Guidelines for assessment of impacts on terrestrial biodiversity

ntepa Northern Territory Environment Protection Authority

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Contact details	
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Contents

1. Introduction

In order to carry out environmental impact assessment (EIA) of a proposal, the NT EPA needs to know what terrestrial ecosystem values are present at the proposal area, and what significant impact the proposal is likely to have on those values. These guidelines have been prepared for proponents and consultants who are required to assess, report on, and manage the impact of proposed development on terrestrial ecosystem values within the NT.

2. Purpose

These guidelines are provided so that proponents of development proposals that have the potential to have a significant impact on the environment and may need to undergo EIA under the *Environment Protection Act 2019* (EP Act):

- have a clear understanding of what is required to undertake an assessment of a proposal's impacts on ecosystems, communities and terrestrial flora, fauna or vegetation
- are able to focus their biodiversity assessments on significant environmental impacts potentially caused by their proposal
- develop information sufficient to allow planning to avoid, mitigate and offset for mitigation of potential significant impacts, and future rehabilitation of the development site.

3. Statutory context

This section provides an overview of the legislation that is most relevant when assessing terrestrial ecosystems for an EIA process under the EP Act and explains why it is relevant. Proponents should identify the statutory authorisations required for a proposal and describe why and when they would be required for the construction, operation or rehabilitation of the proposal.

Where there are not specific, separate legislative requirements related to values of terrestrial ecosystems, these matters must be addressed in the proponent's EIA documents by describing and identifying impacts, assessing the acceptability or otherwise of impacts, and the measures that can be taken to avoid and then mitigate potential significant impacts, or to offset significant residual adverse impacts that cannot be avoided or mitigated.

3.1. Environment Protection Act 2019

The EP Act states that the purpose of the environmental impact assessment and approval system in the NT is to ensure there is no unacceptable impact on the environment resulting from proposed development, now or in the future.

Proposals that have the potential to have a significant impact on the environment must undergo EIA under the EP Act and need an environmental approval to commence. Proposals that require EIA and approval must be planned, assessed and carried out taking into account (section 42(b)):

i. the principles of ecologically sustainable development
ii. the environmental decision-making hierarchy
iii. the waste management hierarchy
iv. ecosystem-based management

v. the impacts of a changing climate.

Section 42(b)(v) applies to all proposals that may have a significant impact on the environment. It places obligations on both the NT EPA and proponents to ensure that terrestrial ecosystem impacts are addressed through the planning and assessment of a proposal and in the carrying out of the proposal.

When addressing terrestrial ecosystem impacts in proposal planning and implementation a proponent has obligations under section 43 of the EP Act (General duty of proponents) which include, among other things:

- to seek and document community knowledge and understanding (including scientific and traditional knowledge and understanding) of the natural and cultural values of areas that may be impacted by the proposal
- to consider the principles of ecologically sustainable development in the design of the proposal
- to apply the environmental decision-making hierarchy in the design of the proposal.

3.2. Territory Parks and Wildlife Conservation Act 1976

The TPWC Act provides for the conservation of biological diversity in the NT through mechanisms such as establishing parks and reserves, and the protection of native wildlife (animals and plants) and its habitat. The TPWC Act defines several terms that are relevant when preparing EIA documents, such as 'sustainable use', 'threatened wildlife', 'classification', and 'area of essential habitat'.

The TPWC Act is supported by several pieces of subordinate legislation, including regulations and by-laws that address issues of conservation. The Territory Parks and Wildlife Conservation Regulations 2001 assigns individual flora and fauna species to classes according to the determined level of threat to the survival of the species in the wild according to the International Union for the Conservation of Nature (IUCN) red list categories and criteria. The classification of wildlife determines the status that relates to its risk of extinction.

Classes of wildlife include extinct (E) extinct in the wild (EW), critically endangered (CR) endangered (EN), vulnerable (V), near threatened (NT), least concern (LC), data deficient (DD) and not evaluated (NE). Species that have been classified as EW, CR, EN, V are threatened species and have greater protection in the NT under the TPWC Act. The TPWC Act restricts activities relating to protected wildlife unless the person is authorised to undertake the activities. Restricted activities include those which harm, disturb, alter the behaviour of or otherwise affect the capacity of the animal or plant to perform its natural processes; or damage or destroy the habitat of the animal or plant.

