GOVERNMENT OF
WESTERN AUSTRALIA

Guidance for planning and development: Protection of naturally vegetated areas in urban and peri-urban areas

In accordance with section 16(k) of the *Environmental Protection Act 1986*

Environmental Protection Authority

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Cover image: Banksia woodland. Photo by Christine Groom.

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1 Key messages

Naturally vegetated areas in our cities and towns support significant biodiversity and provide important amenity and ecosystem services to urban residents.

To avoid, minimise or rehabilitate impacts on naturally vegetated areas, the Environmental Protection Authority (EPA) encourages planners, developers, proponents and referrers to integrate the design advice in this guidance (see Section 9) during project planning.

This guidance focuses on urban and peri-urban areas, but may also be applied to proposals impacting on any naturally vegetated area in Western Australia (WA).

2 Purpose

This guidance sets out the views and expectations of the EPA for the protection of naturally vegetated areas in the design of urban and peri-urban development proposals. This guidance applies to strategic planning, new schemes and scheme amendments, structure plans, and subdivision and development proposals in urban and peri-urban areas of WA. While these are the focus, the guidance may also be applied to any proposal with the potential to impact on naturally vegetated areas.

Part IV of the *Environmental Protection Act 1986* (EP Act) makes provisions for the EPA to undertake environmental impact assessment of significant proposals, strategic proposals and planning schemes. The design guidance in Section 9 will help planners, developers, proponents and referrers to integrate and consider naturally vegetated areas during all stages of the planning process to meet the EPA's environmental objectives for relevant factors, notably Terrestrial Fauna, Flora and Vegetation, Social Surroundings, and Inland Waters.

This guidance complements the following legislation (which may also be used to regulate impacts on naturally vegetated areas):

- Part V, Division 2 of the EP Act and the clearing principles in Schedule 5
- Environmental Protection (Clearing of Native Vegetation) Regulations 2004
- *Biodiversity Conservation Act 2016.*

In addition, the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) controls actions on Matters of National Environmental Significance, which include threatened species' habitats and ecological communities.

This guidance complements advice in the EPA's factor guidelines, *Bush Forever* (GWA 2000a, 2000b; WAPC 2010), *Guidance statement 33 – Environmental guidance for planning and development* (EPA 2008), *Liveable Neighbourhoods* (WAPC 2009, 2011, 2015a) and the *Directions paper on integrating NRM into land use planning* (WAPC 2011).

3 Background

The natural vegetation in the urban and peri-urban areas of WA provides significant habitat for flora and fauna, as well as amenity, landscape and recreational value for the community.

WA has some of Australia's most important biodiversity assets. It is home to eight of Australia's 15 declared biodiversity hotspots; five of which are within the broader South West Australia ecoregion, an internationally recognised biodiversity hotspot stretching from Carnarvon to Esperance and through to the South Australian border.

The number of species in WA, especially flora, is enormous by most international comparisons. At present there are 14,457 known species of native plants in WA, with more being discovered regularly.

Ongoing demand for new housing, industry and infrastructure in urban and peri-urban areas of WA exerts significant pressure on our remaining naturally vegetated areas. These areas may be affected by direct clearing through urban expansion, as well as indirect impacts through fragmentation and disturbance from adjacent land uses. The competing pressures on naturally vegetated areas makes the planning framework in WA (see Figure 1) important for managing impacts on the environment. The cumulative impacts of the loss of native vegetation will make it increasingly difficult to approve the clearing of naturally vegetated areas.

Urban areas are those in which a broad range of activities are undertaken, including residential, commercial, recreational and light industrial. **Peri-urban areas** have a mix of rural, rural-residential and urban uses near cities and towns. They are generally areas of high demand for urban expansion and development of rural small holdings, rural-residential and other rural lifestyle land uses.

The EPA considers that land use planning plays an important role in retaining naturally vegetated areas in urban and peri-urban environments. It recommends greater emphasis on appropriately protecting these areas at all stages of the planning process.

At present, many of the proposed scheme amendments and proposals referred to the EPA do not adequately consider the protection of naturally vegetated areas and, if implemented, would result in significant loss of these areas and the biodiversity and amenity value they support. There is an opportunity to reduce the potential impacts and improve outcomes by following the advice in this guidance.

