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## 9. Terrestrial Ecology

### 9.1 Introduction

This section of the EIS describes the terrestrial ecological (flora and fauna) values of the Project area. The Project will involve works in and around the current dam wall and will also increase the area of inundation at FSL from 972 hectares (ha) to 1505ha.

This assessment describes the conservation status of the terrestrial flora and fauna communities within the Project study area, and is based on both a desktop analysis of background information, and field surveys completed by the Alliance (and specialist sub-consultants) in February to April 2007. The tasks and objectives of the assessment were to:

- consult with relevant State agencies and Gold Coast City Council (GCCC) to obtain existing information
- review relevant background information and data;
- complete a field survey program to census terrestrial flora and fauna communities within the inundation area, with an emphasis on targeted searches for rare or threatened species potentially present;
- compile a description of the vegetation assemblages and fauna habitats of the study area, including an inventory of species recorded in the study area;
- confirm the occurrence of rare or threatened flora and fauna species within the study area (as listed under Commonwealth and State legislation);
- confirm the extent of remnant native vegetation occurring within the study area;
- assess the habitat values of the study area;
- assess the potential impact of the Project on rare and threatened species and vegetation communities in the context of relevant legislation, in particular the *Environment Protection and Biodiversity Conservation Act 1999* and the *Nature Conservation Act 1992*; and
- provide recommendations for measures to avoid or mitigate adverse impacts on significant terrestrial flora and fauna at the design and construction phases.

### 9.2 Legislative Context

The key biodiversity and nature conservation legislation and policy relevant to the Project is described below.

#### 9.2.1 Commonwealth Legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas. Under the environmental provisions of the EPBC Act, actions that are likely to have a significant impact on a matter of National Environmental Significance (NES) are identified as "controlled actions" and cannot be undertaken without approval under the EPBC Act.

The Project was referred to the Commonwealth Minister for Department of Environment and Heritage (DEH) in December 2006. The Hinze Dam Alliance nominated the Project as a "controlled action" under Section 75 of the EPBC Act on the basis of its potential impact on listed threatened and migratory species. A description of the impact of the Project on the seven matters of National Environmental Significance is presented in **Table 9-1**.

■ **Table 9-1 Impact of the Project on Matters of National Environmental Significance**

| Matter of National Environmental Significance          | Impact of Project   |
|--|---|
| World Heritage Properties                              | There are no World Heritage Properties within the study area. One World Heritage Area, the 'Central Eastern Rainforest Reserves (Shield Volcano Group) NSW is located in the same catchment as the Hinze Dam on the upper sections of the Nerang River.   |
| National Heritage Places                               | There are no National heritage places within the study area.  |
| Wetlands of International Importance (Ramsar wetlands) | There are no listed Ramsar wetlands located within the Hinze Dam catchment. Moreton Bay is a listed Ramsar wetland, and the Nerang River flows into the southern end of the Gold Coast Broadwater which adjoins the Moreton Bay Ramsar wetland further north, however the Project will not cause an impact on the wetland.  |
| Threatened Ecological Communities                      | There are no threatened ecological communities within the study area.   |
| Listed Threatened Species                              | Several Commonwealth-listed threatened flora species have been identified in the study area, including <i>Randia moorei</i> , <i>Owenia cepiodora</i> , <i>Macadamia tetraphylla</i> , <i>Macadamia integrifolia</i> and <i>Plectranthus nitidus</i> . These plants are located within the proposed inundation area, and will be impacted by the Project.   |
| Migratory Species                                      | Several listed migratory species have been identified in the study area, including Great Egret ( <i>Ardea alba</i> ), Cattle Egret ( <i>Ardea ibis</i> ), Osprey ( <i>Pandion haliaetus</i> ), White-bellied sea-eagle ( <i>Haliaeetus leucogaster</i> ) and the Rainbow Bee-eater ( <i>Merops ornatus</i> ).<br><br>These species are relatively common and widespread across the Gold Coast region, and the Project is not considered to have a significant impact on these species, their habitat or breeding/feeding resources. |
| Commonwealth Marine Areas                              | There are no Commonwealth marine areas located in the vicinity of the dam.  |
| Commonwealth Lands and Heritage Places                 | There are no Commonwealth lands or heritage places located within the study area.<br><br>One listed Commonwealth heritage place is located in the vicinity of the Dam. This is the Canungra Land Warfare Centre Training Area, located to the west of the Hinze Dam catchment in the Coomera River catchment.   |
| Places on the Register of the National Estate (RNE)    | There are no places listed on the RNE located within the study area.<br><br>Two RNE places are located in the vicinity of the Dam. Canungra Land Warfare Centre Training Area and Wunburra National Park. The Wunburra National Park is now part of the Springbrook National Park and is located to the north west of Little Nerang Dam.  |
| State and Territory Reserves                           | Numinbah State Forest Reserve is located within the study area, immediately upstream of the Dam. This forest reserve is in the process of being converted to a National Park. As part of the conversion process, GCCC has been in negotiation with the Queensland EPA to ensure the new National Park boundary is not inundated by the raised Dam.<br><br>Furthermore, Springbrook National Park is located in the vicinity of the dam in the upper extent of the Nerang River.   |
| Nuclear Action   | The Project does not involve any nuclear actions.   |

