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## 20. Conclusions and Recommendations

### 20.1 Conclusions

The conclusions drawn from the environmental impact assessment process relate primarily to the key issues underlying the Hinze Dam Stage 3 Project in terms of:

- implications in relation to flood mitigation, water supply and dam safety;
- economic implications;
- project delivery impacts and mitigation measures;
- operational impacts and mitigation measures; and
- the environmental management approach proposed during project delivery and operation.

#### 20.1.1 Implications in Relation to Flood Mitigation, Water Supply and Dam Safety

The Gold Coast City Council has been working towards delivering a range of significant benefits to the community through the implementation of the Hinze Dam Stage 3 Project. The benefits will be delivered via the achievement of the three key Project objectives, namely:

- 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 lower Nerang River flows through dense residential, community and commercial areas in the suburbs behind the beaches of the Gold Coast. Major rainfall events in the Nerang River catchment causes flooding to properties and infrastructure in this area. Currently 4441 properties downstream of Hinze Dam could be affected in a 1 in 100 year Average Recurrence Interval (ARI) flood event. The Project will significantly reduce the number of properties flooded in this event down to 1157, a 74 % reduction. It will also significantly reduce the impacts flooding currently has on public utilities and infrastructure on the Nerang River floodplain. Flood reduction benefits will occur for a wide range of flood events.

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.

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 Project will increase the storage volume of the dam and the water supply available from the dam.

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

The Project meets the requirements of the Gold Coast Waterfuture Strategy 2006 – 2056 and the South East Queensland Regional Water Supply Strategy. The Project also delivers on the requirements of the emergency Regulation (made under the *Water Act 2000*), *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<sup>2</sup> and detailed in Gold Coast City Council’s (draft) Local Growth Management Strategy.

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)<sup>3</sup>. The Project configuration proposed will comply with these guidelines and standards. The raised dam and modified spillway will be capable of passing the Probable Maximum Flood (PMF) determined for the dam without overtopping of the dam crest.

### 20.1.2 Economic Implications

The Project is expected to cost \$382.1 million in total, comprised of approximately \$30.9 million in the design and engineering and \$351.2 million in the construction of the dam. It is expected 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 direct labour force associated with the design phase of the development includes approximately 75 full time equivalent (FTE) employees. The construction workforce is expected to build up and peak at approximately 230 FTE, with an average workforce of approximately 162 FTE employees per month over the 36 month construction phase.

The economic impact of the design and construction phases of the Project on both the Queensland and the Gold Coast Local Government Area (LGA) economies are summarised in **Table 20-1**.

■ **Table 20-1 Impact of Design & Construction Phase (\$ 2006)**

|         | Queensland   |                   |              |            | Gold Coast LGA |                   |              |            |
|---------|--------------|-------------------|--------------|------------|----------------|-------------------|--------------|------------|
|         | Output (\$M) | Value Added (\$M) | Income (\$M) | Emp. (FTE) | Output (\$M)   | Value Added (\$M) | Income (\$M) | Emp. (FTE) |
| Direct  | \$310.3      | \$133.7           | \$46.0       | 602        | \$248.9        | \$107.7           | \$35.0       | 532        |
| Flow-on | \$224.3      | \$92.4            | \$49.2       | 849        | \$174.6        | \$71.4            | \$37.8       | 569        |
| Total   | \$534.6      | \$226.1           | \$95.2       | 1451       | \$423.5        | \$179.1           | \$72.8       | 1100       |

Source: Hinze Dam Alliance based on data from Queensland Office of the Government Statistician (2002)

The economic impact of the design and construction phase of the Project is positive. The key points from the impact assessment include an additional:

- \$534.6 million in output (direct and indirect) to the Queensland economy, with \$423.5 million to the local Gold Coast economy;
- \$226.1 million in value added production (direct and indirect) to the Queensland economy, with \$179.1 million to the local Gold Coast economy;
- \$95.2 million in wages and salaries (direct and indirect) to the Queensland economy, with \$72.8 million to the local Gold Coast economy; and
- 1 451 employment positions over the life of the Project (direct and indirect) to the Queensland economy, with 1 100 to the local Gold Coast economy over the life of the Project.

<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> Queensland Government (2005) South East Queensland Regional Plan 2006 - 2026

<sup>3</sup> NRW – Draft guidelines on the selection of acceptable flood capacity for dams (Information note)

The nature of the operations at Hinze Dam is not expected to change materially following the completion of the upgrade. Therefore there is not expected to be any significant change associated with the economic impact of the operation.

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 one 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.

By combining the range of damage estimates for the floods considered for each case considered an average annual damage (AAD) or annual damage cost to the community for accepting a given floodplain condition is determined. The AAD is commonly used in flood management studies, as it is a useful single value indicator of the financial vulnerability of a community to flooding in existing conditions and of the benefit of proposed mitigation schemes. The benefits of flood mitigation will be the average annual losses prevented by the mitigation measure.

