3.6 Nerang River: Hinze Dam Stage III Raising

3.6.1 General

Hinze Dam is located on the Nerang River approximately 15 kilometres southwest of the town of Nerang. With a catchment of 207 km², Hinze Dam supplies almost all of Gold Coast City’s water supply needs. It is a clay core rockfill dam with a concrete spillway section on the left abutment. The dam was initially completed in 1976 and then upgraded in 1989 to a storage capacity of 161,070 ML.

General information regarding Hinze Dam is listed in Table 3.6.1.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Project</td>
<td>Hinze Dam</td>
</tr>
<tr>
<td>Other Names</td>
<td>N/A</td>
</tr>
<tr>
<td>Catchment</td>
<td>Numinbah Valley &amp; Springbrook Plateau</td>
</tr>
<tr>
<td>Catchment Area</td>
<td>207 km²</td>
</tr>
<tr>
<td>Stream</td>
<td>Nerang River</td>
</tr>
<tr>
<td>Location (AMTD)</td>
<td>36.4 km</td>
</tr>
<tr>
<td>Location (Latitude / Longitude)</td>
<td>28°03'00&quot; S / 153°17'05&quot; E</td>
</tr>
<tr>
<td></td>
<td>(Map Grid of Australia (MGA), Zone 56. Datum = GDA94)</td>
</tr>
<tr>
<td>Location (Easting / Northing)</td>
<td>6897215 / 527987</td>
</tr>
<tr>
<td></td>
<td>(Map Grid of Australia (MGA), Zone 56. Datum = GDA94)</td>
</tr>
<tr>
<td>Dam Type</td>
<td>Earth and Rockfill Dam</td>
</tr>
<tr>
<td>Current Capacity</td>
<td>161,070 ML</td>
</tr>
<tr>
<td>Current Surface Area</td>
<td>988 ha</td>
</tr>
</tbody>
</table>

This report has used information provided by Gold Coast Water in the form of a memorandum dated 8 June 2005 “Hinze Dam Cost Estimates” to Gold Coast Waterfuture Advisory Committee members and advisors from the Senior Planning Engineer, Gold Coast Water and a supporting report prepared by Sinclair Knight Merz in May 2005.

This information was supplemented by additional yield studies undertaken by NRM&W in October 2005.
3.6.1.1 Dam Augmentation Options

Augmentation options included in the May 2005 SKM report are summarised below. The existing dam Stage 2 has a Full Supply Level (FSL) of EL82.2m (AHD). All options in the SKM 2005 report include a flood mitigation air space of 79,000 ML and comprise:

- Hinze 2 + (Option 5C), FSL remains at EL82.2m, with a Spilling Level of EL89.2m. (Flood mitigation only with existing Full Supply Level unchanged).
- Hinze 2 ++, FSL raised 1.3m to EL83.5m, with a Spilling Level of EL90.4m.
- Hinze 2 +++, FSL raised 3.4 m to EL85.6m, with Spilling Level of EL92.4m.
- Hinze 3 minus, FSL raised 12.3m to EL93.5m, with a Spilling Level of EL98.7m.

3.6.2 Storage Capacity

The storage capacity curves shown in Figure 3.6.1 and Figure 3.6.2 are based on information provided by NRM&W for the purpose of this study. The information was derived from 2003 survey data and was sourced from Gold Coast Water via Cardno Qld Pty Ltd.

Figure 3.6.1 Hinze Dam: Storage Capacity Curve
3.6.3 Potential Additional Supply

Yield estimates were undertaken by NRM&W in November 2005 for the purpose of this study and are indicated in Table 3.6.2 for various levels of dam development. The yields indicated are preliminary estimates of the historical no-failure yield that could be extracted from the Hinze Dam / Little Nerang Dam system.

A dead storage volume of 2,180 ML coinciding with the level of the existing lower level intake, that is, EL 45.6m AHD was adopted for the purpose of this study.