3.3. Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the Australian Government's key piece of environmental legislation. It provides a legal framework to protect 'nationally significant (protected) animals, plants, habitats or places' (protected matters) which include, among others, listed threatened species and communities, listed migratory species, and Ramsar wetlands of international importance.

Controlled actions need approval from the Australian Government's Minister for the environment. The environmental assessment must determine the presence or likelihood of any protected matters in the vicinity of the study area through database searches and field surveys. An assessment of the likely impacts on protected matters is needed if they are present or are likely to be present.

The NT and Australian governments have an agreement (the bilateral agreement) that allows an EIA process under the EP Act to also assess the potential impacts of a proposal on protected matters under

the EPBC Act. This avoids duplication and allows proponents to undergo one assessment process for both the NT and Australian Governments. However, the NT and Australian Governments' subsequent approval processes remain separate.

There is often some overlap when assessing terrestrial ecosystem impacts that are relevant under NT or Commonwealth legislation. Nevertheless, the EIA documents should contain a separate section or chapter with an assessment of the impacts on protected matters.

4. Limitations

This guidance is not an instrument for predicting outcomes or decisions related to EIA, however it is designed to promote a more certain and consistent approach to terrestrial biodiversity assessments and intended to apply to proposals prior to referring the proposal to NT EPA, and during an assessment process.

The NT EPA has prepared this document in good faith, exercising all due care and attention, but no representation or warranty, express or implied, is made as to the relevance, completeness or fitness for purpose of this document in respect of any particular user's circumstances. Users of this document should satisfy themselves concerning its application to their situation and, where necessary, seek expert advice.

5. Ecological surveys

Proponents are often required (where existing knowledge is insufficient for EIA) to undertake ecological surveys of the proposal site and any other areas that may be impacted, to determine the terrestrial ecosystem values and inform the preparation of EIA documents. Flora, fauna and/or vegetation surveys should be conducted by a suitably qualified ecologist. Proponents should engage an experienced specialist to deal with matters related to threatened species. Proponents must provide information in the EIA documentation that identifies the contribution of ecologists who undertook field studies and those that wrote the ecology sections of the EIA document.

5.1. Incorporating traditional Aboriginal knowledge

The NT EPA recognises that traditional Aboriginal knowledge is an important component of information on vegetation, flora and fauna that should be incorporated into conservation assessments. Incorporating traditional Aboriginal knowledge prior to conducting ecological surveys is encouraged. In most regions, Aboriginal people and communities will have traditional knowledge of areas that support high biodiversity and locations where significant flora and fauna occur. Proponents should engage with knowledge holders according to ethical agreements or research protocols to create transparency, ensure mutual benefit, and to protect indigenous cultural and intellectual property. Information provided by Aboriginal peoples should be communicated with regard for any requirement for confidentiality.

5.2. Desktop assessment

Proponents should undertake a comprehensive desktop assessment in the early planning stages of the proposal. Desktop assessments can include database searches; analysis of maps, satellite images and aerial photographs, and a literature review of the terrestrial ecological values that are known to occur, or potentially occur in the survey area.

Publicly available NT and Australian Government databases and mapping sources include the following resources:

- NT flora and fauna atlases accessible via NR Maps
- NT vegetation mapping accessible via NR Maps
- NT Fauna species checklist
- NT Flora species checklist
- NT Government Open data portal
- Australian Government Protected Matters Search Tool
- Australian Government Species Profile and Threats Database

When requesting data or conducting searches using the above resources, proponents should ensure the search radius is large enough to assess the potential impacts. Use a radius of at least 50km around the proposal area when considering threatened species, or in areas where few field studies have been undertaken. The search radius should be at least 20km outside the proposal area, even for locations where extensive field studies have already been reported. If the proposal is likely to impact downstream waterways, estuarine or marine environments, ensure the search includes those areas.

Proponents should base the desktop assessment of the likelihood that species and communities are present in the survey area on:

- the general habitat requirements of a species or community
- habitat representation in the survey area
- records of known occurrence(s)
- knowledge of geographic distribution.

