provide flood mitigation or water supply to the Gold Coast region.

If decommissioning of the dam is required, the procedures will follow the requirements on the Australian National Commission on Large Dams (ANCOLD).

## Assessment and Mitigation

### *Topography, Geomorphology, Geology and Soils*

In the reaches of the Nerang River and Little Nerang River upstream of Hinze Dam, the geomorphic values include near-natural flow and sediment transport processes, a range of low flow habitat values including cascades, riffles, glides and pools and a range of flood channel habitats on bars, benches and terraces. In downstream reaches, there are also a range of low flow habitat values maintained by the altered low flow regime including riffles, glides and pools.

Flow modelling indicates that while the magnitude of moderate to major floods is expected to decrease, low flow characteristics are expected to be similar to existing. The main geomorphic implications of these changes are expected to be reduced frequency of bar flushing possibly causing further encroachment of vegetation into the channel and reduced scouring of pools. In addition, short term increases of siltation into the pondage area may occur and upstream inundation of geomorphic features in upstream river reaches will occur as the water level equilibrates at a higher level. Mitigation of siltation to the pondage area is addressed through implementation of the EMP.

The dominant geological formation of the area is the Neranleigh Fernvale beds which are typically comprised of greywacke (arenite), shale, siltstone, chert, jasper and basic metavolcanics. There are no geological limitations which can not be overcome for the raising of the dam wall. All quarry and borrow material will be sourced from on-site locations.

The soils within the Neranleigh Fernvale beds are mapped as Kurosols and Tenosols which predominately form on Greywacke and Chert and Ferrosols which form on Greenstone. Dispersible soils (eg Sodosols) are not common. Road cuttings and other soil disturbances generally appear stable around the impoundment. Erosion due to wavelet action was not found to be worse in any particular area of the impoundment. No areas of mass movement have been identified on the surrounding slopes due to water level changes and this is not expected to be an issue with the higher FSL.

The construction works will involve the disturbance of soil, removal of vegetation and the movement of large quantities of spoil creating considerable potential for erosion and sedimentation to affect water quality and land condition in many areas. These impacts can be managed through the development and implementation of erosion and sediment control plans. The use of effective top soil management, rehabilitation and landscaping plans will also reduce the long term potential impacts. Changes to stream flow downstream impacting on the geomorphology can be mitigated by vegetation management and opportunities for habitat enhancement along the flood channel corridor.

### *Land Contamination*

An investigation was undertaken to identify potentially contaminated sites within the area of land affected by the project. This investigation focused on current and historical conditions within the Full Supply Level (FSL) area of additional land inundation, the land area within the 1 in 100 year ARI flood line, and the land utilised for the expanded dam wall and construction activities.

Eighteen potentially contaminated sites were identified as being at least partially within the affected areas, but none are listed on the CLR or the EMR, and there are no "Area Management Advice" regarding contaminated land for the area searched.

The investigation of contaminated land sites within the affected project area identified potential contamination concerns from three reported former cattle dip sites within the 1 in 100 year ARI flood line and/ or the proposed FSL inundation area, and one site outside the 1 in 100 year ARI flood line. The Alliance will conduct site investigations and assessments of these dip sites, in accordance with these policies and regulations, to determine the mitigating actions required to ensure water quality in Advancetown Lake is maintained. Investigation, assessment

and management of contaminated sites will be undertaken in cooperation with EPAs Contaminated Land Unit and in accordance with all relevant legislation and policies.

All required remediation and/ or site management will be completed and approved prior to the raising of dam water levels. Any required long- term monitoring will be provided for in the dam's operation plans.

Project materials and wastes will be managed in a manner that will prevent land contamination that could potentially result from the spillage or on- site disposal of hazardous materials or wastes used in the construction and/or operation of the dam. It is the specific intention of the Alliance that project construction and operation activities will not result in contamination.

### ***Land Use and Infrastructure***

The areas surrounding Hinze Dam are predominately comprised of rural residential development, natural areas contained within National Park and State Forest, rural land uses, scattered small commercial operations, and some recreation facilities. Within the CID area the core land use is the dam and its water supply and flood mitigation requirements. In addition to the water supply use of the dam, there are also extensive recreation facilities located within the dam site. These facilities cater for a range of event based and passive recreation uses as well as community based activities. The location of these facilities is largely concentrated in the vicinity of the dam wall, although boat ramps are located on the eastern and western side of the upper reaches of the dam while horse riding trails are located on the eastern side of the impoundment.

The construction works, including the sourcing of rock and clay will occur within the site boundary. This will necessitate closure of the dam site to the public throughout the construction period, which is planned to commence in October 2007 and continue until November 2010. Therefore the main impact on land use activities during construction will be related to the recreation activities that are currently undertaken within the site and the use of the access road across the main dam embankment.

The location of the new dam infrastructure and the increase in the FSL will cover the existing recreational facilities on the north eastern area of the dam. A Recreation Master Plan has been prepared which provides for the re-establishment of recreational facilities within the Dam site. The plan also includes the provision of an information centre and kiosk facility, which will provide numerous community facilities that are currently not available at the site.