It is important to note that no buffer or contingency storage allowance has been included in the yield assessments.

Nominal riparian and environmental flow releases of 7.26 ML / day into the Nerang River downstream of the town water supply diversion and 0.86 ML / day into Little Nerang Creek were used in the assessment, on the basis of current practice, though such requirements will be subject to the outcomes of the Nerang River Water Resource Plan.
<table>
<thead>
<tr>
<th>Full Supply Level – interpolated from revised storage capacity curve 2003 (m)</th>
<th>Storage Volume (ML)</th>
<th>Storage Surface Area – revised 2003 (Ha)</th>
<th>Yield (ML/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>82.2 (Existing Full Supply Level)</td>
<td>161,090</td>
<td>988</td>
<td>76,900</td>
</tr>
<tr>
<td>85.9</td>
<td>200,000</td>
<td>1,112</td>
<td>79,000</td>
</tr>
<tr>
<td>90.0</td>
<td>248,800</td>
<td>1,280</td>
<td>81,700</td>
</tr>
<tr>
<td>95.3</td>
<td>323,000</td>
<td>1,510</td>
<td>85,050</td>
</tr>
<tr>
<td>100.0</td>
<td>398,600</td>
<td>1,724</td>
<td>88,450</td>
</tr>
</tbody>
</table>

### 3.6.4 Natural Environment

#### 3.6.4.1 Vegetation

Generally the vegetation likely to be cleared is remnant vegetation (including some ‘of concern’ regional ecosystems) and therefore an application to clear the vegetation would be required. Such an application would be assessed under the Regional Vegetation Management Code for Ongoing Clearing Purposes for South East Queensland, which restricts clearing in State Wildlife Corridors. The regional ecosystem map also shows that a State Wildlife Corridor intersects the Nerang River northeast of Beechmont and is likely to cover part of the inundation area (letter from Vegetation Management NRM&W, 10 August 2005, to Gold Coast Water).

#### 3.6.4.2 Wildlife

As previously stated, the regional ecosystem map also shows that a State Wildlife Corridor intersects the Nerang River north east of Beechmont and is likely to cover part of the inundation area (Reference listed in Section 3.6.4.1). It is therefore also likely that substantial impacts of the project on wildlife would occur.

#### 3.6.4.3 River

At least five species of fish of conservation significance are likely to be in this area. They are, the ornate rainbow fish, Australian Bass, Marjories’ hardyhead, freshwater mullet and the lungfish. The existing dam provides a significant barrier to fish in the river, and further raising results in an incremental change (Reference 3).

#### 3.6.4.4 Conservation Significance

A parcel of land at the headwaters of the proposed development is currently zoned ‘Forest Reserve’ (“Numimbah Reserve: 702 AP 6298”). Forest Reserves are managed under the Nature Conservation Act, 1992. The purpose of a Forest Reserve is an
interim tenure to assist with the dedication of that land as a National Park or some other form of protected tenure.

In addition, as outlined above, the proposed development may have some impact on conservation values such as habitat loss and changes to the in-stream regime, thereby impacting on wildlife or fish species.

### 3.6.5 Social and Recreation

A total of 29 residents were reported as being affected by this proposal in 1991. Current data was not researched.

Hinze Dam currently provides recreational value and although this would be obstructed during construction, these values should not be diminished by the proposed project. The Numinbah Environmental Education Centre, which is located on the Nerang River near the intersection of the Nerang-Murwillumbah Road and Pine Creek Road would be inundated as a result of the proposed raising. These two roads would also obviously require realignment.

Hinze Dam is used for flood mitigation purposes and Gold Coast City Council have passed a resolution, to ensure that this purpose is continued for future raising proposals.

### 3.6.6 Cultural / Heritage

A search of the heritage databases listed in Section 2 of this report indicates that there are no heritage sites impacted by this proposed project. However, the Gold Coast City Council’s Planning Overlay Map OM3-9 (Heritage Buildings and Sites) indicates that several lots south of Little Nerang Creek are listed as “Places with cultural heritage (historic) significance”. For FSLs greater than approximately EL90.0, these lots would be impacted by inundation to varying degrees.