The net economic damages from each flood event, the average annual damages (AAD) value generated for the base case (existing conditions) and the Project scenario and the reductions achieved are shown in **Table 20-2**.

■ **Table 20-2 Average Annual Damages (AAD): Comparison (\$2006)**

| Flood Event<br>ARI | Net Economic Damages (\$M) |                           |                    |
|--------------------|----------------------------|---------------------------|--------------------|
|                    | Base Case<br>(\$M)         | Project Scenario<br>(\$M) | Reduction<br>(\$M) |
| 10                 | \$16.4                     | \$14.0                    | \$2.4              |
| 20                 | \$28.9                     | \$25.1                    | \$3.8              |
| 50                 | \$46.1                     | \$35.8                    | \$10.3             |
| 100                | \$124.8                    | \$47.9                    | \$76.9             |
| 200                | \$285.1                    | \$83.1                    | \$202.0            |
| 500                | \$568.9                    | \$160.9                   | \$408.0            |
| 1 000              | \$1176.3                   | \$749.6                   | \$426.7            |
| 10 000             | \$1366.7                   | \$1310.0                  | \$567.0            |
| PMF                | \$3047.2                   | \$2790.7                  | \$256.5            |
| <b>AAD</b>         | <b>\$7.66</b>              | <b>\$4.59</b>             | <b>\$3.07</b>      |

Notes: ARI: Average recurrence interval. PMF: Probable maximum flood.  
Source: Hinze Dam Alliance based on GCCC hydraulic modelling

From this table it can be seen that the Project delivers a 40 percent reduction (\$3.07M) in the Average Annual Damages caused by flooding over the existing conditions case. This reduction in flood damages will be a significant benefit to the regional, State and national economies.

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

### 20.1.3 Design for sustainability

The optimisation and development of the Project has occurred in conjunction with an extensive process of environmental investigations, technical design and community consultation. Within the scope of the Project objectives the Alliance has strived to reduce, if not avoid potential impacts from design, construction and operation. Design criteria and impact mitigation strategies were developed in consultation with relevant Federal, State and local government agencies, community groups and stakeholder groups.

In addition to this integrated process the design and construction elements were developed within a framework of sustainability relating to:

- soils and water management;
- air quality management
- noise management
- greenhouse gases emissions management
- resource use, re- use and management;
- vegetation management;
- compensatory habitat, rehabilitation and regeneration;
- environmental management; and
- community consultation and capacity building.

The Project is significant in terms of its scale, construction duration and operational life. However the forward planning of GCCC in acquiring the majority of the land required for the Project and amalgamating it into one lot covered by a Community Infrastructure Designation (CID) means the Project will have limited impacts on the land use and opportunities in the areas adjacent to the dam. Dam operations will continue at existing levels following completion of the Project, with the exception of the introduction of the fish transfer device. This will not significantly alter the nature of operations on the site. The existing recreational facilities will be upgraded with a more integrated parkland area with enhanced facilities such as upgraded boat ramps, walking/ cycling routes and lakeside park. However this will not alter the nature of the experience of visiting Hinze Dam and Advancetown Lake and will be consistent with the feedback from stakeholders that were consulted.

Being aware of the long term nature of the Project the Alliance's optimisation and design development process has worked to minimise long term impacts through design and rehabilitation measures and to off-set construction impacts. This will be achieved through using a range of mitigation measures which have the potential to provide lasting benefits in the communities impacted upon by construction and in the wider Gold Coast region. Some of these mitigation measures provide opportunities for community and interest group involvement, building awareness, capacity and ownership of the significant community resources in and around the dam. An example of this are some of the elements of the delivery of the compensatory habitat strategy, which involves the rehabilitation of areas of native vegetation and the translocation of endangered, vulnerable and rare flora species. Opportunities exist for an integrated approach involving community groups, the Alliance, State government agencies and the Alliance.

#### **20.1.4 Project Delivery Impacts and Mitigation Measures**

The construction of the Hinze Dam Stage 3 Project will potentially generate a range of environmental, economic and social impacts. A summary of the more significant potential impacts and the proposed mitigation measures are provided in this section.

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

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 will 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.

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

The areas surrounding Hinze Dam are predominately comprised of rural residential development, natural areas contained within National Park and Forest Reserve, 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.

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.

### **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.

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 affected 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 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.

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 Project. Water quality in Hinze Dam will be protected during construction through the implementation of key management mitigation measures such as 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.

### **Terrestrial Ecology**

The Project will involve the loss of approximately 318ha 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 endangered, vulnerable, or rare (EVR) flora and fauna. 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 flora and fauna 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.