4 Importance of urban and peri-urban naturally vegetated areas

Urban and peri-urban naturally vegetated areas provide various benefits and services to the environment and community, such as:

- ecosystem services – providing habitat for wildlife, maintaining ecological processes, cooling the environment, storing carbon and maintaining air quality, soil fertility and water quality
- spaces for recreation and interaction – maintaining physical and psychological wellbeing
- cultural connections – maintaining and supporting culture including Aboriginal connections to country
- natural resources – providing food, medicines and other products
- education and research – providing opportunities to learn and appreciate nature
- amenity and aesthetics – maintaining enjoyment and human connections with nature.

Naturally vegetated areas complement parks and gardens in the urban and peri-urban landscape. Street trees, fauna-friendly gardens and naturally vegetated areas support environmental connectivity and liveability for residents. These aspects also make more desirable localities for living and working in.

Urban vegetation is particularly important for mitigating the urban heat island effect, where the cooling effect of trees and other vegetation balances the heat absorbed and emitted by the hard surfaces associated with urban areas.

5 Consideration of environmental issues through the planning framework

The planning and development system in WA is a hierarchical (or tiered) framework through which the protection of naturally vegetated areas can be achieved. Figure 1 illustrates the various stages in the planning framework and the EPA's role.

Schedule 7 of the *Planning and Development Act 2005* provides for the preservation and conservation of the natural environment through State Planning Policies (SPPs), regional and local planning schemes and conditions of subdivisions (WAPC 2011).

The EPA sees value in linking local planning decision-making to a regional strategy that deals comprehensively with the protection of biodiversity. This is crucial in areas where substantial clearing has occurred or where cumulative development pressures are increasing, and in regions not covered by a regional planning scheme (EPA 2008).

A range of statutory and non-statutory planning and land use instruments are available to identify, retain and protect naturally vegetated areas (WAPC 2011). The instruments include:

- local biodiversity strategies to inform local planning strategies and planning schemes
- reservation of land for conservation purposes
- conservation zoning
- special control areas to guide development within particular areas
- scheme provisions, such as development requirements for particular zones or areas
- local planning policies

Design guidance to protect naturally vegetated areas should be incorporated into the planning process as early as possible and reflected in the later stages of planning. It can be difficult to protect naturally vegetated areas unless the intent has been adequately addressed through earlier strategic planning (e.g. regional and local planning strategies) and statutory planning (e.g. regional and local planning schemes and amendments). It is important to note that opportunities to protect naturally vegetated areas in land zoned for urban development are highly constrained.

6 The EPA's objectives and naturally vegetated areas

All EPA land and water factors are potentially relevant when considering a proposal that affects naturally vegetated areas. However, Flora and Vegetation, Terrestrial Fauna, Social Surroundings and Inland Waters are the environmental factors most commonly considered in relation to naturally vegetated areas.

The EPA's objectives for the relevant environmental factors are available in the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA 2021) and are best considered from the earliest stages of planning. Planning strategies, structure plans, subdivisions and developments should incorporate an intent to retain and protect naturally vegetated areas. They should also include management measures to ensure the integrity and value of the naturally vegetated areas are maintained for the long term.

Surveys to assess naturally vegetated areas and identify those for protection should be carried out by people who are appropriately qualified, in accordance with EPA technical guidance and in consultation with the relevant agencies. Guidelines and technical guidance for all factors are available on the EPA website (www.epa.wa.gov.au).

7 Referral of proposals impacting on naturally vegetated areas

While all naturally vegetated areas have environmental and amenity values, the protection of regionally significant natural areas should be a priority, particularly in large intact blocks of vegetation. The EPA is interested not only in the amount of vegetation potentially being impacted, but also the quality, habitat value, conservation value, connectivity and context of that vegetation. The EPA will also consider the cumulative and holistic effects of development.

The EPA utilises criteria to identify regionally significant vegetation and to determine the significance of impacts on naturally vegetated areas. These two sets of criteria can be used to help decide when to refer a proposal to the EPA and to ensure it has enough information to determine whether a significant impact on the environment is likely.

Criteria for determining significance of impacts

The EPA takes a holistic approach to assessing environmental impacts, taking into consideration the interconnected nature of the environment. Determining the significance of impacts can be a highly complex process. To help with the task, the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA 2021) has criteria for assessing the significance of impacts. Individual environmental factor guidelines may also be consulted – these are available on the EPA website (www.epa.wa.gov.au). The EPA identifies naturally vegetated 'significant ecosystems' in environmental factor guidelines on Flora and Vegetation, Terrestrial Fauna, Inland Waters, Subterranean Fauna, Landforms and Social Surroundings, among others.