No information was located on archeological impacts, but based on general knowledge of the area, there is likely to be an impact on aboriginal heritage (Reference 3).

### 3.6.7 Strategic Land Use Planning

Relevant Gold Coast City Councils Planning Scheme information is as listed:

- Land Use Themes – Planning Strategy Map PS1 – designated “Open space”;
- Gold Coast Character Map – Planning Strategy Map PS10 – designated “River Valleys”;
- The area around Hinze Dam is not affected by Rural Subdivision plans.

As discussed in Section 3.6.4.4, a parcel of land in the headwaters of the proposed development is currently zoned “Forest Reserve”.

South east Queensland Regional Water Supply Strategy
Hinze Dam Raise AMTD 36.4 km
3.6.7.1  SEQ Regional Plan
A search of the SEQ Regional Plan mapping indicates that the area of the proposed Hinze Dam raising is currently categorised “Regional Landscape and Rural Production Area”.

The SEQ Infrastructure Plan indicates that no new major infrastructure or major upgrades to infrastructure is planned for this site.

3.6.8  Agriculture
The land affected by inundation up to EL93.5m is classified as Class C1 or Class C2 (pasture land) as shown on agricultural land capacity mapping.

3.6.9  Forestry
There are small pockets of land used for forestry purposes, according to land use mapping; however, the impact of the inundation is likely to affect only the fringe of such areas.

3.6.10  Extractive Industry
No mineral resources are known in the study area.

3.6.11  Primary Limitation on Storage Capacity
The potential restriction posed by the Forest Reserve needs to be further investigated before a decision on development level can be made.

The primary constraint on incremental storage capacity is anticipated to relate to the incremental cost of water. The capacity to pass and mitigate floods may also be a significant consideration.

3.6.12  Project Capital Cost
The project capital cost includes:

1. Dam construction cost;
2. Land purchase costs;
3. Relocation of electricity distribution lines;
4. Relocation of telecommunication lines; and,
5. Relocation of shire facilities.

Cost estimates for items 1 to 5 above have been included in the costs to date and are indicated in the following sections. An estimate of raw water distribution augmentation costs has not been undertaken as part of this assessment though these are anticipated to be relatively low compared with other options that are not connected to existing
delivery networks. The estimates do not take into consideration the cost of financing during construction or operational costs.

### 3.6.12.1 Estimated Cost of Dam Construction

The estimated cost of raising Hinze Dam is given in the SKM May 2005 report and is shown in Table 3.6.3.