### 9.2.2 Queensland Legislation

The *Nature Conservation Act 1992* (Qld) (NCA) provides for the conservation and management of Queensland's native animal and plants. The Act prohibits the taking or destruction, without authorisation, of certain listed flora and fauna species.

The *Nature Conservation (Wildlife) Regulation 2006* lists the plants and animals considered presumed extinct, endangered, vulnerable, rare, common, international and prohibited. It states the declared management intent and the principles to be observed in any taking of or destruction for each group.

The *Land Protection (Stock and Pest Route Management) Act 2002* and the *Land Protection (Pest and Stock Route Management) Regulation 2003* provides for pest management in Queensland, and includes both weeds and fire ants.

The *Vegetation Management Act 1999* (Qld) (VM Act) regulates the clearing of mapped remnant vegetation on freehold and leasehold land in Queensland. For the purposes of assessing significant projects, the VM Act is supported by the Regional Vegetation Management Code for Southeast Queensland Bioregion (RVMC) and Policy for Vegetation Offsets (the Offset Policy).

The *Nature Conservation (Koala) Conservation Plan 2006* provides for the conservation of Koala (*Phascolarctos cinereus*) in Queensland and includes provisions for the assessment and management of Koalas during the development approval processes and implementation of projects. Differentiated levels of provisions apply to the three different Koala areas that have been delineated across Queensland. The study area is situated within Koala District A. The Koala Conservation Plan maps Koala Habitat Areas comprising Koala Conservation Areas, Koala Sustainability Areas and Urban Koala Areas. These habitat areas have statutory intent and the Hinze Dam study area is not within any mapped habitat area or Koala living area.

Because the Project area is situated in Koala District A, all clearing of koala habitat trees must be undertaken using sequential clearing techniques. An extract from the Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006-2016 detailing the clearing technique requirement is included below.

*“(1) Clearing of trees is carried out in a way that ensures koalas living in or near the area being cleared (the clearing site) have enough time to move out of the clearing site without human intervention, including in particular, for a clearing site with an area of more than 6ha, by:*

*(a) carrying out the clearing in stages; and*

*(b) ensuring not more than the following is cleared in any one stage: (i) for a clearing site with an area of 6ha or less—50 percent of the site’s area; (ii) for a clearing site with an area of more than 6ha—3ha or 3 percent of the site’s area, whichever is the greater; and*

*(c) ensuring that between each stage there is at least one period of 12 hours that starts at 6p.m. on a day and ends at 6a.m. on the following day, during which no trees are cleared on the site; and*

*(2) clearing of trees is carried out in a way that ensures, while the clearing is being carried out, appropriate habitat links are maintained within the clearing site and between the site and its adjacent areas, to allow koalas living on the site to move out of the site; and*

*(3) no tree in which a koala is present, and no tree with a crown overlapping a tree in which a koala is present, is cleared.”*

A koala spotter means a person who has demonstrated experience in locating koalas in koala habitats or conducting fauna surveys. Prior to the commencement of, and during felling operations, it is the responsibility of the koala spotter to identify trees in which a koala is present and any trees where their crown overlaps trees in which a koala is present and convey this information to the person(s) conducting the clearing (Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006-2016).