Proponents and developers may also find useful guidance in the WA environmental offsets framework, particularly in the *WA Environmental offsets guidelines* (GWA 2014). This includes information about the mitigation hierarchy (avoid, minimise, rehabilitate, offset) and the residual impact significance model (RISM).

Criteria for identifying regionally significant natural areas

The EPA recognises that naturally vegetated areas may be considered regionally significant for a single reason or multiple reasons. Criteria for identifying regionally significant natural areas (GWA 2000b) across WA include those that:

- adequately represent the range of ecological communities
- have a high diversity of landforms, flora and/or fauna species or communities
- contain rare or threatened species or communities
- maintain ecological processes or natural systems
- have areas of scientific or evolutionary importance
- have areas of wetland, streamline and estuarine fringing vegetation and coastal vegetation.

For more detail on applying these criteria, see section 3.7 of *Bush Forever volume 2: Directory of Bush Forever sites* (GWA 2000b) or Appendix 3 of the *Greater Bunbury Region Scheme* (EPA 2003). In addition to these criteria, the EPA may consider social surroundings and Aboriginal cultural values of naturally vegetated areas when determining significance.

On the Swan coastal plain, the EPA takes into account both vegetation complexes and vegetation communities when considering the significance of an impact, but this information is not available for all areas of WA. DataWA (www.data.wa.gov.au) provides mapping and statistics for most of the Swan coastal plain, Jarrah forest and Warren Interim Biogeographic Regionalisation for Australia (IBRA) regions. The EPA's *Technical guidance – Flora and vegetation surveys for environmental impact assessment* includes a non-exhaustive list of regional vegetation surveys in Appendix A.

Vegetation complexes that have a small proportion of their pre-European extent remaining, or are poorly represented in conservation reserves, such as on the eastern side of the Swan coastal plain, are considered to have high conservation value. Similarly, naturally vegetated areas that support threatened species or communities are generally considered to have high conservation value. In addition, given the cumulative impacts of development on the Swan coastal plain and greater Bunbury region, retention of Banksia woodland, Tuart woodland, western ringtail possum and black cockatoo habitat are key considerations. There are many other important environmental values to be considered: proponents should consult the EPA's environmental factor guidelines for further advice.

Potential impacts on threatened species and communities may require referral under the EPBC Act. For some of these, Matters of National Environmental Significance referral guidelines and conservation advice have been prepared and should be used where available (e.g. EPBC Act referral guidelines for three threatened black cockatoo species. When considering referral to the EPA, please note that approval is required under the *Biodiversity Conservation Act 2016* to modify an occurrence of a threatened ecological community or population of a threatened species.

Proponents are encouraged to contact the EPA Services directorate of the Department of Water and Environmental Regulation to arrange a pre-referral meeting to discuss their proposal.

It is important to note that clearing of native vegetation will require a permit under Part V of the EP Act unless an exemption applies (see Schedule 6 of the EP Act and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004).

8 Assessment of impacts to naturally vegetated areas

Under Part IV of the EP Act, the EPA may undertake environmental impact assessment of significant proposals, strategic proposals and planning schemes.

The EPA uses this guidance to support its determinations for planning schemes and proposals, including preparing public advice for decision-making authorities and proponents when it has decided not to assess a planning scheme or proposal.

In accordance with the *Environmental Protection Amendment Act 2020*, for proposals the EPA may take into account other statutory decision-making processes that can mitigate the potential impacts on the environment, notably the clearing permit process under Part V of the EP Act.

When a land planning or development proposal is referred to the EPA, information should be provided to determine whether it has previously considered the area through referral of a scheme or proposal and what matters were considered.