#### Table 3.6.3 Hinze Dam Augmentation Cost Estimates

<table>
<thead>
<tr>
<th>Description</th>
<th>Hinze 1</th>
<th>Hinze 2++</th>
<th>Hinze 2+++</th>
<th>Hinze 3 minus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raising of the existing dam</td>
<td>$6,733,977</td>
<td>$7,368,070</td>
<td>$8,733,132</td>
<td>$23,613,560</td>
</tr>
<tr>
<td>Raising of the existing saddle dam</td>
<td>$803,382</td>
<td>$1,012,092</td>
<td>$1,400,272</td>
<td>$2,650,030</td>
</tr>
<tr>
<td>Construction of New Saddle Dam</td>
<td>$350,476</td>
<td>$527,126</td>
<td>$2,428,843</td>
<td>$7,777,690</td>
</tr>
<tr>
<td>Spillway Construction</td>
<td>$5,436,628</td>
<td>$5,781,472</td>
<td>$7,615,087</td>
<td>$23,620,295</td>
</tr>
<tr>
<td>Upper Intake Tower Extension</td>
<td>$163,450</td>
<td>$287,640</td>
<td>$379,935</td>
<td>$748,700</td>
</tr>
<tr>
<td>Lower Intake Tower Extension</td>
<td>$1,773,250</td>
<td>$1,930,440</td>
<td>$2,073,135</td>
<td>$3,640,500</td>
</tr>
<tr>
<td>Spillway Gates</td>
<td>$700,000</td>
<td>$700,000</td>
<td>$700,000</td>
<td>$700,000</td>
</tr>
<tr>
<td>Other Services</td>
<td>$6,672,232</td>
<td>$7,451,368</td>
<td>$9,214,080</td>
<td>$19,150,155</td>
</tr>
<tr>
<td>Net Construction Cost</td>
<td>$22,633,395</td>
<td>$25,058,208</td>
<td>$32,544,83</td>
<td>$81,900,930</td>
</tr>
<tr>
<td>Other Costs</td>
<td>$5,468,848</td>
<td>$6,038,679</td>
<td>$7,797,953</td>
<td>$19,396,719</td>
</tr>
<tr>
<td><strong>Total Cost (A$)</strong></td>
<td><strong>$28,102,242</strong></td>
<td><strong>$31,096,887</strong></td>
<td><strong>$40,342,436</strong></td>
<td><strong>$101,297,649</strong></td>
</tr>
<tr>
<td>Anchorage of Concrete Gravity Dam (Spillway)</td>
<td>$1,902,295</td>
<td>$1,678,409</td>
<td>$1,630,615</td>
<td>$2,396,542</td>
</tr>
<tr>
<td><strong>Total (A$) including Spillway Anchors</strong></td>
<td><strong>$30,004,538</strong></td>
<td><strong>$32,775,297</strong></td>
<td><strong>$41,973,051</strong></td>
<td><strong>$103,694,191</strong></td>
</tr>
</tbody>
</table>

1 The cost of Hinze 2+ is associated with raising the spill level to 89.2 to provide for flood mitigation effects and to enable the PMF to be passed. The FSL remains at a level of 82.2m and thus no additional water storage is provided.

The cost estimates and increased yield for the raising of Hinze Dam are listed in Table 3.6.4.

Cost estimates were undertaken by SKM assuming two different concept designs and a gated spillway for all options. The estimates were sourced from the report “Raising Hinze Dam – Cost Estimate for Options” May 2005.
Table 3.6.4 Hinze Dam Stage III: Estimated Dam Cost / Yield Characteristics

<table>
<thead>
<tr>
<th>Option</th>
<th>Storage Volume interpolated from GCC capacity curve (ML)</th>
<th>TOTAL Yield (^5) (ML/a)</th>
<th>Incremental Yield (ML/a)</th>
<th>Estimated Cost SKM 2005 (^4) ($Million)</th>
<th>Incremental Costs of Providing Additional Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinze 2+ (FSL 82.2)</td>
<td>161,073</td>
<td>76,900</td>
<td>30.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hinze 2++ (FSL 83.5)</td>
<td>174,219</td>
<td>77,609(^3)</td>
<td>709</td>
<td>32.8</td>
<td>2.8</td>
</tr>
<tr>
<td>Hinze 2+++ (FSL 85.6)</td>
<td>196,617</td>
<td>78,813(^3)</td>
<td>1,913</td>
<td>42.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Hinze 3 minus (FSL 93.5)</td>
<td>296,215</td>
<td>84,841(^3)</td>
<td>7,941</td>
<td>103.7</td>
<td>73.7</td>
</tr>
<tr>
<td>FSL 95.3</td>
<td>323,000</td>
<td>85,050</td>
<td>8,150</td>
<td>125.2(^1)</td>
<td>95.2</td>
</tr>
<tr>
<td>FSL 100.0</td>
<td>398,600</td>
<td>88,450</td>
<td>11,550</td>
<td>190.8(^1)</td>
<td>160.8</td>
</tr>
</tbody>
</table>

Notes
1. Extrapolated SKM data for FSL greater than EL 93.5m.
2. Interpolated storage volume (revised 2003 storage curve).
4. Estimated cost includes provision for flood storage and upgrade works to pass the PMF. The component of cost attributable to additional water supply has been separated out in Table 3.6.6.
5. 2005 NRM&W estimate. Dead Storage assumed to be 2180 ML.

