

Indirect impacts occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas. As with direct impacts, consideration must be given, when applying each factor, to all of the likely indirect impacts of the proposed activity or development.

The factors of assessment

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Context

This factor refers only to those species listed on Part 1 and Part 4 of Schedule 1, Part 1 of Schedule 1A and Part 1 of Schedule 2 of the TSC Act, and Part 1 and Part 4 of Schedule 4 and Schedule 5 of the FM Act.

Interpretation of key terms used in this factor

Life cycle: the series or stages of reproduction, growth, development, ageing and death of an organism.

Viable: the capacity to successfully complete each stage of the life cycle under normal conditions.

Local population: the population that occurs in the study area. The assessment of the local population may be extended to include individuals beyond the study area if it can be clearly demonstrated that contiguous or interconnecting parts of the population continue beyond the study area, according to the following definitions.

- The *local population* of a threatened *plant* species comprises those individuals occurring in the study area or the cluster of individuals that extend into habitat adjoining and contiguous with the study area that could reasonably be expected to be cross-pollinating with those in the study area.
- The *local population* of *resident fauna* species comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area.
- The *local population* of *migratory or nomadic fauna* species comprises those individuals that are likely to occur in the study area from time to time.

In cases where multiple populations occur in the study area, each population should be assessed separately.

Risk of extinction: the likelihood that the local population will become extinct either in the short-term or in the long-term as a result of direct or indirect impacts on the viability of that population.

Application

The key assessment is risk of extinction of the local population. The risk of extinction will increase if any factor operates to reduce population size or reproduction success. The components of the life cycle of a species are dependent on its habitat and affected by threats to the species. The removal or modification of habitat or changes to the nature of important periodic disturbances such as fire or flood may affect the survival of that species. Therefore, it is important that the applicant/proponent not only has an understanding of the species' life cycle, but also an understanding of the way in which a species makes use of its habitat, the way this may change at particular times or in certain seasonal conditions, and whether the life cycle is dependent on a particular disturbance.

Demonstrating that a population is not viable would require considerable effort and study. Therefore any known or presumed local population should be assumed viable unless the contrary can be conclusively demonstrated through analysis of local ecological information, records, references and knowledge of species' behaviour and habitat or through a comprehensive on-site ecological study.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

Context

This factor is essentially identical to factor (a) except that it refers only to endangered populations listed in Part 2 of Schedule 1 of the TSC Act and Part 2 of Schedule 4 of the FM Act, whereas factor (a) refers to species.

The key assessment is risk of extinction of the local population. The risk of extinction will increase if any factor operates to reduce population size or reproduction success. The components of the life cycle of the individuals that comprise an endangered population of a species are dependent on its habitat and threats to the population. The removal or modification of habitat or changes to the nature of important periodic disturbances such as fire or flood may affect the survival of that population. Therefore, it is important that the applicant/proponent not only has an understanding of the life cycles of the species involved, but also an understanding of the way in which a species makes use of its habitat, the way this may change at particular times or in certain seasonal conditions, and whether the life cycle is dependent on particular disturbances.

Demonstrating that a population is not viable would require considerable effort and study. Therefore any known or presumed local population should be assumed to be viable unless the contrary can be conclusively demonstrated through analysis of local ecological information, records, references and knowledge of species' behaviour and habitat, or through a comprehensive on-site ecological study.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

Context

This factor applies to endangered ecological communities listed under Part 3 of Schedule 1 of the TSC Act and Part 3 of Schedule 4 of the FM Act, and critically endangered ecological communities listed under Part 2 of Schedule 1A of the TSC Act and Part 2 of Schedule 4A of the FM Act. Endangered and critically endangered ecological communities are defined in determinations made by the respective Scientific Committees.

It is important to note that the size or age of a remnant are not determining factors as to whether that remnant constitutes a listed endangered or critically endangered ecological community.