The FSL and 1 in 100 ARI flood levels will extend outside of Council owned land, onto Unallocated State Land and freehold land on the eastern arm and into the Numinbah Forest Reserve on the western arm. The Alliance are currently negotiating tenure in the form of easements with land owners and State Government over the impacted properties.

### ***Surface Water Resources and Water Quality***

The existing Nerang River flow regime is a consequence of the construction of Hinze Dam, which captures all of the low flows and the majority of the medium to high flows. The further raising of the dam will have very minor impacts on the existing downstream flow regime. These impacts will reduce as the river approaches the tidal zone, due to the inflow of various tributaries along the Nerang River, including Mudgeeraba Creek.

The project will significantly increase the flood mitigation capacity of Hinze Dam, reducing the downstream flood risk and impact at all levels of flooding.

Upstream of the dam the flood frequency will not change, however the flood level, duration and affected area will increase. If required easements are proposed for the properties effected in a 1 in 100 year ARI flood and will be obtained through voluntary agreement with the land holders. Mitigation of the flooding impacts on the Nerang-Murwillumbah Road will be provided via works to the affected embankments and drainage structures. To offset the

flooding impacts on the Gold Coast-Springbrook Road it is proposed to raise the road to provide 1 in 50 year ARI immunity. To offset the flooding impacts on Pocket Road crossing a new bridge will be constructed.

The impacts of the project on the surface water resources of the Nerang River catchment will be minor and manageable. Existing water users will not be affected by the project. Downstream of the dam the existing flow regime will experience very minor changes while the flood risk will be significantly reduced. Upstream the flow regime will not change, however the inundated area, flood levels and flood duration will increase. Mitigation measures have been identified for upstream flood impacts and management plans developed for implementation.

The assessment of the project included an evaluation of the water quality conditions within the dam and surrounding catchment and an assessment of the potential impacts from the proposal. The major key activities have the potential to impact on surface water both during and post-construction. The key management mitigation measures that will be implemented include stabilisation of exposed soils, revegetation of impact areas, installation of bunding and spill equipment for hazardous materials, and undertaking a routine water quality monitoring program throughout the dam.

### ***Groundwater Resources***

The hydrogeological setting of the Hinze Dam area is dominated by the Neranleigh Fernvale beds. This formation does not generally host any groundwater resource of significance and aquifer prospects are typically poor. Groundwater occurrence in the vicinity of the Hinze Dam is limited to a localised fractured chert body near the dam wall and potentially, alluvial sediments along minor drainage lines.

The potential for groundwater-related environmental and social impacts to occur during the construction and operational phases of the project is considered negligible. Based on available Department of Natural Resources and Water data there were no licensed groundwater users identified in the immediate vicinity of the dam. Furthermore, no groundwater dependant ecosystems or other sensitive groundwater receptors were identified in the locale.

Given the absence of any significant groundwater resource in the vicinity of the project area, the low risk of deleterious impacts and the general absence of potential sensitive receptors the only potential management measure considered necessary is an ongoing monitoring program during the operational phase of the project. This will be undertaken as part of the geotechnical assessment and is considered appropriate for providing an early indication of changes in groundwater quality and levels.

### ***Terrestrial Ecology***

The study area was found to support 628 species of terrestrial flora including 20 plant species listed as Endangered, Vulnerable or Rare (EVR) under the *Commonwealth Environment Protection and Biodiversity Conservation Act (1999)* or *Queensland Nature Conservation Act (1992)*. A total of 204 species of terrestrial vertebrate fauna were recorded from the study area, including 17 amphibians, 23 reptiles, 131 birds and 36 mammals. Eight EVR fauna species were recorded from the study area.

The Proposal will involve the loss of approximately 318 ha of remnant vegetation (within the meaning of the *Queensland Vegetation Management Act 1999*), comprising six regional ecosystems listed as either “of concern” or “not of concern”. These areas contain mapped essential habitat and additional areas of known or potential habitat for EVR flora and fauna taxa. There will be no impacts on “endangered” regional ecosystems.

The mitigation approach involves a set of complementary actions including the propagation and translocation of EVR flora, weed and fire management within retained habitats (for the protection of populations of EVR taxa contained therein), provision of compensatory habitat, acquisition or protection (through registered covenant) of appropriate biodiversity offset sites and implementation of Environmental Management Plans during both construction and operational phases of the project.

The compensatory habitat strategy will involve a combination of actions including the purchase (and management) of advanced regrowth or remnant vegetation, strategic purchase of key land parcels in the open space/green space network and revegetation and rehabilitation of existing cleared or disturbed areas.

### ***Aquatic Ecology***

Field surveys and a review of existing information were carried out to identify any potential impacts the project will have on the aquatic ecology within the Hinze Dam catchment. Focus was placed on habitat availability, sediment and substrate, aquatic vegetation, invertebrates, fish, amphibians, semi-aquatic and aquatic reptiles and mammals.

