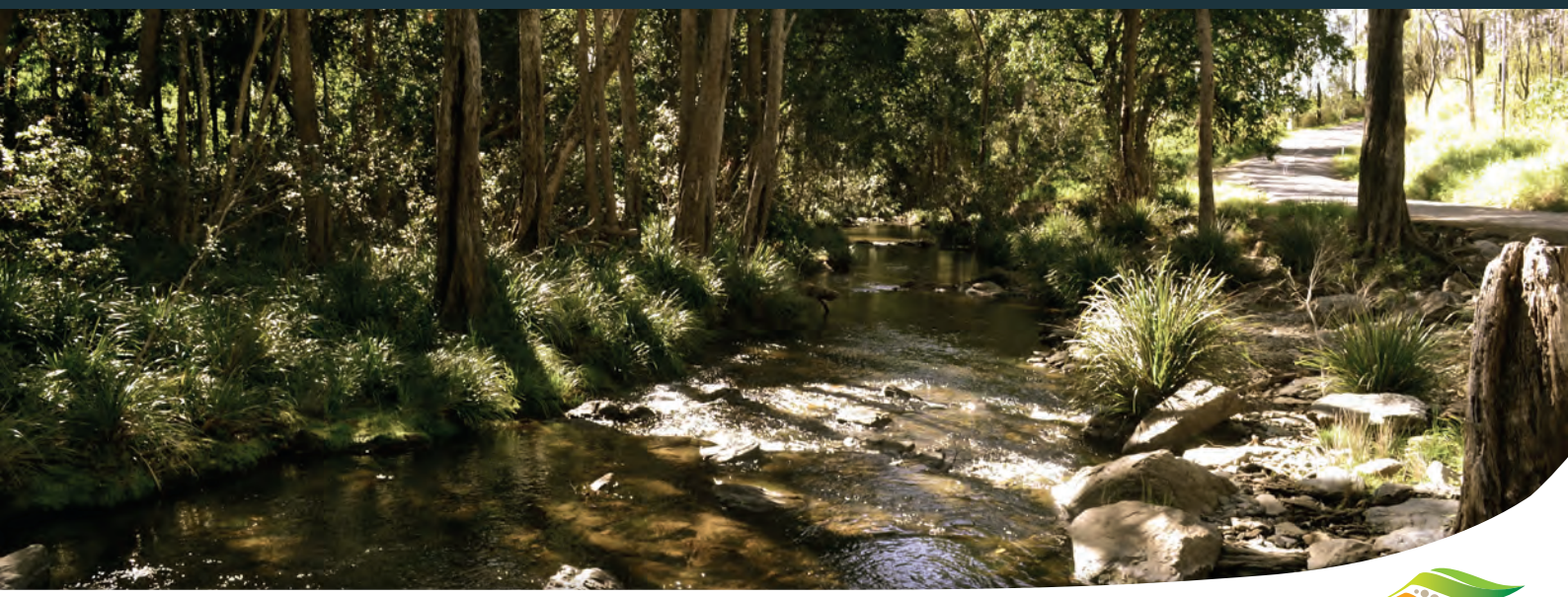
Planning Scheme Policy
Environmental Areas and Corridors



Planning scheme policy – Environmental Areas and Corridors

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Adoption

Moreton Bay Regional Council adopted this planning scheme policy 24 November 2015.

Commencement

This planning scheme policy will take effect from [insert date here].

Amendment

Alignment amendment 1 2017

- Adopted by Moreton Bay Regional Council on 27 June 2017
- Took effect from 3 July 2017

Major amendment 1 2019

- Adopted by Moreton Bay Regional Council on 12 December 2019
- Took effect from 29 January 2020.

1 Introduction

This planning scheme policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 2, Part 3, Division 2 of the *Planning Act 2016*.

1.1 Purpose

This planning scheme policy:

(a) outlines information Council requires or may require for the assessment of a development application;
(b) provides guidance and advice for the achievement of outcomes of the Environmental Areas Overlay assessment benchmarks;
(c) provides guidance and advice for developers and decision makers on how development can achieve ecologically sustainable development design outcomes;
(d) provides guidance and advice for counterbalancing environmental values where permitted as a last resort, through the use of environment offsets.

1.2 Application

This planning scheme policy applies to development applications (code assessable development and impact assessable development) for land mapped by the:

- Environmental Areas Overlay;
- Environmental Offset Receiving Areas Overlay;

This planning scheme policy also applies to development affecting matters of national environmental significance, non-juvenile koala habitat trees, habitat trees and priority species and other species of importance on land not mapped by the above overlay maps.

1.3 Interpretation

Terms used in this planning scheme policy are defined in Schedule 1 – 1.2 Administrative definitions. Additional terms are also detailed in Section 6 - Glossary.

2 Environmental Areas

The Moreton Bay region contains outstanding environmental values including a diverse range of ecosystems across terrestrial, wetland, waterway, and coastal areas. Thousands of plant, animal, and fungi species have been recorded in the region, including many threatened species.

Environmental areas are important ecological landscapes vital to protecting and maintaining the ***ecological health*** of the natural environment within the region, that provides ongoing benefit to the community.

Environmental areas support the full spectrum of wildlife lifecycle functions. They include a range of habitat types from native vegetation, montane, riverine, wetland, and coastal areas to places with scattered vegetation, any of which may be used by wildlife to forage, move through, breed, shelter and refuge.

Environmental Areas include mapped elements such as matters of state environmental significance (MSES) and matters of local environmental significance (MLES) and non-mapped elements such as matters of national environmental significance, non-juvenile koala habitat trees, habitat trees and priority species and their habitat.

2.1 Elements of the Environmental Areas Overlay

The Environmental Areas Overlay represents, where spatially possible, the Moreton Bay region's most environmentally important areas recognised as MSES and MLES.

Where there is inconsistency between provisions within the planning scheme the overlays prevail over all other components (other than strategic framework and regulated categories of development) to the extent of the inconsistency.

2.1.1 High Value Areas

Matters mapped under the Environmental Areas Overlay map are classified into one of two main categories: **High Value Areas** or **Value Offset Areas**.

High Value Areas represent high value environmental matters of State or local significance. These matters are to be protected from development impacts. In the limited circumstances where clearing of native vegetation in a High Value Area is not prohibited by State law or the planning scheme, impacts will be required to be offset in accordance with the Queensland Environmental Offsets Policy.

HIGH VALUE AREAS

Matters of State Environmental Significance (MSES)

MSES are referenced in the Queensland Government's State Planning Policy 2014. MSES include certain environmental values that are protected under Queensland legislation and is generated from regulatory data sourced directly from the Queensland government including, but not limited to: regulated vegetation; Queensland wetland mapping; protected areas; marine parks; wildlife habitat; koala habitat; fish habitat areas; and State legally secured offsets.

Matters of Local Environmental Significance (MLES)

MLES include environmental values, important to achieving local environmental outcomes and that are not the same, or substantially the same, as MNES or MSES. Mapped MLES areas may contain shorebird habitat areas, biodiversity areas and land protected in perpetuity for environmental purposes.

MLES Wetlands

MLES wetlands include locally significant wetlands within the Moreton Bay region that are not the same or substantially the same as MNES or MSES.

2.1.2 Value Offset Areas

Value Offset Areas represent valued environmental matters of State or local significance where offsets may be allowed if values cannot be avoided or mitigated. For MLES offsets please refer to section 10.3. For MSES offsets please refer to section 10.2.

VALUE OFFSET AREA

MSES - Koala Offsets

MSES - Koala Offsets are areas of Koala habitat within State identified priority areas. MSES - Koala Offsets are generated from regulatory data sourced directly from the Queensland government including, bushland habitat areas, high value rehabilitation habitat areas and medium value rehabilitation habitat areas under the *Planning Regulation 2017*. Where a non-juvenile koala habitat tree is proposed to be cleared in this mapped area, and the clearing is not accepted development, a legally secured offset may be required.

MLES Waterways buffer

Land adjacent to waterways requires special management to safeguard water quality, water dependent ecosystems and fish habitats. Where native vegetation clearing is proposed within an MLES waterway buffer and the clearing is not accepted development, a legally secured offset is required to ensure water quality outcomes for waterways are achieved.

The following buffer distances apply to the following stream orders (as measured from the top of the outer bank as defined under the *Water Act 2000)*:

- 100m buffer to W1
- 40m buffer to W2
- 20m buffer to W3

MLES Wetlands buffer

Where vegetation clearing is proposed within 100m of mapped MLES wetlands, and the clearing is not accepted development, a legally secured offset is required to ensure water quality outcomes for wetlands are achieved.

Refer to **Appendix 1** for a detailed list of all mapped MSES and MLES layers in the Environmental Areas Overlay.

2.2 Matters not spatially represented

2.1.1 Matters of national environmental significance

Development is to be located in areas to avoid significant impacts on matters of national environmental significance (MNES) and considers the requirements of the *Environment Protection and Biodiversity Conservation Act 1999*.

MNES refer to natural values and features protected under the authority of the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). In the Moreton Bay region, this includes but is not limited to:

- National heritage places.
- Wetlands of international importance.
- Listed threatened species and ecological communities.
- Migratory species protected under international agreements.

Proponents should refer to the Commonwealth Protected Matters Search Tool for assistance in determining whether MNES are likely to occur in the project area.

2.1.2 Matters of Local Environmental Significance not spatially represented

2.1.2.1 Habitat trees and habitat infrastructure

Habitat trees are trees with large canopies and or structural hollows where animals live, breed and shelter. Many native animals of Moreton Bay Region are dependent upon habitat trees for their survival. Old and dead trees can continue to be good habitat trees.

A habitat tree is defined as a native tree with a diameter greater than 80cm at 1.3metres above the ground. It should be noted that trees not meeting this size may still contain multiple conspicuous hollows and provide critical habitat for local wildlife.

2.1.2.2 Priority species and their habitat

Moreton Bay is a region of biological diversity with more than 3000 plant, animal and fungi species recorded. Of these, 118 are considered to be priority species.

Priority species generally have one or more of the following traits:

a. listed as a threatened species (that is extinct in the wild, endangered, vulnerable or near threatened or special least concern) under State or Commonwealth legislation or international agreements;
b. of management concern within Moreton Bay region;
c. of scientific interest or at risk (e.g. because of specialised habitat requirements or a poorly known species / population);

Wallum Sedgefrog

d. are iconic and contribute to regional identity (e.g. Moreton Bay Fig, *Ficus microphylla*).

Priority species habitat is incorporated into the Environmental Areas overlay to the extent it can be represented spatially. Scattered and diffuse native vegetation and habitat values may not be captured in this overlay and must be identified and valued at development application stage.

Appendix 3 contains a list of Priority species of the Moreton Bay Region.

2.1.2.3 The koala – a special priority species

The koala is a special priority species with significant iconic and conservation status at local, state and national levels.

Koalas are widely dispersed throughout the Moreton Bay region. Repeated studies have identified koalas using habitat in rural and urban areas and often moving between the two.

Koala home ranges vary and are dependent upon habitat availability and quality and are influenced by local land uses. Many environmental areas and corridors are likely to contain local koala habitat and contribute to safe movement of local koalas.

Areas used by koalas for movement or habitat will generally be:

a. Where koala habitat trees are present or close by. This includes scattered and isolated gum trees in urban environments.
b. Where koalas frequently or transiently use habitat.
c. Where there exists data, habitat mapping or local community observations.
d. Where there exists a koala sighting within a 1 – 2 km range.
e. Where there exists trace evidence of koala presence such as koala scat, scratches on tree trunks.

Existing scattered and isolated koala habitat trees are often critical 'stepping stones' for local koalas moving through modified landscapes.

Where scattered koala habitat trees and koala records exist within urban areas, all koala habitat values will be considered important for local and transient koala population viability.

Koala scratches on tree trunk

Koala scats

3 Avoidance and mitigation

An 'avoid, mitigate, offset' framework applies to environmental impacts resulting from development in Queensland. Applicants must demonstrate avoidance and mitigation of environmental impacts arising from development. Requirements for demonstrating avoidance and mitigation:

1. **Identify -** The environmental values of the area, including MNES, MSES and MLES values, within the development site and adjacent areas through ecological assessments.

2. **Avoid** - In designing the development, impacts on MNES and MSES should in the first place, be avoided wherever possible. Where development is proposed that will impact on MNES or MSES, it must be demonstrated that it is not possible to avoid the impacts.

Align roads around important trees

3. **Mitigate** - Development avoids areas subject to constraint, limitation, or environmental value. Where development cannot avoid these identified areas, it responds by:
    i. adopting a 'least risk, least impact' approach when designing, siting and locating development in any area subject to a constraint, limitation or environmental value to minimise the potential risk to people, property and the environment;
    ii. ensuring no further instability, erosion or degradation of the land, water or soil resource;
    iii. when located within a water buffer area, complying with the environmental values and water quality objectives for waters under the Environmental Protection (Water) Policy 2009.
    iv. maintaining, restoring and rehabilitating environmental values, including natural, ecological, biological, aquatic, hydrological and amenity values, and enhancing these values through the provision of planting and landscaping, and facilitating safe wildlife movement and connectivity through:
        a. the provision of replacement, restoration, rehabilitation planting and landscaping;
        b. the location, design and management of development to avoid or minimise adverse impacts on ecological systems and processes;
    v. protecting native species and protecting and enhancing species habitat;
    vi. protecting and preserving the natural, aesthetic, architectural, historic and cultural values of significant trees, places, objects and buildings of heritage and cultural significance;
    vii. establishing effective separation distances, buffers and mitigation measures associated with identified infrastructure to minimise adverse effects on sensitive land uses from odour, noise, dust and other nuisance generating activities;
    viii. establishing, maintaining and protecting appropriate buffers to waterways, wetlands, native vegetation and significant fauna habitat;
    ix. ensuring it promotes and does not undermine the ongoing viability, integrity, operation, maintenance and safety of identified infrastructure;
    x. ensuring effective and efficient disaster management response and recovery capabilities;
    xi. where located in an overland flow path:
        a. development siting, built form, layout and access responds to the risk presented by the overland flow and minimises risk to personal safety;
        b. development is resilient to the impacts of overland flow by ensuring the siting and design accounts for the potential risks to property associated with the overland flow;
        c. development does not impact on the conveyance of the overland flow for any event up to and including the 1% AEP for the fully developed upstream catchment;
        d. development directly, indirectly and cumulatively avoid an increase in the severity of overland flow and potential for damage on the premises or other premises, public lands, watercourses, roads or infrastructure.

Examples of mitigation measures can be found Appendix 2 *Design Guide*

4. **Offset** - Where it can be demonstrated that further avoidance is not possible, Council will require environmental offsets in accordance with the *Environmental Offsets Act 2014.* Offset conditions will only be applied if a suitable offset can be found. In cases where a suitable offset cannot be found, the activity might not be approved.