### **9.2.3 Gold Coast City Council Nature Conservation Strategy**

The Gold Coast City Council’s Nature Conservation Strategy (NCS), prepared in February 1998, sets out the Council’s strategic approach to the protection and management of the city’s natural assets. The NCS is comprised of three volumes, with the broad content as follows:

- Volume 1 – Strategy Plan;
- Volume 2 – Flora and Fauna Resources Inventory and Ecological Assessment;

- Volume 3 – Consultation and Community Involvement.

Volume 2 of the NCS provides an inventory of the flora and fauna within the Gold Coast City. The major vegetation communities and significant species of flora and fauna that have been recorded within the Gold Coast are identified, and suggested recovery plans and priority actions plans for significant species are provided. In this context ‘significant species’ are those listed as rare and threatened or special cultural significance under the NCA.

### 9.3 Methodology

The methodology adopted for the flora and fauna investigations involved two distinct elements:

- a desktop review of background data and literature (**Section 9.3.1**); and
- field surveys (**Section 9.3.2**).

#### 9.3.1 Background Data Review

The desktop analysis involved the collection and review of relevant database records, surveys and ecological literature with relevance to the Hinze Dam catchment. The following data sources were used:

- searches of the Queensland Herbarium, Queensland Museum, Birds of Australia, Gold Coast City Council publications and databases and the EPBC Act Protected Matters (Department of the Environment and Water Resources) protected matters search tool;
- Environmental Protection Agency’s (EPA) regional ecosystem mapping (Version 5.0, 2005) for the study area;
- Gold Coast City Council’s (GCCC) vegetation and ecological significance mapping; and
- aerial photography at 1:25 000 scale.

The Gold Coast City Council has undertaken a two-stage review of the Nature Conservation Mapping for the entire Gold Coast local government area. Stage 1 (Vegetation Mapping)<sup>1</sup> was to review and refine the existing Gold Coast City 1998 Nature Conservation Mapping. Stage 2 (Significance Mapping)<sup>2</sup> was to identify the conservation significance of the vegetation mosaic of Gold Coast, utilising the Common Nature Conservation Classification System (CNCCS), developed by Chenoweth (1999) and endorsed by the Southeast Queensland Regional Organisation of Councils. The vegetation mapping covers all vegetation for the City, including remnant and non-remnant vegetation types. These maps together with the EPA’s regional ecosystem mapping have been consulted for the purposes of identifying vegetation cover across the study area.

The conservation status of species recorded in the study area has been assessed in the Commonwealth, State and local context with reference to the EPBC Act, the NCA and GCCC’s Nature Conservation Strategy.

#### 9.3.2 Field Surveys

##### Terrestrial Flora

Field surveys for terrestrial flora were completed between the 29 January and 18 April 2007. The survey was completed by the Alliance (including specialist sub-consultants). The flora survey involved the following:

- targeted survey for rare or threatened flora. All rainforest and wet sclerophyll forest ecosystems were searched using the random meander method (Cropper 1993). A substantial search effort was expended, with 30 survey sites sampled by at least two observers over 16 days, for an estimated total search effort of 320 person hours

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<sup>1</sup> Ryan, T.S. et al., 2003, *Gold Coast City Council 1998 Nature Conservation Mapping Review – Stage 1*, produced by the Queensland Herbarium, Environmental Protection Agency, Queensland Government for the Gold Coast City Council.

<sup>2</sup> Francis, D., Searle, J. and Chenoweth, A., 2005, *Gold Coast City Nature Conservation Mapping Review Stage 2 – Significance Mapping (Common Nature Conservation Classification System)*, prepared by Chenoweth Environmental Planning & Architecture Pty Ltd for Gold Coast City Council.