Searched data and maps can be used to preliminarily assess the terrestrial ecosystems, threatened species and habitats that are known to occur, or are likely to be, on and around the proposal area. Identify potential animal habitat through aerial photography, vegetation mapping (e.g. regional ecosystem mapping), and in the case of large-scale proposals, remote sensing technology. Identify locations of listed threatened plant and animal species and communities using a likelihood of occurrence assessment based on desktop assessment of habitat factors, survey records and expert knowledge.

The Species Recovery and Threats Database can identify recovery plans and conservation advice for species that might be present in the wider region.

The NT Open data portal provides mapping data for public access and use in a geographic information system.

5.2.1. Knowledge gaps

Use the desktop searches to identify gaps in the knowledge of the distribution of biodiversity, particularly in areas where detailed studies have not been undertaken or reliable field data is not available. The EIA documents for a referred proposal should clearly explain these knowledge gaps and address any gaps that are relevant to assessing potential significant impacts through field surveys.

5.3. Field surveys

Information obtained from the desktop studies should be used to plan and design field surveys where required. The surveys must be sufficient to identify relevant terrestrial ecosystem values, verify the findings from the desktop review, and address any important knowledge gaps. Proponents should set specific objectives for the field surveys, and state them in the EIA document.

5.3.1. Survey area and effort

The survey area must cover the entire proposal area and any potentially impacted surrounding areas. Information collected during the desktop assessment can be used to refine the extent of the survey area and the field survey methodology to target potentially occurring species, habitat and vegetation communities.

Extend the survey area outside the proposal area in the following circumstances:

- potential impacts might occur outside the proposal (e.g. downstream of the proposal area)
- more information is needed about the occurrence of species or communities outside the proposal area
- non-impacted reference sites are required for baseline monitoring.

An extended survey area should include, for example, any groundwater dependent ecosystems that may be impacted by groundwater drawdown downstream or upstream of the proposal area. Terrestrial and aquatic ecological values are often interconnected and may need to be surveyed and assessed in combination.

Surveys should target representative plant and animal habitats, vegetation communities and regional ecosystems across the defined area of potential impact of the proposal. Sampling should be proportional to the total area of each identified vegetation type.

5.3.2. Survey timing

The desktop assessment should be used to identify the most effective timing (seasonality) and duration of the survey work. Proponents should determine when and how often field trips will be needed to ensure that seasonal effects are adequately taken into account for both plants and animals. The survey timing must consider matters including flowering and fruiting periods, growth cycles, breeding cycles, and migrations.

The survey report should demonstrate that the selected timing and frequency of animal surveys provides the highest likelihood of detecting threatened and migratory species. However, the optimal time(s) of year to undertake terrestrial ecology surveys will vary across NT bioregions, taxa and ecosystems and this should be accounted for in designing the survey.

5.3.3. Identification of appropriate survey locations, equipment and personnel

Develop suitable terrestrial field surveys for the proposal area and any potentially impacted areas outside of the proposal area. Proponents should refer to the following NT government guidelines when developing the survey program:

- Guidelines and field methodology for vegetation survey and mapping
- Guidelines for targeted surveys of threatened and significant plant species
    - Supplement 1: *Typhonium* field surveys
- Guidelines for surveying for the ghost bat at the landscape scale

Guidance from other jurisdictions relating to terrestrial biodiversity assessments may also be used:

- Terrestrial vertebrate fauna survey guideline (QLD)

- Technical Guidance - Terrestrial vertebrate fauna surveys for environmental impact assessment (WA)
- Technical Guidance - Sampling of short range endemic invertebrate fauna (WA)
- Technical Guidance - Subterranean fauna surveys for environmental impact assessment (WA)
- Draft survey guidelines for Australia's threatened orchids (Australian Government)
- Survey Guidelines for Australia's threatened bats (Australian Government)
- Survey Guidelines for Australia's threatened birds (Australian Government)
- Survey Guidelines for Australia's threatened frogs (Australian Government)
- Survey guidelines for Australia's threatened fish (Australian Government)
- Survey guidelines for Australia's threatened mammals (Australian Government)
- Survey guidelines for Australia's threatened reptiles (Australian Government).

Surveys should be planned to cover all potentially impacted threatened species and species habitats. For plants, select locations where meanders, transects, and/or plots will be surveyed. For animals, select locations and equipment for such activities as trapping, spotlight searching, call detection, roost searching etc.

