



Policy 8: Guidelines for Ecological Assessments

Chapter 1 Introduction

In 1998, Council adopted the **Gold Coast City Nature Conservation Strategy (GCCNCS)**. The Strategy completed an initial inventory and assessment of the City's biodiversity values and identified the actions required to protect and manage these for existing and future residents and visitors.

One of the most significant findings was that Gold Coast City is perhaps the most biologically diverse City in Australia with more birds, fish, amphibia and mammals than Kakadu and a similar number of reptiles. Only in the Wet Tropics are similar numbers of species found.

Council's commitment to protect the City's biodiversity is demonstrated in the **Gold Coast City 1998 – 2003 Corporate Plan**. Specific strategies to achieve the Corporate Plan objectives are contained in the **GCCNCS**.

Nature Conservation is also addressed as one of 15 Key Strategies of the **Gold Coast City Planning Scheme (Division 1, Section 1.0)**, providing the foundation for decisions about preferred land-use types throughout the City.

This is in accordance with the **Integrated Planning Act 1997** which requires Planning Schemes to address valuable features within the Local Government Area. Such valuable features include resources or areas that are of ecological significance (such as habitats, wildlife corridors, buffer zones, places supporting biological diversity or resilience, and features contributing to the quality of air, water and soil).

To protect the Gold Coast's biodiversity, it is essential that these values are identified, protected and managed during all development activities within the City. This will, in turn, contribute to preserving the outstanding aesthetic and lifestyle values of the Gold Coast.

Chapter 2 Purpose

The purpose of the Planning Scheme Policy is to:

- advance the purpose of the **Integrated Planning Act 1997**, which seeks to achieve ecological sustainability by managing the effects of development on the environment (**Section 1.2.1 of the Act**). **Section 1.2.1 of the Act** states that this includes ensuring that decision-making processes take account of short and long-term environmental effects of development at local, regional, State and wider levels and apply the precautionary principle and avoiding, if practicable, or otherwise lessening adverse environmental effects of development (**Section 1.2.3 of the Act**).
- ensure that ecologically significant areas are identified, protected and managed during development, thereby contributing to a viable City-wide conservation network for present and future generations and the implementation of the **GCCNCS**.
- assist applicants to adequately address the performance criteria stated in the **Nature Conservation Constraint Code** and the **Natural Wetland Areas and Natural Waterways Constraint Code** by clearly articulating Council's requirements for the preparation of an Ecological Site Assessment Report for a proposed development. This will streamline the application/ assessment process and ensure a consistent and equitable approach throughout the City.
- ensure the information collected can be entered into relevant databases (eg. the **GCCNCS Flora and Fauna Database¹**), improving knowledge of the City's ecological values.

¹ It is intended that, in the future, such mapping and databases be made available to the public to assist with the preparation of Ecological Site Assessments. For public information requests, mapping will be available in MapInfo format and the flora and fauna database in Microsoft Access format.



Chapter 3 Application

These guidelines apply where an applicant is preparing an Ecological Site Assessment Report in accordance with the acceptable solutions of the **Nature Conservation Constraint Code** and/or the **Natural Wetland Areas and Natural Waterways Constraint Code** in the Gold Coast City Planning Scheme.

They may also prove useful for those Council departments responsible for the provision of the City's infrastructure (eg. roads, pipelines, etc) where the construction of such infrastructure is proposed in areas identified on the **GCCNCS Conservation Strategy Plan** (eg. the Engineering Services and Gold Coast Water Directorates).

Please note that definitions for the specific terms used in these Guidelines are provided in **Part 4, Division 1, Chapter 3** of the **Planning Scheme**.

Chapter 4 About the Ecological Site Assessment

Ecological Site Assessment is an integral part of the development design and assessment process. Its primary aims are outlined below and form stages in the Assessment process.

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|-----------------|---|
| Stage 1: | Identify Ecological Features and Functions
Assess the flora, fauna and habitat of the site to determine the ecological features and functions of the study site. |
| Stage 2: | Identify Ecologically Significant Areas
Identify ecologically significant areas of the site and identify the measures required to maintain their viability. |
| Stage 3: | Assessment of Impacts
Determine the potential impacts of the operation and construction phases of the development in relation to these areas. |
| Stage 4: | Recommendations
Recommend any measures or changes to the development design that may be required to avoid or mitigate any impacts of the proposed development design, construction and operation. |

1.0 Documentation

The findings of the Ecological Site Assessment are to be documented in a written report, the Ecological Site Assessment Report. This report is to be submitted to Council as part of the development application. A sample Table of Contents for the Report is provided in **Appendix 6**. Specific requirements for documentation are detailed where necessary (eg. in the appendices for **Flora and Fauna Surveys**).

2.0 Level of Detail Required

The level of detail required in the Ecological Site Assessment depends on the category of the individual site in the **Conservation Strategy Plan**, and the intensity of the development impact. These levels are defined below and referred to, where relevant, throughout the different stages of the Ecological Site Assessment.

2.1 Basic Ecological Site Assessment

A Basic Ecological Site Assessment is required where the development is proposed in the following **Conservation Strategy Plan** categories:

- Existing Remnant Vegetation (and Other Natural Areas); or
- Major Areas of Existing Bushland Committed to Development.



2.2 Detailed Ecological Site Assessment

A Detailed Ecological Site Assessment is required where the development is proposed:

- on sites that include or are immediately adjacent to natural wetland areas or natural waterways; or
- in the following **Conservation Strategy Plan** categories:
 - Large Habitat System;
 - Foothill Buffers;
 - Major Linkage;
 - Significant Remnants;
 - Bushland Mosaic.

2.3 Variations to the Level of Detail Required

Requests to undertake a lesser or greater degree of assessment will be a matter for negotiation between the applicant and Council, based on the potential environmental impact of the particular development proposal.

3.0 Defining the Study Area

The study area should include the minimum area likely to be affected by the construction and, where relevant, ongoing operation of the proposed development. In all instances, this will include the entire property that is the subject of the development application. In some instances, it may also include areas surrounding or adjoining the property.