4 Ecological assessment and reporting

Ecological assessment is an integral part of the development design and assessment process. The results and conclusions of an ecological assessment report allows Council to understand if the proposed development will achieve the performance outcomes required by the Environmental Areas Overlay assessment benchmarks.

Where a proposed development has the potential to adversely impact on environmental areas, an ecological assessment report will be required to inform the development assessment process. In addition, Council may request associated plan/s

All surveys must be conducted, and reports must be prepared, by persons with relevant tertiary qualifications in ecology, conservation biology, natural resource management, environmental science or other appropriate ecological disciplines.

Where a specific Information Request is made by Council under the *Planning Act 2016* seeking more detailed or targeted information than outlined in this guideline, the Information Request takes precedence.

4.1 When an ecological assessment report and/or associated plan/s may be required

TYPE OF REPORT / PLAN	WHEN REQUIRED?	
ECOLOGICAL ASSESSMENT REPORT Includes below three plans where relevant (these may also form conditions of development approval prior to Operational Works)	An ecological assessment report is required when a proposed development: is within or adjacent to areas subject to the environmental areas overlay.	**Application stage**
NOTICE OF ELECTION	When required by the *Environmental Offsets Act 2014*.	
VEGETATION MANAGEMENT PLAN Note: an Ecological Restoration Plan may be required where revegetation is planned.	A vegetation management plan is required where clearing of native vegetation is proposed.	

FAUNA MANAGEMENT PLAN Plan outlining procedures to reduce impacts of clearing habitat on native fauna.	A fauna management plan is required where clearing of native vegetation is proposed.	**Information request or decision stage**
HABITAT TREE MANAGEMENT PLAN Plan outlining procedures to protect habitat trees retained within the development site.	A habitat tree management is required where the site contains habitat trees.	
NEST BOX MANAGEMENT PLAN Plan outlining procedures to counterbalance hollow loss.	A nest box management plan is required where clearing of native vegetation with hollows is proposed.	
OFFSET DELIVERY PLAN Refer to section 10.4.3.	Where an offset requirement is triggered by the *Environmental Offsets Act 2014*.	
AGREED DELIVERY ARRANGEMENT Refer to section 10.4.4.		
ECOLOGICAL RESTORATION PLAN Refer to section 9.	An Ecological Restoration Plan is required where revegetation is planned.	

Note: nothing within this planning scheme policy limits Council's discretion to request other relevant information under the Development Assessment Rules made under section 68(1) of the *Planning Act 2016*.

4.2 Ecological Assessment Reports

Ecological Assessment Reports must clearly identify any environmental values within the development site and adjacent areas of influence.

Table 1 below outlines The minimum form and content required for ecological assessment reports. Reports must provide details relevant to the application and site which enable identification and location of on-ground features, including images, A3 maps (at a scale not greater than 1:500), figures, tables, development plans.

1. Describe the location and extent of the development site and surrounding ecological landscape features:
    a. Location.
    b. Size.
    c. Environmental values of the site and adjacent areas.

2. Describe the physical characteristics of the site:
    a. Geology and soils.
    b. Hydrology and water quality (surface and groundwater).
    c. Topography, slope and landform.
    d. Waterbodies

3. Outline the previous and existing uses of the site and associated details:
    a. Existing uses.
    b. Previous uses.
    c. Existing infrastructure (access routes, transport, water supply, power, communications etc.)
    d. Influence of past and present land use on the site, and residual effects.

4. Outline field and desktop methodology including:
    a. date of survey
    b. justification for timing of survey
    c. methods, including reference to relevant survey guidelines
    d. survey duration
    e. weather conditions
    f. names and qualifications and relevant experience of professionals that undertook the survey
    g. details of relevant permits
    h. survey locations
    i. justification for survey locations
    j. limitations
    k. assumptions.

5. Conduct Fauna surveys and vegetation surveys in accordance with section 4.3 Survey and monitoring techniques. Koala surveys are required if clearing of non-juvenile koala habitat tree(s) is proposed. Conduct Koala surveys in accordance with section 4.3 Survey and monitoring techniques.

6. Provide an accurate description of the characteristics of the site, including flora, fauna, native vegetation communities and wildlife habitat:
    a. Environmental areas including:
        i. Matters of National Environmental Significance.
        ii. Matters of State Environmental Significance.
        iii. Matters of Local Environmental Significance, including:
            i. Priority species of the Moreton Bay Region and other species of importance.
            ii. Habitat trees, koala habitat trees, heritage trees and street trees.
    b. Regional Ecosystems (remnant and regrowth) and discuss extent, location, structure, proportions and condition.
    c. Flora species records and presence.
    Fauna species records and presence as well as breeding and dispersal behaviours

d. Habitat function and ecological processes.
e. Green infrastructure network
f. Environmental corridors
g. Urban forest canopy composition and coverage
h. Native Vegetation providing ‘stepping stone’ habitat for wildlife.
i. Wildlife movement infrastructure (fences, culverts, rope bridges etc.)
j. Specific habitat features available for fauna
k. Residential gardens contributing green values.
l. Managed forest
m. Offset areas, revegetation
n. Riparian zone and riparian buffer zone.
o. Waterways, watercourses, wetlands, water bodies (inc. dams) and drainage lines
p. Water quality and stream health indicators.
q. Presence of weed and pest species.

Note: Identification of environmental values may include aquatic environmental values and water quality objectives, and BioCondition assessment.

Note: Refer to Section 4.3.2 for koala survey requirements.

7. Provide an overview of the proposed development:
   a. Type of development.
   b. Primary use of development.
   c. Location and extent of the development site
   d. All associated infrastructure required for the development.
   e. Location and extent of all operational works including earth works and native vegetation clearing, with reference to development plans including version.
   f. Alternative locations for the development.

8. Identify all potential threatening processes and impacts from the proposed development including:.
   a. Edge effects, including noise and light pollution.
   b. Biodiversity and habitat impacts.
   c. Landscape effects.
   d. Invasive species.

e. Downstream effects (including water quality impacts).

9. Show current aerial photos highlighting existing environmental values overlaid with the plan of development:
   a. Remnant regional ecosystems
   b. Regrowth regional ecosystems
   c. Nonjuvenile koala habitat trees
   d. Juvenile koala habitat trees
   e. Habitat trees
   f. Threatened species records

10. Detail and discuss proposed avoidance and mitigation measures appropriate to the scale of impact including:
    a. Development design, footprint and location.
    b. Alternative location for the development.
    c. Minimisation of edge effects.
    d. Species specific interventions.
    e. Environmental buffers.
    f. Revegetation or restoration.
    g. Landscaping.
    h. Wildlife movement infrastructure.

i. Nest box habitat.
j. Fauna management.
k. Environmental Offsets.

11. List all references used in the information gathering and analysis process and include appendices for any additional supporting information (including wildlife records and database extractions):
    a. Technical information or data.
    b. Authorities and agencies consulted – include any correspondence.
    c. Background reports and literature reviewed.

4.3 Survey and monitoring techniques

Robust and repeatable survey methodologies are important as (a) they provide decision makers with a solid scientific basis to determine whether a development proposal complies with environmental objectives and visions, and; (b) provide a baseline event from which to repeat further surveys to determine change over time.

All surveys and assessments must be conducted by persons with relevant tertiary qualifications in ecology, conservation biology, natural resource management, environmental science or other appropriate ecological disciplines or a qualified arborist with experience in completing flora and fauna surveys and assessments.

Requests to undertake surveys and monitoring which deviate from techniques specified in this document will be a matter for negotiation between the applicant and Council's Manager Environmental Services, based on the potential environmental impact of the particular development proposed and the environmental characteristics of the site.

4.3.1 Fauna surveys

Fauna surveys identify and evaluate the presence of native species and their habitats, movement and dispersal corridors and pathways. In addition to searches of current literature and ecological databases, this usually requires a comprehensive site survey using repeatable and approved survey methodology.

Of particular interest are priority species of Moreton Bay Region and those identified as nationally, state or locally importance including those endangered, threatened, vulnerable or special least concern (refer Nature Conservation (Wildlife) Regulation (1994, and amended 2006) and *Environment Protection and Biodiversity Conservation Act* (1999) and migratory birds protected under international agreements.

Terrestrial vertebrate field surveys are to be consistent with the following accepted methodology:

Eyre TJ, Ferguson DJ, Hourigan CL, Mathieson MT, Kelly, AL, Venz MF & Hogan, LD (2018)*Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland*; Department of Science, Information and the Arts, Queensland Government, Brisbane.

In addition to the methodology as outlined above, fauna assessment must:

a. If handling, capturing, trapping or taking animals, be undertaken by persons who hold an appropriate Scientific Purposes Permit from Department of Agriculture and Fisheries, and must be registered under the *Animal Care and Protection Act 2001* and have ethical clearance from an Animal Ethics Committee

b. describe the fauna habitat significance of the subject site or its sub-components within a local, bioregional, state and national context;

c. identify any evidence of edge effects, invasive pest species and other disturbances (locations, causes and levels) which have potential to influence native fauna population viability;

d. identify specific habitat features available for fauna and indications of fauna presence such as:
    i. potential habitat trees e.g. containing hollows;
    ii. trees with scratch marks;
    iii. location and identification of scats, tracks and other traces of fauna;
    iv. fruit and seed trails;
    v. fauna trails;
    vi. fallen logs;
    vii. termite mounds;
    viii. ground diggings;
    ix. rock outcrops;
    x. nests in banks;
    xi. Roost /nest /den trees.

e. A minimum of four days and nights survey (conducted across several times) to minimise sampling duration influences within a given sampling period. Upon prior application, Council may allow less sampling effort in some circumstances where appropriate justification is provided.

4.3.2 Koala survey

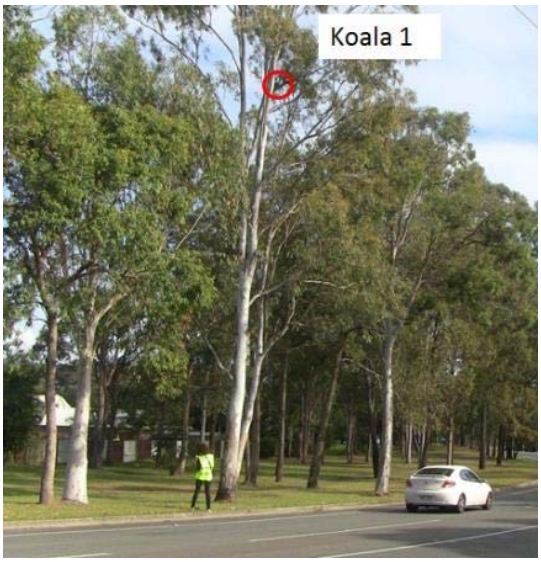
Koala surveys are to be consistent with the following acceptable methodology:

a. A desktop assessment of koala data, sightings and habitat mapping, and

b. Field assessment of current onsite habitat values assessment including bushland and urban habitat values including groups of koala food and habitat trees and individual trees across a site and adjacent to it.

c. Field assessment of evidence of use by koalas using a valid scientific methodology for assessing koala presence and activity such as a transect and spot assessment technique (SAT) to identify scratches on tree trunks, scat or any other presence data.

d. Assessment of movement pathways including existing and potential links between koala habitat areas, within and external to the site.



4.3.3 Vegetation survey

Vegetation surveys are to be consistent with the following acceptable methodology:

Neldner, V.J., Wilson, B.A., Thompson, E.J. and Dillewaard, H.A. (2012) *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*. Version 5; Updated 2019; Queensland Herbarium, Queensland Department of Science, Information Technology, Innovation and the Arts, Brisbane

Biocondition assessments may be required as a remnant vegetation condition assessment tool to provide a measure of how well a terrestrial ecosystem is functioning for the maintenance of biodiversity values, and are to be consistent with:

Eyre, T.J., Kelly, A.L., and Neldner, V.J. (2017). *Method for the Establishment and Survey of Reference Sites for BioCondition*. Version 2.0. Department of Environment and Resources Management (DERM), Biodiversity and Ecological Sciences Unit, Brisbane.

Eyre, T.J., Kelly, A.L, Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J and Franks, A.J. (2011). Biocondition: *A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual*. Version 2.1. Department of Environment and Resource Management (DERM), Biodiversity and Ecosystem Sciences, Brisbane.

Aquatic surveys for water quality and stream health monitoring are to be consistent with the following acceptable methodology:

Nolte, U., (2011), *Method Manual for Stream Health Monitoring based on macro invertebrate communities*, Moreton Bay Regional Council, Queensland.

In addition to this resource, aquatic surveys will include fauna and flora survey of the waterway, wetland or water body and adjacent areas of influence. Of particular interest are priority species of the Moreton bay region.

4.4 Requesting a correction to the matters of local environmental significance overlay mapping

The Environmental Areas - Matters of local environmental significance mapping is reviewed, and refined where justified, as part of the development assessment process in conjunction with an ecological assessment report and/or associated plan/s when required.
However, if after viewing the Environmental Areas - Matters of local environmental significance map for your property you believe the mapping is in error, and you wish to amend the mapping **outside the development assessment process,** you can make an application to Council.
Note that fees may apply where a site inspection is required to make a determination on the map change request.

4.4.1 How to apply for a map correction for MLES

Your application must include:

- A completed 'Assessment to change an overlay map' form (refer to **Appendix 3**)
- A map showing the current mapped areas versus the proposed mapped areas, and information to demonstrate how the proposed change will result in increased mapping accuracy. The application form provides further details of this requirement.

What happens next?
Once your application is accepted, Council will first conduct a 'desktop analysis' using the information supplied in your application, imagery and any other relevant data available. If Council requires extra information, you will be contacted and a site inspection arranged if necessary.
Note that if a site inspection is required to inform Council's decision on the map change process then a fee may apply.

After Council has considered all available information, you will be sent a notice advising of the outcome. The amendment will be submitted to the state government as part of the next relevant amendment to the planning scheme. If your proposed changes are not accepted, Council will provide you with information detailing the reasons behind the decision and offer you the opportunity to supply additional information.

4.4.2 Requests about a koala habitat area

Requests to the assessment manager for changes to the koala habitat values designation can be made in accordance with Schedule 11 Part 4 of the Planning Regulation 2017.

5 Fauna Management Plan

Where development requires clearing of native vegetation or a development has the potential to impact fauna a Fauna Management Plan outlining management measures to reduce impacts on fauna will be required.

Fauna Management Plans must be prepared by persons with relevant tertiary qualifications in ecology, conservation biology, natural resource management, environmental science or other appropriate ecological disciplines or a qualified arborist with experience in completing flora and fauna surveys and assessments.

Fauna Management Plans must be based on field assessment of potential fauna habitat including areas in which protected wildlife (at any stage of its life cycle) may be located.