Field surveys must be sufficient to provide accurate mapping of terrestrial ecosystems and habitat at a suitable scale, and to target threatened plant and animal species and sensitive or significant vegetation. Ensure that survey locations are adequately positioned within the habitat i.e. avoid areas adjacent to roads or cleared areas.

Identify any constraints that would result in suboptimal field surveys. When assessing the survey data, proponents should take a conservative approach and seek advice from the DLPE Flora and Fauna Division. For example, if the desktop assessment indicates a threatened species is likely to be present but the field surveys are constrained from adequately confirming their presence or absence, then the survey report and EIA documents should assume the threatened species is present. A reconnaissance site visit to check that the desktop studies provided an adequate basis for designing the field survey program may be required. The reconnaissance visit should confirm that the proposed survey sites are accessible and check the accuracy of vegetation mapping of the area, particularly where ground truthing of mapped areas has not occurred.

Adjust the field survey program for the EIA process as necessary to ensure that regional terrestrial ecosystems at the site are accurately mapped, especially if the proposal may require offsets for residual adverse impacts. Ensure that the survey team will have permission to access the selected sites during the appropriate seasons, and that necessary statutory authorisations have been obtained.

5.3.4. Pre-survey consultation

Proponents are encouraged to consult with the DLPE Flora and Fauna Division and Environment Division to discuss the survey program before it commences. The DLPE Flora and Fauna Division will provide feedback on the adequacy of the proposed survey program and may make recommendations for improvement.

Nevertheless, the survey team should incorporate a contingency plan if circumstances at the site change, such as a recent bushfire or flooding that indicates that additional actions are needed to properly conduct the survey. The proponent is responsibility for demonstrating the appropriateness of the survey strategy.

5.3.5. Conducting field surveys

Conduct the flora and fauna surveys in accordance with relevant guidelines, including those listed above. Record locations and survey boundaries in decimal degrees of latitude and longitude based on the Geocentric Datum of Australia 2020 (GDA2020). Refer to the NT EPA 'Guide for preparing biodiversity data packages' for further detail about data standards.

Use available spatial data and maps to identify terrestrial ecosystem values, and to provide a basis for identifying potential significant impacts on terrestrial ecosystems, such as the loss or fragmentation of threatened species habitat.

Quantify the area of potential habitat for threatened species within the proposal area and the condition of the habitat. If a threatened species is observed, determine the population extent and density of the species within the potentially affected area. Further information about conducting plant, animal and vegetation surveys is provided in the following sections.

6. Vegetation assessment

6.1. Objectives

The purpose of a vegetation assessment is to provide documentation of:

- the vegetation of a proposal site and the immediately adjacent area
- the presence and distribution of critical habitats (declared area of essential habitat under TPWC Act or listed Threatened ecological communities under the EPBC Act)
- the local and regional conservation status of vegetation types present at a proposal site
- the potential impacts of a proposal on vegetation in, adjacent to, and downstream from a proposal site
- the conservation significance of a proposal's impacts on vegetation at local and regional levels
- compliance with NT Land Clearing Guidelines (including the Pastoral Land Clearing guidelines and the NT Planning Scheme land clearing guidelines).

6.2. Information requirements

6.2.1. Desktop assessment

The DLPE maintains spatial data on Territory-wide mapping of vegetation. Mapping is available at a scale of 1:1,000,000 for the NT. Additional mapping is available at higher resolution for some areas. The lower resolution data are suitable for preliminary assessment of vegetation. Available spatial data on soils, land units and land systems may assist in preliminary desktop assessments.

6.2.2. Mapping site vegetation

Vegetation types on, and immediately adjacent to, a proposal site are to be mapped at a scale appropriate to the size of a proposal, usually at least 1:50,000, unless the proposal site is exceptionally large or designed for linear infrastructure spanning long distances. Mapping, classification of vegetation types, ground truthing of vegetation types and boundaries and vegetation descriptions (structural and species

composition) should follow the Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping[1].