4.0 Relationship to the Development Design Process

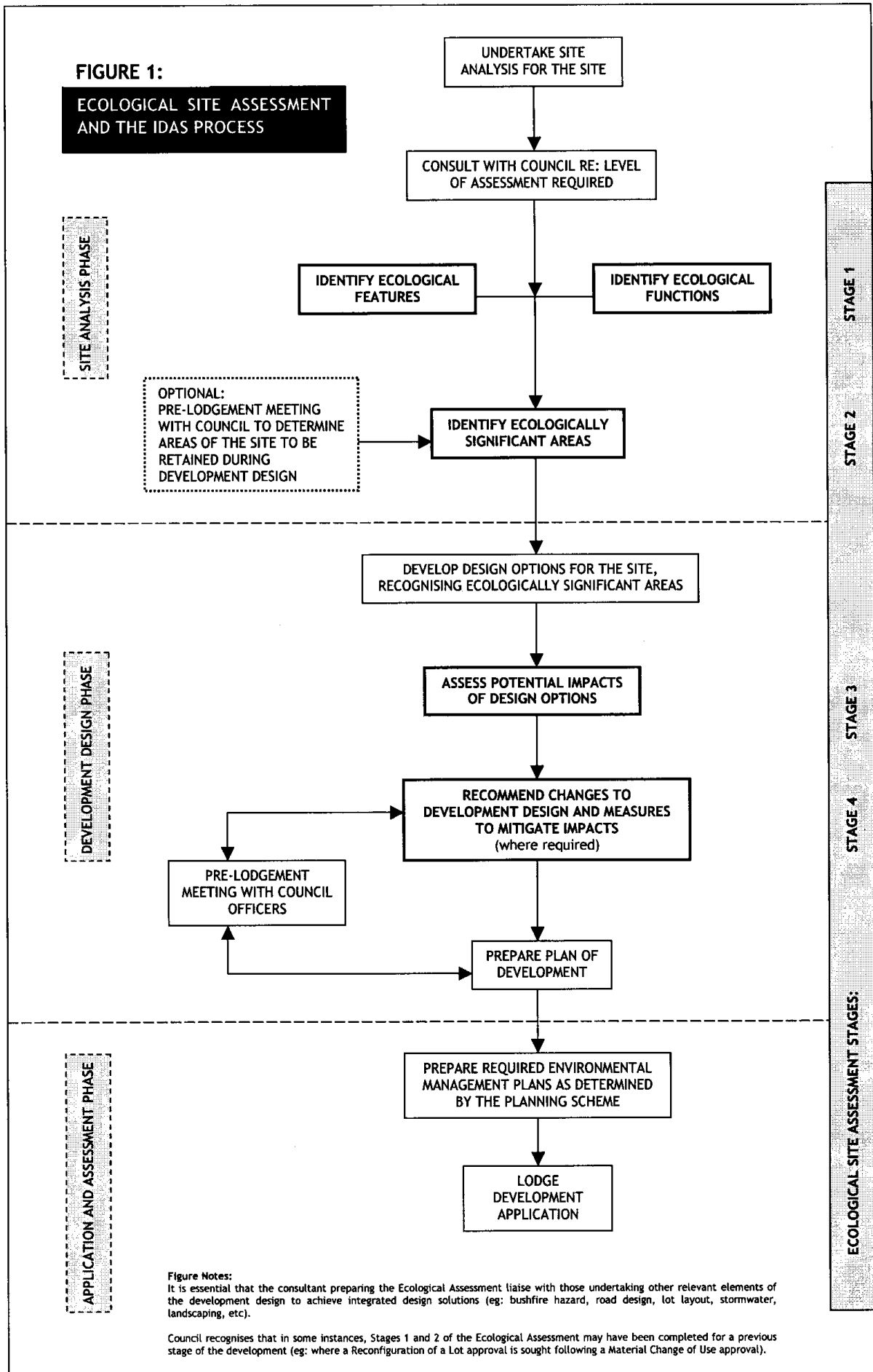
The Ecological Site Assessment is an essential part of the **Integrated Development Assessment System (IDAS)** defined under the **Integrated Planning Act**. **Figure 1** illustrates how the various stages of the Ecological Site Assessment (as described in **Section 2.1** above) relate to the 'application stage' of the **IDAS** process.

5.0 Qualifications of the Consultant

The principal consultant undertaking the Ecological Site Assessment must have appropriate qualifications or experience in environmental science, botany, ecology, zoology or other related discipline. They must also have demonstrated experience in undertaking flora and fauna surveys and conservation assessments within the Southeast Queensland Bioregion (as defined on page 12/5 of **Sattler and Williams (1999)**). **Appendix 1** provides information to assist applicants select a suitable consultant to undertake the Ecological Site Assessment.

6.0 Community Consultation

It is desirable that local naturalists and other people who are likely to be able to provide further detailed information about the ecological values of the study area (eg. members of local environmental or catchment groups) are consulted during the preparation of the Ecological Site Assessment.





Chapter 5 The Ecological Site Assessment

1.0 Stage 1: Ecological Features and Functions

1.1 Assessing Ecological Features

Ecological Features include the flora, fauna and habitat associations, both terrestrial and aquatic, within the study area. To determine these features, information on the presence/ potential presence and distribution of flora and fauna and their habitat is to be gathered.

1.1.1 Basic Assessment of Ecological Features

The assessment is to:

- a) provide a map/ survey plan, at the same scale as the proposed development plans, identifying all existing vegetation, roads, contour lines (using intervals between 1 and 5 metres) and any existing buildings or other infrastructure. On smaller sites (ie. less than 2000m²), older and dominant taller trees should be identified; on larger sites, broad vegetation types (as defined by the canopy species) should be identified, utilising the classification system established in the Gold Coast City **Nature Conservation Strategy** to the extent that this is possible.
- b) provide a list of expected and known fauna (to be determined using existing databases, such as Queensland Museum and WildNet data, and through on-site observation of scats, scratchings, burrows, habitat types, etc – detailed fauna surveys would not generally be required);
- c) identify the presence and location of any expected and known significant flora and fauna species;
- d) identify the location of any known significant habitat;
- e) identify the location of any known poorly conserved ecosystem, as defined by the Queensland Herbarium and **GCCNCS** mapping;
- f) identify the presence and location of any significant infestations of environmental weeds or pest plants;
- g) identify the location of wetlands, other water bodies (permanent or ephemeral), and natural drainage lines;
- h) identify the location and tenure of any conservation reserves within or adjacent to the study area; and
- i) identify the location of any properties subject to a Voluntary Conservation Agreement within or adjacent to the study area.

1.1.2 Detailed Assessment of Ecological Features

The assessment is to:

- a) review existing databases (eg. those of the Queensland Museum, Queensland Herbarium or WildNet) for previous flora and fauna records for the study area;
- b) undertake a comprehensive Flora Survey² to:
 - identify terrestrial and aquatic flora species on the site;
 - highlight the presence (or expected presence) of any significant flora species;
 - describe and map the terrestrial and aquatic vegetation associations of the study area and assess their level of integrity; and
 - identify the regional ecosystems present and their conservation status, highlighting the presence of any poorly conserved ecosystems.
- c) undertake a comprehensive Fauna Survey² to:
 - identify terrestrial and aquatic fauna species on the site;
 - highlight the presence (or expected presence) of any significant fauna species;
 - highlight the presence of any significant habitat.
- d) identify the location and tenure of any conservation reserves within or adjacent to the study area;
- e) identify the location of any properties subject to a Voluntary Conservation Agreement within or adjacent to the study area.

² **Appendices 2 and 3** provide further detail on the preferred methodologies for undertaking Flora and Fauna Surveys and the required documentation.