Fauna Management Plans must contain at least the following information:

a. Legislative context, including any approvals, licenses and permits required
b. Management measures to reduce impacts to fauna including:
    i. a fauna spotter/catcher undertaking preclearing inspections and being present on site during clearing.
    ii. contact details and qualifications of fauna spotter/catcher; wildlife hospital/vet
c. Procedures for:
    i. relocating fauna observed immediately prior to native vegetation clearing,
    ii. managing fauna during native vegetation clearing,
    iii. treatment of injured fauna/ transport from the site,
    iv. recording fauna captured, health assessment and relocation, transportation and release.

The Fauna Management Plan must reference each stage of proposed operational works and provide management measures relevant to the nature and scale of the proposed operational works.

Fauna Management Plans will require approval from Council prior to works commencing, and all associated works must be carried out in accordance with the approval.

6 Vegetation Management Plans

Where native vegetation clearing is proposed a Vegetation Management Plan is required. A Vegetation Management Plan describes the actions to be used to manage native vegetation before, during and after operational works.

Vegetation Management Plans must be prepared by persons with relevant tertiary qualifications in ecology, conservation biology, natural resource management, environmental science or other appropriate ecological disciplines or a qualified arborist with experience in completing flora and fauna surveys and assessments.

Vegetation Management Plans must be based on vegetation assessment/plot survey as per AS4970 Protection of Trees on Development Sites.

Vegetation Management Plans will include:

a. A series of A3 maps (at a scale not greater than 1:5000) spatially representing:
    i. location and extent of all operational works, with reference to development plans including version.
    ii. all native vegetation intended to be removed, retained and restored.
    iii. native vegetation type and value (remnant and regrowth regional ecosystems, habitat trees, juvenile koala habitat trees and non-juvenile koala habitat trees).
    iv. Tree Protection Zones and Structural Root Zones
b. Tree management procedures for incursions within these zones.

c. Staged clearing plans (where required) to demonstrate compliance with Part 3 of the Nature Conservation (Koala) Conservation Plan 2017 or Schedule 11, Part 3 of the Planning Regulation 2017.
d. Reuse plans for removed native vegetation.

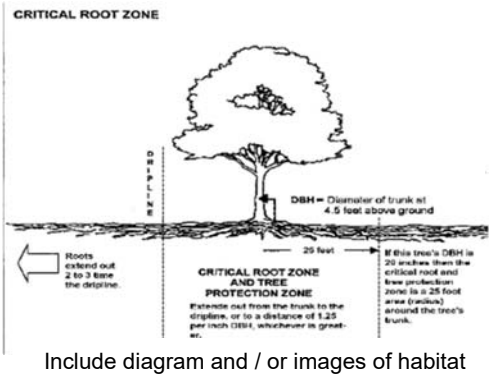
Vegetation Management Plans will require approval from Council prior to works commencing. All works must be carried out in accordance with the approval.

7 Habitat Tree Management Plan

Consideration for the needs of large or hollow bearing trees must be given at the development design stage. Where the development site contains habitat trees, an approved habitat tree management plan will be required to guide conservation management.

Habitat tree management plans must be prepared by an arborist with a minimum level 5 qualification.

Minimum information required Habitat tree management plan
Location and extent of all operational works including earth works and clearing of native vegetation, with reference to development plans including version.
Tree species
Size (height, canopy spread)
Estimated age
Location on site
Hollow abundance and estimated sizes
Native species most likely to be using hollow
Tree Protection Zones and Structural Root Zones
Tree management procedures for incursions within these zones.
Vigour (canopy condition etc.)
Current risks to tree health
Location of utilities (above & below ground)
Immediate protective actions required
Maintenance and future management actions
Inspection program



Include diagram and / or images of habitat tree, location and protection zone.

8 Nest Box Management Plan

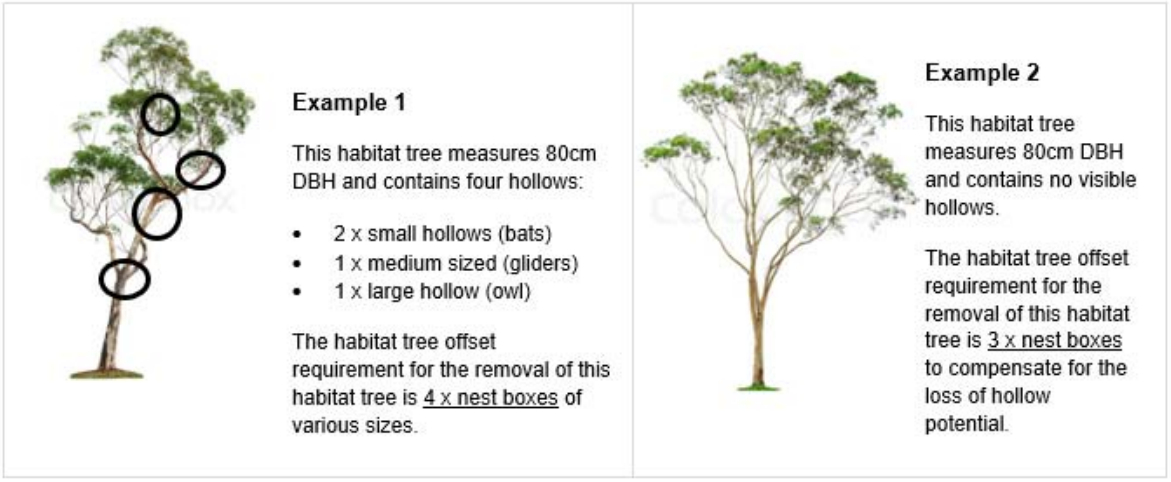
Clearing of native vegetation with hollows will necessitate installation of artificial nest boxes to ensure lost habitat values are at least temporarily counterbalanced.

Where nest boxes are installed a nest box management plan will be required to ensure monitoring of wildlife use of the nest boxes to determine effectiveness.

Nest box management plans must be prepared, by persons with relevant tertiary qualifications in ecology, conservation biology, natural resource management, environmental science or other appropriate ecological disciplines.

Nest box management plans must contain at least the following information:
a. Assessment of the target species
b. Requirements for the target species
c. Nest box types

d. Installation technique
e. Proposed location of the nest box, including GPS location and owners consent
f. Monitoring and maintenance regime details, including protocols for replacing fallen or broken nest boxes.



9 Ecological Restoration Plan

Ecological restoration assists the recovery of a degraded, damaged or destroyed ecosystem. The objective of ecological restoration is to create and/or re-instate a self-sustaining native vegetation community that would occur naturally in that particular area and in doing so, establish and enhance wildlife habitat and improve connectivity. Restoration may also minimise the impacts of storm water run-off on water quality and help to buffer existing habitat values from edge effects.

Ecological restoration projects use 'reference ecosystems' to model project design aspects including species selection, abundance, and planting densities to create native vegetation communities to reflect naturally occurring habitats.

In addition to the guidance material outlined in this policy, all revegetation and restoration works should be consistent with the South East Queensland Restoration Framework. An ecological restoration plan (ERP) will be prepared and approved before the commencement of any ecological restoration work.

Ecological restoration plans must be prepared by persons with relevant tertiary qualifications in ecology, conservation biology, natural resource management, environmental science or other appropriate ecological disciplines.

At a minimum, the plan will include the following information:

a. Scaled map with restoration area clearly defined.
b. Identification of the pre-existing / reference ecosystem to be recreated, giving consideration to proposed onsite changes as a result of the development including soil type, elevation and hydrology.
c. Site preparation. Prepare revegetation areas by appropriately managing or treating weed species. A staged removal of weeds may be necessary to allow native fauna enough time to move into alternative habitat areas.
d. Nutrient requirement. Fertiliser suitable for native plants and water saving devices such as water crystals as required.

e. Weed suppression. Blanket mulch restoration area with weed free organic mulch to a minimum settled depth of 100-150mm. Pre-emergent herbicides may be required to ensure mulching material remains weed free. Where riparian ecosystems are restored, mulching below top-of-bank is often impractical. Jute matting or other measures should be applied as appropriate to ensure water quality is maintained.
f. Natural Biodiversity. Where natural regeneration of plant species is occurring, mulch may be withheld or applied at to a depth < 100mm only where an approved weed control plan is in place.
g. Species selection. Select plant species consistent with the reference ecosystem for the site and source from local provenance plant stock where possible.
h. Tube stock is the minimum acceptable size of plant stock for ecological restoration; except where direct seed methods are applied or where otherwise approved by Council. Tube stock should be healthy with no signs of root bound, free of pest and disease, true to species and form, sun-hardened, and self-supporting.
i. Environmental processes that impact on restoration must be managed. Where appropriate treat erosion prone areas with Jute mat and plant at higher densities to mitigate erosion potential. Earthwork may be required to assist planting and maintenance access and minimise erosion processes.
j. Position maintenance tracks to minimise edge effects and avoid fragmentation of the restoration site.
k. Site protection. Protect revegetation works from browsing by herbivores through appropriate measures such as exclusion fencing, tree guards, chemical products etc. Barbed wire is not acceptable. Signage may be necessary to ensure awareness of restoration activities.
l. Establishment Irrigation or appropriate watering schedule required until plantings are self-maintaining.
m. Maintenance schedule. Maintenance will continue for a minimum period of 24 months. During the first 12 months of maintenance a minimum of 1 visit per month is required. In some circumstances longer maintenance periods may be conditioned to ensure sustainable establishment of a project, e.g. recreation of complex rainforest habitat.
n. Performance criteria. Plant mortality rate should not exceed 5% in the first 12 months.

10 Environmental offsets

Environmental offsets are intended to compensate for unavoidable impacts on significant environmental matters. Under the *Environmental Offsets Act 2014*, an offset may be required if a development, despite taking all reasonable avoidance and mitigation measures, will cause an significant residual impact on matters of State environmental significance or matters of local environmental significance.

Council is the administering authority for decisions relating to environmental offsets for the following matters:

- MSES – Koala Offsets
- MLES – Value Offset Areas – waterways buffer
- MLES – Value Offset Areas – wetlands buffer

Note: A prelodgement meeting is highly recommended for development applications involving native vegetation clearing.

The requirements of applying for an environmental offset can be found in the Queensland Environmental Offsets Policy.

10.1 Offset planning and design principles

a. Offsets do not replace or undermine existing standards or regulatory requirements, ad are not used to allow development in areas otherwise deemed inappropriate through the planning scheme, legislation or policy.

b. Impacts must first be avoided, then minimised, before considering the use of offsets for any remaining impact. Offsets are only considered when efforts to avoid or minimise any negative environmental impacts have been thoroughly exhausted.

c. Offsets must provide environmental values as similar as possible to those being lost.

d. Offsets are to achieve a conservation outcome that is equivalent or better outcome for the values under consideration.

e. Offset provisions minimise the time-lag between the environmental impact and the delivery of the offset.

f. Offsets provide additional protection to environmental values at risk, and ensure management actions to improve the environmental values over the longer term.

g. Offsets are to occur as a single entity to ensure maximum environmental benefit is achieved. An offset is not to be segregated across multiple locations or sites unless it will consolidate and connect existing secured components of the region's green infrastructure network.

h. Offset placement is to allow for adequate buffer distances between the future mature native vegetation and existing/planned development, including buffers for asset protection, clearing for maintenance tracks and hazard risk minimisation e.g. bushfire.

i. Offsets are to be wholly planned, located, installed, managed and maintained at the cost of the applicant for the development, or where approved by Council an equivalent financial contribution paid to an offset broker or Council.

j. Where legal security is required, Offsets are to be legally secured for the duration of the impact on the prescribed environmental matter in accordance with the provisions in the Queensland Environmental Offsets Policy.

Note: The Commonwealth and State governments may require environmental offsets for matters of environmental significance under their jurisdiction.

10.2 MSES Koala Offsets requirements

Where clearing of non-juvenile koala habitat trees is not prohibited by the Planning Regulation 2017 and the clearing within an MSES Koala Offsets area cannot be avoided, an offset will be required in accordance with the *Environmental Offsets Act 2014* unless the Queensland Offsets Policy provides for discretion.

For details regarding the significant residual impacts for MSES koala offsets, refer to the Queensland Environmental Offset Policy - Significant Residual Impact Guideline.

10.3 MLES offset requirements

Council has two matters of local environmental significance that allow for offsets – waterways buffer areas and wetland buffer areas as mapped in the Environmental Areas overlay – MLES Value Offset Areas.

Where **native vegetation** cannot be avoided and clearing is proposed within a MLES Value Offset Area (waterway buffer area or wetland buffer area), and the clearing is not accepted development, an offset will be required in accordance with the *Environmental Offsets Act 2014* unless the Queensland Offsets Policy provides for discretion.

Significant Residual Impacts for MLES - Value Offset Areas

MLES	Significant Residual Impact	Offset Ratio
Waterways buffer area	Removal of any native vegetation within the buffer area	1:1
Wetland buffer area	Removal of any native vegetation within the buffer area	1:1

10.4 Delivery of Environmental Offsets

10.4.1 Notice of Election

The applicant must submit a Notice of Election and any other associated forms relevant to the offset delivery approach chosen prior to commencement any works that impact on the offset matter in accordance with section 18 of the *Environmental Offsets Act 2014*. Refer to the Queensland Government's website for the location of all forms associated with environmental offsets.

10.4.2 Financial Settlements

If the proponent chooses to deliver an offset obligation by financial settlement, the financial settlement for impacts to MLES values can be calculated using the Queensland Environmental Offsets Policy online offset calculator. For the 'Matter Group' choose 'Local Government Matter MLES 1'.

10.4.3 Offset Delivery Plans for land-based offsets

If a proponent driven (land-based) offset option is chosen, the proponent must prepare an Offset Delivery Plan in accordance with section 18 of the in *Environmental Offsets Act 2014* and the latest version of the Queensland Offsets Policy.

10.4.4 Agreed delivery arrangement

Upon agreement between Council and the proponent about the proponent's planned delivery of the offset (and within 40 business days after receiving the notice of election), Council will issue an Agreed Delivery Arrangement in accordance with sections 19 and 19A of the *Environmental Offsets Act 2014*. This agreement forms a contract between the parties and details the delivery of the offset.

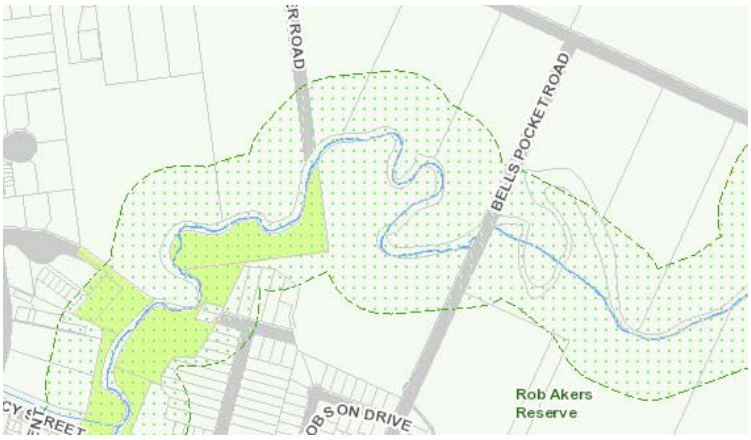
The proponent must enter into an agreed delivery arrangement with Council prior to commencement of any works that impact on the offset matter in accordance with section 19B of the *Environmental Offsets Act 2014*.