Ecological communities are usually defined by two major components – the geographical distribution and the species composition which influences the physical structure and ecological function of the ecological community. The relative importance of the geographical distribution and the species composition varies according to the specific listed ecological community. Hence this factor provides for consideration of two criteria:

- (i) local occurrence of the ecological community
- (ii) modification of the ecological community's composition.

Interpretation of key terms used in this factor

Local occurrence: the ecological community that occurs within the study area. However the local occurrence may include adjacent areas if the ecological community on the study area forms part of a larger contiguous area of that ecological community and the movement of individuals and exchange of genetic material across the boundary of the study area can be clearly demonstrated.

Risk of extinction: similar to the meaning set out in factor (a), this is the likelihood that the local occurrence of the ecological community will become extinct either in the short-term or in the long-term as a result of direct or indirect impacts on the ecological community, and includes changes to ecological function.

Composition: both the plant and animal species present, and the physical structure of the ecological community. Note that while many ecological communities are identified primarily by their vascular plant composition, an ecological community consists of all plants and animals as defined under the TSC and FM Acts that occur in that ecological community.

Application

Determining the risk of extinction of an ecological community is difficult. Critical thresholds of remnant size, and species and structural composition required to maintain ecological functioning will vary from ecological community to ecological community.

When evaluating the significance of the impact, consideration must be given to whether the life cycles of the species which make up the ecological community will be disrupted in a similar manner to the consideration of individual species described in factor (a). Disproportionate impacts may occur on certain components of the community that may cause those components to be placed at a greater risk of extinction without explicitly placing the entire ecological community at risk. Loss of individual species from a community may simplify faunal, floristic or vegetation structure and have flow-on effects to other plant and animal species. This may increase its susceptibility to extreme events and decrease its resilience. An assessment of ecological functioning is critical to this factor.

(d) in relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**

- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

Interpretation of key terms used in this factor

Habitat: the area occupied, or periodically or occasionally occupied, by any threatened species, population or ecological community and includes all the different aspects (both biotic and abiotic) used by species during the different stages of their life cycles.

Extent: the physical area removed and/or to the compositional components of the habitat and the degree to which each is affected.

Importance: related to the stages of the species' life cycles and how reproductive success may be affected.

Locality: the same meaning as ascribed to local population of a species or local occurrence of an ecological community.

Application

When applying this factor, consideration must be given to all short- and long-term impacts (direct and indirect) on habitat which are likely to support threatened species, populations and ecological communities regardless of whether the habitat occurs on the subject site. This applies to both occupied and unoccupied habitat because the recovery of threatened species, populations and ecological communities relies on them having access to suitable habitat to move into as numbers increase.

The extent to which habitat is likely to be removed or modified should be determined by estimating the total area of habitat to be directly and indirectly impacted by the proposed development, activity or action. This may be an estimation of the surface area of land to be affected, and/or in some cases the number of key habitat components to be affected.

When deciding whether an area of habitat is likely to become fragmented or isolated from other areas of habitat, it is necessary to identify and assess the patterns and extent of habitat connectivity. The affected habitat may form part of a habitat corridor, cul-de-sac or an isolated area. Recent Landsat imagery, aerial photographs, vegetation maps, topographic maps and data obtained from on-ground investigations are useful information sources for assessing this. The dispersal and genetic exchange mechanisms of individual species should be considered. For example, will the isolation of habitat for threatened species, populations or ecological communities that are currently connected or near to each other adversely affect the maintenance of gene flow and the ability to sustain viable populations. It should also be noted that isolation can occur through a variety of habitat modifications and is not confined to the clearing of vegetation.