- mapping of the extent of the Endangered Spiny Gardenia and determining an approximate population size in a patch of habitat found to support a large number of individuals of that species. The perimeter of the area occupied was mapped using GPS and population estimate was extrapolated from two 30m x 30m quadrats and one 10m x 1.5km transect
- field checking of existing vegetation maps covering the Project area, namely the current (Version 5.0) Regional Ecosystem Mapping and GCCC Vegetation Maps
- compilation of a flora inventory, based on point and transect surveys and opportunistic traverses.

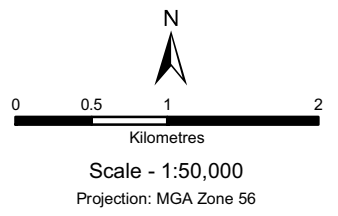
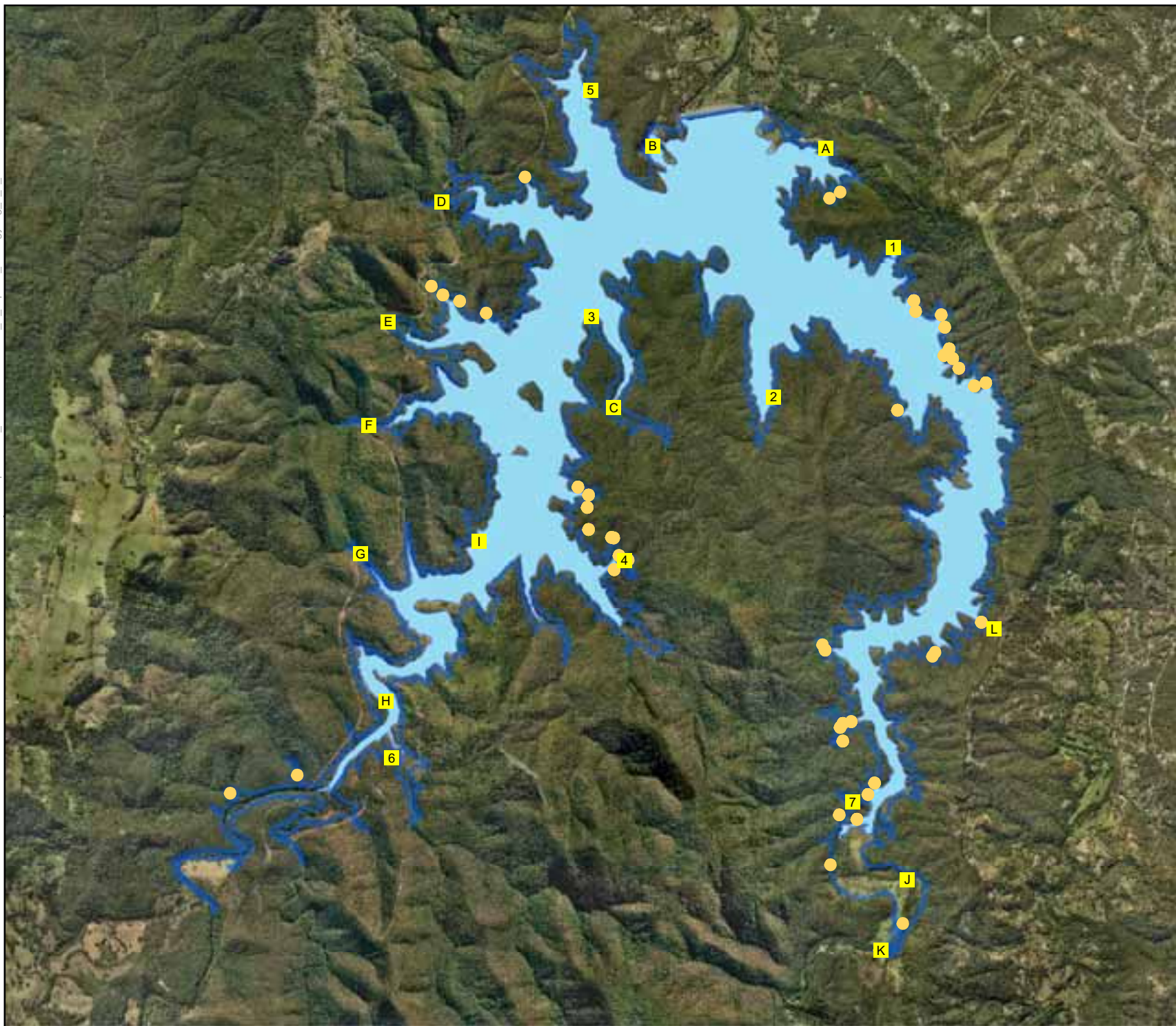
The location of the vegetation survey plots is indicated on **Figure 9-1**.