10.5 Environmental Offsets Receiving Areas

Connected and functioning ecological corridors are critical for maintaining viable (genetically diverse) wildlife populations. Ecological corridors also support plant distribution. The Environmental Offset Receiving Areas Overlay map represents ecological corridors that are the pathways for wildlife in the Moreton Bay region. These areas are Council's preferred locations for land-based and advanced offsets for MLES.

Offsets for MSES must be located in accordance with the Queensland Environmental Offsets Policy, giving consideration to the Koala Habitat Values mapping developed by the Department of Environment and Science.

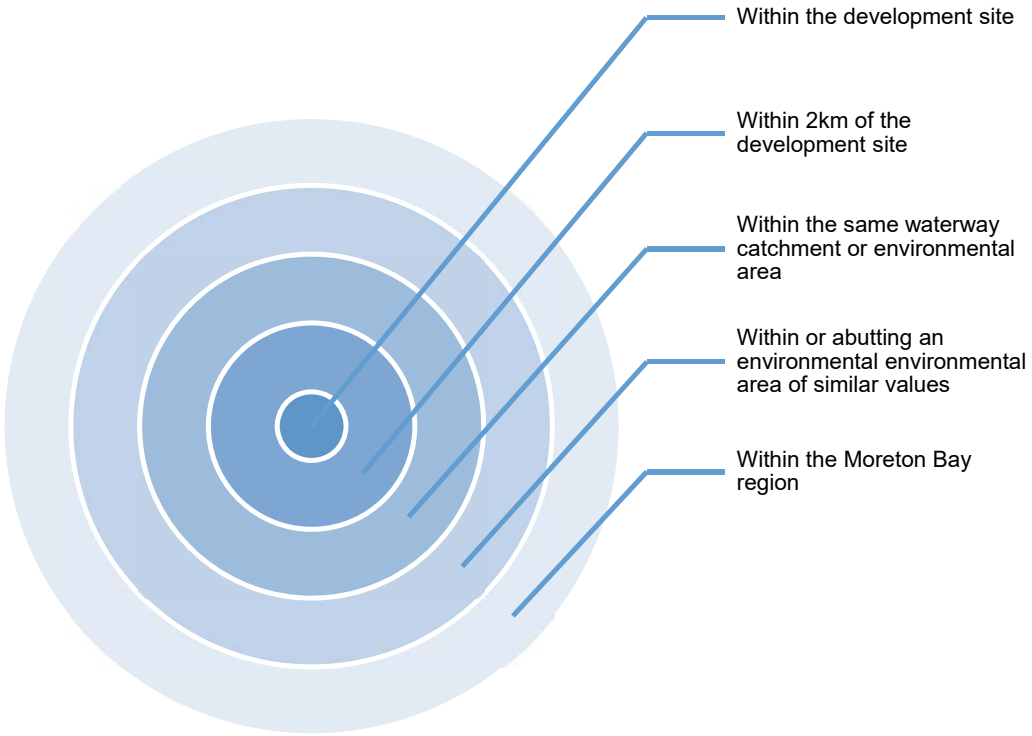
Smaller ecological linkages may not be shown on the Environmental Offset Receiving Areas Overlay map; instead these development scale corridor values must be identified and valued at development planning stage.



Example of an environmental offset receiving site area as shown on the Environmental Offset Receiving Areas Overlay map.

10.6 Environmental Offset Receiving Site location hierarchy

Placement of offsets as close as possible to the development site is encouraged, to locally retain environmental values. However it may not always be possible to locate offsets in the immediate vicinity of a development site. In these instances the below hierarchy is to be followed.



Note: MSES Koala Offset obligations originating from clearing within the Priority Koala Assessable Development Area (PKADA) must establish offsets within the PKADA in accordance with the Queensland offsets policy.

11 Further reading and resource material

For further reading on concepts contained within this policy the following material may be useful.

Bushfire Management
SEQ Fire & Biodiversity Consortium www.fireandbiodviersity.org.au

Green Infrastructure
Moreton Bay Regional Council, 2015*, Green Infrastructure Strategy 2013-2031; available at* http://www.moretonbay.qld.gov.au/infrastructureplanning/

Habitat Trees
'*Habitat Trees and Hollow-dependent Fauna'*,1998, Forest Ecosystem Research and Assessment, the State of Queensland Department of Natural Resources Natural Sciences Precinct

Moreton Bay Regional Council, 2008, Habitat Trees Brochure, *Living with the Environment* Series.

Survey and Monitoring Techniques
Moreton Bay Regional Council, 2010, *Priority Species of the Moreton Bay Region*.

Waterways
Staton, J. & O'Sullivan, J., 2006. *Stock and waterways: a manager's guide.* Land and Water Australia, Canberra

Department of Natural Resources and Mines, 2006, Managing stock in and around waterways.

State of Queensland, 2011, *Queensland Wetland Buffer Planning Guideline*

Wildlife Movement Infrastructure
State of Queensland (Department of Environment and Heritage Protection), 2012, *Koala-sensitive Design Guidelines: A guide to koala-sensitive design and measures for planning and development activities.*

State of Queensland (Department of Transport and Main Roads), 2002, *Fauna Sensitive Road Design: Volume 1 – Past and Existing Practices.*

State of Queensland (Department of Transport and Main Roads) 2010. *Fauna Sensitive Road Design Manual, Volume 2: Preferred Practices.*

*Gleeson J. & Gleeson D.,*2013*, Reducing the impacts of development on wildlife, CSIRO Publishing Australia:* Describes and evaluates the effectiveness of key measures used to reduce the impacts of development on flora and fauna with examples from South East Queensland.

Offsets
State of Queensland (Department of Environment and Heritage Protection), 2015. *Queensland Environmental Offsets Policy – General Guide*

12 Glossary

Biodiversity is the degree of variation in life, and can refer to individual variation, species variation or ecosystem variation within an area.
Biodiversity quality describes ecosystem functionality and species diversity.
Clear, for native vegetation means remove, cut down, ring bark, top, poison, destroy vegetation in any way including burning, flooding, draining, otherwise injuring vegetation including, pushing over, damaging the structural root zone by compaction, excavation or filling within the tree protection zone of vegetation. Partial clearing such as removal of understorey or thinning of vegetation or the removal of dead habitat trees is classed as clearing. This does not include maintaining existing open pastures, lawns or created gardens; and grazing of native pasture by stock.
Clear, for habitat trees includes activities which constitute clearing for native vegetation as well as lopping.
Cultivars are plants which differ sufficiently from their wild ancestors to be worthy of distinction and merit special names (e.g. cultivars may be ornamental, medicinal or edible).
Dispersal refers to the movement of animals or plants from their birth site to their breeding site, as well as movement from one breeding site to another.
An **Ecological assessment** is a component of the development design and assessment process that identifies environmental values (such as flora, fauna, geology and hydrology) of the development site and adjacent areas where relevant, and associated environmental impacts.
Ecological restoration is the reinstatement of a degraded, damaged or destroyed ecosystem to a plant community of a type that would occur naturally in a particular regional ecosystem
Ecosystem means a dynamic combination of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.
Ecosystem Health is the vigour, organisation and resilience of an ecosystem.
Ecosystem services are the goods and services that ecosystems provide (for example food, water, aesthetics and air quality).
Edge effects are changes in conditions at the boundaries of environmental areas, and include increased light and noise penetration, changes in soil moisture and increased access by pest plants and animals.
Environmental areas are mapped in the Moreton Bay Region Planning Scheme and are categorised into High Value and Value Offset Areas.
Environmental corridors are functionally connected areas supporting animal and plant movement, dispersal and refuge.
An **environmental offset** is an activity undertaken to counterbalance a significant residual impact of a prescribed activity on a matter of environmental significance.
Fauna means native fauna
A **Fauna spotter-catcher** is an independent and appropriately qualified person who checks areas of native vegetation prior to clearing and is present through the duration of works. Responsibilities also include arranging for relocation of fauna and recording release sites, and recording numbers of injured animals, arranging treatment and recording the outcomes of treatments.
Green infrastructure refers to natural, semi-natural and engineered green assets that are connected across a landscape.
Habitat connectivity is a measure describing the permeability of an area for movement and dispersal of plants and animals.
Habitat fragmentation is when previously connected environmental areas and corridors become severed or reduced (e.g. through native vegetation clearing, construction of barriers such as roads, and changes in land use).
Habitat integrity is the degree to which a habitat is self-sustaining, intact and functioning in a way necessary for the continuation of native species and the communities they form.
Habitat Tree is a native tree with a diameter greater than 80cm at 1.3metres above the ground.
High Value Areas represent high value MLES or MSES. These matters are to be protected from development impacts and cannot be offset.

The **home range** of an animal is the region that encompasses all the resources the animal requires to survive and reproduce.
A **koala habitat tree** is a food tree of the *Corymbia, Melaleuca, Lophostemon* or *Eucalyptus* genera OR a preferred shelter species such as *Angophora.*
Microclimate refers to a local area where the climate differs from the surrounding area (for example near bodies of water, or under a large tree). Urban heat islands (where concrete absorbs heat in built up areas) are a type of microclimate.
Locally native vegetation means a native tree or a native plant naturally occurring in South East Queensland, other than a grass except where the grass is a Priority Species of Moreton Bay Region. Note: The *Fisheries Act 1994* provides for the protection of marine plants. Note: For more information on priority species, please see Council fact sheet titled 'Priority Species of the Moreton Bay Region.
Nest boxes are manmade boxes for animals to nest and shelter in, and can be specially designed for different types of animals (e.g. parrots, possums, microbats).
Non-juvenile koala habitat tree is a koala habitat tree that has a height of more than four metres or a trunk with a circumference of more than 31.5 centimetres at 1.3 metres above the ground.
A **Priority Species** in the Moreton Bay Region is a species worthy of special attention and requiring priority conservation planning (e.g. because it is threatened, has iconic status, habitat values, or cultural significance).
Reference ecosystems are naturally occurring habitats used to model project design in ecological restoration (i.e. the reference ecosystem is the pre-existing plant community in a degraded ecosystem).
Regional ecosystems are native vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
Resilience is the ability of the system, or components of it, to recover from damage and / or adapt to change.
A **Riparian zone** is the interface between land and a waterway.
Sequential/staged native vegetation clearing is clearing which allows wildlife enough time to seek refuge elsewhere (e.g. by clearing limited numbers of trees at any one time and retaining tree linkages).
Stepping stones are habitat refuges for wildlife and include parks, vegetated waterways and street trees/road reserves.
Value Offset Areas represent valued MLES and MSES where offsets may be allowed if values cannot be avoided or mitigated.
Native vegetation means vegetation (as defined) under the Vegetation Management Act.
Viability is the ability of a plant or animal to maintain itself and successfully reproduce.
Watercourse has the meaning defined in the *Water Act 2000*, namely: a watercourse is a river, creek or other stream, including a stream in the form of an anabranch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow events, in a natural channel, whether artificially modified or not; or (b) in an artificial channel that has changed the course of the stream.
Wetland has the meaning defined in the Environmental Protection Regulation 2008, namely an area shown as a wetland on the Map of referable wetlands. An area delineated in accordance with the Queensland Wetland Definition and Delineation Guideline is a wetland.
Wildlife friendly fencing is fencing that avoids the use of barbed and does not entangle or harm wildlife, and allows the appropriate free movement of wildlife across landscapes.
Wildlife friendly lighting is lighting that reduces disorientation and exposure to higher predation levels for native wildlife.

End Notes

Amendment Number: 2 **Adopted: 27 June 2017** **Effective from: 3 July 2017**	
Planning Scheme Policy Reference	**Summary of amendment**
-	• Amendment to reflect the terminology used in the *Planning Act 2016*, the *Planning Regulation 2017* and related state planning instruments.
Amendment Number: 3 **Adopted: 12 December 2019** **Effective from: 29 January 2020**	
	• Amendment to change the format and presentation of the PSP to consolidate planning and design principles as an appendix (Design guide) to improve structure of the document.
	• Amendment to correct factual matters incorrectly stated in the PSP
	• Amendment to reflect avoidance and mitigation requirements of the *Planning Act 2016* and the *Queensland Environmental Offsets Policy*.
	• Amendment to reflect requirements of the *Queensland Environmental Offsets Act 2014* in relation to agreed delivery arrangements.
	• Amendment to reflect the terminology used the *Queensland Environmental Offsets Act 2014* and policy.
	• Amendment to clarify when an environmental offset is required.
	• Amendment to include guidance regarding state interest policy biodiversity in relation to the EBPC Act and MNES.
	• Amended of 'vegetation clearing' and 'native vegetation' definitions (revised to 'clearing' and 'vegetation' respectively, to align with *Planning Act 2016* (which references the *Vegetation Management Act 1999)*.
	• Amendment to clarify MLES and separate MNES, MSES from MLES.
	• Amendment to clarify when an ecological assessment report and associated plans are required.
	• Amendment to simplify vegetation management plan requirements.
	• Amendment to improve structure (layout, logical flow) and correct minor errors.

APPENDIX 1 – Environmental Areas Overlay – mapped elements detail

The following table contains a detailed list of all of the mapping elements of the Environmental Areas Overlay.

HIGH VALUE AREAS

Matters of State Environmental Significance

Currency: MSES mapping version 4.1

The State Planning Policy 2014 defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992.*
- Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the *Marine Parks Act 2004.*
- Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008.
- Threatened wildlife under the *Nature Conservation Act 1992* and special least concern animal under the Nature Conservation (Wildlife) Regulation 2006.
- Regulated vegetation under the *Vegetation Management Act 1999* that is:
  - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems
  - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems
  - Category R areas on the regulated vegetation management map
  - areas of essential habitat on the essential habitat map for wildlife prescribed as 'endangered wildlife' or 'vulnerable wildlife' under the *Nature Conservation Act 1992*
  - regional ecosystems that intersect with watercourses identified on the vegetation management watercourse map
  - regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map.

- Designated precincts in strategic environmental areas under the Regional Planning Interests Regulation 2014.
- Wetlands in a wetland protection area or wetlands of high ecological significance shown on the Map of Referable Wetlands under the Environmental Protection Regulation 2008.
- Wetlands and watercourses in high ecological value waters as defined in the Environmental Protection (Water) Policy 2009, schedule 2.
- Legally secured offset areas.

Matters of Local Environmental Significance

Shorebird Habitat	Shorebird Habitat Mapping Project for MBRC by Queensland Wader Study group and Jill Dening, 2009.
Biodiversity Priority Areas	Biodiversity Priority Areas v3.5 (Updated December 2007) created by the Department of Environment and Heritage Protection (EHP). Biodiversity Priority Areas are generated using the Biodiversity Assessment and Mapping Methodology produced by EHP.
Local conservation agreements	Vegetation protected in through local conservation agreements such as covenants.