Surveys of fish habitat, macroinvertebrates and aquatic vegetation indicated clear separation between reaches upstream of the Hinze Dam, within the Dam and in the Nerang River below the dam wall. Upstream reaches were generally in good condition whereas downstream of the spillway, reaches were heavily infested by exotic macrophytes and had higher numbers of introduced fish species.

No significant flora or fauna species as listed under either the *Environment Protection and Biodiversity Conservation Act 1999* or the *Nature Conservation Act 1992* were recorded from the Hinze Dam catchment during the investigations undertaken for the EIS. There are two fish species, Freshwater Mullet (*Myxus petardi*) and Purple-spotted Gudgeon (*Mogurnda adspersa*) that may possibly exist within the Hinze Dam catchment based on their geographic range and habitat preferences, but were not recorded in fish surveys.

Two migratory species were found within the Hinze Dam catchment; the Longfinned Eel (*Anguilla reinhardtii*) and the Short-finned Eel (*A. australis*). These species would already be restricted in their required upstream and downstream passage, an impact which is likely to be continued by the project.

The investigations undertaken for the EIS identifies the need for further surveys into the fish communities in the Nerang and adjacent catchments.

Investigations undertaken for the EIS have identified that conditions in the river and estuary of the Nerang River downstream of the dam will not be significantly impacted by the project. The further raising of the dam will have very minor impacts on the existing conditions of the Nerang River downstream of the dam and its estuary.

The investigations undertaken for the EIS identifies the need for further surveys into the fish communities in the Nerang and adjacent catchments.

The project will include a trap and transfer fishway to provide upstream fish passage.

### ***Air Quality and Greenhouse Gases***

The project has the potential to generate air quality impacts at sensitive receivers as a result of construction works and minor road relocation. The results of the air quality modelling for the site suggest that there may be potential dust nuisance impacts at receivers located close to the site construction area. However, it is considered highly unlikely that the project will result in exceedances of the guidelines due to the conservative methodology employed in the assessment. Appropriate measures will be incorporated into site and construction management to mitigate potential impacts. These dust control strategies have also been incorporated into the project EMP.

There will be no change in air emissions as a result of operation after raising the dam wall, apart from occasional vehicle emissions associated with the fish transfer system.

The construction of the project will result in 0.022 Mt CO<sub>2</sub>-e (tonnes of CO<sub>2</sub> equivalents) of greenhouse gas emissions over an approximate three year period (or 0.007 Mt CO<sub>2</sub>-e per annum). The construction program has been designed to maximise energy efficiency and minimise greenhouse gas emissions from the works. This has been done primarily by sourcing almost all material for construction of dam walls from the project area. The greenhouse

gas emissions from construction and operation of the project represent a small fraction of Queensland's greenhouse gas emissions.

Climate change risk assessment has determined that the project has limited vulnerability to climate change. Climate change has the potential to reduce the potential yield from the project but this can be offset through water demand management, if required. The vulnerability to flooding resulting from an increase in rainfall intensity will be reduced after raising the dam wall. In this context, the project aligns with the Queensland Greenhouse Strategy (EPA 2004) by laying the foundation for climate change adaptation.

### ***Noise and Vibration***

The existing noise environment in the vicinity of the dam is typically that of a quiet rural residential community located in the Gold Coast Hinterland. In the area close to the dam wall the change in the character and level of the noise environment due to construction activities is expected to be significant and therefore noise impacts must be managed wherever practical.

While there are no specific noise guidelines for the construction activities a noise level goal consistent with the EPP (Noise) acoustic quality objective, has been developed for the project. An assessment of the airborne noise emissions from typical construction activities has been made to determine the potential for impacts on the amenity of adjacent noise sensitive receivers and assist in the development of appropriate mitigation strategies. The noise level predictions indicate that at nearest sensitive receivers, construction noise levels are likely to be higher than the project noise goals during the most intensive portion of the works. To minimise or eliminate the emissions that contribute to the noise environment as a result of the project, a table of mitigation and management measures has been developed and incorporated into the project EMP.

Monitoring of noise levels from the project is proposed to assist with the management of construction noise impacts at sensitive receiver locations. These measured levels would be compared to the project noise goals and reasonable and feasible remedial actions would be implemented, as required. As part of the Construction Communication Program a system of complaint reporting, investigation and response would be initiated allowing the local community the opportunity to provide feedback on noise and other environmental issues.

### ***Transport and Roads***

The total traffic generated during the construction stage of the project is 526 light vehicles, 4 buses and 22 heavy vehicles per day using two main routes to access the project site. The construction phase of the project is not expected to have significant impact on traffic operations of any of the studied road links.

The current use of Hinze Dam will not change significantly on completion of the construction works. As such, traffic flows in the neighbouring road network will not be significantly affected during the operational phase therefore it is not envisaged that there will be traffic impact on the surrounding environment.

The haulage of construction equipment and materials along the two designated haul routes from the Pacific Highway to the dam site is expected to result in the slight deterioration of the pavements. The pavement distress is only expected to occur along the westbound traffic lanes carrying the heavy fully laden haulage vehicles to the dam site. A maintenance strategy will be developed to monitor and resolve any maintenance issues during the construction period. This is to be developed in collaboration and agreement with the Department of Main Roads.

