Environmental Protection Authority

Land

Environmental Factor Guideline

Flora and Vegetation

The objective of the factor *Flora and Vegetation* is:

> ***To protect flora and vegetation so that biological diversity and ecological integrity are maintained.***

Purpose

The purpose of this guideline is to outline how the factor *Flora and Vegetation* is considered by the Environmental Protection Authority (EPA) in the environmental impact assessment (EIA) process.

Specifically, the guideline:

- describes the factor *Flora and Vegetation* and explains the associated objective
- describes EIA considerations for this factor
- discusses the environmental values of flora and vegetation, and their significance
- describes issues commonly encountered by the EPA during EIA of this factor
- identifies activities that can impact on flora and vegetation
- provides a summary of the type of information that may be required by the EPA to undertake EIA related to this factor.

What are flora and vegetation?

For the purposes of EIA, flora is defined as native vascular plants. Western Australia's native flora is diverse, ranging from giant karri trees in the forests of the south-west to the diverse tiny ephemeral plants on granite domes in the goldfields.

Vegetation is defined as groupings of different flora patterned across the landscape that occur in response to environmental conditions. The EPA is of the view that vegetation can be an effective surrogate for ecological processes and the diversity of interactions in terrestrial ecosystems.

Flora and vegetation that occur in marine and estuarine environments and in plantations are not considered as terrestrial flora and vegetation for the purposes of this guideline.

How this factor links with other environmental factors

The EPA recognises that there are inherent links between the factor *Flora and Vegetation* and other environmental factors.

Flora and vegetation may hold spiritual, cultural, and/or economic values. Environmental impacts to these values are considered by the EPA within the context of other relevant factors, such as *Social Surroundings, Inland Waters Environmental Quality* or *Hydrological Processes*. Flora and vegetation may be considered by the EPA in concert with other factors to assess impacts on an ecosystem's integrity as a whole.

Vegetation is an important functional component, and often the defining feature, of terrestrial ecosystems. A decline in the extent and condition of vegetation may precede the loss of its species and provide an indicator of the health of other elements of the environment. Loss of vegetation can impact upon many terrestrial factors, including *Terrestrial Fauna, Inland Waters Environmental Quality, Hydrological Processes, Coastal Processes* and *Social Surroundings*. Conversely, impacts to hydrological processes, terrestrial fauna, inland waters environmental quality and other factors can affect the ecological processes that support significant flora and vegetation.

The environmental objective for Flora and Vegetation

The EPA's environmental objective for the factor *Flora and Vegetation* is: "To protect flora and vegetation so that biological diversity and ecological integrity are maintained."

In the context of this objective:

Ecological integrity is the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements.

Considerations for environmental impact assessment

Considerations for EIA for the factor *Flora and Vegetation* include, but are not necessarily limited to:

- application of the mitigation hierarchy to avoid and minimise impacts to flora and vegetation, where possible
- the flora and vegetation affected by the proposal
- the potential impacts and the activities that will cause them, including direct and indirect impacts
- the implications of cumulative impacts
- whether surveys and analyses have been undertaken to a standard consistent with guidance
- the scale at which impacts to flora and vegetation are considered
- the significance of the flora and vegetation, and the risk to the flora and vegetation
- the current state of knowledge of flora and vegetation and the level of confidence underpinning the predicted residual impacts
- whether proposed management and mitigation approaches are technically and practically feasible
- whether the proposal area will be revegetated in a manner that promotes biological diversity and ecological integrity.

Environmental values of flora and vegetation and their significance

Some of the most ancient, geologically-stable landscapes on earth occur in Western Australia. The climatically isolated south-western portion of the state is internationally recognised for its diversity and endemism. Five of WA's national biodiversity hotspots occur in the hyper-diverse south west, with the remaining three located in the Pilbara, Kimberley, and Carnarvon Basin.

Western Australia has high species richness with more than 11,000 species of flora, which is more than half of Australia's total flora. Western Australia also has high levels of endemism with 60 per cent of the flora occurring nowhere else on earth. Many of these species occur in small, localised populations and this distribution makes them more vulnerable to environmental disturbance.

The distribution and variability of Western Australia's vegetation reflects that of the flora. At a state level, there are 54 threatened ecological communities and 186 priority ecological communities in which vegetation type is either the defining feature or a significant component of the ecological community. As of 2016, the Commonwealth had listed 15 vegetation-based ecological communities in Western Australia as threatened ecological communities under the *Environment Protection and Biodiversity Act 1999*.

Flora and vegetation may be considered significant for a range of reasons, including, but not limited to the following:

Flora

- being identified as threatened or priority species
- locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems)
- new species or anomalous features that indicate a potential new species
- representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids
- relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Vegetation

- being identified as threatened or priority ecological communities
- restricted distribution
- degree of historical impact from threatening processes
- a role as a refuge
- providing an important function required to maintain ecological integrity of a significant ecosystem.