1.2 Assessing Ecological Function

Ecological Function refers to the role played by remnant vegetation and other natural areas in maintaining the viability of the Ecological Features identified in **3.1.1** above. For example, ecological corridors facilitate fauna movement and buffers protect habitat for significant species.

1.2.1 Basic Assessment of Ecological Functions

The Ecological Function(s) of remnant vegetation and other natural areas of the study area should be identified according to their role as:

- core habitat areas;
- ecological corridors;
- buffer areas;
- etc.

for any known significant species, significant habitat and poorly conserved ecosystems, or to maintain the viability of any conservation reserves or areas subject to a Voluntary Conservation Agreement, within or adjacent to the study area.

1.2.2 Detailed Assessment of Ecological Functions

The Ecological Function(s) of remnant vegetation and other natural areas of the study area should be identified according to their role as:

- core habitat areas;
- ecological corridors (continuous or fragmented);
- buffer areas;
- isolated remnants;
- etc.

for each of the major fauna groups (ie. bird, mammal, amphibians, reptiles, fish and significant invertebrates) and flora in general, and to maintain the viability of any conservation reserves or areas subject to a Voluntary Conservation Agreement, within or adjacent to the study area.

2.0 Stage 2: Ecologically Significant Areas

Ecologically Significant Areas are those locations within the study area that support important ecological features and functions. They are areas of intrinsic ecological value or areas that function as part of a valued ecological community or nature conservation network. They include, but are not limited to, those areas identified in **Appendix 4: Schedule of Ecologically Significant Areas**.

This Stage of the Ecological Site Assessment also identifies any measures that may be required to maintain the long-term viability of the identified ecologically significant areas.

In the future, it is anticipated that ecologically significant areas will be defined using the methodology detailed in the **Common Nature Conservation Classification System (Chenoweth EPLA, 2001)**. However, this requires some preliminary work by Council at the City-wide level that will not be completed until the end of 2003.

In the interim, ecologically significant areas are to be defined using a selection of the criteria used in **Chenoweth EPLA (2001)**, with a City-wide context being obtained by reference to relevant parts of the **GCCNCS** (in particular to **Maps 4 and 7**).

The following assessment uses the site-based information gathered in **Stage 1** to identify Ecologically Significant Areas.

2.1 Basic Assessment of Ecologically Significant Areas

As stated in **Section 2** of the **Nature Conservation Constraint Code**, Existing Remnant Vegetation (and Other Natural Areas) and Major Areas of Existing Bushland Committed to Development are recognised as being subject to more intense commitments to development. However, they also contain areas supporting habitat for smaller and more mobile fauna species (especially birds), significant species and poorly conserved ecosystems.



In addition to those areas identified in **Appendix 4**, ecologically significant areas will include those core habitat areas, ecological corridors and buffer areas required to maintain or enhance the viability of any:

- expected or known significant species;
- expected or known significant habitat;
- known poorly conserved ecosystems;
- conservation reserves; or
- areas subject to a Voluntary Conservation Agreement within or adjacent to the study area.

In this instance, ecologically significant areas may include individual habitat (ie. feeding, roosting, nesting, etc) trees.

2.2 Detailed Assessment of Ecologically Significant Areas

As stated in **Section 2.0** of the **Nature Conservation Constraint Code**, each of the **Conservation Strategy Plan** categories requires a Detailed Level of Assessment, ie. the Large Habitat Systems, Foothill Buffers, and Major Linkages. Significant Remnants and Bushland Mosaics have specific functional objectives.

To ensure that the development meets these objectives and therefore complies with the Code, Ecologically Significant Areas will include:

- a) areas specified in **Appendix 4**;
- b) areas required for the conservation of any significant species, significant habitat, poorly conserved ecosystems, existing conservation reserves and areas subject to a Voluntary Conservation Agreement;
- c) areas required to meet the functional objectives of the **Conservation Strategy Plan** category(ies) represented in the study area (eg. Major Linkages protect viable linkages between Large Habitat Systems and Significant Remnants).

The areas described in **b)** are to be defined by assessing each of the remnant units in the study area against the following criteria, taken from **Chenoweth EPLA, 2001**. (Further information about each criterion is provided in **Appendix 5**):

- Essential Habitat for Significant Species;
- Ecosystem Value;
- Remnant Size;
- Relative Size of Ecosystem;
- Condition;
- Ecosystem Diversity;
- Context and Connection.

The following criteria can be used to refine the identification of ecologically significant areas in the study area, if the information is available:

- Other Habitat for Significant Species;
- Habitat for Other Species;
- Localised Contribution to Biodiversity;
- Corridor Links, Context and Connection;
- Geomorphologic Variation;
- Other Ecosystem Values.

Those portions of the study area which provide essential habitat for significant species, contain poorly conserved ecosystems, are relatively large, have high integrity, contain a high diversity of species and are well connected to other remnants would be considered areas of very high ecological significance. Use of the above criteria will enable comparison of remnant units within the study area and relative rankings to assist in the identification of ecologically significant areas.

The areas described in **c)** are to be determined with reference to **Section 2** of the **Nature Conservation Constraint Code**. Further details can be found in **Section 9.4** and **9.5** of **Volume 1** of the **GCCNCS** (p. 77 – p. 93).



The Ecological Site Assessment Report should clearly document the consultant's reasons for any inclusion or rejection of areas as ecologically significant, based on the terms of the above criteria.

2.3 Maintaining the Viability of Ecologically Significant Areas

The assessment is to identify, and provide details of, any measures that may be required on the proposed development site to maintain and/or enhance the viability of the identified ecologically significant areas of the study area. Such measures might include:

- the provision of buffers around any ecologically significant areas that occur, either wholly or partly, on the development site. Buffers should also be provided on the development site for any ecologically significant areas that occur directly adjacent to its boundaries. Such buffers may incorporate both native vegetation and degraded areas requiring rehabilitation. The report should describe the location, dimensions and characteristics of these. Appropriate widths are provided in the **Nature Conservation Constraint Code** and **Natural Wetland Areas and Natural Waterways Constraint Code**;
- the designation, protection and enhancement of ecological corridors on the development site to provide links between the identified ecologically significant areas of the study area and its surrounds. These may incorporate both native vegetation and degraded areas requiring rehabilitation. The report should describe the location, dimensions and characteristics of these. Appropriate dimensions are provided in the **Nature Conservation Constraint Code** and the **Natural Wetland Areas and Natural Waterways Constraint Code**;
- the identification of areas of the site requiring rehabilitation to support the ecologically significant areas of the study area by enhancing their ecological value and function;
- the identification of pest plant and environmental weed infestations that require eradication and management;
- the determination of management arrangements for each ecologically significant area on the development site. Such arrangements might include incorporation of ecologically significant areas in areas proposed to be dedicated as public open space, inclusion within the Conservation Domain, or incorporation within private open space as areas subject to a Voluntary Statutory Covenant or Vegetation Protection Order.