Mapping should be as described for unmapped sites and involve full characterisation of multiple samples per vegetation type. Vegetation classification should use the National Vegetation Information System (NVIS) methodology allowing interpretation at more than one scale. The intensity of sampling should be determined according to the level of variation present within individual vegetation types. The adequacy of sampling intensity should be demonstrated. Sampling should occur at times of year when floristic material allowing plant identification is most likely to be available for the targeted species.

Ensure the methodology and data are sufficient to assess biodiversity, condition, and habitat quality (including species habitat) of each vegetation community. Data on the floristic and structural attributes of the existing vegetation types provide a sound basis for planning the rehabilitation of disturbed sites.

Background information on the frequency and extent of fire at various times of year can be obtained from the North Australia Fire Information website.

6.3. Assessment of conservation significance

An assessment of conservation significance of a site's vegetation types can be made with reference to:

- the NT Land Clearing Guidelines for vegetation regarded as 'sensitive' to disturbance
- vegetation types included in designated buffer zones precluded from clearing under the Land Clearing Guidelines
- the *Supplement to the NT Parks and Wildlife Conservation Masterplan* for bioregional conservation significance (the Masterplan provides information on the area of each major vegetation type in each bioregion, together with the reservation status of vegetation types)
- critical habitats listed under the TPWC Act or ecological communities listed under the EPBC Act
- previous area-specific assessments by government or information to be found in scientific literature.

Assessments of conservation status at local levels can be more informative than those completed at the broader regional level. However, an assessment of both local and regional levels of potential significant impacts is preferred.

6.4. Assessment of impacts on vegetation

Sources of impacts on the conservation significance of vegetation types inevitably include loss of vegetation from clearing. All other forms of impact should be addressed e.g. such as those caused by erosion, sedimentation, dust deposition, wildfire, or weeds or exacerbated by climate change.

Impact assessment should include each form of impact on each vegetation type or group of vegetation types. Impacts or impact levels specific to vegetation types should be assessed for each individual type. Impacts can be assessed for groups of vegetation types when potential impacts from a source or activity are expected to be uniform across types.

[1] Brocklehurst, P., Lewis, D., Napier, D., Lynch, D. (2007) Northern Territory guidelines and field methodology for vegetation survey and mapping. Technical Report No. 02/2007D. Department of Natural Resources, Environment and the Arts, Palmerston, Northern Territory.

The significance of a proposal's impacts is to be determined for each source of impact and each identified consequence to each of the vegetation types or group of types. Proponents are to determine the significance of potential impacts at local and regional levels. Assessment should consider whether impacts on vegetation are permanent or the vegetation is likely to recover over time and the duration of any recovery period.

7. Flora assessment

7.1. Objectives

The purpose of a flora assessment is to provide documentation of:

- the threatened flora species (as listed under the TPWC Act and/or EPBC Act) of the proposal area and immediately adjacent areas
- the local and regional conservation status of threatened flora present in the proposal area
- the potential impacts of the proposal on threatened flora in, adjacent to, and downstream from the proposal area
- the conservation significance of a proposal's impacts on threatened flora at local and regional levels.

7.2. Information requirements

7.2.1. Desktop assessment

The DLPE maintains a database that provides information on all plant specimens held by the NT Herbarium, including the spatial location of collections sites, dates of collection, species and conservation status. Additional flora records are collated by DLPE and published on the FloraNT and NR Maps websites. Survey information can be accessed via the NT Government Open Data Portal. Where available and accessible, detailed data about flora for areas specific to a proposal can be requested by contacting datarequests.dlpe@nt.gov.au.

These data are useful in establishing the likely level of knowledge on the flora of a site, and in making a preliminary assessment of an area's likely species of threatened flora.

An understanding of the location and extent of threatened flora potentially occurring in a proposal area can also be obtained using the Australian Government's Protected Matters Search Tool.

7.2.2. Native flora and threatened plants

The flora of the proposal area and each vegetation type will be documented during the characterisation of vegetation types. These data, threatened species fact sheets, recovery plans, herbarium records, NR Maps and the Australian Government's Protected Matters Search Tool can be used to establish a list of threatened species potentially present in the proposal area.

Habitats for each of the potentially occurring threatened species are to be searched at appropriate times of year to determine the presence of the species and obtain estimates of population abundance where the species occur. Search areas, full descriptions of methods, search/sampling time/effort and results are to be reported for each possible threatened species, demonstrating the adequacy of the applied level of

sampling effort. Greater reliance on historic records or habitat distributions may be needed for arid and semi-arid environments.