Wetlands	Locally important wetlands identified through the State Wetland Management Area mapping.
VALUE OFFSET AREAS	
Matters of State Environmental Significance – Koala Offsets	
Koala Offsets	Bushland habitat and Medium Value and High Value Suitable for Rehabilitation areas in Koala Assessable Development Areas and Priority Koala Assessable Development Areas as per the *South East Queensland Koala Conservation State Planning Regulatory Provisions*.
Matters of Local Environmental Significance – Waterways Buffer	
100m (W1)	Major freshwater streams and estuaries of high ecological value within the MBRC determined hydrological network.
40m (W2)	Freshwater streams and minor estuaries within the MBRC determined hydrological network.
20m (W3)	Minor freshwater tributaries that extend the MBRC determined hydrological network.
Matters of Local Environmental Significance – Wetlands Buffer	
100m	Buffer to MLES Wetlands.

APPENDIX 2 - Design Guide

Moreton Bay region contains outstanding environmental assets including a diverse range of ecosystems across terrestrial, wetland, waterway, and coastal areas. More than three thousand plant, animal, and fungi species have been recorded in the Moreton Bay region, including many threatened species. Numerous and diverse environmental corridors help to keep these species connected across the landscape.

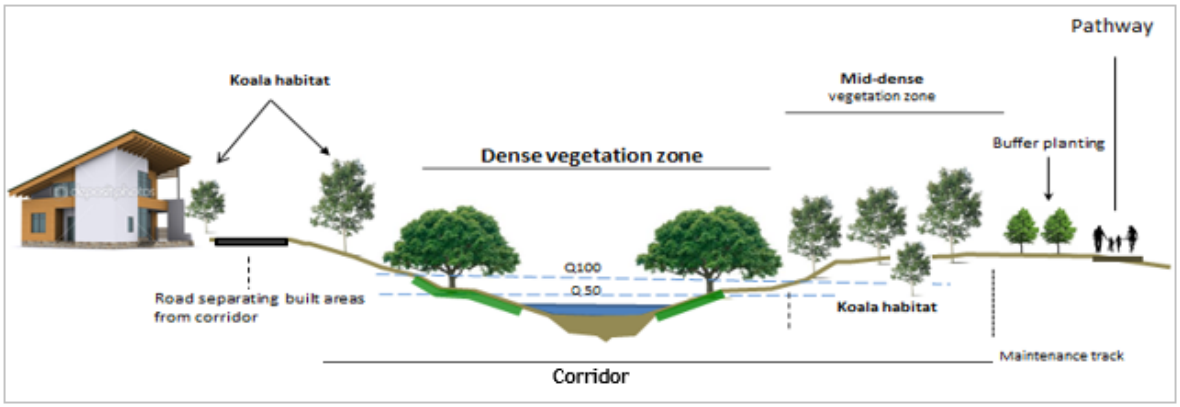
Where a development is proposed that may impact on environmental areas, implementation of avoidance and mitigation measures are required. Council encourages retention of environmental values as far as possible, with integration of green infrastructure design solutions to be considered during the concept planning phase of development design to ensure a healthy and connected green infrastructure network is maintained across the region.

The following green infrastructure components should be incorporated into design with environmental values (where relevant).

Environmental areas

Environmental areas are important ecological landscapes vital to protecting and maintaining the health and resilience of biodiversity within the region, and for the ongoing provision of ecosystem services to our community. Environmental areas support wildlife breeding and refuge and describe a range of habitat types from vegetation, wetland, and coastal areas to places with scattered vegetation which wildlife use to forage, move through, breed and shelter.

Environmental corridors



Example of a corridor interface showing both a waterway and ecological corridor.

It is generally accepted that biodiversity and ecological function increases with corridor width and integrity. The following principles can be used to build healthy corridors and contribute to biodiversity quality, habitat connectivity and safe wildlife movement options:

a. Corridors should be as broad as possible, and should ideally contain multi-layered vegetation to cater for wide assemblages of species.

b. It is preferable to have low intensity land uses adjacent to the corridor to minimise environmental impacts. Design of corridor interface should be appropriate and compatible with adjacent land use.

c. Housing or other impacts should avoid projecting into the corridor, form impediments to movement, or produce harmful effects.

d. Where buildings are permitted next to a corridor, establish a buffer appropriate to the mature height of the tallest vegetation and if possible place an easement over the area.

e. Locating environmental offsets and revegetation in and adjacent to corridors is a useful way for development to minimise edge effects and to protect the integrity of habitats.

f. Maintain as much natural open space as possible next to culverts and bridges to encourage their use by wildlife.

g. Wildlife friendly lighting must be used where required in and adjacent to corridors.

h. Urban tree planting improves habitat for urban dwelling native animals and can improve connectivity for their movement through city landscapes and between urban and rural areas.

i. Street trees provide linkages to corridors, allowing genetic mixing for increased biodiversity resilience. Select local tree species and space to achieve canopy connection at early maturity.

j.

k. Wildlife movement infrastructure may be appropriate to reduce potential wildlife and vehicle interaction on highly trafficked roads.

l. Incorporate water sensitive urban design solutions into the development concept planning phase to maximise multipurpose outcomes e.g. water quality, visual amenity and green infrastructure.

Connectivity

Appropriate tree planting is a useful way for development to provide for ongoing wildlife movement and habitat connectivity.

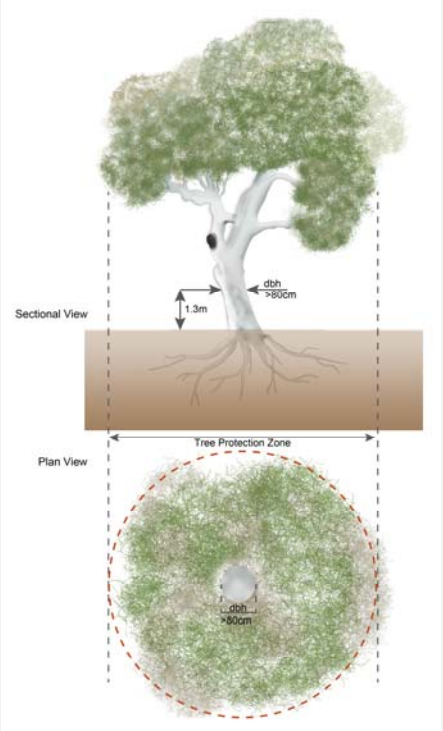
Well-placed and connected street tree canopies function as additional linkages in urban environments.

Habitat trees and development

Large trees are an important part of urban ecosystems. They help to regulate local microclimates, provide habitat for wildlife, and their retention contributes to social enrichment.

Retaining habitat trees ensures viability of hollow-dependent native animals and maintains biodiversity to support ecological integrity.

Habitat and large trees should be thoughtfully incorporated into development at design stage. Developments should maintain and protect habitat trees and avoid disturbance to trees containing hollows. Removal of habitat trees should be a last resort.



Example habitat tree

Example 1

This habitat tree measures 80cm DBH and contains four hollows:

- 2 x small hollows (bats)
- 1 x medium sized (gliders)
- 1 x large hollow (owl)

The habitat tree offset requirement for the removal of this habitat tree is 4 x nest boxes of various sizes.

Example 2

This habitat tree measures 80cm DBH and contains no visible hollows.

The habitat tree offset requirement for the removal of this habitat tree is 3 x nest boxes to compensate for the loss of hollow potential.

Habitat trees and linear infrastructure

Where proposed subterranean linear infrastructure intersects habitat trees or any native tree greater than 50cm diameter tunnel boring is a preferred solution to maximise tree retention.

Salvaging hollows and other habitat features

Where the clearing of habitat trees and vegetation cannot be avoided, habitat features such as hollow logs should be harvested to preserve their values and used to enhance remaining and newly established habitat and landscaped areas.

Habitat feature salvage may help development to demonstrate that habitat integrity is maintained and protected.

An example of a harvested hollow installed in a retained tree onsite.

Temporary habitat

Nest boxes do not replace the broad ecological and aesthetic values provided by large habitat trees. Developments should maintain and protect habitat trees and avoid disturbance to trees containing hollows.

Connectivity

Connectivity is a multi-scale value describing the permeability of an area for movement and dispersal of plants and animals. Maintaining habitat connectivity is necessary for a healthy and resilient green infrastructure network. Incorporation of multi-scale connectivity values into development design will contribute to 'whole-of-landscape' resilience and is critical to long-term conservation of biodiversity.

Landscape and regional-scale connectivity values are broadly identified through environmental corridor mapping overlay. The identification of local corridors, local linkages and local connectivity values is very limited in this dataset. For example, boundary-line trees provide significant connectivity values in urban areas however issues of scale mean the connectivity value is unlikely to be captured by corridor mapping. Local linkage and connective values should be identified and incorporated at concept development stage.

What is fragmentation?

Fragmentation occurs where previously connected environmental areas and corridors become severed or reduced, resulting in isolation of wildlife populations and their habitat resources and reducing their long-term viability.

Vegetation clearing, physical barriers and changes in land use are the most common causes of habitat fragmentation. Barriers to movement and dispersal decrease opportunities for genetic exchange (breeding) which reduces genetic resilience and diversity. Fragmentation impacts are variable and influenced by local factors including scale.

Planning and design principles for connectivity & reducing fragmentation

Improving connectivity reduces habitat fragmentation. Designing for connectivity will help development to avoid the creation of fragmented and isolated patches of habitat. Re-positioning, relocating or reducing a development footprint will assist development to avoid fragmenting habitat and to maintain habitat connectivity.

Connectivity can be evaluated and addressed by:

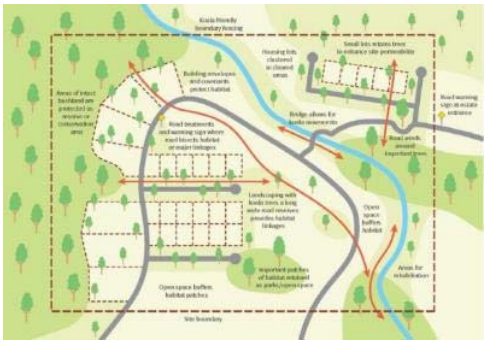
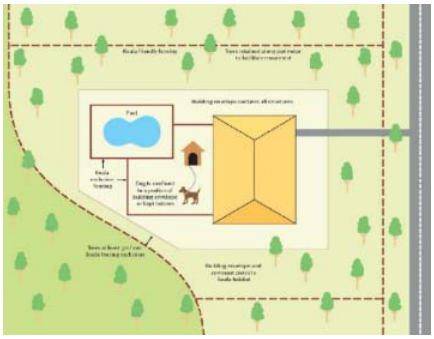
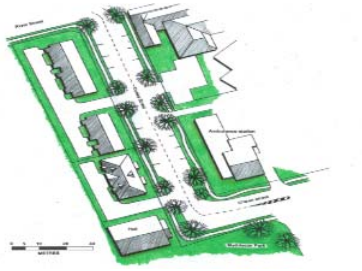
a. Assessing the presence or absence of barriers to wildlife movement (barriers include roads, impassable fences, highly incompatible land uses etc.)
b. Protecting and conserving intact connections by incorporating them into development design.
c. Incorporating strategies for the rehabilitation and repair of disrupted connections into development design.
d. Identify multiple connections and consider the benefits of each within development design.

The following table provides strategies for maintaining and enhancing connectivity and reducing fragmentation.

Connectivity Strategies		Example design solutions
Location of development	Consideration for alternative locations for the development to achieve high quality urban design and habitat connection.	✓ Relocating development in an area of lowest vegetation class and where minimum vegetation clearing is required. ✓ Retention of bushland habitat in the largest patches possible. ✓ Relocation of road network away from drainage lines to avoid impacts on frog-breeding habitat and wildlife movement corridors. ✓ Identifying opportunities to create additional environmental corridors and habitat linkages across the development site.
Development footprint	Consideration for alternative designs for development to	✓ Maximise the area of vegetation and habitat that remains after development is completed.

Connectivity Strategies		Example design solutions
	achieve high quality urban design and habitat connection.	✓ Consolidate development including through multiple storeys to reduce building perimeter area ✓ Enhancing existing environmental corridors by retaining, regenerating and rehabilitating vegetation ✓ Street tree boulevarding, park and conservation land dedication, wildlife movement infrastructure and habitat restoration.
Linear infrastructure	Locate transport routes and infrastructure corridors to avoid to the greatest extent practicable clearing vegetation.	✓ Consolidate and streamline linear infrastructure into shared corridors to achieve high quality design. ✓ Designing roads to wind around habitat and heritage trees. ✓ Install wildlife movement infrastructure to connect habitats where linear infrastructure dissects environmental areas and corridors and especially between tracts of vegetation.

Examples of connectivity solutions

Tree-lined streets	Planting habitat
	
Alternative development design	**Habitat retention**
	
Urban renewal	
 Potential street tree linkage need identified	 Concept design to accommodate large-at-maturity street trees for koala movement (example only)

What are edge effects?

Edge effects are changes in physical and biological conditions at the boundaries of environmental areas, environmental corridors and other green infrastructure. Edge effects occur where habitat becomes exposed resulting in increased light and noise penetration, changes in soil moisture and increased access by pests. Edge effects significantly influence native species composition by decreasing native biodiversity and ecological function resulting in negative effects on biodiversity quality and integrity of habitats

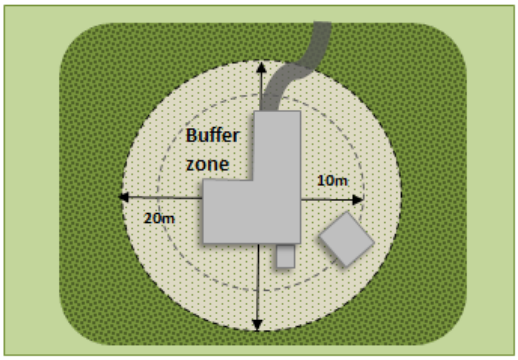
Edge effects become more intense where environmental areas and corridors have low area to edge ratios.

Buffers and buffer widths

Buffers are separation areas between environmental values and incompatible or impacting land uses. Buffers can be used to gently transition between different place types and help to shield environmental values from deleterious edge effects of adjacent land uses.

Buffers widths are typically determined by the impacting land use and development activities and the significance and sensitivity of the environmental values they are protecting. Optimal buffer widths depend on many factors; and wider buffers are likely to function better than narrower buffers.

Asset protection buffer for bushfire preparedness



Example buffer widths

Buffer width (m)	Example
10 - 20m	Asset protection zone where vegetation is managed for safety around buildings and structures (optional).
30m	Recommended revegetation width each side of the waterway for riparian habitats as identified by the MBRC Total Water Cycle Management Plan.
>40	Recommended setback distance from streams with health class target c or d and to minor estuary streams.
>100	Recommended setback distance for wading bird roosts and from streams with health class target a or b, and to major estuary streams.
>200	Recommended setback distance from environmental areas. Recommended buffer to key resource areas.
>400	Recommended distance between development and the conservation estate.
500m	Buffers to bat colonies.