2.4 Other Remnant Vegetation

In areas requiring a Detailed Ecological Site Assessment, remnant vegetation within the study area that has not been identified as an ecologically significant area should also be mapped in order to comply with **Performance Criteria 6** of the **Nature Conservation Constraint Code**:

'The conservation and retention of remnant vegetation, other than ecologically significant areas located on the site, must be maximised to support the conservation of the site's ecologically significant areas.'

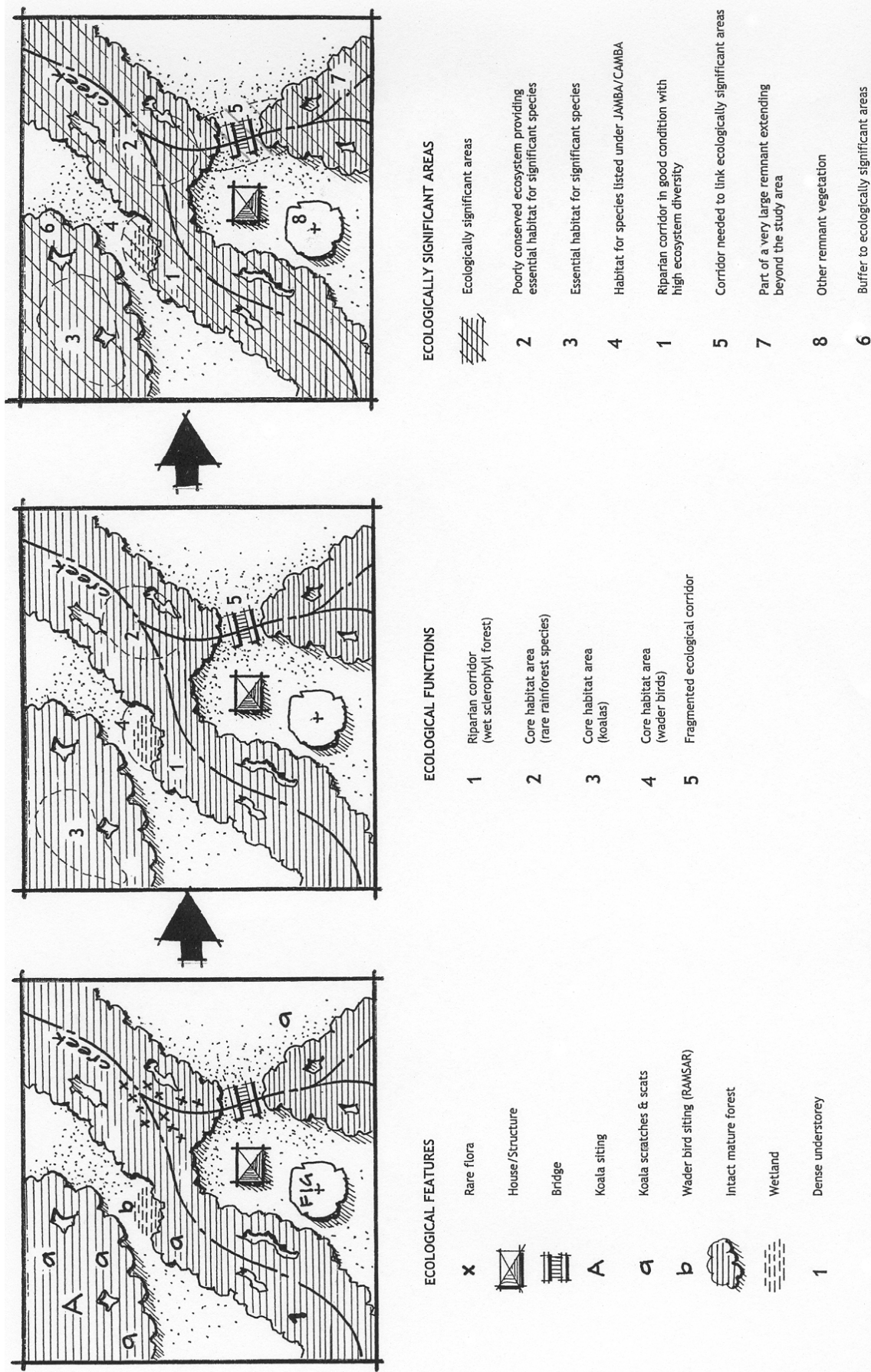


Figure 2: A Hypothetical Example Undertaking Stages 1 and 2 of the Ecological Site Assessment.



3.0 Stage 3: Assessment of Impacts

Using the information obtained from **Stages 1 and 2**, the likely impacts of the proposed development design on the identified ecologically significant areas of the study area are to be determined.

The determination should consider both the spatial and temporal impacts of the design, construction and operational phases of the development on these areas.

The following list of issues is derived from the **Nature Conservation Constraint Code** and the **Natural Wetland Areas and Natural Waterways Constraint Code**, where they are encapsulated as performance criteria. They should be considered as a minimum.

3.1 Basic Assessment of Impacts

Consider the impact of the development on the conservation of:

- ecologically significant areas;
- fauna;
- buffers; and
- ecological corridors.

3.2 Detailed Assessment of Impacts

Consider the impact of the development on the conservation of:

- ecologically significant areas;
- fauna;
- remnant vegetation within the study area, other than that identified as an ecologically significant area;
- buffers;
- ecological corridors.

On sites where the **Natural Wetland Areas and Natural Waterways Constraint Code** applies, consideration should also be given to the additional impacts of:

- filling of the site;
- on-site effluent disposal; and
- water management strategies and associated changes in hydrological regimes;

as they may impact upon the natural hydrological regime of wetlands and waterways, including natural water quality, water quantity and groundwater conditions.

4.0 Stage 4: Recommendations

Using the information obtained in **Stages 1, 2 and 3**, a strategy for the conservation of ecologically significant areas during both the construction and operational phases of the development should be recommended.

The strategy should:

- specify in detail any changes to the development design that may be required to minimise the impact of the development on the ecologically significant areas, as well as discuss those impacts that cannot be mitigated, the reasons why, the subsequent consequences and any proposed compensatory packages; and
- identify any requirement for an environmental management plan to be prepared for the site to conserve the ecologically significant areas of the study area during the construction and operational phases of the development should the application be approved by Council. Highlight the specific issues that it should address (eg. a rehabilitation plan, a vegetation management plan, a fauna management plan, weed management plan, landscape plan or open space management plan, etc).

Reference should be made to the acceptable solutions provided in the relevant Constraint Code.

Ecological Site Assessment Key Performance Criteria

The ultimate measure of the success of the Ecological Site Assessment will be if the proposed development design can demonstrate that it is 'responsive' to the existing conditions of the study area and that it minimises impact on the natural environment by conserving the identified ecologically significant areas.



Appendices

Appendix 1 Considerations When Selecting a Consultant

The following considerations are provided to assist in selecting a suitable consultant to undertake ecological site assessments. They are not intended to be a checklist or criteria. Rather, they are considerations to assist in asking the right questions of potential consultants, with the intention of obtaining a quality assessment of the ecological features and functions of a given study area and the identification of its ecologically significant areas. The achievement or otherwise of one or more of these considerations should not represent qualification or disqualification to prepare such assessments.