The costs above do not include:
- Approvals and EIS process;
- Compensatory habitat costs due to permanent inundation;
- Environmental management or implementation, for example, the provision of fish lifts;
- Legal aspects (native title and cultural heritage); or,
- Water supply infrastructure works downstream of dam.

Figure 3.6.3 shows the cost versus incremental yield relationship for the raising of Hinze Dam for various full supply levels.
Figure 3.6.3  Hinze Dam Stage III: Yield / Dam Cost Comparison

<table>
<thead>
<tr>
<th>Estimated Capital Cost of Dam Raise</th>
<th>Incremental Historical No Failure Yield (ML/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinze 3 minus</td>
<td>$200,000,000</td>
</tr>
<tr>
<td>Hinze 2++</td>
<td>$180,000,000</td>
</tr>
<tr>
<td>Hinze 2++</td>
<td>$160,000,000</td>
</tr>
<tr>
<td></td>
<td>$140,000,000</td>
</tr>
<tr>
<td></td>
<td>$120,000,000</td>
</tr>
<tr>
<td></td>
<td>$100,000,000</td>
</tr>
<tr>
<td></td>
<td>$80,000,000</td>
</tr>
<tr>
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<tr>
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<td>9,000</td>
</tr>
<tr>
<td>10,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

Note: Nominal environmental flow requirements have been taken into account in determination of the yields shown in this graph as outlined in Section 3.6.3.

3.6.12.2  Estimated Cost of Land Purchases

For the purpose of this report and to enable economic comparison to be made with other damsites, the cost of land acquisition was based on $15,000 per hectare for the additional land required. Even though some of this land may already have been acquired, the cost of purchase of land has been added to the construction cost so that consistent economic comparisons between alternative sources of water supply can be made.

It has been assumed that land would be acquired to the extent defined by a 200m buffer area surrounding the full supply level for each option, less the area of the existing full supply level and a similar 200m buffer area. The area within this buffer zone was obtained from GIS datasets using contour information provided by NRM&W.

No determination of the impacts of a flood margin have been considered, though it is anticipated that any additional land required beyond the 200m buffer zone, would not be significant.

In some instances, it may be necessary to acquire whole properties. The portions of these properties outside the buffer zone would, to the extent practical, be resold. An

1 GIS = Geographical Information Systems
allowance of 50% has been added to the land portion of the estimated cost in order to cover:

- Legal fees, subdivision and transfer costs;
- Re-establishment of access to properties isolated by the storage; and,
- Retention of unsaleable portions of properties outside the buffer zone.

An offset compensatory package may need to be negotiated with EPA in respect of areas of Forest Reserve required, though no specific allowance has been made in the estimate above the assumed cost per ha.

The estimated cost of acquisitions is summarised in Table 3.6.5.

<table>
<thead>
<tr>
<th>Full Supply Level</th>
<th>Area (ha)</th>
<th>Estimate of Acquisitions (including buildings)</th>
<th>50% Allowance $M</th>
<th>Total Acquisition Cost $M</th>
</tr>
</thead>
<tbody>
<tr>
<td>83.5</td>
<td>40</td>
<td>0.6</td>
<td>0.4</td>
<td>1.0</td>
</tr>
<tr>
<td>85.6</td>
<td>1,106</td>
<td>16.6</td>
<td>8.3</td>
<td>24.9</td>
</tr>
<tr>
<td>93.5</td>
<td>2,269</td>
<td>34.1</td>
<td>17.0</td>
<td>51.1</td>
</tr>
<tr>
<td>95.3</td>
<td>2,616</td>
<td>39.3</td>
<td>19.6</td>
<td>58.9</td>
</tr>
<tr>
<td>100.0</td>
<td>3,070</td>
<td>46.0</td>
<td>23.1</td>
<td>69.1</td>
</tr>
</tbody>
</table>

### 3.6.12.3 Estimated Cost of Telecommunications and Electrical Distribution Relocation

The costs for telecommunications and electrical distribution were not available for inclusion in the project cost estimates; however, these are not expected to be significant.