Note: Development is to be planned to be located at, or beyond, the buffer distance from the value.

Planning and design principles for buffers & reduced edge effects

- Design development adjoining a corridor in a way that sensitively transitions up to the edge of the corridor e.g. incorporate landscaping that includes native plantings similar to those within the waterway corridor and allow for permeable landscapes near the corridor edges.
- Site ecological restoration activities on the edges of environmental areas and corridors.

Residential development adjacent to a waterway corridor and separated by road placement for full length

- In waterway corridors, design development to protect riparian zones, and retain and restore as much locally vegetation within the riparian zone buffer to maximise provision of ecosystem services to the adjacent development whilst protecting waterway health.

- Integrate the design of corridors, stormwater treatment and open space in the early development planning phases to maximise mutual benefits for each.

- Maintain vegetation and landform structures and functions that are essential to corridor function and ecological health e.g. existing vegetated riparian zone and riparian zone buffer.

- Where necessary in waterway corridors, provide soft engineering solutions e.g. vegetation, instead of hard e.g. concrete, to prevent erosion of the waterway.

- Maintain natural stream flow characteristics to support stream health and associated diverse vegetation communities.

- Compatible land uses may only occur within the riparian zone buffer area e.g. passive recreation and necessary infrastructure where designed and constructed sensitively.

- To improve waterway health on productive rural land, exclude or restrict stock from the riparian zone, instead offering off-channel stock watering points. Any new stock exclusion fencing must be wildlife friendly.

'Stepping stone' koala habitat in urban landscapes

Habitat refuges such as parks, vegetated waterways, easements and road reserves function are important stepping stones within urbanised environments linking larger bushland habitats and regional corridors.

The design and layout of development should reduce distances to no greater than 50m between these areas of habitat refuge to significantly reduce the risk of koalas becoming stressed and/or encountering threats from dogs and vehicles. It is also recommended that shelter opportunities be provided between these habitat refuges. Informed designs which incorporate large at maturity koala-food and habitat species in urban places will help to achieve this. Urban designers must consider appropriate street designs to accommodate koala trees.

The more time koalas spend on the ground moving between trees the higher the risk is of death or injury from dog attack or vehicle strike. Residential lots and local streetscapes and paths containing 'stepping stone' koala habitat trees provide important food and shelter opportunities for koalas moving through urban environments.

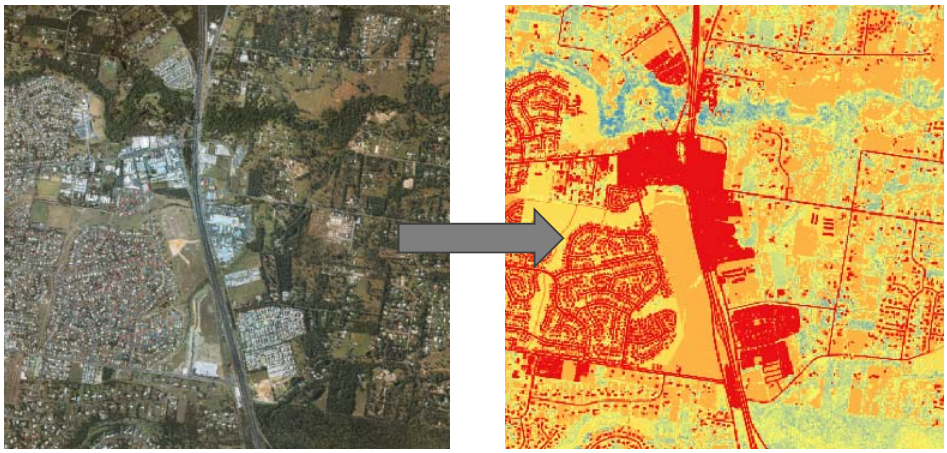
Note: Although koalas spend most of their time in trees they generally descend to the ground to move between trees. In urban areas where koala habitat trees are sparsely distributed, koalas spend more time travelling along the ground and are at increased risk of contact with cars and dogs. The retention of koala habitat trees and urban design incorporating design principles for large-at-maturity tree species are important for the long-term survival of the koala in the Moreton Bay Region.

Urban forest canopy

Large trees are an important part of urban ecosystems. They help to regulate local microclimates, provide habitat for wildlife, and their retention contributes to social enrichment.

Changes in land-use patterns influence micro-climates. This is especially true for the region's urban areas where hard, impermeable surfaces such as concrete and asphalt readily absorb solar radiation - reducing heat reflectivity.

Urban heat islands (UHI) occur when densely built urban areas become warmer than nearby suburban or rural areas. Little vegetation or evaporation causes urban areas to remain warmer than surrounding rural and natural areas.



Remote sensing shows the potential for urban heat island effect
red = high/hot, blue = low/cool

Along with regional climate influences, the degree of micro-climate fluctuation is dependent on urban forest canopy cover. Urban green infrastructure plays a key role in mitigating the urban heat island effect to create cool urban spaces, reduce demand for electricity, cool buildings, and control air movement.

The urban forest canopy

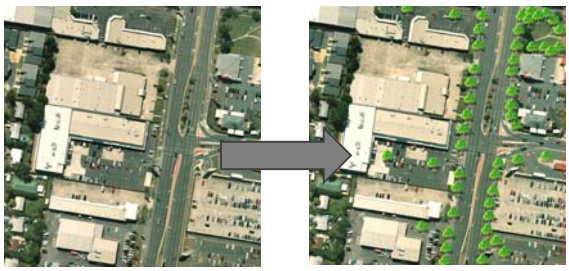
Moreton Bay region's urban forest canopy comprises all vegetation in urban areas on public and private land. The urban forest includes vegetation in streets, parks, gardens, activity centers, waterways, wetlands and coastal areas, car parks, community gardens. Canopy may extend to green infrastructure such as green walls and roofs

Urban development can reduce the urban forest canopy extent, contributing to the urban heat island effect.

Planning and design principles for urban heat island mitigation

a. Integrate existing vegetation into design to maintain canopy coverage and reduce landscaping costs. Design with care to avoid impact on vegetation.

b. Landscape with densely planted vegetation, ensuring an even spread of vegetation cover to cool local surroundings.



c. Plant native street trees to achieve connected canopies for continuous shade paths. Design must allow appropriate verge widths to ensure form at maturity is not compromised.

The current urban forest cover in this area is low, contributing to a high UHI. Installation of canopy trees will increase shade and reduce UHI potential.

d. Integrate the urban water cycle into development design, to improve storm water quality outcomes and help increase the urban forest canopy extent.

e. Incorporate the use of porous paving (e.g. loose gravel, structural gravel, masonry pavers or engineered pavers to encourage percolation and slow evaporation.

f. Use innovative urban design solutions such as green walls and rooftops to help cool hot surfaces.

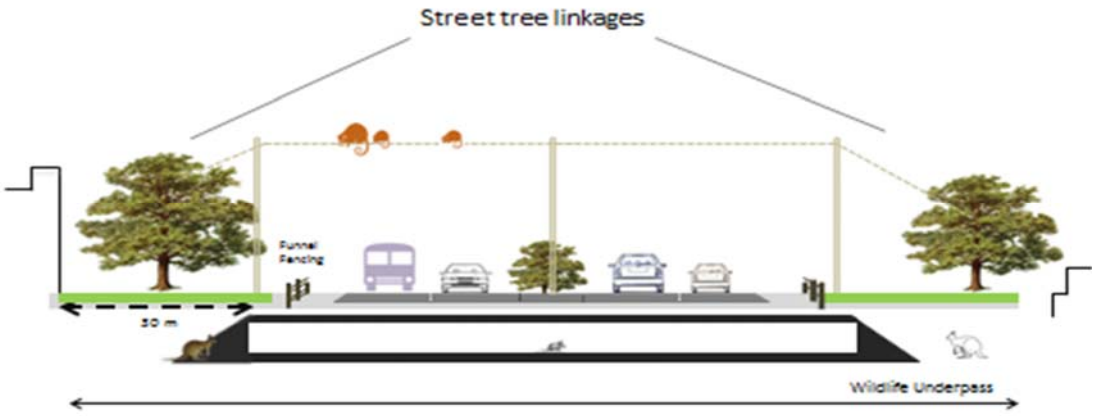
Permeable surfaces improve the health of waterways and are particularly useful under trees. Green walls contribute visual amenity and habitat value.

Wildlife movement and dispersal

Native wildlife move through urban and rural landscapes to forage, socialise, breed and disperse to new territories. Development and vegetation clearing can fragment habitat and create barriers which limit animal movement and increase the risk of injury to wildlife moving across landscapes.

Retaining vegetation, using local native species (preferably from local seed stock) in landscaping, and installing hard infrastructure (such as koala refuge poles, glider poles, fencing and tunnels) are all considered green infrastructure solutions assisting safe wildlife movement and dispersal.

Development must carefully plan new corridors and connections to avoid increasing barriers to wildlife movement (e.g. busy roads and incompatible land use). The removal of a single gum tree or group of trees providing ‘stepping-stone’ movement values can significantly reduce habitat and movement opportunities for local wildlife including koalas.



Example road cross section incorporating wildlife movement infrastructure

Planning and design principles for wildlife movement

The principles provided below assist with safe wildlife movement infrastructure into development design.

a. Create and retain linear linkages of vegetation through a development site to assist animals to move safely through the landscape. This may include
   ii. Utilisation of grassy open space to create permeable landscapes for wildlife
   iii. Landscaping with locally native species
   iv. Stepping stone plantings of locally native trees
   v. Using locally native street trees to link habitat areas

b. Retain scattered trees and other diffuse vegetation to promote safe movement and refuge for animals.

c. Appropriate placement of 'hard' infrastructure structures such as koala refuge poles and escape poles, street tree planting, 'stepping stone' vegetation plantings, tunnels, appropriate wildlife fencing, culverts with ledges and movement 'furniture', fauna underpasses and overpasses, rope bridges and, glider poles.

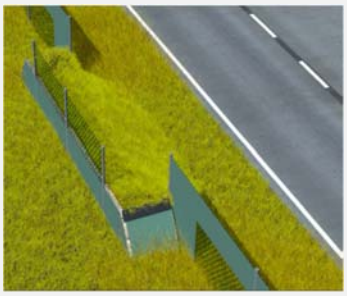
d. Enhance existing linkages by widening or buffering and re-vegetating with local native species.

e. Select wildlife friendly fencing.

f. Use fauna crossing signs and speed limit variations.

g. Consider understorey habitat within utility corridors for the safe movement of ground dwelling animals.

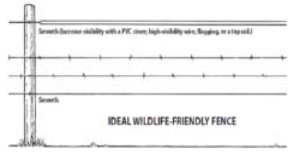
h. Feral animal control measures.

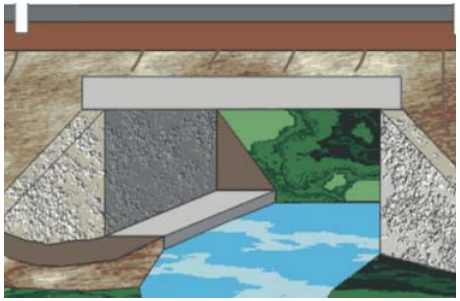


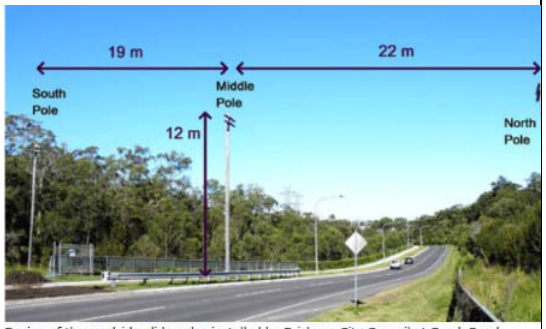
Concept design by Griffith University showing funnel fencing and escape areas for wildlife trapped between the road and exclusion fence.

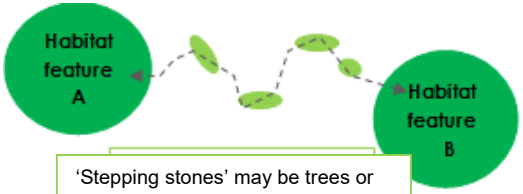
Wildlife movement infrastructure

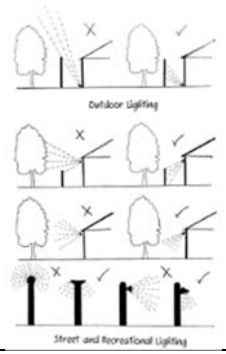
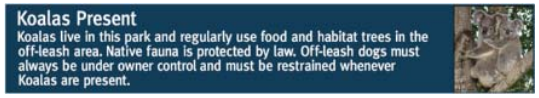
The following table of information is provided to assist development to determine when and what type of green infrastructure is appropriate to ensure safe, convenient and ongoing wildlife movement.

Green Infrastructure type	Benefit	Examples	When to apply
Inclusion Fencing - no barbed wire - Increase visibility	Allows animals to pass through and improves opportunities for animals to access habitat and food resources and each other.	 	✓ Where safe, convenient and ongoing wildlife movement is to be provided. ✓ Where avoidance and reduction of barrier-related fragmentation is sought. ✓ To assist in the provision of contiguous habitat connectivity. ✓ Where development requires a fence for property delineation and native animals do not need to be excluded from the site. ✓ Works best when domestic cats and dogs are appropriately contained.
Exclusion Fencing (funnel)	Prevents animals from entering hazardous landscape and is often used to direct wildlife to move to safe crossing points.		✓ Where development poses an unacceptable hazard to fauna movement and where safe wildlife movement is to be provided. ✓ Where installation of fencing does not have detrimental effect on dispersal of wildlife across the landscape. ✓ Where wildlife movement can be directed to a safe and convenient crossing point. ✓ Where a road fragments two intact vegetation patches, posing a risk to safe wildlife movement. ✓ Works best when in conjunction with wildlife sensitive road design e.g. appropriate speed limits, traffic islands and escape poles

Green Infrastructure type	Benefit	Examples	When to apply
Exclusion Fencing - temporary (during construction)	A temporary measure to assist preventing animals from venturing onto roads/linear infrastructure during construction Purpose is to limit death and injury to fauna during clearing activities.		✓ Where authorised clearing activities take place in habitat areas adjacent to infrastructure that poses a safety risk to fauna dispersing from the development site. ✓ This fencing will be temporary and remain in place for the duration of clearing activities.
Fauna underpasses - Culverts - Under bridges - Tunnels - Frog culverts (in conjunction with exclusion fencing).	Connectivity infrastructure providing safe passage between habitat areas. Reduces stress caused by barriers and interbreeding which subsequently undermines genetics. Reduced impacts resulting from light, traffic noise and vehicle impact.		✓ Where safe, convenient and ongoing wildlife movement is to be provided. ✓ Where the underpass can facilitate or be retrofitted to encourage use by target species. ✓ Where fauna must traverse development (roads, railway lines etc.) to access habitat. ✓ Works best when designed in conjunction with exclusion / funnel fencing and is appropriately large.
Underpass 'furniture' - Ledges - Horizontal Poles - Ropes	Reduces risks associated with multi-use underpasses such as wildlife drowning and entrapment. Re-use of removed stags/mature hollows provides additional refuge from predators. Retrofitting existing underpasses is cost efficient.		✓ Where retrofitting is appropriate. ✓ Where safe wildlife movement opportunities are to be provided and where multiple fauna species are affected e.g. arboreal and terrestrial animals. ✓ Where the underpass is open and lacks refuge areas. ✓ Works best when underpass is appropriately sized to provide a combination of dry ledges, poles and rope connections to accommodate a wide assemblage of fauna.