Does the consultant have the necessary field experience in the technical area in which they will be expected to undertake work?	Can the consultant provide referees within the profession or within relevant areas of Government, such as the Environmental Protection Agency (EPA), Queensland Parks & Wildlife Service (QPWS), Queensland Museum, Queensland Herbarium or a local authority?
Does the consultant have qualifications in the technical area in which they will be expected to undertake work?	For example, qualifications in botany if consulting on flora issues, zoology if consulting on fauna, etc. Note that such qualifications may not be essential, provided the consultant has field experience, as per above.
Does the consultant have a good reputation in relation to the quality of their work and is their advice well regarded professionally?	Can the consultant provide referees within the profession or within relevant areas of Government such as the EPA, QPWS, Queensland Museum or Queensland Herbarium?
Does the consultant use recognised scientific methodologies in gathering data and undertaking scientific surveys to support their technical reports?	For example, those specified in this document 'Guidelines for Preparing Ecological Site Assessments during the Development Process – May 2002' .
Does the consultant use as their principal data source comprehensive, site-specific data gathered in the field, as opposed to sourcing data principally from non site-specific data sources, such as regional mapping and flora/ fauna databases?	A quote which differentiates between cost/ hours spent in the field and cost/ hours for data research and preparation of the report may assist in indicating the relative weighting of each task.
Does the consultant have experience in preparing and submitting similar technical reports to Queensland local authorities?	Can the consultant provide evidence of relevant experience?
Is the consultant familiar with the development assessment and environmental assessment regime operating in Gold Coast City?	Has the consultant undertaken work of this kind in the City before? What is the extent of the direct experience the consultant has in working in this technical area within Gold Coast City?
Is the consultant familiar with this document, 'Guidelines for Preparing Ecological Site Assessments during the Development Process – May 2002' , and relevant Gold Coast City Council documentation such as the Nature Conservation Strategy ?	
Has the consultant been recognised by the Court as a credible witness in legal action involving their advice?	Can the consultant provide evidence of Court experience as an expert witness?
Does the consultant, or their firm, have an identifiable conflict of interest or a financial interest in the project (other than payment for service) that would reduce the credibility of their advice in the eyes of an independent third party?	
Is the consultant a member, or do they hold the necessary qualifications to make them eligible to be a member, of a recognised professional body, eg. the Environment Institute of Australia, Australian Institute of Landscape Architects, etc, or other relevant professional body that supports its members through the dissemination of up-to-date ecological information?	
Will the people undertaking the fieldwork hold the necessary licences to undertake the work expected of them?	For example, a 'Scientific Purposes Permit', issued by QPWS under the Nature Conservation Act , to enable the lawful trapping of wildlife to compile site fauna lists.



Appendix 2 Flora Survey

The assessment will include a detailed record and assessment of the flora within the study area, both native and exotic.

A2.1 Aim

Gold Coast City is widely recognised as having both high biodiversity and a high number of significant species compared with other areas in Australia. It is therefore essential that the flora survey be comprehensive enough to fully describe the biodiversity and significance of the study area.

The aim of the flora survey is to collect enough botanical information to:

- develop a detailed description of the floristic and structural composition of each vegetation association present; and
- provide a comprehensive list of any significant species present in the study area.

A2.2 Method

To Identify and Describe the Vegetation Associations

Following an initial assessment of the study area, sampling sites within each vegetation association present should be located, such that a representative sample is identified and surveyed. A plot-based survey methodology is recommended, with fieldwork at each plot including plant identification, structural analysis and species diversity characterisation of all flora present. The survey methodology should be generally consistent with the established formats used by the Queensland Herbarium (Neldner et al, 1999) or Walker and Hopkins (1990).

Within each sample site, the following work is to be undertaken:

Plant collection and identification

A list of all plant species should be prepared within each vegetation association, making note of any significant species, including exotic species. Where possible, flora should be positively identified and recorded in the field. For any unconfirmed plant specimens, adequate samples should be collected, pressed and sent to the Queensland Herbarium for further identification, where possible.

Classification of vegetation association

A formal classification of each vegetation association should be undertaken, utilising the structural analysis techniques established by Walker & Hopkins (1990) and consistent with the classification system established in the **Gold Coast City Nature Conservation Strategy (GCCNCS)**, to the extent that this is possible. It is, however, noted that the localised scale of the survey work required is likely to identify vegetation associations that are either sub-units of, or additional units to, those identified in the **GCCNCS**. It is anticipated that the minimum data set required to adequately describe the terrestrial vegetation of any study area would include all of the following, while wetland vegetation need only include items **d)** and **e)**.

- a) height estimates of each layer or strata within the vegetation community, together with records of dominant or emergent taxa;
- b) an indication of the structural formation of the canopy (ie. the crown separation class, eg. tall open forest) and of each of the remaining stratum layers (ie. groundcover class, eg. dense or isolated clumps);
- c) an indication in the range and mean basal areas (DBH) of the canopy for open forest/ woodland communities;
- d) an assessment of the level of any previous disturbance to the existing vegetation communities, eg. fire, weeds, grazing, etc; and
- e) a list of plant species occurring in each layer or strata within the vegetation community.

Guidance for the definition and categorisation of vegetation associations may be obtained from the **GCCNCS Vol. 2** and **Map 3**. However, it is recognised that a more detailed site inspection will, in many instances, delineate additional vegetation associations on the basis of local differences of aspect and terrain (ie. topography, soils and geography) and localised differences in the dominant floristic components of the vegetation in the field.



To Determine the Presence and Location of Significant Species

Following a search of existing databases (eg. such as WildNet) to identify which species are likely to occur in the area, a targeted search is required over the entire study area to determine the presence and location of significant species, utilising 'whole-of-site' traverses or equivalent. This is of particular importance where existing records or local knowledge suggest that significant species may be present, or where prior site disturbance may have resulted in an unpredictable distribution of species.