### 3.6.12.4 Estimated Cost of Relocation of Shire Facilities

The costs for the relocation of shire facilities were not available for inclusion in the project cost estimates.

### 3.6.12.5 Overall Estimate of Cost

The estimated cost provided by the GCCC was increased by 15% to allow for inflation in the period since the estimates had been completed and to allow for establishment, environmental management (including fish ladder / lift) and other general construction costs not included in the GCC estimates.
The unit cost of water and the marginal cost for water have been derived as the incremental cost for providing additional yield. That is, the costs for providing flood mitigation and PMF passing capacity, has been subtracted from the total cost of raising to give the costs for raising the dam to provide incremental yield.

The incremental yield was derived by subtracting the current available yield from the increased yield, which is the result of raising the dam.

The estimates do not include consideration of operational costs.

The unit cost of water and the marginal cost of water are indicated in Table 3.6.6 and Figure 3.6.4
<table>
<thead>
<tr>
<th>Option</th>
<th>FSL (m)</th>
<th>Spill Level (m)</th>
<th>Incremental Yield compared to existing structure</th>
<th>Construction cost of Dam Raising SKM $M</th>
<th>Establishment and Inflation $M</th>
<th>Estimated TOTAL construction cost of Dam Raising $M</th>
<th>Cost of Water Supply Component of Dam Raising ($M)</th>
<th>Land Acquisition $M</th>
<th>Total Cost of Water Supply Component of Dam Raising $M</th>
<th>Unit Cost of Water $/ML/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinze 2+</td>
<td>82.2</td>
<td>89.2</td>
<td>-</td>
<td>30.0</td>
<td>4.5</td>
<td>34.5</td>
<td>6.4</td>
<td>1.0</td>
<td>7.4</td>
<td>10,448</td>
</tr>
<tr>
<td>Hinze 2++</td>
<td>85.6</td>
<td>92.4</td>
<td>1,918</td>
<td>42.0</td>
<td>6.3</td>
<td>48.3</td>
<td>16.8</td>
<td>24.9</td>
<td>41.7</td>
<td>21,720</td>
</tr>
<tr>
<td>Hinze 3 minus</td>
<td>93.5</td>
<td>98.7</td>
<td>6,941</td>
<td>103.7</td>
<td>15.6</td>
<td>119.3</td>
<td>60.7</td>
<td>51.1</td>
<td>111.8</td>
<td>16,102</td>
</tr>
<tr>
<td></td>
<td>95.3</td>
<td>95.3</td>
<td>8,150</td>
<td></td>
<td></td>
<td>68.6</td>
<td>58.9</td>
<td></td>
<td>127.5</td>
<td>15,638</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>11,550</td>
<td></td>
<td></td>
<td>133.9</td>
<td>69.1</td>
<td></td>
<td>203.0</td>
<td>17,575</td>
</tr>
</tbody>
</table>

1) Cost includes cost of providing flood storage and increasing flood passing capacity to PMF

2) The cost of the water supply component of the dam raising without provision for flood storage or upgrading to pass the PMF has been derived by assuming the cost is that computed by SKM for a dam with a spillway level equal to the FSL of the dam for which the cost attributable to additional water supply only is required. For example, the cost of Hinze 2++ attributable to water supply has been computed as the cost of a dam with a spillway level of 83.5m. The cost of the water supply component of dams with a full supply level less than EL 89.2 has been derived by linear interpolation between zero cost at the current spillway level of 82.2m and the cost estimated to construct the dam to a spillway level of EL 89.2, that is, $34.5M.
Figure 3.6.4  Hinze Dam Stage III: Total Project Capital Cost / Yield Comparison
**3.6.13 Investigations Proposed to Ensure the Viability of the Hinze Dam Raising**

A number of key factors with a potential to jeopardise the viability of raising Hinze Dam have been identified. Further and more detailed investigation of those factors is recommended as summarised below in Table 3.6.7.