Construction traffic is expected to have an effect on the pavement condition over the duration of the construction period. A maintenance strategy will be developed in collaboration and agreement with Main Roads to address any accelerated pavement deterioration as a result of the construction transport traffic.

The project is expected to have an impact on the existing transport infrastructure largely due to increased flood levels, however some impacts are as a direct result of the increased footprint of the dam wall and spillway.

To mitigate against full road inundation, it is proposed to realign Gold Coast-Springbrook Road vertically under the requirement of the Department of Main Roads. To provide adequate flood immunity for the Pocket Road Bridge a new bridge will need to be constructed at a higher level. This will allow flood waters during a significantly critical storm to be conveyed without submergence of the bridge.

In response to the need to close off the access across the dam wall, maintenance vehicles will be admitted to the dam crest via the spillway bridge in order to access facilities from the dam wall and the Saddle Dam. Emergency Services vehicles will also be allowed to travel across the dam crest to access existing fire trails immediately east of the Saddle Dam. The road over the dam crest will consist of a single lane road 3.5m wide with passing bays at nominated intervals. Safety barriers will be installed to prevent vehicles diverting off the roadway and down the dam embankment.

### ***Hazard, Safety and Risk***

The hazards and risks associated with the project have been identified through the use of a Preliminary Hazard Analysis (PHA), which assisted in the identification of potential incident scenarios, potential consequences, prevention, protection and mitigation measures.

The major hazards identified are associated with dam failure and public safety. In terms of this preliminary risk assessment, it is considered that the risk levels are tolerable, and can be managed through the design process through to construction and operation.

The risk profile is generally “low” to “moderate” with the exception of safety risks from blasting, which have been assessed as “high” risk. It should be noted that these are assessed as high since there is significant energy involved and the controls can only reduce the probability of the event. These risks are common to all blasting operations and are subject to standard controls and a rigorous site-based safety management system.

The project will implement a safety management system, which adopts an integrated approach to risk management, recognising the hazards at all points in the operations and how these are controlled. The analysis of the hazards indicates that risks to the public and to the environment are moderate. In terms of this preliminary risk assessment, it is considered that the risk levels are tolerable and can be managed with the processes identified in the Environmental Management Plan.

### ***Waste Management***

Waste produced on site during construction will include demolition waste (concrete, rock, gravel, steel and timber), construction material wastes (timber framing, concrete, rock, gravel, scrap metals, cable, wire, insulation, plastics and packaging), vegetation and soils as a result of clearing, regulated waste (hydrocarbon waste, chemical residues, detergents, solvents, batteries, tyres), drums and containers from supply of chemicals and oils, domestic and other general waste (food scraps, packaging, rags), recyclable waste (aluminium cans, glass, cardboard and paper), scrap metal; and sewage effluent and sludge. During the operational phase of the project waste will be limited to domestic and office waste and materials left over from maintenance work.

The waste generated during construction and operation will be handled, stored, treated, transported and disposed with a low level of impact on environmental values. Waste management implementation procedures will focus on the waste hierarchy of waste avoidance, re-use and recycling.

All waste generated on-site during the construction and operation phase will be disposed of in accordance with a Waste Management Plan (WMP), which will include waste stream characterisation and separation, assessment of waste reduction opportunities for identified waste and management of waste in accordance with the waste management hierarchy. Standard procedures for the storage, handling, disposal and spill response for potentially hazardous waste materials will follow the Emergency Response Plan.



### *Socio-Economic*

The Hinze Dam is an asset to the entire Gold Coast City community for water supply, flood mitigation, and recreational purposes. However, any changes to the social environment will be experienced in the communities closest to the dam.

Permanent impacts and benefits of the dam's operation are expected to include:

- increased safety of the dam wall infrastructure for flood protection purposes;
- increased security of the water supply to meet existing and future demands; and
- potential for increased recreational amenity due to safer boat ramps and the creation of the lakeside park.

Impacts and benefits of the construction that are likely to be experienced include:

- limitations on land and water-based activities in the vicinity of the dam wall;
- a diminution of the visual amenity during construction for some residences with views to the dam;
- potential for anxiety about the effects of blasting or other on private property and community safety;
- the inconvenience of restricted access across the dam wall; and
- an additional \$364.8 million in output (direct and indirect) to the Queensland economy, with \$247.5 million to the local Gold Coast economy.

The project is expected to cost approximately \$382 million in total. It is anticipated that the majority of expenditure will be retained within the Queensland and South East Queensland economies due to the nature of the construction, with much of the input material being sourced from the area surrounding the dam.

The closure of the cafe that currently services the needs of recreational visitors will result in a reduction of expenditure on food and drink at the site during the construction phase. However, the reduction in economic activity is relatively small in relation to the additional economic activity generated by the design and construction phase.