A2.3 Documentation

The findings of the Flora Survey, including the results of any community consultation, should be clearly presented as part of the Ecological Site Assessment Report (see Sample Table of Contents in **Appendix 6**). The following information should be included:

- a brief introduction providing a background to the study area, setting the context of the study, outlining the study objectives, and providing a brief outline of the proposed development;
- a summary of the methodology used to conduct the assessment, including the name of the field assessor and the date of the survey, and a justification of the selection of the methodology used;
- a brief summary of any regional floristic or vegetation data used to supplement on-site survey results (cite references);
- a summary of the floristics of the study area, including any significant species as defined in the Glossary of this Planning Scheme Policy; any 'pest plants' as defined under the **Land Protection (Pest and Stock Route Management) Act 2002**; and any environmental weeds as listed in the **Gold Coast City Landscape Strategy Part 3 – Information Sheet 5 'Guidelines for Undesirable Plants for Natural Bushland and Waterways'**;
- a concise description of the vegetation associations and existing environment within the study area. The description should include a list of the dominant plant species within each structural layer of each vegetation association;
- a list of identified flora species³, noting their conservation status as defined by the particular statute (eg. endangered, vulnerable, rare, or common as defined by the **Nature Conservation (Wildlife) Regulation of the Nature Conservation Act**); their 'pest plant' status (Class 1, Class 2 or Class 3) as defined by the **Land Protection (Pest and Stock Route Management) Act**; or their environmental weed status;
- an assessment of the 'condition' or 'integrity' of the vegetation associations present over the study area, in terms of site history, fire, prior land use, extent of canopy thinning/ clearance, disturbance by weeds and feral animals, presence of understorey, native grasses, litter layer and other relevant notes. Any indication of vegetation dieback and its potential causes should also be included in this assessment;
- an assessment of the distribution and conservation status of identified vegetation associations locally and regionally, including reference to the **Vegetation Management Act and Regulations**.

The above information should be supported by appropriately scaled map(s) clearly indicating:

- the location of all existing vegetation within the study area, contour lines (using intervals between 1 and 5 metres) and any existing buildings, roads or other infrastructure;
- the location of survey plots and/or transects used during the flora survey;
- the location, extent and conservation status of the different vegetation associations that exist within the study area; and
- The location of any significant species (as defined in the glossary of this planning scheme policy), 'pest plants' or environmental weeds.

The maps should clearly indicate the location and extent of the feature being shown and either overlay, or be easily compared with, plans of the proposed development.

³ This list should be provided in hard copy and, where possible, in digital format. To facilitate the efficient transfer of the data into Council's flora and fauna database, digital information should be presented in table format (eg. Microsoft Excel or Access) and contain at least 4 fields labelled Genus, Species, X and Y. The X and Y fields must contain coordinates in UTM projection. **Please note: each table must contain only fauna OR flora information (not both).**



Appendix 3 Fauna Survey

This assessment will include a detailed record and assessment of the fauna and fauna habitat within the study area, both native and exotic.

A3.1 Aim

The objective of the fauna survey is to develop a comprehensive inventory of the fauna using and potentially using the habitat associations of the study area.

A3.2 Scope

The survey period requirements will be dependent on habitat diversity within the study area, the size of the area to be surveyed, and the seasonal behaviour of any expected species (eg. of migratory birds). This is further discussed in **Section A3.3** below.

A3.3 Methods

Prior to commencing the survey, discussion should be undertaken with Council officers to ascertain the survey period and detailed trapping requirements for the study area. Ideally, both a Site Analysis Report and Flora Survey will have been completed to assist in these determinations.

At least one sampling site should be established in each broad ecosystem and habitat type (ie. gully, ridge, open forest, closed forest, flowing/ stagnant water bodies, etc). For large study areas it is expected that replicate sampling sites be established in widespread ecosystem and habitat types.

Prior to the selection of the methodology, the study area should be assessed on the basis of habitat present and known records and associated literature for the surrounding area. Ideally, the survey methodologies selected should be sufficient to record all fauna species potentially using the study area and the capacity in which they use these habitats (including transient and migratory species).

Suggested Methodologies for a Standard Fauna Survey Involve:

Diurnal Search	This involves intensive investigation of streams, ground layer (under logs, rocks and leaf litter), low vegetation (under bark and in tree stumps) and caves for target invertebrates (eg. snails, ants, butterflies and any anticipated significant species) and all amphibians, reptiles, bats and animal signs, eg. scats, owl pellets, remains and tracks.
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Minimum Duration: 2hr/ Site During the Middle of the Day

Pitfall Traps	These should comprise one pitfall trap line comprising 3 or more pits (20 litre containers) and a 20 metre drift fence per habitat type. However, the number of buckets/ line length to use is often best determined on site. Pitfall traps should be cleared early morning and late afternoon. This is a sound means of sampling for amphibians, reptiles and small mammals.
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Minimum Duration: Four Days and Nights

Opportunistic Records	Covers all fauna observations outside the systematic survey times.
Spotlighting	Should be undertaken on foot, where possible, at a leisurely pace using hand-held 30 – 50 Watt spotlights and/or head torches. Surveys should be undertaken along predetermined transects of varying length and location, depending upon habitat and species' characteristics and be started in the early evening. This method samples nocturnal mammals (flying, arboreal and terrestrial), birds (owls and nightjars), reptiles (geckos) and frogs.

Minimum Duration: 2hr for each Night of the Survey Period

Elliot and Wire Cage Traps	A minimum of 20 Elliot 'A' and 1 Elliot 'B' traps should be laid on ground transects 10 or more metres apart. Each transect should include two medium-large wire cage traps on the ground and five platform mounted arboreal traps using a variety of baits. This is a sound means of sampling for arboreal and terrestrial mammals. Trap placement will be influenced by vegetation diversity, the size and shape of habitat patches and by naturally occurring features such as logs, rock outcrops, tree bases and clumping vegetation.
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Suggested Methodologies for a Standard Fauna Survey Involve:

Minimum Duration: Trapping Over 4 Consecutive Nights is Recommended

Bird Surveys	Bird species are to be recorded, indicating method of identification (ie. call or visual observation) and habitat location. Surveys should be conducted from dawn to early morning, dusk to early evening and during the night for nocturnal species. The relationship of habitats occurring within the study area and any implications for migratory species should be noted. Surveys are to be conducted in each of the ecosystems represented in the study area.
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Minimum Duration: Fifteen Minutes Per Transect

Harp Traps and Mist Nets	For the capture of micro chiropteran bats.
Electronic Bat Detectors	For recording the ultrasonic calls of micro chiropteran bats. Survey options include walking a predetermined transect, stopping to record calls detected, and remote/ stationary detection at specific locations such as stage trees. Surveys of transects should occur at least one hour after sunset.

Minimum Duration: Sixty Minutes Per Transect

Hair tubes	Of different sizes left in site for two weeks as an additional method of mammal detection. This is a useful technique for the detection of small ground-dwelling mammals.
Arboreal Trapping	Used to identify the presence of gliders which are hard to detect using conventional spotlighting techniques. The method involves setting up specially designed trap stations, typically comprising a wooden platform secured to selected trees with a glider trap. Further information can be found in Mawberry, 1989.
Nocturnal Voice Playback and Call Recording	This technique uses voice playback to determine the presence of species that may be breeding or difficult to physically observe in the field (eg. owl and frogs).

Note: *Specific methods may be required to target particular fauna species identified as potentially occurring within the study area.*

A Permit for Scientific Purposes is required for any survey methods that result in interference with native fauna. The consultant is to obtain a permit from the Queensland Parks & Wildlife Service prior to commencing any survey work and reports are to be lodged in accordance with permit requirements.

In cases of doubt over species identification, voucher specimens with full collection details can be sent to the Queensland Museum for identification (subject to permit requirements).