**Table 3.6.7 Proposed Investigations to Ensure Viability of Hinze Dam Raising**

<table>
<thead>
<tr>
<th>Investigation Proposed</th>
<th>Tasks Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield</td>
<td>Evaluate the cost and benefit of flood harvesting from adjacent streams in combination with a raised Hinze Dam.</td>
</tr>
<tr>
<td>Natural environment -</td>
<td>Investigate the implications of the proposed raising on the Numimbah Forest Reserve and other impacts on flora and fauna.</td>
</tr>
<tr>
<td>vegetation, wildlife,</td>
<td></td>
</tr>
<tr>
<td>river</td>
<td></td>
</tr>
<tr>
<td>Cultural Heritage</td>
<td>Investigate the cultural heritage values of lots south of the Little Nerang Creek, which are impacted by the raising of Hinze Dam above approximately FSL 90.0.</td>
</tr>
</tbody>
</table>

Gold Coast Water is currently progressing investigations regarding the raising of Hinze Dam.

**3.6.14 Figures 3.6.5 to 3.6.11**

The following pages contain the figures as listed below:

- Figure 3.6.5 Locality Plan
- Figure 3.6.6 Satellite and Cadastral Plan
- Figure 3.6.7 General Geological Plan
- Figure 3.6.8 Land Use Plan
- Figure 3.6.9 Environmental and Vegetation Plan
- Figure 3.6.10 Agricultural Land Capacity Plan
- Figure 3.6.11 Zoning Plan (Information not available)
- Figure 3.6.12 EPA Regional Ecosystems (reproduced with permission)
- Figure 3.6.13 Hinze Dam, Major Vegetation Types (reproduced with permission)
- Figure 3.6.14 Hinze Dam, Remnant Vegetation Types (reproduced with permission)
Figure 3.6.5

Legend
- Potential Dam / Weir Site
- Highway
- Major Road
- Local Government Area
- Towns
- River
- Creek

Source: GIS data supplied by Geoscience Australia, NRM & W Project: MGA Zone 56
Date Printed: 15 August 2005
File: M:\4\14840\gis\maps\Locality_A4\Hinze_Locality_rev_2.mxd
Size: A4
South East Queensland
Regional Water Supply Strategy
Hinze Dam Stage III Raising
Nerang River AMTD 36.4km
Satellite and Cadastral Plan
Figure 3.6.6

Legend
- Towns
- Proposed Damwall
- Highway
- River
- Creeks
- Major Road
- 200m Buffer
- Inundation Area
- FSL - 90.5m
- Cadastre

Source: GIS data supplied by Geoscience Australia, NR M&W
Projection: MGA Zone 56
Date Printed: 15 August 2005
File: M:\41\14840\gis\maps\satellite\hinze_satellite_rev_b.mxd
Size: A3

0 300 600 900 1,200
Metres
1:35,000
Hinze Dam Site Geology

Alluvium: First and second river terraces; sand, silt, clay, gravel

Qpa - Pleistocene Alluvium: High level alluvium; silt, clay, sand, gravel

DCf - Devonian - Carboniferous Neraniegh-Fernvale Beds: Sedimentary Rock; Mudstone, shale, arenite, chert, jasper, basic metavolcanics, pillow lava, conglomerate

Reference

- Cadastral Boundary
- NRM Registered Bore
- Street
- Road
- Main Road
- Highway/Motorway
- River
- Suburb Boundary

Dam Embankment (Not to Scale)
South East Queensland Regional Water Supply Strategy