When a listed threatened plant species is found, record the total number of plants comprising the population. If the population is too dense or dispersed for this to be practical, estimate the density of the overall population, e.g. by calculating the average number of plants within quadrats. This plot-based assessment is required to determine the species abundance, distribution and habitat associations. If a plant species cannot be identified, submit a sample of the plant to the NT Herbarium for identification. Ensure specimen collection and vouchering is done in accordance with NT Herbarium procedures.

Surveys for threatened plants should be undertaken by suitably qualified and experienced specialists, noting that some species identities need to be confirmed (e.g. by suitable specimens examined at the NT Herbarium). Searches of habitat away from the proposal area may be appropriate to provide context for the status of poorly known species occurring in the proposal area.

7.2.3. Weeds

Species of introduced weeds listed under the *Weeds Management Act 2001*, as a Weed of National Significance (WoNS) or as a key threatening process (KTP) should be identified from DLPE digital weed records and by ground survey. Weed data should be collected using the process and format provided in the Weed Data Collection Field Guide and the Weed Data Collection Manual . Where these weed species are identified, measures required to meet statutory obligations for their management under the *Weeds Management Act 2001* should be documented.

7.3. Assessment of conservation significance

Assessment of conservation significance for flora should be based on observed levels of species richness (the count or total number of species in a community) of the flora, the number of threatened species present and the sizes of populations of threatened species. These data can only be interpreted in relation to known species richness or threatened species distributions/abundances in the locality or region. In many cases there will be little such information available other than that collected from the proposal area. Therefore, interpretation must also use existing information from areas outside of the proposal area.

It may be appropriate to sample similar habitats outside the proposal area to develop a suitable comparative basis for the assessment of conservation significance. The principle of proportionality and the precautionary principle[2] should be used in interpreting the conservation significance of findings.

7.4. Assessment of impacts on flora

Sources of impacts on the conservation significance of the flora and threatened plant species will often include loss of vegetation from clearing. All other forms of impact should be assessed, such as those caused by erosion, sedimentation, dust deposition, wildfire or weeds taking into account projected climate change.

The flora impact assessment should include each source of impact on the flora, and each threatened plant species. The significance of a proposal's impacts from each source, and for each identified consequence, and flora/species, is to be determined at local and regional levels.

[2] Refer to sections 18A and 19 of the *Environment Protection Act 2019*.

8. Fauna assessment

8.1. Objectives

The purpose of a fauna assessment is to provide documentation of:

- the threatened fauna (as listed under the TPWC Act and/or EPBC Act) of the proposal area and immediately adjacent areas
- congregations, large populations or important sites for listed migratory fauna (EPBC Act) in the proposal area
- important fauna sites (e.g. major breeding areas, fauna congregations, isolated permanent water sources, geological features such as caves, large boulder piles or escarpments) in the proposal area
- the local and regional conservation status of threatened fauna, listed migratory fauna, or important fauna congregations or sites present in the proposal area
- the potential impacts of a proposal on threatened fauna, listed migratory fauna, or important fauna congregations or sites in, adjacent to, and downstream from the proposal area
- the conservation significance of a proposal's impacts on threatened fauna, listed migratory fauna, important fauna congregations or sites at local and regional levels.

8.2. Information requirements

8.2.1. Desktop assessment

The DLPE maintains a database on fauna records from across the NT. The data includes spatial locations of record observation sites, dates of observation records and species and conservation status. Information can be accessed via the DLPE website (https://environment.nt.gov.au/homepage), including through the NR Maps function. Detailed data for particular areas can be accessed by contacting datarequests.dlpe@nt.gov.au.

These data are useful in establishing the likely level of knowledge of the fauna of a site, and in making a preliminary assessment of an area's likely species of threatened and/or migratory fauna.

A less reliable understanding of threatened and/or migratory fauna possibly occurring in an area can be obtained using the Australian Government's Protected Matters Search Tool.

8.2.2. Threatened and migratory fauna surveys

Species of threatened and/or listed migratory fauna likely to be found in the proposal area can be determined from the DLPE fauna atlas (accessible at NR Maps), threatened species fact sheets available on the DLPE website, scientific literature and the Australian Government's Protected Matters Search Tool.