When assessing the importance of the habitat likely to be removed, modified, fragmented or isolated in the locality, a quantitative and qualitative approach should be adopted as follows:

- an assessment of the area and quality of habitat of the threatened species, population or ecological community that occurs within the locality from recent Landsat imagery, vegetation mapping, topographic maps, air photos and in some cases data obtained from on-ground investigations

- an estimate of the area and quality that the habitat of the study area represents in relation to the area and quality of that habitat within the locality
- an assessment of the role of the habitat to be affected in sustaining habitat connectivity in the locality
- an assessment of the ecological integrity of the habitat to be affected in the study area, in relation to the ecological integrity, tenure and security of the habitat which will remain both in the study area and in the locality.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

Application

This factor is aimed at assessing whether the proposal is likely to affect (directly or indirectly) areas of critical habitat present in the study area. Critical habitat refers only to those areas of land listed in the following registers:

- the Register of Critical Habitat kept by the Director General, DECC
[\[www.nationalparks.nsw.gov.au/npws.nsf/content/critical+habitat+protection\]](http://www.nationalparks.nsw.gov.au/npws.nsf/content/critical+habitat+protection)
- the Register of Critical Habitat kept by the Director General, DPI
[\[www.fisheries.nsw.gov.au/threatened_species/general/register_of_critical_habitat\]](http://www.fisheries.nsw.gov.au/threatened_species/general/register_of_critical_habitat)

These registers are open for public inspection during ordinary business hours and copies of, or extracts from, the register may be purchased on request.

Maps showing the location of critical habitat are kept by the Director General, DECC and the Director General, DPI.

Developments or activities which require consent or approval under Part 4 or Part 5 of EP&A Act which are proposed on land that is, or is part of, critical habitat, automatically require the preparation of a species impact statement and the concurrence of the Director General, DECC or the Director General, DPI, depending on the Act under which the critical habitat is declared. In some cases consultation with the Minister for Climate Change, Environment and Water or the Minister for Primary Industries is required.

In accordance with the EP&A Act, Local Environmental Plans and Regional Environmental Plans are required to identify any land that has been declared critical habitat. These plans are available for public inspection at the Department of Planning, the office of the council to which a Local Environmental Plan / Regional Environmental Plan applies or such other premises operated or controlled by the council.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

Application

When deciding whether the proposal is consistent with the objectives or actions of a recovery plan or threat abatement plan, applicants/proponents must consider all relevant approved recovery plans and threat abatement plans. In addition, it is recommended that they refer to draft recovery plans and draft threat abatement plans, and threatened species profiles and related guidelines, which are available through the DECC and DPI websites.

Draft and approved recovery plans can be obtained from:

- DECC recovery plans
[\[www.nationalparks.nsw.gov.au/npws.nsf/Content/Recovery+plans\]](http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Recovery+plans)
- DPI recovery plans.
[\[www.fisheries.nsw.gov.au/threatened_species/general/abatement-plans\]](http://www.fisheries.nsw.gov.au/threatened_species/general/abatement-plans)

Draft and approved threat abatement plans can be obtained from:

- DECC threat abatement plans
[\[www.nationalparks.nsw.gov.au/npws.nsf/Content/Threat+abatement+plans+by+doctype\]](http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Threat+abatement+plans+by+doctype)
- DPI threat abatement plans.
[\[www.fisheries.nsw.gov.au/threatened_species/general/abatement-plans\]](http://www.fisheries.nsw.gov.au/threatened_species/general/abatement-plans)

Threatened species profiles and guidelines can be obtained from:

- DECC's threatened species website
[\[www.threatenedspecies.environment.nsw.gov.au/tsprofile/browse_allspecies.aspx\]](http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/browse_allspecies.aspx)
- DECC's threatened species publications list
[\[www.nationalparks.nsw.gov.au/npws.nsf/Content/Threatened+species+publications\]](http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Threatened+species+publications)
- DPI's threatened species publications list.
[\[www.fisheries.nsw.gov.au/threatened_species/threatened_species\]](http://www.fisheries.nsw.gov.au/threatened_species/threatened_species)

In 2004 amendments were made to the TSC Act and the FM Act that remove the mandatory requirement to prepare recovery plans and threat abatement plans, and instead requires preparation of a *threatened species priorities action statement* (TSC Act s. 90A and FM Act s. 220ZVA).