The ongoing flood mitigation benefits of the project include the reduction in the risk of flooding on the Nerang River floodplain, the reduction in the number of properties flooded, and the reduction in flood damages incurred. Currently a 1 in 100 year flood event would result in a nett economic loss to the region of approximately \$124.8 million. This is estimated to reduce to \$47.9 million following the completion of the project. This represents a benefit to the region from the reduction in flood damages of \$76.9 million. This is a 62 percent reduction in the estimated 1 in 100 year flood damages for the Nerang River flood plain.

With the majority of the impacts retained within the local regional economy and the economic impact of the project is overwhelmingly positive.

Mitigation strategies proposed include:

- provision of a communication program targeted to residents in Advancetown and Gilston, and provision of a complaints response system;
- effective management of negative impacts on amenity e.g. movement of vehicles, personnel and materials to and from the site;
- advice to community and recreational organisations regarding restrictions to site access during construction; and
- maximising activity and amenity values once the dam site is reopened.

### ***Cultural Heritage***

The indigenous history of human occupancy within the Hinze Dam catchment dates back for at least 6000 years. Aborigines have played an important role in the establishment of rural industries such as the timber and pastoral industries and according to a recent census, 3600 Aborigines live on the Gold Coast (Aird 2001).

Consultative procedures concerned with engaging Aboriginal Parties interested in the development of a Cultural Heritage Management Plan have occurred in line with the *Aboriginal Cultural Heritage Act 2003*. As a result of these processes, 59 endorsed parties were established as well as the identification of three indigenous groups that hold a connection to the Gold Coast area, being the Eastern Yugambeh, Komumerri and Ngarang-Wal. It is intended that cultural heritage studies be conducted over that area and the recommendations for the protection of the affected cultural heritage be used as the basis of the CHMP developed specifically for the project.

The recorded non-indigenous history in the region began in the mid 1800s with the opening up of the Numinbah Valley. Timber harvesting, commercial timber mills, dairying, banana plantations and beef cattle production were some of the most significant industries to be established in the 150 years since settlement in the area. Whilst farming no longer plays a significant role in the region, the guest houses and restaurants which were established in the 1930s and 1940s to supplement farm incomes provide much of the basis of today's local economy in the region. There are no sites within the CID listed on the Register of National Estate, the National Trust and the Queensland Heritage Register

Most of the sites/places which have been identified as being culturally significant will not be impacted either during construction or operation of the project. The only exception to this is the Guinea family gravesites which will be relocated to a site above the inundation level.

### ***Landscape and Visual Amenity***

The Hinze Dam visual catchment has a number of landscape character units which share common features and characteristics and elements which combine to create a landscape type include landform, location, vegetation, land use and available views to and from the area. In summary:

- the dam wall is a distinct topographic feature and is highly visible from within the northern portion of the visual catchment. The dam wall also provides expansive views across the Advancetown Lake water body and of surrounding vegetated ridgelines;
- the exposed benched rock faces from previous quarrying activities contrast with the natural surroundings and are highly visible from surrounding landmarks and elevated areas;
- the waterbody is the dominant land use in the visual catchment and contributes to it's overall high scenic amenity;
- the Nerang River rural valley is highly visible from the dam wall;
- rural residences in the Nerang River valley have a predominantly rural outlook, however some residences, particularly those located at Mottee Court and Toola Court, have views of the top of the existing dam wall;
- the steep vegetated ridgelines on the eastern side of the impoundment area are generally visible from the majority of locations within the visual catchment; and
- Pages Pinnacle is a significant landscape feature.

The aspects of the project that will have the most significant visual impacts are the raising of the dam wall and relocation of the recreation area, quarrying activities, and the clay borrow area. In response the site should be managed to minimise waste, control night lighting, remove vegetation from the new full supply level where visually prominent. Vegetation management and the commencement of rehabilitation are key components in retaining the landscape and visual amenity of the area. This will be achieved through implementation of the environmental management plans.

■ **View of Hinze Dam Stage 3 from Beechmont Road**



***Management Plans***

A draft Environmental Management Plan and Emergency Response Plan has been prepared to provide input into the detailed planning and design phase of the project. These plans will form the basis of the development of the final plans to be used on site to ensure the safe, efficient and environmentally responsible management of the construction and operation of Hinze Dam.

The EMP and ERP provide the State and Local authorities, and the Alliance, with a framework to confirm compliance with relevant legislation, regulations, policies and requirements. The plans also provide the community with evidence that the management of the project will be undertaken in an environmentally responsible manner.

**Proponent Commitments**

The key commitments required for implementation of the Project both during construction and operation are detailed below. The costs associated with these commitments will be borne by the Project. A full list of Proponent commitments is provided in **Appendix G**.

While these works are required to mitigate the Project impacts, the intention is to undertake these works to a high standard, consistent with the desire to provide future generations with a project that enhances water security, safety and liveability of the Gold Coast community.