Habitats for each of the potentially occurring species can be sampled according to methods provided by the Australian Government survey guidelines for different types of fauna, and using the DLPE Northern Territory Survey Guidelines or other methods as appropriate.

Multiple survey techniques should be used to survey the diversity of animal species. Ensure the taxonomic details and conservation status of the survey results are compatible with the NT species checklists. The presence of pest animal species on the proposal area should be quantified.

Alternative methods may be required for assessment of species abundance (i.e. the total number of individuals from a given species within a given area). Sampling is to occur at suitable times of year and with adequate survey intensity to determine the presence of the species and obtain estimates of population abundance where the species occur. Search areas, sampling methods, search time/effort, capture effort as appropriate and results are to be reported for each potentially occurring threatened species. Adequate effort must be applied during surveys to enable the assessment of impacts of the proposal on threatened fauna and habitats.

8.2.3. Important congregations of, or sites for, fauna

Important congregations of fauna or sites for fauna include locations with:

- seasonal feeding/roosting congregations of migrant species
- colonies of roosting species
- breeding colonies
- caves
- breeding areas for species with known highly specific breeding area requirements e.g. Gouldian finches
- isolated and possibly spatially rare habitat resources important to fauna or of importance to fauna at a particular time of year or the life cycle e.g. isolated sources of permanent water, large boulder piles, escarpments.

The occurrence of areas with these attributes in the proposal area is to be mapped and investigated to determine the nature of the resources provided to fauna, and the fauna using those resources (seasonal or otherwise).

8.3. Assessment of conservation significance

Assessment of conservation significance of fauna should be based on the observed number of threatened/migratory species present, the regional significance of these records, and the size of the population of threatened species or congregation of wildlife. These data can only be interpreted in relation to known threatened/migratory species distributions/abundances in the locality or region. In many cases there will be little such information other than that collected from the site.

Interpretation must use existing information from adjacent areas outside of the proposal area. It may be appropriate to sample similar habitats outside the proposal area to develop a suitable comparative basis for the assessment of conservation significance. The precautionary principle and the principle of proportionality[3] will need to be used in interpreting the conservation significance of findings.

The conservation significance of congregations of or sites for fauna can only be assessed based on:

[3] Refer to sections 18A and 19 of the *Environment Protection Act 2019*.

- the biology of each fauna species involved (to be accessed from the scientific literature)
- the pattern of occurrence, abundance and importance to the species of those habitat features and congregations in the landscape.

8.4. Assessment of impacts on fauna

Sources of impacts on the conservation significance of the threatened species or congregations/important sites will inevitably include loss of vegetation from clearing. All other forms of impact should be assessed e.g. such as those caused by noise, dust, sedimentation, erosion, wildfire or weeds.

Impact assessment should include each form of impact on each threatened species or congregation/site. Significance of a proposal's impacts from each source of impact and for each identified consequence and species/congregation/site category is to be determined at local and regional levels.

9. Describing terrestrial ecosystem values

Proponent EIA documents should list the ecosystems, habitat, and plant and animal species identified in the desktop studies and ecological surveys. Identify, describe and map all terrestrial ecological values present or likely to be present within an area potentially affected either directly or indirectly by the proposal. Base the description on the desktop assessment, vegetation surveys, plant and animal species surveys, and the assessment of the condition of, and threats to, the vegetation communities and species habitats.

Address all threatened species, sensitive or significant vegetation communities, local and regional ecosystems. Describe the potential for threatened species to occur, or potentially occur, within the area potentially affected either directly or indirectly by the proposal. Show the location of significant species found during field surveys on suitable maps and figures and describe their habitat. Include any other environmental value(s) that the desktop studies identified as occurring or potentially occurring in, and adjacent to, the proposal area (e.g. wildlife corridors, environmentally sensitive areas) and display them on maps and figures.

Describe the connectivity of habitats and ecosystems. Describe, with photographs and detailed mapping at suitable scales, the current extent of local and regional ecosystems, species habitat, sensitive or significant vegetation communities at the proposal area. Define the condition of each vegetation community in terms of how well it functions for the maintenance of the biodiversity values it supports. Provide mapping of the habitat condition of local and regional ecosystems, sensitive and significant vegetation communities, and potential threatened species habitat.