## Terrestrial Fauna

A two week fauna survey was completed between the 12 and 23 February 2007. Fauna survey activities comprised a combination of systematic survey at seven sites representative of the dominant habitat types within the inundation area and less intensive opportunistic survey elsewhere within the study area. The survey program was designed to identify the fauna assemblage associated with the inundation area (and surrounding habitats), and to identify rare or threatened species that may utilise the study area. The locations of the systematic and opportunistic survey sites are indicated on **Figure 9-1** and outlined in **Table 9-2**.

### ■ Table 9-2 Fauna Survey Sites

| Site                              | Description  |
|-----------------------------------|--|
| <b>Systematic Survey Sites</b>    |  |
| 1                                 | Rainforest gully within RE 12.11.1. Located in the eastern section of the study area, along the eastern bank of the Little Nerang Creek stretch of the dam within the proposed inundation area                         |
| 2                                 | Open eucalypt forest within RE 12.11.5. Located in the eastern section of the study area, along the western bank of the Little Nerang Creek stretch of the dam, behind the rowing platforms                            |
| 3                                 | Open eucalypt forest within RE 12.11.5. Located in the central section of the study area, on the eastern bank of the Nerang River stretch of the dam within the proposed inundation area                               |
| 4                                 | Rainforest gully within RE 12.11.3/12.11.1. Located in the central section of the study area, along the eastern bank of the Nerang River reach of the dam within the proposed inundation area                          |
| 5                                 | Open eucalypt forest within RE 12.11.3. Located in the north-western section of the study area, west of the dam wall within the proposed inundation area   |
| 6                                 | Open eucalypt forest within RE 12.11.5. Located in the south-western section of the study area, approximately 750m east of Numinbah Environmental Education Centre, and 250m south of Nerang River off Pine Creek Road |
| 7                                 | Eucalypt tall open forest within RE 12.3.2. Located in the south-eastern section of the study area, on the western bank of the upper reaches of Little Nerang Creek, within the proposed inundation area               |
| <b>Opportunistic Survey Sites</b> |  |
| A                                 | Hinze Dam walking trail, south-east of the recreational area   |
| B                                 | Hinze Dam quarry area, west of the dam wall  |
| C                                 | Gully within RE 12.11.5. Located in the central section of the study area, on the eastern bank of the Nerang River stretch of the dam within the proposed inundation area  |
| D                                 | Nerang-Murwillumbah Road at the Beliss Creek crossing. Located on the western side of the dam adjacent to the inundation area  |
| E                                 | Nerang-Murwillumbah Road at the Black Shoot Gorge crossing. Located on the western side of the dam adjacent to the inundation area   |
| F                                 | Nerang-Murwillumbah Road at the Burns Creek crossing. Located on the western side of the dam adjacent to the inundation area   |
| G                                 | Nerang-Murwillumbah Road at the Arkinstalls Gorge crossing. Located on the western side of the dam adjacent to the inundation area   |
| H                                 | The boat ramp off Nerang-Murwillumbah Road on the western side of the dam within the inundation area   |
| I                                 | Open eucalypt forest – RE 12.11.3. Located on the western side of the dam within the inundation area   |
| J                                 | Upper reaches of Little Nerang Creek at the Currumbin Wildlife Sanctuary koala feed tree plantation  |
| K                                 | Off Gold Coast – Springbrook Road at the Little Nerang Creek causeway. Located in the south-eastern section of the study area, outside the inundation area   |
| L                                 | Off Little Nerang Road on the eastern side of the dam, near the intake tower   |



**Legend**

- Fauna Survey Sites
- Vegetation Survey Sites
- Current FSL (82.2 m)
- Proposed FSL (94.5m)

Figure 9-1  
Location of Flora &  
Fauna Survey Sites  
Hinze Dam Stage 3 EIS



Survey techniques employed during the survey are outlined in **Table 9-3** below.