Category	Commitments or Proposed Works	EIS Section
General	<ul style="list-style-type: none"> <li>■ The Proponent will deliver the Project with the intention of compliance with the requirements of the Water Amendment Regulation (No. 6) 2006.</li> <li>■ The Proponent will undertake the design of the dam and the development of operational arrangements in accordance with the Water Resource (Gold Coast) Plan 2006.</li> <li>■ The Proponent will construct Hinze Dam Stage 3 in accordance with the Environmental Management System developed for the Project.</li> <li>■ The Proponent will maintain an inventory of greenhouse gas emissions for the Project once construction commences, report greenhouse emissions and progress on greenhouse mitigation measures as well as maintain membership of the Commonwealth Government Greenhouse Challenge Program.</li> </ul>	-
Soils	<ul style="list-style-type: none"> <li>■ 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.</li> <li>■ A rehabilitation plan for the clay borrow area will be developed that considers mountain biking as an end use.</li> <li>■ 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.</li> </ul>	4
Land Contamination	<ul style="list-style-type: none"> <li>■ The Proponent will conduct site investigations and assessments of potential contaminated sites identified to determine the extent of mitigation required.</li> <li>■ Investigation, assessment and management of contaminated sites will be undertaken in cooperation with EPA's Contaminated Land Unit and in accordance with the Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (DEH, 1998), NEPM and national water quality criteria.</li> <li>■ All required remediation and/ or site management will be completed and approved prior to the raising of dam water levels.</li> <li>■ It is the specific intention of the Proponent that project construction and operation activities will not result in contamination that will result in the land requiring listing on the EPA's Contaminated Land Register (CLR).</li> </ul>	5

Category	Commitments or Proposed Works	EIS Section
Land Use and Infrastructure	<ul style="list-style-type: none"> <li data-bbox="383 276 1787 375">■ To offset the closure of the recreation area around the dam wall the Proponent will upgrade the existing boat ramps on the eastern and western arm of the Advancetown Lake. The facilities will include a sealed designated access track and ramp facility, sealed parking area, and also includes public toilet facilities. The western boat ramp upgrade will also include a memorial park in memory of the Guinea family, whose grave sites will be inundated by the proposed new FSL.</li> <li data-bbox="383 403 1787 480">■ The Proponent has prepared a Recreational Master Plan for the Hinze Dam site. The objective of the Master Plan is to provide for long term recreation use that balances the requirements for protecting the water quality, while providing sustainable recreation opportunities for the community. This plan will be implemented as part of this project.</li> <li data-bbox="383 509 1787 560">■ In consultation with stakeholders the Proponent will identify sites for the relocation of both the Fleay's and Dreamworld koala food plantations which are impacted by the Project.</li> <li data-bbox="383 588 1787 639">■ The access road across the top of the main dam embankment will be reinstated for pedestrian and cycling access upon completion of the construction works as part of the integrated park network.</li> <li data-bbox="383 668 1787 694">■ Access across the top of the main dam embankment will be maintained for Maintenance and Emergency vehicles</li> <li data-bbox="383 722 1787 799">■ The Proponent will negotiate easements over any freehold properties adversely affected in the 1 in 100 year ARI flood associated with the Project. In the event that a voluntary easement cannot be reached, the easements will be obtained through compulsory acquisition under the provisions of the <i>Acquisition of Land Act 1964</i>.</li> <li data-bbox="383 828 1787 924">■ The Proponent will continue negotiations with the State government in relation to offsetting the area of the Numinbah Forest Reserve inundated by the new FSL. In association with the State government a suitable vegetated site will be identified and made available as an offset. It is likely that this area will be sourced from the southern portion of Community Infrastructure Designation lot (Lot 4 SP164198), which is adjacent to the Numinbah Forest Reserve.</li> </ul>	6

Category	Commitments or Proposed Works	EIS Section
Surface water Resources and Water Quality	<ul style="list-style-type: none"> <li>■ During construction the Proponent will continue to operate the dam in accordance with current requirements of its Interim Resource Operations Licence. This will include the maintenance of the current level of environmental flow releases.</li> <li>■ The Proponent will undertake construction of the dam upgrade using techniques to ensure water quality and security of water supply are maintained.</li> <li>■ The construction program has been developed to ensure that the flood risk associated with the current dam configuration is not increased during construction.</li> <li>■ The flooding impacts created by the Project will be mitigated via infrastructure upgrades and the acquisition of easements.</li> <li>■ To protect the water quality in the dam and downstream of any construction areas, erosion and sediment control plans will be developed and implemented. The project will have a site water management system comprised of a series of sediment dams.</li> <li>■ To ensure water quality in the lake is maintained the Proponent will implement a vegetation clearing and maintenance strategy as detailed in the EIS.</li> <li>■ Upon completion of construction the Proponent will continue to monitor water quality in accordance with standard operational procedures.</li> <li>■ Upon completion of construction the Proponent will operate the dam to achieve the outcomes specified in the Water Resource (Gold Coast) Plan 2006.</li> </ul>	7