A3.4 Documentation

The findings of the Fauna Survey, including the results of any community consultation, should be clearly reported as part of the Ecological Site Assessment Report (see Sample Table of Contents in **Appendix 6**). The following information should be included:

- a brief introduction providing the background to the study area, setting the context of the study, outlining the study objectives, and providing a brief outline of the proposed development;
- detailed information on the scope and duration of the fauna survey and description and justification of the techniques employed for each fauna group (ie. fish, amphibians, reptile, birds and mammals). In particular, the report should provide details on survey intensity, survey duration, sampling methodology and strategies, qualification of any assumptions based on non-quantitative sampling techniques (ie. those based on personal observation), and demonstration of how the effects of seasonal variation and climatic conditions have been addressed by the methodology;
- reference to any limitations in duration, scope and techniques of the fauna survey work;
- a summary of any regional fauna data used to supplement on-site survey results (cite references);
- a summary assessment of the fauna and fauna habitat types within the study area, including any significant species as defined in the Glossary of the Planning Scheme Policy;
- the results of the fauna survey, expressed for each faunal group (ie. fish, amphibians, reptiles, birds and mammals), giving a summary description of the fauna values of the study area and in which habitats/ areas they occur. This should include the sites at which each species was recorded and a reference to their abundance at the site (ie. abundant, common, uncommon, occasional);
- a list of all fauna species⁴ present or potentially present in the study area, noting whether they are native or exotic and their conservation status as defined by the particular statute (eg. endangered, vulnerable, rare, common or special cultural significance), as defined by the **Nature Conservation (Wildlife) Regulation** of the **Nature Conservation Act**; and
- identification and assessment of significant habitat within the study area.

The above information should be supported by an appropriately scaled map(s) clearly indicating:

- the location of all existing vegetation within the study area, contour lines (using intervals between 1 and 5 metres) and any existing buildings or other infrastructure;
- the location of the survey area and a map of trap lines, pitfall lines, bird survey and spotlighting transects, and harp traps/ mist nets;
- the location of any significant species as defined in the Glossary of this Planning Scheme Policy;
- the location of any identified fauna movement corridors or pathways, and/or breeding sites and clarification of site status (ie. either active or dormant); and
- identification of important habitat trees, ie. active den and nest sites, the presence of tree hollows and obvious nests (particularly those of raptors), etc.

The maps should clearly indicate the location and extent of the feature being shown and either overlay, or be easily compared with, plans of the proposed development.

⁴ This list should be provided in hard copy and, where possible, in digital format. To facilitate the efficient transfer of the data into Council's flora and fauna database, digital information should be presented in table format (eg. Microsoft Excel or Access) and contain at least 4 fields labelled Genus, Species, X and Y. The X and Y fields must contain coordinates in UTM projection. **Please note: each table must contain only fauna OR flora information (not both).**



Appendix 4 Schedule of Ecologically Significant Areas

Stage 2 of the Ecological Site Assessment requires the applicant to identify ecologically significant areas of the study area. To ensure compliance with various legislative requirements and inter-governmental agreements, the following must be included as ecologically significant areas if they occur within the study area:

- areas containing listed threatened ecological communities, as identified under the **Commonwealth Environment Protection and Biodiversity Conservation Act**;
- areas prescribed under the **Nature Conservation Act** and **Nature Conservation (Wildlife) Regulation**, including areas subject to an Interim Conservation Order and/or a Conservation Plan;
- areas identified as being of nature conservation significance under the **Vegetation Management Act**, including 'endangered' and 'of concern' regional ecosystems;
- areas declared as Fish Habitat Areas under the **Fisheries Act**;
- RAMSAR sites;
- areas providing essential habitat for species listed under JAMBA, CAMBA and the Bonn Convention;
- areas owned or managed by Gold Coast City Council for nature conservation purposes (including those areas acquired with funds raised through the Open Space Preservation Levy);
- areas subject to a Voluntary Conservation Agreement with Gold Coast City Council;
- areas subject to a Vegetation Protection Order under the Gold Coast City Local Law No. 6 (**Vegetation Management**).



Appendix 5 Criteria for Defining Ecologically Significant Areas

The following definition of each of the criteria listed in **Section 3.2.1.2** has been adapted from the **Common Nature Conservation Classification System (Chenoweth EPLA, 2001)**. Each remnant unit in the study area should be assessed against these criteria to determine its ecological significance.

Essential Habitat for Significant Species	The remnant unit may provide critical or known habitat for populations of significant species. These areas are of very high nature conservation significance for the maintenance of biological diversity.
Ecosystem Value	<p>The remnant unit may contain one or more:</p> <ul style="list-style-type: none"> ▪ Regional Ecosystem types that are poorly conserved at the regional level, as defined in the Vegetation Management Act and Regulations; or ▪ Endangered communities and areas of ecological significance, as prescribed under the Environmental Protection and Biodiversity Conservation Act; or ▪ Nationally important wetlands, as identified in either ‘A directory of Important Wetlands in Australia’ (ANCA, 1992) or in the Conservation Assessment of Coastal Wetlands in Southeast Queensland (Chenoweth EPLA, 1999).
Remnant Size	The area in hectares of each remnant unit, size being a major indicator of ecological significance and diversity, and strongly correlated with viability of the flora and fauna species it supports.
Relative Size of Ecosystem	The relative size of each ecosystem type within the remnant unit, compared with other remnant units of the same ecosystem type in the southeast Queensland region (as determined by the Queensland herbarium’s regional ecosystem map). Some ecosystem types commonly cover large areas, while others are normally restricted to small patches. A measure of the relative size indicates whether this particular remnant unit is likely to represent a significant proportion of its type remaining in the area and therefore to be of high ecological significance.
Condition	The extent to which each remnant unit resembles its pre-clearing condition, as indicated by canopy integrity, degree of disturbance, regrowth, etc.
Ecosystem Diversity	The number of different ecosystems present in a remnant unit is a broad indication of its habitat diversity, eco-tones (boundaries) and ecological processes that contribute to biodiversity.
Context and Connection	<p>The extent to which the remnant unit incorporates, borders or buffers other areas of conservation significance, other remnant units, or important ecological processes as follows:</p> <ul style="list-style-type: none"> ▪ Water: the presence/ inclusion of, or other relationship to, a waterbody, watercourse or marine/ estuarine system increases the significance of remnant bushland for contributing to ecological processes and to protecting water quality and stream bank stability. ▪ Endangered Ecosystem: remnant units bordering Endangered or ‘Of Concern’ Regional Ecosystems have additional importance as buffers and habitat extension. ▪ Physical Connection: the degree to which a remnant unit is connected to other contiguous areas of vegetation is important. Patches of bushland that are connected to others contribute more to a habitat network than isolated fragments with significant barriers to wildlife movement. They are significant for the long term survival of plants and animals, and have greater resilience to the effects of disturbance than isolated fragments.



The following criteria can be used to refine the identification of ecologically significant areas within the study area, where the information is available.