Hinze Dam Stage III
Nerang River AMTD 36.4km

Land Use Plan

Figure 3.6.8

Legend:
- 
- Towns
- Proposed Dam wall
- River
- Canal
- Laundries
- Meat/Meat processing
- Intensive livestock
- Reservoir/Dam
- Lake
- Ponds
- Natural vegetation
- Grazing
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Map disclaimer: Regional ecosystem mapping, 14/07/2005. Regional ecosystem data supplied at a scale of 1:100,000, except in designated areas, should be used as a guide only. The positional accuracy of the data is 100 metres. The Environmental Protection Agency accepts no responsibility whatsoever for any errors, omissions, bias, or consequences of any kind resulting from the use of this data. The data is not to be used for direct marketing or in breach of the privacy laws.

Legend:
- Towns
- River
- Major Road
- Proposed Dam
- Proposed Dam Area
- 20m Buffer
- RSL - 0.35m
- Endangered (Dominant)
- Endangered (Sub-Dominant)
- Of Concern (Dominant)
- Of Concern (Sub-Dominant)
- Not Of Concern

South East Queensland
Regional Water Supply Strategy
Hinze Dam Stage III
Nerang River AMTD 36.4km
Environmental and Vegetation Plan
Figure 3.6.9
South East Queensland
Regional Water Supply Strategy
Hinze Dam Stage III
Nerang River AMTD 36.4km
Agricultural Land Capacity Plan
Figure 3.6.10

Legend
- Towns
- Proposed Damwall
- Creek
- Highway
- Major Road
- 200m Buffer
- Inundation Area

Good Quality Agricultural Land (GQAL)
- Class A - Crop land
- Class B - Limited crop land
- Class C1 - Pasture land
- Class C2 - Pasture land
- Class D - Non-agricultural land

Source: GIS data supplied by Geoscience Australia, NRM&W
Projection: MGA Zone 56
Date Printed: 15 August 2005
File: M:\41\14840\gis\maps\gqal_a4\hinze_gqal_rev_b.mxd
Size: A4

Scale: 1:50,000
EPA Regional Ecosystems (Version 4.3) & NR&M DCDB on Plan:

Vegetation and Other Topographical Features

Remnant Endangered Regional Ecosystem
- Dominant
- Sub-Dominant

Remnant Of Concern Regional Ecosystem
- Dominant
- Sub-Dominant

Remnant Not of Concern Regional Ecosystem
- Plantation
- Water

Amended RE
- Essential Habitat
- State Wildlife Corridor
- Property Boundary - DCDB
- Subject Lot(s)
- Local Authority Boundary
- Bioregion Boundary
- - National Park Boundary, State Forest
- Certified Map Amendment
- Roads

EPA RE Date
- August 2005

The data is compiled at a scale of 1:100 000. Additional field investigation is advisable for applications at a large scale (eg. 1:25 000).

Regional Ecosystem (RE) numbers

Defined map areas (polygons) are labelled with the regional ecosystem (RE) numbers along with the percentage breakdown of RE values within the polygon.

A regional ecosystem has reached its threshold at the point where any further clearing would cause it to change its vegetation management conservation status. For example if a "Not of Concern at present regional ecosystem was cleared to the point where any further clearing would cause it to go into the 'OF Concern' category then it has reached threshold.

Defined map areas (polygons) smaller than 10ha. may not be labelled.

The data is compiled at a scale of 1:100 000. Additional field investigation is advisable for applications at a large scale (eg. 1:25 000).

Importance Notice:
- Not Guaranteed.

The extent of remnant regional ecosystems depicted on this map is based on certified 2001 Land Use data supplied by SLAT, SNRM.

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Disclaimers and Map Notes

This map shows the current distribution and status of regional ecosystem (RE) as listed in the schedule of the Vegetation Management Regulation (2000). Regional ecosystem mapping is compiled at a map scale of 1:100,000 except for some areas in Southeast Queensland where 1:50,000 scale mapping is available. At a map scale of 1:100,000 regional ecosystem linework should be used as a guide only. The positional accuracy at this scale is 100 metres.

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