10. Assessment of the significance of impacts

Under section 11 of the EP Act, a 'significant impact' of an action means:

> 'an impact of major consequence having regard to the context and intensity of the impact; and the sensitivity, value and quality of the environment impacted on and the duration, magnitude and geographic extent of the impact'.

Therefore, in assessing the potential significant impacts of a proposal, it is essential that proponents have regard to the terrestrial biodiversity values with consideration of the quality and sensitivity of the potentially impacted area.

An assessment of the significance of potential impacts must have regard to the environmental decision-making hierarchy in line with section 26 of the EP Act, including to what extent avoidance and mitigation measures can be applied to reduce the significance of potential impacts on terrestrial ecological values. Environmental offsets may be required for significant residual adverse impacts that cannot be avoided or mitigated.

Thorough identification of the potential sources of impacts from a proposal (e.g. land clearing, dust and others) is critical to successful risk analysis and assessment. Each source of impact can have more than one consequence for a particular component of biodiversity. Analysis of the potential significance of impacts on any one component of biodiversity (e.g. a threatened species) must include assessment of:

- each potential significant impact from each impact source (direct and indirect), and
- a subsequent assessment of the cumulative impact of all impact sources combined.

The Australian Government Significant impact guidelines 1.1 (significant impact guidelines) for the assessment of the significance of impacts on matters of national environmental significance provides guidance on to decide whether a referral should be submitted under the EPBC Act.

These guidelines are appropriate for assessing the risks to vegetation, entire floras and entire faunas of particular areas. The significant impact guidelines also provide information for assessing the significance of impacts to threatened species, migratory species, and ecological communities. Assessment of the significance of congregations of fauna or sites of importance to fauna can be determined using the significant impact criteria listed in the significant impact guidelines.

Where a proposal is likely to result in habitat loss (due to destruction, fragmentation, or degradation of habitat) and habitat is altered to the extent that it becomes unsuitable and displaces resident species, unless there is sound scientific evidence available to verify that the displaced fauna species can migrate or translocate without reducing the population, proponents should consider that the resident fauna will also be lost and the assessment of conservation significance made on this basis.

Clarity and adequate justification in identification of the sources of impacts and associated consequences, likelihoods of consequences and severity of consequences are important in the appropriate design for mitigation if standard measures fail to result in a low level of residual adverse impact.

11. Avoidance and mitigation measures

The EIA documents must detail measures that will be applied to manage the proposal's impacts using the following order of priority in line with the environmental decision-making hierarchy:

- avoid impacts wherever possible
- mitigate unavoidable impacts to the greatest extent practicable
- provide biodiversity offsets for significant residual adverse impacts.

Describe the practicality, effectiveness and risk of avoidance and mitigation measures. Include the timeframes for results to be delivered. Justify how applying the proposed avoidance and management measures would result in acceptable outcomes for terrestrial ecosystems. Describe how achievement of the measures will be monitored, measured and audited. Include provisions to regularly evaluate the mitigation measures so that improvements may be made as new technologies and best practices evolve. Propose conditions that should be applied to ensure the avoidance and minimisation measures proposed will be delivered and achieve the desired outcome.

11.1. Rehabilitation

The rehabilitation of proposals that have undergone EIA is regulated through the EP Act. Proponent EIA documentation should address how the proposal area will be progressively rehabilitated and provide evidence for the expectation that rehabilitation will be successful (based on scientific literature, or case studies). Baseline data identified during field surveys should be used to propose benchmarks for relevant indicators and completion criteria. Provide reasoning why the chosen reference sites are considered appropriate for comparison with impacted sites to assess the success of rehabilitation. Detail how and why any milestone criteria and completion criteria for rehabilitation were chosen. Assess the need for and, if relevant, propose buffer zones and the retention, rehabilitation or planting of movement corridors.

11.2. Offsets

An environmental offset may be required where a proposal is likely to result in a significant residual adverse terrestrial ecosystem impact. The NT Biodiversity offsets framework, policy and guidelines provide information about what an offset is, when it is required, and how it is quantified. In some cases, an offset would not provide an acceptable outcome, and so impacts may need to be further reduced.