Green Infrastructure type	Benefit	Examples	When to apply
Rope bridges	Increases connectivity between otherwise intact vegetation corridors, reducing ground predation and road fatalities. Aids safe passage of arboreal wildlife and helps to prevent vehicle strike.		✓ To provide continuity of habitat and to facilitate movement where development has severed habitat. ✓ Where suitable habitat exists and development is placed within the natural paths of the target species (e.g. gliders). ✓ Works best in conjunction with overpasses, land bridges, glide poles and funnel fencing. Particularly useful across wide roads with high vehicle speeds.
Glide poles	Increases connectivity of roadsides and along median strips with existing canopy gaps. Preferred option by gliders even in sections of established regrowth vegetation.	 Design of the roadside glide poles installed by Brisbane City Council at Scrub Road. Credit: B Taylor/R Goldingay	✓ To avoid the creation of fragmented habitats. ✓ To provide safe, convenient and ongoing wildlife movement opportunity and link habitat corridors separated development including for example, open space and recreational facilities and linear infrastructure. ✓ Where habitat patches are separated by a distance greater than the gliding capabilities of species concerned. ✓ In areas of immature vegetation lacking intact canopy and or to provide linkages between street trees and landscape vegetation. ✓ Where a functional corridor 'stepping stone' linkage tree is removed e.g. old growth and stag trees.
Koala refuge poles	Provides fauna with a means of escaping a threatening situation. Provides a refuge point for Koalas to effectively rest/hide from predators in open areas.		✓ Where the provision of safe wildlife movement opportunities are sought ✓ In areas clear of vegetation where risk of predation is high. ✓ Where barriers to wildlife movement may exist between koala habitats. ✓ In situations where the planting of Koala habitat trees would not be suited e.g. high density residential areas. ✓ In areas of immature vegetation that would otherwise provide linkage for smaller terrestrial species.

Green Infrastructure type	Benefit	Examples	When to apply
'Stepping Stone' vegetation or other habitat features	Provides habitat and refuge to animals and assists in the movement of individuals between larger habitat patches. Enables wildlife to disperse, acquire resources and fulfil life cycle requirements. Maintains population and genetic exchange. Reducing in-breeding and disease susceptibility.	 'Stepping stones' may be trees or landscaping or other green infrastructure incorporated into development.	✓ Where biodiversity and integrity of habitats are required to be protected and maintained. ✓ Where safe, convenient and ongoing wildlife movement opportunities are required. ✓ To maintain biodiversity values within the environment. ✓ To provide continuity of habitat and to maintain connectivity values. ✓ To reduce habitat fragmentation
Nest boxes	Increases potential nesting and roosting sites and supports breeding populations. Provides safe refuge in immature vegetation lacking existing hollows.		✓ Where biodiversity and integrity of habitats are required to be protected and maintained. ✓ Where hollow bearing trees has been are or have been removed and or priority species habitat is removed. ✓ To conserve particular hollow-dwelling fauna. ✓ Where offset planting lacks mature hollow bearing trees. ✓ In conjunction with landscaping for improved food resource availability in urban areas.
Habitat trees, street trees, and landscaping for wildlife	Provides safe refuge points with the benefit of supplementary feeding habitat. Street tree installations function as environmental corridors linking habitat features across the landscape. See 'stepping stone' plantings above.		✓ Where biodiversity and integrity of habitats are required to be protected and maintained. ✓ Where safe, convenient and ongoing wildlife movement is to be provide. ✓ In conjunction with water sensitive urban design, and dedicated open space corridors. ✓ Where development reduces or delineates habitat patches. ✓ Works best in urban areas where civic design supports habitat integration and where there is greater competition for wildlife habitat.

Green Infrastructure type	Benefit	Examples	When to apply
Wildlife friendly lighting	Reduces disorientation and attraction of wildlife to artificial light and reduces development infrastructure related mortality. Reduces exposure to higher predation levels. Reduces effect on the light sensitive cycles of many species (turtles, predatory birds, reptiles).	 	✓ Where safe and convenient wildlife movement opportunities are to be provided. ✓ Where biodiversity and integrity of habitats are required to be protected and maintained. ✓ Where outdoor lighting may spill or reflect into the habitats of susceptible wildlife (e.g. turtles, shorebirds). ✓ Adjacent to wildlife habitat corridors, fauna underpasses, rope bridges and glider poles. ✓ Where pedestrian and wildlife are likely to share space.
Signage	Increases awareness of species presence and habitat importance. Educates the public on interest and risk factors. Reduces risk to wildlife resulting from artificial food resources, entrapment, vehicle strike. Alerts motorists to modify driving behaviour for reduced risk of collision with wildlife. Decreases response time for emergency wildlife care.	 	✓ Where wildlife habitat clearing is in progress and for the duration displaced wildlife is likely to be at increased risk of harm (i.e. moving to new habitat areas). ✓ Where safe wildlife movement opportunities are to be provided. ✓ In areas of public interest including adjacent to sensitive habitat areas. ✓ In areas of recorded wildlife and human conflict e.g. vehicle collision, domestic pet attacks, where feeding of native wildlife occurs. ✓ All developments where remaining wildlife habitat occurs, is adjoining or adjacent.

Green Infrastructure type	Benefit	Examples	When to apply
Ecological and habitat restoration	The broad range of benefits includes reducing fragmentation, increasing connectivity, providing food and habitat for wildlife. Tree planting buffers environmental areas and corridors, improves water quality and reduces risk of local wildlife extinction from lack of food/habitat sources. Mitigation of urban heat island effects.		✓ Where biodiversity and integrity of habitats are required to be protected and maintained. ✓ Where safe, convenient and ongoing wildlife movement is to be provided. ✓ Within or as near as possible to the development site. ✓ Where priority species habitats are impacted by development. ✓ Where environmental areas and corridors are impacted by poor water quality, weed incursion, ecological degradation and habitat loss through clearing. ✓ Adjacent or adjoining existing wildlife habitat corridors.
Integrating multiple green infrastructure values in design	Promotes shared use and multi-purpose values i.e. provision of habitat, micro-climate regulation and necessary infrastructure. Reduces wildlife and development conflict. Economically advantageous.		✓ Where space and financial constraints exist. ✓ Where urban design needs to achieve shared use of space (pedestrian / wildlife). ✓ Where multiple target species are concerned.

Landscaping as habitat

Vegetation makes an important contribution to the urban environment. Urban landscapes can provide important refuge habitat for wildlife and ecosystem services to people.

Melaleucas incorporated into the streetscape at Scarborough.

Moreton Bay fig incorporated into development design at Hotel.

Planning and design principles for landscaping as habitat

Place types can be enhanced with quality landscape design acknowledging the environmental values of an area. High functioning landscape design will:

a. Maximise retention of existing habitat trees and other vegetation, and integrate these with built and urban form.
b. Enhance urban wildlife habitats by using locally native plant species.
c. Space street trees to encourage canopy connection and tree success.
d. Rehabilitate areas of poor environmental quality.
e. Maximise wildlife connectivity and reduce habitat fragmentation, including the use of artificial habitat such as nest boxes.
f. Buffer sensitive areas and separate conflicting land uses with deep landscaping.
g. Design landscaping to deliver maximum shade and support ecosystem services and function.
h. Innovatively use of rainwater and overland flow.

Concept design showing green infrastructure solutions in an urban setting (credit image: Stockland)

Planning and design principles for priority and other native species

Priority species and their habitats should be considered during the concept planning phase of a development.

The following principles can be used to guide development to provide safe and connected habitat areas.

a. Identify if priority species, habitat areas and local movement pathways occur within the development site and adjacent areas.

b. Maximise habitat protection and safe wildlife movement and dispersal opportunities across the landscape by identifying and reducing potential threats and designing for connectivity, habitat integrity and ecologically functioning green spaces.

c. Incorporate mitigation measures appropriate to location and setting into the development to ensure biodiversity quality and integrity of habitats is maintained and protected.

d. Rehabilitate priority species habitat to increase habitat extent and connectivity, and incorporate habitat values into development design.

e. Maximise habitat connections using green infrastructure components.

f. Use wildlife friendly fencing and lighting.

Planning and design principles for koala sensitive development

The following principles can be used to maintain and protect biodiversity quality, habitat connectivity and safe, convenient and ongoing wildlife movement.

a. Retain as many existing native and koala habitat and food trees as possible.

b. Development and its operational activities should be of a size, scale, type and design that avoids fragmenting or otherwise adversely impacting on koalas, koala habitat or habitat connectivity.

c. Ensure a sufficient separation area is maintained between the development and koala habitat trees to achieve long-term viability for local koalas.

d. Retain koala habitat and food trees and use them as features in the development design e.g. in car parks, open space areas, drainage reserves, corridors, street trees, road verges, road reserves and within residential lots where appropriate.

e. Road design and placement avoids fragmentation and clearing of koala habitat, and instead increases visibility to provide safe road crossing opportunities for koalas.

f. Roads wind around mature and habitat trees.

g. Locate building envelopes in cleared areas to reduce habitat removal while pursuing good urban design outcomes.

h. Provide night time road lighting at identified koala road crossing points and appropriate to other wildlife requirements – chiefly in urban/high traffic areas.

i. Use koala food and habitat trees as a priority in urban landscaping, including as street trees where appropriate to provide habitat linkages.

j. Build and strengthen local connections of ‘stepping stone’ linkages of koala food and habitat trees.

k. Use development envelopes that are shaped and located to:
    i. Co-locate all associated activities, infrastructure and access strips
    ii. Be within the least-valued area of koala habitat on the site
    iii. Minimise the footprint of the development envelope area
    iv. Minimise edge effects to areas external to the development envelope

l. Retain trees along fence lines to provide linear linkages through the landscape, and use wildlife friendly fencing.

Further information is available in the *Koala-sensitive Design Guideline* (2012) and *Fauna Sensitive Road Design Manuals* (DTMR).

Ecological restoration

Methods of ecological restoration

There are four general methods for ecological restoration. The approach selected will depend upon the objective of the project and the condition of the project area. Sometimes a combination of approaches may be appropriate.

Natural regeneration

Natural regeneration applies to areas capable of quickly self-regenerating without the need to introduce plants, seeds, spores and vegetation material. Preventative action may include fencing out livestock and weed eradication. Natural regeneration is a preferred restoration method for maintaining local genetic biodiversity.

Assisted natural-regeneration

Assisted natural-regeneration applies to areas capable of regenerating and which may require some intervention to control weeds and / or ameliorate soil. Introduction of plants, seeds, spores and vegetation material may be necessary to help establish a functioning community. The informed inclusion or exclusion of fire may assist natural –regeneration. Assisted natural-regeneration is a preferred restoration method for maintaining local genetic biodiversity.

Reconstruction

Reconstruction applies to highly degraded areas not capable of naturally regenerating and where the planting of key plant community specific canopy and pioneer species are necessary to re-establish the original regional ecosystem.

Fabrication

Fabrication applies to areas not capable of naturally regenerating and where it is not possible to restore the original native plant community. These are areas where specialised design may be required for a specific ecological function or purpose. Water sensitive urban design and bio-retention systems are examples of a fabricated ecological community. Dramatically altered hydrology and changes in soil chemistry are examples where site may require an alternative ecological restoration approach to re-naturalisation.

Planning and design principles of ecological restoration

Principles of ecological restoration		Guidance comment
1	Restored ecosystems incorporate groups of plant species reflecting those in reference ecosystems (i.e. the pre-existing plant community which would naturally occur in the restoration area).	Regional Ecosystem technical descriptions provided by the Qld Herbarium can be used to determine the structure and floristic composition of a target plant community. Council can supply stratified plant lists for most plant communities in the region. Where technical descriptions or a council plant species list is not available, replication of a nearby intact 'reference ecosystem' of same or similar nature is acceptable.
2	Restored ecosystems support the same structure and function as reference ecosystems.	
3	Restored ecosystems consist of native species of local genetic origin to the greatest extent practicable.	Proponents are encouraged to source plant material from nurseries which use locally collected seed material and / or propagate their own plants from material collected within the proposed development site.
4	Restoration area should have curved edges (i.e. no sharp corners)	Rounded margins reduce exposure to edge effects.
5	Restored ecosystems are self-sustaining and are resilient to normal periodic stress.	Species selected should be based upon local occurrence, appropriateness for the ecosystem being restored and be sufficiently established to withstand naturally variable environments.
6	Restored ecosystems interact with the surrounding landscape and contribute to ecosystem services.	Revegetation and restoration of ecosystems contributes to habitat connectivity, reduces edge effects, improves water quality outcomes, provides habitat for priority species and helps to mitigate urban heat island effects.
7	Restored ecosystems - particularly those which use reconstruction and fabrication techniques - must be maintained for the greatest length of time possible.	Adequate maintenance periods with regular maintenance activities helps to ensure projects are self-sustaining in the longer term. Some ecosystems may require a minimum of 3 - 5 years maintenance.

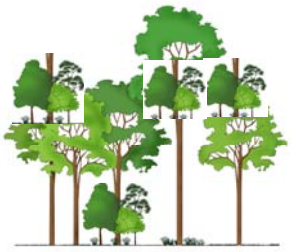
Example of habitat restoration design within and buffering an environmental corridor
Image source:www.melbournewater.com.au

Planting densities

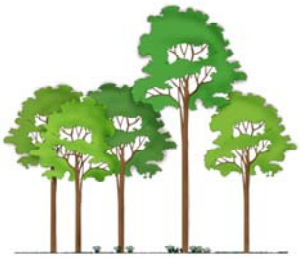
Planting densities for ecological restoration should be consistent with naturally occurring densities within the reference regional ecosystem. Ecological restoration planting densities are guided by ecosystem structure, species dominance, frequency, and relative coverage and differ from those applied to amenity landscaping. Where technical information for a reference ecosystem is not available the following densities will be the minimum used.