## Air Quality and Greenhouse Gases

The Project has the potential to generate air quality impacts at sensitive receivers as a result of construction works. 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. Appropriate measures will be incorporated into site and construction management to mitigate potential impacts. These dust control strategies have been incorporated into the Project Environmental Management Plan.

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 the dam walls from the Project site. 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

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 will be implemented, as required. 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 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 transport 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. 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.

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.

### **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 and associated 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 \$534.6 million in output (direct and indirect) to the Queensland economy, with \$423.5 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.

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**

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 the Study 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. 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 during construction 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 aspects of the Project that will have the most significant visual impacts are the raising of the dam wall, quarrying activities and the clay borrow area, vegetation clearing, and the relocation of the recreation area. In response the site will be managed to minimise waste, control night lighting and 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.

### **20.1.5 Operational Impacts and Mitigation Measures**

The range of operational impacts for the Project is relatively small compared with the project delivery stage. Key impacts and mitigation measures are discussed below.

### **Land Use and Infrastructure**

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 cafe facility, which will provide a high level of community facility which is currently not available at the site.

The FSL and 1 in 100 year 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 is currently negotiating tenure in the form of easements with land owners and State Government over the impacted properties.

### **Aquatic Ecology**

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.

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 upon 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.

The Project will include a trap and transfer system to provide upstream fish passage.

## Transport and Roads

The current use of Hinze Dam will not change significantly on completion of the Project. As such, traffic flows in the regional 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 only major change that will occur is the closure of the dam wall to public vehicles. In response to the need to close access across the dam wall, maintenance vehicles will be permitted to access the dam crest via the spillway bridge in order to service facilities on 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. As part of the recreation facilities access will be provided across the dam wall for pedestrians and cyclists.

## Socio-Economic

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.

The Project will significantly reduce the number of properties flooded over a broad range of flood events. The number of properties protected from over floor flooding is summarised in **Table 20-3**.

### ■ Table 20-3 Reduction in the Number of Properties Flooded

| Flood Event ARI | Reduction in properties flooded |                        |       |
|-----------------|---------------------------------|------------------------|-------|
|                 | Residential                     | Commercial/ Industrial | Total |
| 10              | 36                              | 4                      | 40    |
| 20              | 126                             | 18                     | 144   |
| 50              | 449                             | 49                     | 498   |
| 100             | 3166                            | 118                    | 3284  |

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 the economic impact of the Project is overwhelmingly positive.

### 20.1.6 Approach to Environmental Management

Management of the impacts of construction of the Project will be pro actively delivered using a performance based Environmental Management Planning process. This is to ensure that community concerns are addressed and environmental values are retained.

The objective of the draft Environmental Management Plan (EMP) is to ensure all potential environmental impacts that could reasonably be expected to occur during the Project are managed and fall within acceptable and agreed limits. This will be achieved through pro-active environmental management. Accordingly, emphasis is placed upon integrating the environmental management planning with design, construction methods and operation planning.

The requirements of this plan are applicable to all on-site work carried out. All subcontractors and suppliers will be bound to comply with the requirements of this plan, in so far as they are applicable to the nature and scope of their work.

In particular the EMP will:

- establish procedures that will minimise adverse environmental, social and economic impacts;
- facilitate compliance with the relevant Legislation;
- provide practical and achievable plans for managing the Project to ensure that environmental requirements are complied with, by providing an integrated planning framework for comprehensive monitoring and control of construction and operational impacts; and
- provide documented evidence that the Project is being managed in an environmentally acceptable manner.

A draft EMP and Emergency Response Plan (ERP) has been prepared to provide input into the detailed planning and design phase of the Project.

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.

## 20.2 Proponent Commitments

The key commitments required for implementation of the Project both during construction and operation are detailed in **Table 20-4**. 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.

■ **Table 20-4 Proponent Commitments**

| 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="383 277 1787 373">■ 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="383 405 1787 478">■ 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="383 510 1787 558">■ 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="383 590 1787 638">■ 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="383 670 1787 694">■ Access across the top of the main dam embankment will be maintained for Maintenance and Emergency vehicles</li> <li data-bbox="383 726 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="383 831 1787 927">■ 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          |

### 20.3 Recommendations

The Hinze Dam Stage 3 Project as assessed in this EIS will deliver Gold Coast City Councils 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 the Gold Coast 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, consultative management to meet community and regulator concerns and expectations.

Considering the benefits and impacts of the Hinze Dam Stage 3 Project presented in this EIS, it is recommended that the Project proceed subject to:

- a) Developing and Implementing detailed environmental management plans for the construction phase and operation phase; and
- b) Implementation of the specific Proponent commitments set out in **Section 20.2** of this EIS.

In making the recommendation, the Coordinator – General is requested to:

- i. Assess the EIS
- ii. Recommend the Hinze Dam Stage 3 Project proceed
- iii. State conditions for the Project under section 39 of the *State Development and Public Works Organisation Act 1971*