The priorities action statements will set out the measures required to promote the recovery of each threatened species, population and ecological community to a position of viability in nature and for managing each key threatening process. In applying this factor, consideration should be given to measures outlined in the priorities action statements as well as existing recovery plans and threat abatement plans which will remain in place.

Once prepared, the priorities action statements will be available on the DECC and DPI websites. Further information can be obtained at DECC's threatened species website www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_PAS.aspx.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

Context

This factor refers only to those key threatening processes (KTPs) listed in Schedule 3 of the TSC Act and Schedule 6 of the FM Act. The NSW legislation website [www.legislation.nsw.gov.au] provides the most up-to-date information on what is listed in the schedules.

All determinations to list KTPs made by the NSW Scientific Committee and Fisheries Scientific Committees can be found at:

- the NSW Scientific Committee
[\[www.nationalparks.nsw.gov.au/npws.nsf/Content/List+of+Scientific+Committee+determinations\]](http://www.nationalparks.nsw.gov.au/npws.nsf/Content/List+of+Scientific+Committee+determinations)
- the Fisheries Scientific Committees
[\[www.fisheries.nsw.gov.au/threatened_species/general/what_is_currently_listed\]](http://www.fisheries.nsw.gov.au/threatened_species/general/what_is_currently_listed)

DECC and DPI have produced fact sheets for a number of KTPs. They can be found at:

- DECC fact sheets
[\[www.nationalparks.nsw.gov.au/npws.nsf/Content/Threatened+species+publications\]](http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Threatened+species+publications)
- DPI fact sheets
[\[www.fisheries.nsw.gov.au/threatened_species/general/what_is_currently_listed\]](http://www.fisheries.nsw.gov.au/threatened_species/general/what_is_currently_listed)

Application

In addition to deciding whether the action/activity constitutes a KTP, consideration must also be given to whether the proposal is likely to exacerbate a KTP. Species listed in the determination as being 'at risk' warrant particular consideration if these species are known or likely to occur within the study area of the development or activity.

Making an assessment of significance

The threatened species assessment of significance should **not** be considered a 'pass or fail' test. Instead, consideration of the factors will inform the decision-making process of the likelihood of significant effect. Where necessary, the process will trigger further assessment in the form of a species impact statement.

All factors should be considered as well as any other information deemed relevant to the assessment. The assessment of significance should not be used as a substitute for a species impact statement. Application of the precautionary principle requires that a lack of scientific certainty about the potential impacts of an action does not itself justify a decision that the action is not likely to have a significant impact. If information is not available to conclusively determine that there will not be a significant impact on a threatened species, population or ecological community, or its habitat, then it should be assumed that a significant impact is likely and a species impact statement should be prepared.

Proposed measures that mitigate, improve or compensate for the action, development or activity should not be considered in determining the degree of the effect on threatened species, populations or ecological communities, unless the measure has been used successfully for that species in a similar situation.

In many cases where complex mitigating, ameliorative or compensatory measures are required, such as translocation, bush restoration or purchase of land, further assessment through the species impact statement process is likely to be required.

In determining the nature and magnitude of an impact, it is important to consider matters such as:

- pre-construction, construction and occupation/maintenance phases
- all on-site and off-site impacts, including location, installation, operation and maintenance of auxiliary infrastructure and fire management zones
- all direct and indirect impacts
- the frequency and duration of each known or likely impact/action
- the total impact which can be attributed to that action over the entire geographic area affected, and over time
- the sensitivity of the receiving environment
- the degree of confidence with which the impacts of the action are known and understood.

Recovery and threat abatement plans, priorities action statements, threatened species profiles and other fact sheets prepared by DECC and DPI may provide further guidance on whether an action or activity is likely to be significant.