■ **Table 9-3 Fauna Survey Techniques**

| Survey Technique                   | Description   |
|------------------------------------|---|
| Elliot trapping                    | Large and small Elliott traps were used to capture ground-dwelling mammals. Twenty-five small traps were placed in a single transect line at each systematic site (Sites 1-7), at intervals of approximately 5-10m. Five large traps were placed along the transect line, at intervals of every 5 small traps. Traps were left open for four consecutive nights, and checked early each morning within two hours of sunrise. Traps were baited with a mixture of rolled oats, peanut butter, honey, vanilla essence and bacon. Large traps were also baited with apple and sweet potato. A total of 800 small Elliott and 160 large Elliott trap nights was achieved. |
| Cage trapping                      | Cage traps were used to target arboreal and terrestrial mammals. Three traps were placed at each systematic site (Sites 1-7), randomly spaced along the Elliot transect line. Traps were left open for four consecutive nights, and checked early each morning within two hours of sunrise. Traps were baited with tins of cat food, apple and sweet potato. A total of 96 cage trap nights was achieved.   |
| Harp trapping                      | Harp traps were used to capture insectivorous bats. A single harp trap was erected at locations with suitable fly through, i.e. gullies and streams (Sites 1, 4, 7, J). Traps were left up for four consecutive nights, and checked early each morning within two hours of sunrise. Bats were retained for the day and released in the vicinity of the site that evening. A total of 16 harp trap nights was achieved.  |
| Pitfall trapping                   | Two pitfall lines were installed at Site 5, each comprising 5 pitfalls linked by a drift fence. Pitfalls were checked early each day. Wet weather prevented the installation of further pitfall lines (buckets were pushed above ground level by rising watertable, and the risk of fauna drowning was high).   |
| Hair tubes                         | Hair tubes were used to sample mammals that may not be captured by the Elliot or cage traps. Twenty hair tubes, baited with the same oat mixture, were laid in a single transect line at three opportunistic survey sites, at intervals of approximately 10m (Sites B, I, J). Two different sized hair tubes were used at each site; 80mm opening and 50mm opening. The traps were left out in the field for a period of three weeks. Hair samples collected in the tubes were sent to Barbara Triggs for identification. A total of 1260 hair tube sample nights was achieved.   |
| Bird surveys                       | Bird surveys were conducted after morning trap clearing at the seven systematic survey sites (Sites 1-7) with additional observations made at the opportunistic survey sites (Sites B, D, E, F, G, J, L). These surveys included observations of birds and identification of bird calls.  |
| Mammal spotlighting                | Spotlight searches for nocturnal mammals, both arboreal and semi-arboreal, were conducted at all seven systematic survey sites (Sites 1-7) over one night for a duration of one hour at each site. The activity involved foot based searches using head torches and spotlights. Opportunistic spotlighting was also completed at various locations across the Project area.   |
| Anabat                             | A full night of Anabat recording (using zero-crossings anabat interface module) was conducted at selected sites that provided potential feeding habitat for microchiropteran bats (Sites 1-4, 6-7, F, J, K, L). A total of 16 anabat sample nights was achieved.  |
| Playback                           | Playback sessions targeting nocturnal mammals, birds and owls were conducted at all seven systematic sites (Sites 1-7, C, H, J) for one night at each site. The activity involved broadcasting pre-recorded calls, and then listening and spotlighting the area immediately afterwards.   |
| Herpetofauna searches              | Diurnal searches for reptiles and amphibians were conducted at both systematic and opportunistic survey sites (Sites 1-7, L). Total search time per site differed based on the abundance of microhabitat at each site. On average, two person hours of search effort was expended at each systematic site for a total of 14hours of search effort.  |
| Vehicle-based Herpetofauna surveys | Vehicle-based nocturnal herpetofauna surveys are particularly effective at detecting amphibians and snakes. The Nerang-Springbrook and Mudgeeraba-Springbrook Roads were intensively surveyed using this method over four nights per site.  |

Table 9-4 summarises the survey techniques undertaken during the fauna survey program at different sites.