Strata		Planting density
(G)	Groundcover	2 per 1m^2
(S1)	Sub-shrub	2 per 2m^2
(S2)	Shrub	
(T3)	Low tree layer	1 per 3m^2
(T2)	Sub-canopy	
(T1)	Canopy	1 per 5m^2

Minimum planting densities for ecosystems lacking specific density detail.



Example of a ecological restoration incorporating full ecosystem structure



Example of an amenity landscaping incorporating only sub-canopy and canopy

Note that higher ground cover densities are usually required in waterways and areas with high erosion potential. Plant community structure will determine stratum number.

Named varieties or cultivars are not appropriate for ecological restoration purposes except where amenity outcomes are sought along the outer edges of a planting area and provided that such species have no parental history of invasive escape and are of local native origin.

Salvaging plants

Plants can sometimes be transplanted for use in landscaping and ecological restoration. Plant translocation is particularly useful for slow growing, rare and long lived plants. In some cases, topsoil can be trans-located from the development site and used to encourage ecological regeneration. Plant salvage is a useful way for development to maintenance and protection of floristic biodiversity.

Seed collection and propagation

Seed collection is a useful way for development to demonstrate that floristic biodiversity is maintained and protected. Seed collection conserves genetic diversity of flora species. Collection takes place prior to commencement of construction activities. Germination testing should be undertaken before any vegetation is cleared.

APPENDIX 3 – Priority Species of the Moreton Bay Region

Priority	Common Name	Scientific Name
1	Loggerhead turtle	*Caretta caretta*
2	Lesser swamp orchid	*Phaius australis*
3	Spotted-tailed quoll	*Dasyurus maculatus*
4	Giant barred frog	*Mixophyes iteratus*
5	Red goshawk	*Erythrotriorchis radiatus*
6	Wallum sedgefrog	*Litoria olongburensis*
7	Koala	*Phascolarctos cinereus*
8	Water mouse	*Xeromys myoides*
9	Dugong	*Dugong dugon*
10	Brush sophora	*Sophora fraseri*
11	Red lilly pilly	*Syzygium hodgkinsoniae*
12	Macadamia nut	*Macadamia tetraphylla*
13	Bopple nut	*Macadamia ternifolia*
14	Macadamia nut	*Macadamia integrifolia*
15	Shade lily	*Romnalda strobilacea*
16	Australian lungfish	*Neoceratodus forsteri*
17	Grey-headed flying-fox	*Pteropus poliocephalus*
18	Bahr's scrub croton	*Croton mamiillatus*
19	Wallum froglet	*Crinia tinnula*
20	Powerful owl	*Ninox strenua*
21	Richmond birdwing butterfly	*Ornithoptera richmondia*
22	Glossy black-cockatoo	*Calyptorhynchus lathami*
23	Green-thighed frog	*Litoria brevipalmata*
24	Common death adder	*Acanthophis antarcticus*
25	Richmond birdwing vine	*Pararistolochia praevenosa*
26	Thready barked myrtle	*Gossia inophloia*
27	Brush-tailed phascogale	*Phascogale tapoatafa*
28	Platypus	*Ornithorhynchus anatinus*
29	Squirrel glider	*Petaurus norfolcensis*
30	Black flying-fox	*Pteropus alecto*
31	Little red flying-fox	*Pteropus scapulatus*
32	Frilled lizard	*Chlamydosaurus kingii*
33	Land mullet	*Bellatorias major*
34	Feathertail glider	*Acrobates pygmaeus*
35	Brolga	*Grus rubicunda*
36	Moreton Bay fig	*Ficus macrophylla*
37	Short-beaked echidna	*Tachyglossus aculeatus*
38	Eastern osprey	*Pandion cristatus*
39	Emu	*Dromaius novaehollandiae*

Priority	Common Name	Scientific Name
40	Fleay's frog	*Mixophyes fleayi*
41	Regent honeyeater	*Anthochaera phrygia*
42	Southern giant-petrel	*Macronectes giganteus*
43	Coxen's fig-parrot	*Cyclopsitta diophthalma coxeni*
44	Swift parrot	*Lathamus discolour*
45	Nightcap plectranthus	*Plectranthus nitidus*
46	Yellow swamp orchid	*Phaius bernaysii*
47	Oxleyan pygmy perch	*Nannoperca oxleyana*
48	Northern quoll	*Dasyurus hallucatus*
49	Australasian bittern	*Botaurus poiciloptilus*
50	Wandering pepper cress	*Lepidium peregrinum*
51	Ravine orchid	*Sarcochilus fitzgeraldii*
52	Christmas bells	*Blandfordia grandiflora*
53	Wandering albatross	*Diomedea exulans*
54	Shy albatross	*Thallassarche cauta*
55	Australian painted snipe	*Rostratula australis*
56	Black-breasted button-quail	*Turnix melanogaster*
57	Long-nosed potoroo	*Potorous tridactylus tridactylus*
58	Slender milkvine	*Marsdenia coronata*
59	Corky milkvine	*Marsdenia longiloba*
60	Ball nut	*Floydia praealta*
61	Toadflax	*Thesium australe*
62	Hop bush	*Dodonaea rupicola*
63	Missionary nutgrass	*Cyperus semifertilis*
64	Black-browed albatross	*Thalassarche melanophris*
65	Three-leaved bosistoa	*Bosistoa transversa*
66	Southern dayfrog	*Taudactylus diurnus*
67	Cascade treefrog	*Litoria pearsoniana*
68	Tusked frog	*Adelotus brevis*
69	Little tern	*Sternula albifrons*
70	Australian fritillary butterfly	*Argyreus hyperbius inconstans*
71	Water grass	*Lilaeopsis brisbanica*
72	Small-leaved jasmine	*Jasminum jenniae*
73	Wallum rocketfrog	*Litoria freycineti*
74	Beach stone curlew	*Esacus magnirostris*
75	Major Mitchell's cockatoo	*Lophochroa leadbeateri*
76	Southern emu-wren	*Stipiturus malachurus*
77	Painted honeyeater	*Grantiella picta*
78	Red-tailed tropic bird	*Phaethon rubricauda*
79	Plumed frogmouth	*Podargus ocellatus plumiferus*
80	Illidge's ant-blue butterfly	*Acrodipsas illidgei*

Priority	Common Name	Scientific Name
81	Mark's cassia	*Cassia marksiana*
82	Long haired ricinocarpos	*Ricinocarpos speciosus*
83	Tiny wattle	*Acacia baueri*
84	Mountain tea-tree	*Leptospermum oreophilum*
85	Tea-tree	*Leptospermum luehmannii*
86	Fine-leaved tuckeroo	*Lepiderema pulchella*
87	Aponogeton	*Aponogeton elongatus*
88	Swamp herb	*Maundia triglochinoides*
89	Pouched frog	*Assa darlingtoni*
90	Square-tailed kite	*Lophoictinia isura*
91	Grey goshawk	*Accipiter novaehollandiae*
92	Australian swiftlet	*Aerodramus terraereginae*
93	Black-necked stork	*Ephippiorhynchus asiaticus*
94	Red-browed treecreeper	*Climacteris erythrops*
95	Sooty oystercatcher	*Haematopus fuliginosus*
96	Black-chinned honeyeater	*Melithreptus gularis*
97	Turquoise parrot	*Neophema pulchella*
98	Lewin's rail	*Lewina pectoralis pectoralis*
99	Sooty owl	*Tyto tenebricosa tenebricosa*
100	Cotton pygmy-goose	*Nettapus coromandelianus*
101	Freckled duck	*Stictonetta naevosa*
102	Golden-tipped bat	*Kerivoula papuensis*
103	Elf skink	*Eroticoscincus graciloides*
104	Rose's shade-skink	*Saproscincus rosei*
105	Rusty vine	*Marsdenia hemiptera*
106	Rainforest acomis	*Acomis acoma*
107	Large-leaved wonga vine	*Pandorea baileyana*
108	Fraser Island creeper	*Tecomanthe hillii*
109	Corky cucumber	*Nothoalsomitra suberosa*
110	Gonocarpus	*Gonocarpus effusus*
111	Giant ironwood	*Choricarpia subargentea*
112	Hairy hazelwood	*Symplocos harroldii*
113	Water-shield	*Brasenia schreberi*
114	Tangle orchid	*Papillilabium beckleri*
115	Grease nut	*Hernandia bivalvis*
116	Wading birds	*Various*
117	Australian river mussel	*Cucumerunio navaehollandiae*
118	Sapphire rockmaster	*Diphlebia coerculescens*
119	North Pine River freshwater snail	*Fluvidona anodonta*

APPENDIX 4 – Offset Delivery Plan template

The following template is designed to provide Council with the mandatory components required in an Offset Delivery Plan as per section 18(4) of the *Environmental Offsets Act 2014* and Queensland Environmental Offsets Policy.

Before submitting an Offset Delivery Plan, the applicant must lodge the following forms required under the *Environmental Offsets Act 2014.* The forms are available from the Department of Environment and Heritage Protection's website:

- Environmental Offsets Delivery Form 1 - Notice of Election form (EOD1);
- Environmental Offsets Delivery Form 2 - Offset Delivery Plan details (EOD2); and
- Environmental Offsets Delivery Form 3 - Offset Area Details (EOD3).

Report Section	Requirements / Considerations
Describe the environmental matter being impacted by the development	• Provide details of the matter of environmental significance being impacted by the development works. • If the development is to be staged, the full consideration of the impacts on the environmental matter must be detailed and a breakdown of impacts per stage included. • Scaled map showing aerial photography of vegetation proposed for clearing (and retention if applicable) overlayed with the plan of development.
Justification of unavoidable impacts resulting in the need for the offset.	a. Detail the need and purpose of the proposed development, and its land use planning context. b. Description of avoidance and mitigation efforts. c. Description of environmental values proposed for offsetting, prepared in accordance with Section 10. **Note:** *please check with Council prior to lodgement of application to determine if an ecological assessment or vegetation management plan is required. This will depend on the scale of the proposed development and anticipated impact.*
Determine offset obligation (refer section 10: offset requirements)	Vegetation, including koala habitat trees, proposed for clearing is to be individually counted or estimated using an accepted estimation technique. The determined methodology for the calculation is to be documented. All koala food and habitat trees must be accounted for in calculations. **Appendix 5** provides a list of koala food and habitat tree species. The species composition of an offset must be reflective of lost values and relevant to the receiving site.
Demonstrate how a conservation outcome will be achieved	Describe how the proposed offset will be undertaken and how a conservation outcome will be achieved including how the plan will: a. Effectively account for and manage the risks of the offset failing to achieve a conservation outcome; b. Ensure the offset provides benefit in relation to the impacted matter in addition to any other benefits required by the planning scheme; c. Ensure the offset is of a size and scale proportionate to the significance residual impact on the impacted environmental matter.

Receiving site details	• Show offset receiving site boundaries and the calculated area capable of receiving the offset and planting densities. • Planting densities should be appropriate and consistent with regional ecosystem technical descriptions published by the State of Queensland for the relevant pre-clearing regional ecosystem. • State whether the offset will be delivered, wholly or partly, on the land on which the environmental offset will be undertaken. • Identify the details of any persons with an interest in the offset receiving site. • Describe the existing land use of the offset receiving site and any impact that land use may have on the delivery of the offset.
Legally securing the offset site	Provide details of the mechanism used for legally securing the offset as per *Environmental Offsets Act 2014* section 29.
Five-year implementation plan	a. Detail key actions to be undertaken across the whole of the site to achieve the outcomes stated in the management plan; b. Provide detail on the timing and prioritisation of offset delivery in accordance with on-ground stages of works; c. List resource requirements (including labour); and d. List any permits or licences required for implementation.
Monitoring	Outline the monitoring strategy for the offset receiving site including: a. monitoring methodology; b. monitoring performance indicators; c. timing and frequency of monitoring inspections; and d. the person responsible for both establishing baseline figures and conducting the ongoing monitoring (provide details of that person's qualifications and relevant experience).
Maintenance	Outline the maintenance strategy for the offset including: a. a minimum 5-year maintenance period by the proponent (to commence after Council's acceptance of completed establishment works "on maintenance"); b. maintenance occurring at intervals of no longer than 4 weeks in the first year, 8 weeks in the second year, and 12 weeks in the third to fifth years; c. watering events sufficient to ensure 100% floristic survival; d. weed treatment/removal (occurring before weed seed matures, to prevent a weed seed bank developing); e. replacement planting within 30 days of plant death, and other risk management measures.
Reporting	Detail a schedule for submitting offset progress and condition reports for the duration of the maintenance period. Reports are to be submitted to Council on an annual basis, and must demonstrate how the offset is progressing in terms of achieving the objectives and outcomes stated in the offset management plan, and provide specific details of: a. progress on the implementation plan; b. any changes to the implementation plan as a result of adaptive management; c. monitoring results and compliance with monitoring performance indicators; d. progress of ongoing site management and any issues of concern; and e. progress of threatened flora and fauna species within the receiving site.

APPENDIX 5 – Koala Food and Habitat Trees

Commonly occurring koala food and habitat trees in South East Queensland. (The below list is not exhaustive. For further information refer to the *Guideline for Revegetation of Koala Habitat* DERM 2011).

Common Name	Scientific Name	Comments
Smooth barked Apple	*Angophora leiocarpa*	Large tree
Broad-leaved Apple	*Angophora subvelutina*	Large tree
Smudgy Apple	*Angophora woodsiana*	Large tree
Spotted Gum	*Corymbia citriodora*	Tall, slender tree
Large-leaved Spotted Gum	*Corymbia henryi*	Tall tree
Pink Bloodwood	*Corymbia intermedia*	Medium tree
Carbeen	*Corymbia tessellaris*	Large tree
Large-fruited Grey Gum	*Eucalyptus biturbinata*	Large tree
Narrow-leaf Ironbark	*Eucalyptus crebra*	Medium to large tree
Rose Gum	*Eucalyptus grandis*	Very large tree
Mountain Grey Gum	*Eucalyptus major*	Large tree
Tallowwood	*Eucalyptus microcorys*	Large tree
Gum-topped Box	*Eucalyptus moluccana*	Large tree
Blackbutt	*Eucalyptus pilularis*	Large tree
Small-fruited Grey Gum	*Eucalyptus propinqua*	Large tree
Scribbly Gum	*Eucalyptus racemosa*	Medium to large tree
Red Mahogany	*Eucalyptus resinifera*	Large tree
Swamp Mahogany	*Eucalyptus robusta*	Medium tree
Sydney Blue Gum	*Eucalyptus saligna*	Very large tree
Narrow-leaf Red Gum	*Eucalyptus seeana*	Small & medium forms
Grey Ironbark	*Eucalyptus siderophloia*	Large tree
Qld Blue Gum	*Eucalyptus tereticornis*	Large tree; a favourite
Brush Box	*Lophostemon confertus*	Large tree
Swamp Box	*Lophostemon suaveolens*	Large tree
Broad-leaved Paperbark	*Melaleuca quinquenervia*	Small tree for wet areas