Other Habitat for Significant Species	The remnant unit may provide habitat for a critical part of the species life cycle, represent a significant part of the known geographic range, or support a high proportion of the known populations.
Habitat for Other Species	The remnant unit may contain locally significant 'icon' or other species, sub-species or locally endemic variants, migratory species, or populations that are isolated or at their geographic range limits. Alternatively, it may support an unusually high species richness, relative to other remnants of similar ecosystem type.
Localised Contribution to Biodiversity	The remnant unit may be of local importance for biodiversity, incorporating refugia qualities, artificial waterbodies or managed wetlands of ecological significance, or hollow bearing trees providing habitat for arboreal mammals and nesting birds.
Corridor Links, Context and Connection	There may be high quality links between non-contiguous remnant units (eg. riparian habitats, corridors and 'stepping stones' for particular species or suites of fauna) which enhance the ecological significance of those links and remnant units.
Geomorphological Variation	High geomorphologic and ecological variations within the remnant unit may indicate high habitat diversity and ecosystem micro-variation.
Other Ecosystem Values	The remnant unit may support ecological processes that are important for conserving natural values – eg. catchment and floodplain values, scenic values, protection from land degradation, etc.



Appendix 6 Sample Table of Contents for Ecological Site Assessment Report

The results of the Ecological Site Assessment should be clearly documented in a Report that demonstrates compliance with the relevant Code. The extent of information contained within the Report will vary, depending on the study area and the intensity of the development impact. In general, it should detail the ecological features and functions and ecologically significant areas of the study area, the potential impacts of the development and the design and management measures recommended to avoid or mitigate any impacts.

The Report should be supported by appropriately scaled maps for each Stage of the Ecological Site Assessment. The maps should clearly indicate the location and extent of the feature being shown, and either overlay, or be easily compared with, the proposed development design.

Suggested headings are provided below. They generally correspond with the Stages of the Ecological Site Assessment described in this Planning Scheme Policy.

Ecological Site Assessment Report for (Lot/ Plan)		
1.0	Study Area Description	Provide a brief description of the study area.
2.0	Development Description	Provide a brief outline of the proposed development.
3.0	Ecological Features and Functions	Where a detailed assessment has been undertaken, this section should contain a summary of the relevant findings of the flora and fauna report. Full details of the latter should be provided as appendices.
4.0	Ecologically Significant Areas	Where a detailed assessment has been undertaken, this section should contain a summary of the results of the assessment according to the criteria. Full details of the latter should be provided as appendices.
5.0	Assessment of Impacts	
6.0	Recommendations	
7.0	Sources of Information	Provide a list of reference material and literature cited in the assessment, and a list of individuals/ community groups consulted.
8.0	Maps and Aerial Photographs	As a minimum, the following should be included:

Study Area Description

An up to date aerial photograph of the study area, in full colour and at a scale that enables interpretation. This should include an overlay of the development footprint or, where relevant, the subdivision layout.

Ecological Features

Map(s) showing the location and extent of:

- vegetation associations;
- significant flora species;
- poorly conserved ecosystems;
- significant fauna species sitings;
- significant fauna habitat;
- any wetlands or waterbodies;
- any conservation reserves;
- any areas subject to a Voluntary Conservation Agreement.

Ecological Functions

Map(s) showing the location and extent of:

- core habitat areas;
- ecological corridors;
- buffer areas, etc.

Ecologically Significant Areas

Map(s) showing the location and extent of:

- identified ecologically significant areas and other remnant vegetation;
- measures required to maintain the viability of Ecologically Significant Areas.



Where possible, the following maps should be included:

Assessment of Impacts	A map showing the spatial extent of the likely impacts of the development on Ecologically Significant Areas.
Recommendations	A map showing the spatial attributes of any measures recommended to avoid or mitigate potential impacts of the development (eg. the location of proposed rehabilitation areas, etc).
Species Lists	Provide a list of observed, known and/or expected: <ul style="list-style-type: none">▪ flora species;▪ fauna species.
Appendices	Where a detailed Ecological Site Assessment has been undertaken, the following appendices should be included: <ol style="list-style-type: none">a) Flora Survey Results;b) Fauna Survey Results;c) Assessment of Ecologically Significant Areas.

Appendix 7 Useful Data Sources Maintained by Council

The following Council-maintained data sources are available for use by consultants when preparing Ecological Site Assessments.

Gold Coast City Nature Conservation Strategy

- Volume 1: Strategy Plan;
- Volume 2: Flora and Fauna Resource Inventory and Ecological Site Assessment;
- Volume 2 Appendices.

Maps

- Map 2: Locations of Existing Studies to 1997;
- Map 3: Major Vegetation Associations;
- Map 5: Ecological Significance;
- Map 7: Conservation Strategy Plan.

NCS Flora and Fauna Database

It is intended that, in the future, this database be made available to the public to assist with the preparation of Ecological Site Assessments.

Various Council Geographic Information Layers

- Soils layer;
- Geology layer.



Appendix 8 Text References and Further Reading

- Australian Nature Conservation Agency (1992) **A Directory of Important Wetlands in Australia.**
- Chenoweth EPLA, 1999, **Conservation Assessment of Coastal Wetlands in Southeast Queensland.**
- Chenoweth EPLA, 2001, **Common Nature Conservation Classification System.**
- Gold Coast City Council, 1997, **Site Analysis Local Planning Policy.**
- Gold Coast City Council, 1998, Gold Coast City Nature Conservation Strategy.
- Margules, C.R. and M.P. Austin, 1991, **Nature Conservation: Cost Effective Biological Surveys and Data Analysis:** CSIRO, Melbourne.
- Mawberry, R.B., 1989, **A New Trap Design for the Capture of Sugar Gliders, *Petaurus breviceps*.** Aust. Wild. Res, 16:425-428.
- Neldner, V.J., Thompson, E.J., Bean, A.R., Dillewaard, H.A, 1999, **Methodology for Survey and Mapping of Vegetation Communities and Regional Ecosystems in Queensland.** Prepared by the Queensland Herbarium.
- Queensland Herbarium, 1997, **Queensland Plants, Names and Distribution.** Queensland Department of Environment, Brisbane.
- Sattler, P. & Williams, R., 1999, **Conservation Status of Queensland's Bioregional Ecosystems.** Queensland Environmental Protection Agency.
- Specht, R.L, 1970, Vegetation In: Leeper, G.W. (ed) **The Australian Environment.** CSIRO, Melbourne University Press.
- Thackway, R. & Cresswell, I.D., 1995, **An Interim Biogeographic Regionalisation for Australia.** Australian Nature Conservation Agency, Canberra.
- Walker, J. and Hopkins, M.S., 1990, **Vegetation In: Australian Soil and Land Survey – Field Handbook.** (Eds. R.C. Mcdonald, R.F. Isbell, J.G. Speight, J. Walker & M.S. Hopkins), pp. 58-86. Inkata Press, Melbourne.