Category	Commitments or Proposed Works	EIS Section
Terrestrial Ecology	<ul style="list-style-type: none"> <li>■ The Proponent will implement a compensatory habitat strategy to offset the unavoidable loss of 318 ha of mapped remnant vegetation to be cleared and/or flooded below the proposed FSL, to enable permanent inundation for the water storage. The objectives of the strategy will be twofold; (a) the strategy will seek to comply with the intents of the Queensland <i>Vegetation Management Act (1999)</i> and associated Codes and Policies; and (b) the strategy will aim to provide tangible conservation and biodiversity benefits at the local and citywide scale, with an emphasis on threatened species conservation.</li> <li>■ The Proponent will develop Translocation Plans (and associated management plans for translocation sites) for significant flora such as Spiny Gardenia, Onion Cedar, <i>Plectranthus nitidus</i> and Rough-shelled Bush Nut. It is intended that suitable translocation sites be identified within the study area (above the proposed new FSL), and that propagated individuals of the target species be planted at several sites. These sites will be subject to active management to reduce threatening processes such as weed invasion and fire.</li> <li>■ Collection of seeds and cuttings and propagation trials for significant flora known from the study area and the establishment of ex-situ populations of those species will be implemented. Pilot propagation and planting trials will be initiated as soon as practicable to determine the translocation potential of the target species.</li> <li>■ The Proponent will implement a plan for dealing with fauna during vegetation clearing and construction which will outline protocols for dealing with injured wildlife and other necessary actions relating to fauna.</li> </ul>	9
Aquatic Ecology	<ul style="list-style-type: none"> <li>■ Investigations into an upstream fish passage based on a trap and transfer system will be undertaken by the Proponent.</li> <li>■ The Proponent will carry out additional fish research including fish distribution patterns and fish passage, to be utilized in the refinement of the design and operation of any trap and transfer system.</li> </ul>	10
Air Quality	<ul style="list-style-type: none"> <li>■ Dust deposition monitoring will be carried out in the vicinity of sensitive receptors adjacent to the construction site throughout the duration of construction.</li> <li>■ Any dust complaint will be actively investigated expeditiously and the complainant will be consulted on the outcomes and proposed future actions.</li> <li>■ The risk of impacting on local air quality will be managed as set out in the Environmental Management Plan</li> </ul>	11
Noise and Vibration	<ul style="list-style-type: none"> <li>■ While there are no specific noise guidelines for the construction activities a noise level goal of LAeq 12 Hr 58 dB(A), consistent with the EPP (Noise) acoustic quality objective, has been developed for the project.</li> <li>■ A Noise and Vibration Environmental Management Plan will be developed to minimise the noise levels emitted from the construction site.</li> <li>■ Environmental noise compliance monitoring will be conducted on a 24 hour basis at two locations representative of the closest residential areas to the construction activities. Other sensitive receiver locations will be used on an ad hoc basis to monitor specific work activities or in response to a noise complaint. These measured levels will be compared to the project noise goals and reasonable and feasible remedial actions will be implemented, as required.</li> </ul>	12

Category	Commitments or Proposed Works	EIS Section
Transport and Roads	<ul style="list-style-type: none"> <li>■ A Traffic Management Plan will be developed to manage the safety and performance of motorists and community (schools) during construction. This plan will be developed in consultation with the relevant authorities and local community stakeholders.</li> <li>■ To reduce construction traffic in the Gilston and Advancetown areas the Proponent will operate a bus service for the construction work force between the construction site and key transport hubs on the Gold Coast.</li> <li>■ Prior to construction commencing a safety audit of transport routes will be undertaken and works undertaken to ensure the safe passage of construction vehicles (eg raise overhead wires, local road widening etc).</li> <li>■ An education program will be implemented for the workforce to raise and maintain awareness of issues safety and courtesy issues within the local community. Topics will include but not be limited to speed, fatigue, littering, noise, school zones etc.</li> <li>■ As part of the Construction Communication Program a system of complaint reporting, investigation and response will be initiated allowing the local community the opportunity to provide feedback on traffic and safety issues.</li> <li>■ The stability and integrity of road embankment along Nerang-Murwillumbah Road (Main Roads road 201) and Gold Coast-Springbrook Road (Main Roads road 104) will be investigated. If required works will be undertaken to maintain the stability of these road embankments</li> <li>■ The Proponent will raise a section of the Gold Coast-Springbrook Road over a length of approximately 700 m starting approximately 250 m east of the Little Nerang Creek Bridge to provide 1 in 50 year ARI flood immunity. Access to adjacent properties will be upgraded to suit the proposed new road level. Utilities will be relocated to accommodate the new road formation.</li> <li>■ The Proponent will upgrade the Pocket Road Bridge to provide an adequate level of service to the local community. GCCC and local residents will be consulted in relation to the level of service required.</li> <li>■ Vehicular access will be provided across the dam wall and saddle dams for maintenance vehicles and Emergency Services vehicles. Access will also be provided to existing fire trails immediately east of the saddle dam.</li> </ul>	13
Hazard, Safety and Risk	<ul style="list-style-type: none"> <li>■ During construction the Proponent will implement safety standards and occupational health standards that provide a basis for effective management of employee and public health and safety.</li> <li>■ The Proponent will liaise with local State Emergency Services and local paramedic and hospital services with respect to planning for Emergency response.</li> <li>■ The Proponent will complete a Failure Impact Assessment Study according to ANCOLD guidelines.</li> <li>■ Safety management systems will be developed for all operations in line with current guidelines as published by ANCOLD.</li> <li>■ An updated Operations and Maintenance manual will be prepared for the dam.</li> </ul>	14