■ **Table 9-4 Surveys Undertaken at each Fauna Survey Site**

| Fauna Survey Site | Elliot traps | Cage traps | Harp traps | Pitfall traps | Hair tubes | Bird surveys | Spot-lighting searches | Anabat | Playback | Herp searches |
|-------------------|--------------|------------|------------|---------------|------------|--------------|------------------------|--------|----------|---------------|
| 1                 | X            | X          | X          |               |            | X            | X                      | X      | X        | X             |
| 2                 | X            | X          |            |               |            | X            | X                      | X      | X        | X             |
| 3                 | X            | X          |            |               |            | X            | X                      | X      | X        | X             |
| 4                 | X            | X          | X          |               |            | X            | X                      | X      | X        | X             |
| 5                 | X            | X          |            | X             |            | X            | X                      |        | X        | X             |
| 6                 | X            | X          |            |               |            | X            | X                      | X      | X        | X             |
| 7                 | X            | X          | X          |               |            | X            | X                      | X      | X        | X             |
| A                 |              |            |            |               |            |              | X                      |        |          |               |
| B                 |              |            |            |               | X          | X            |                        |        |          |               |
| C                 |              |            |            |               |            |              | X                      |        | X        |               |
| D                 |              |            |            |               |            | X            |                        |        |          |               |
| E                 |              |            |            |               |            | X            |                        |        |          |               |
| F                 |              |            |            |               |            | X            |                        | X      |          |               |
| G                 |              |            |            |               |            | X            |                        |        |          |               |
| H                 |              |            |            |               |            |              | X                      |        | X        |               |
| I                 |              |            |            |               | X          |              |                        |        |          |               |
| J                 |              |            | X          |               | X          | X            | X                      | X      | X        |               |
| K                 |              |            |            |               |            |              |                        | X      |          |               |
| L                 |              |            |            |               |            | X            |                        | X      |          | X             |

## 9.4 Existing Environment

### 9.4.1 Study Area

Details of the environment including topography, geology, soils and landuse are provided in **Sections 4 and 6**.

The extent of the study area for the purposes of this section is shown on **Figure 9-2**.

The ecology of the area surrounding the Hinze Dam spillway has been disturbed by the construction of the dam, and the development of the ancillary facilities. The remainder of the study area surrounding Advancetown Lake is moderately steep and hilly, and a number of small creeks and gullies drain directly into the lake. A dominant feature on the south-western side of the lake is Pages Pinnacle, an exposed pinnacle of igneous rock. The creeks and gullies that drain into the lake are steep and rocky in places, with small waterfalls on some of the gullies.

Remnant vegetation communities are dominant in the study area, comprising dry eucalypt open forests, with small areas of rainforest and wet sclerophyll forest within sheltered gullies. At the upper reaches of Nerang River and Little Nerang Creek, areas of non-remnant vegetation are present. These areas were previously cleared for agriculture and pastureland use before the dam, and are slowly regenerating.

The study area is bordered by the Tallai Range to the east, Beechmont Road to the west, the urbanised area of Advancetown to the north, and Numbinah Forest Reserve to the south. Remnant vegetation within the study area, forms part of a larger mosaic of highly diverse forests that are interconnected and includes Numbinah Forest Reserve, and the World Heritage listed forests of Springbrook National Park and Lamington National Park in the upper sections of the Hinze Dam catchment. Part of the study area is mapped as a declared State Wildlife Corridor by the State Government (EPA Biodiversity Assessment for Southeast Queensland 2005).

Photographs of the study area are shown in **Plates 9-1 to 9-6**.