Issues

The following issues are matters that are commonly encountered by the EPA due to the nature of proposals that are referred to it. Background on these issues is provided here to help proponents and the community engage with EIA. This issues section will be updated from time to time to reflect new issues as they arise in referrals and EIA.

Habitat loss, degradation and fragmentation

Species are less resilient to external pressures when the ecosystems of which they are a part are reduced or when occurrences become isolated from each other. Habitat loss and fragmentation affect the survival of individual populations as well as entire species and, in time, may affect the functioning of entire ecosystems. Some parts of Western Australia have had up to 97 per cent of the native vegetation removed, with the remaining areas in scattered, isolated fragments.

Invasive species

Invasive species include weeds, pest animals, and disease-causing organisms. Invasive species compete with flora and vegetation for resources, increase herbivory and severity of disease impacts, and alter the physical environment in ways that exclude native species or promote invasive species.

Fire regimes

Although fire is an important process for regeneration and renewal of many Australian species and ecosystems, some fire regimes can adversely impact flora and vegetation through alteration of the structure and composition of vegetation, increased soil erosion, and expansion of weed and feral animal populations.

Changing climate

The scale, rate and nature of projected change, and the interactions between a changing climate and other threatening processes, have the potential to reduce the capacity of current ecosystems to adapt to a changing climate. The scale, rate and nature of projected change, and the interactions between a changing climate and other threatening processes, will determine to what extent flora and vegetation are impacted.

For the purposes of EIA, the EPA is concerned with proposal specific impacts that, when considered in combination with climate change, are likely to exacerbate impacts to flora and vegetation.

State of knowledge

A key challenge to impact assessment for flora and vegetation can be limited knowledge. Knowledge of the flora and vegetation within bioregions is variable, due to the size and remote nature of much of Western Australia, combined with the diverse and complex flora and vegetation. Scientific gaps that particularly influence EIA include:

- **New flora species**

  The discovery of new species, or inadequate information on the distribution and abundance of others, is a regular occurrence in surveys undertaken for EIA. Discovery of new species is likely to continue to be reported in EIA as flora and vegetation surveys are undertaken in areas that have not been subject to detailed survey. The percentage of new species that are also rare has increased over time as most of the common species have been recorded. The identification of new flora species during the EIA process may create an increased level of risk and uncertainty for the EPA and proponents.

- **Collection and collation of data**

  It is important for informed and timely decision making that specimens and accompanying data are available in the Western Australian Herbarium as part of the State collections. This enables identifications to be verified, and ensures that biodiversity data are safely and permanently stored.

- **Lack of State-wide detailed systematic vegetation classification and mapping**
  Detailed vegetation classification and mapping does not exist for the bulk of the state. In many areas the only vegetation mapping is at a 1:1,000,000 scale. In many cases, the proponent must provide the regional context in which the EPA can assess a proposal's impact.
- **Lack of understanding of ecosystem processes**
  There is not a good understanding of all of the complex ecosystems of Western Australia, their processes, functions, and resilience to impacts.
- **Challenges for revegetation**

  The complexities of biological diversity, climate, soils and land use in Western Australia are reflected in the challenges of revegetation. Seed germination, dormancy and supply are key issues for the broad-scale revegetation required in many of WA's ecosystems. The technical and practical feasibility of proposed rehabilitation may be a consideration in EIA.

For all proposals which significantly impact on flora and vegetation, the EPA will take into account the level of knowledge in determining environmental impacts and risks. The EPA will encourage cooperative efforts to build information about poorly known areas which may be targeted for future development.

Impacts

The development activities that have the potential to impact on flora and vegetation include direct and indirect impacts.

Direct impacts on flora and vegetation can occur on a spectrum from temporary to permanent. The degree of soil disturbance and the biology and ecology of the flora and vegetation involved will determine the severity of direct impacts. The most severe is total permanent alteration of substrate and habitat (such as building a road or removing the landform upon which a species occurs), while some flora and vegetation may readily recover from temporary clearing without soil disturbance.

Indirect impacts include, but are not necessarily limited to:

- fragmentation of populations, isolation of populations/occurrences
- impacts on habitat that supports the flora and vegetation
- impacts on other species with important ecological functions, e.g. pollinators, seed dispersal vectors, essential symbiotic fungi
- introduction or promotion of weeds and/or disease, and temporary impacts such as fire
- altered hydrology, including increase or decrease of groundwater level and alteration of surface water flow.

Information required for EIA

Technical guidance for survey standards and information required for assessment are available on the EPA's website.

Environmental Protection Authority 2016, *Environmental Factor Guideline: Flora and Vegetation*, EPA, Western Australia.

This document is available in alternative formats upon request.

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