Category	Commitments or Proposed Works	EIS Section
Waste Management	<ul style="list-style-type: none"> <li>■ The Proponent will develop a waste management plan for the site which will include monitoring and auditing.</li> </ul>	15
Socio Economic	<ul style="list-style-type: none"> <li>■ During the approvals and construction phase of the Project the Proponent will continue ongoing communication with the local community and stakeholders regarding such things as the Project approval process, timelines, key Project milestones, regular construction updates, advice on blasting, transport issues and the results of EMP monitoring . This will be delivered by a site based dedicated communications team.</li> <li>■ The Proponent will provide a complaints response system including promotion and provision of phone contact with construction management staff during hours of construction, and a follow up procedure which notifies complainants within 24 hours of the intended response to the issue raised.</li> <li>■ To off set the inundation of the existing recreation facilities adjacent to the lake a new lakeside park will be constructed to the west of the spillway in the vicinity of the quarry.</li> </ul>	16
Cultural Heritage	<ul style="list-style-type: none"> <li>■ The Proponent will prepare a Cultural Heritage Management Plan (CHMP) and meet the duty of care standards set by the <i>Aboriginal Cultural Heritage Act 2003</i>.</li> <li>■ The Proponent will continue to engage with endorsed Aboriginal parties to develop the CHMP in order to manage the Aboriginal cultural heritage of the area in a culturally appropriate fashion in the context of the proposed development.</li> <li>■ In order to minimise the risk of accidental damage to Aboriginal cultural heritage features the Proponent will incorporate cultural heritage awareness into worker induction programs.</li> <li>■ The Guinea family gravesites will be relocated to an accessible location in a parkland setting. A plaque will be supplied commemorating the Guinea family graves. This process will be carried out with full sensitivity to the nature of the activity and in close consultation with the Guinea family and other interested community members as well as relevant local and State Government agencies.</li> </ul>	17
Visual Amenity	<ul style="list-style-type: none"> <li>■ Existing vegetation will be retained on site and only removed where necessary. In particular, a buffer should remain between the clay borrow area and Duncan Road.</li> <li>■ Waste generated during construction will be collected and stored neatly on the construction site and removed from site as soon as possible.</li> <li>■ The Proponent will ensure that areas where vegetation is removed for construction activities that the areas are progressively rehabilitated to reduce visual impacts.</li> <li>■ Dead/dying vegetation which becomes inundated and is visible from prominent viewing locations will be cleared.</li> <li>■ Rehabilitation of the quarry and clay borrow area be completed as site works are completed. Rehabilitation will incorporate a selection of indigenous and fast growing plant species that are endemic to the site.</li> <li>■ Lighting required for safety and security will be focussed on the areas required, with shields around the globes to limit extraneous light where practical. Lighting of the site will conform to Australian Standards.</li> </ul>	18

## Conclusions and Recommendations

The Hinze Dam Stage 3 project as assessed in this EIS will deliver Gold Coast City Council's three key project objectives in relation to flood mitigation, water supply and dam safety. The project will provide significant economic and social flood mitigation benefits to the Nerang River flood plain. Water supply benefits will be provided to both the Gold Coast and the wider South east Queensland region through increased water supply and security. Over arching these objects the project will deliver an upgraded facility that will be fully compliant with current State and National dam safety requirements and guidelines.

The scale of the Hinze Dam Stage 3 project is such that during the construction phase the project will impact on local communities adjacent to the dam. Limited impacts were identified during the operations phase of the project. The impacts both during construction and operation will require proactive and consultative management to meet community and regulator expectations.

Considering the benefits and impacts of the project presented in this EIS, it is recommended that the project proceed subject to:

- developing and implementing detailed environmental management plans for the construction phase and operation phase; and
- implementation of the specific Proponent commitments set out in **Appendix G** of this EIS.

The Proponent requests that the Coordinator – General:

- assesses the EIS;
- recommend the Hinze Dam Stage 3 project proceed; and
- state conditions for the project under section 39 of the *State Development and Public Works Organisation Act 1971*.

## Submissions on the EIS

Members of the community, organisations and Government agencies are invited to make formal submissions on the EIS, in accordance with the SDPWO Act. Submissions are to be written and signed by each person making the submission. The submission should state the name and address of the each person making the submission and state the grounds of the submission and the facts and circumstances relied on in support for the submission.

The Coordinator General will assess the EIS against the ToR. The Coordinator General will consider the properly made submissions. Copies of all submissions will be provided to the Proponent. All submissions will be treated as public documents, unless the author requests that the submission be treated as a confidential submission.

Submissions are to be received by the Coordinator General on or before the last day of the submission period.

Written submissions are to be addressed to:

The Coordinator-General  
Attention: EIS Project Manager  
Hinze Dam Stage 3 Project  
SEQ Water Grid, Department of Infrastructure  
PO Box 15009  
BRISBANE CITY EAST QLD 4002

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