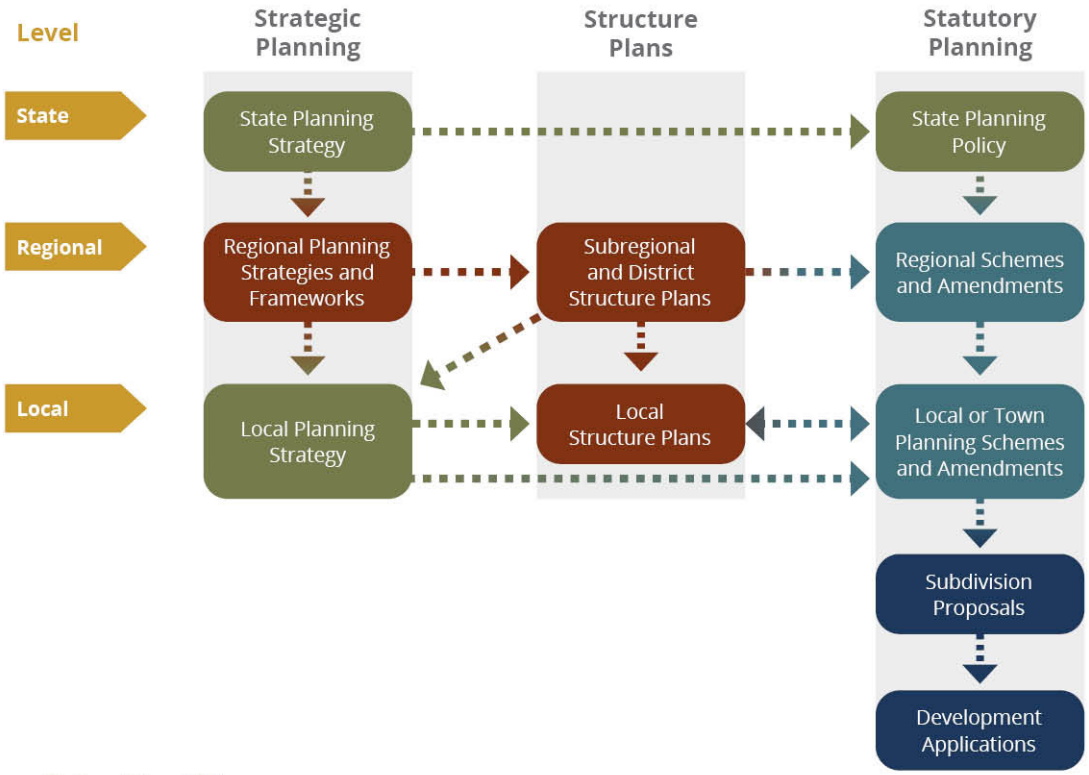
In cases where a land planning referral is not assessed, the EPA may provide public advice on the relevant environmental issues that should be considered, including naturally vegetated areas. Generally, the EPA will focus its public advice on issues related to regionally significant natural areas and other relevant environmental issues. The EPA's public advice may also include recommendations based on the design guidance in this document (see Section 9). The EPA expects that proponents, local authorities and planning agencies will use their best endeavours to ensure its advice is included in the relevant plan, scheme or development.

Biodiversity and water resources are valid planning considerations established in Schedule 7 of the *Planning and Development Act 2005*. Regardless of whether the EPA assesses or provides advice on a referral, planning authorities should take account of and seek to protect the values of naturally vegetated areas through the planning process.

For subdivision proposals and development applications assessed under Part IV of the EP Act, the EPA expects the proponent to apply the mitigation hierarchy to their proposal. The design guidance in Section 9 is useful for addressing the mitigation hierarchy steps and achieving the best environmental outcomes possible.

If all reasonable mitigation measures have been applied and significant residual impacts are likely to remain for regionally significant naturally vegetated areas, offsets may be considered on a case-by-case basis.

Figure 1: Western Australian Planning Framework and the role of the EPA



Role of the EPA

The EPA does not have a statutory role but may provide advice on significant environmental issues. DWER may also provide advice.

EPA Advice (s16 EP Act)

Where there are significant environmental issues, the EPA may:

- Carry out strategic environmental assessment
- Provide advice under s16 EP Act
- Provide public advice

The EPA expects its advice and recommendations will be followed in subsequent planning stages (i.e. schemes and amendments, subdivision and development applications)

Scheme Assessment (s48A EP Act)

Following the referral of a scheme to the EPA, the EPA:

- Decides whether to assess the scheme
- May provide public advice when the scheme is not assessed
- May carry out formal environmental assessment (Division 3 Part IV EP Act)
- May find that the scheme is incapable of being made environmentally acceptable

Proposals (s38 EP Act)

Following the referral of a significant proposal under s38 EP Act, the EPA:

- Decides whether to assess the proposal
- May provide public advice when the proposal is not assessed
- May carry out formal environmental assessment (Division 1 Part IV EP Act)

Figure 1: Western Australian planning framework and the role of the EPA

9 Design guidance for planning and development

The following design guidance will help planners, developers and local governments to minimise impacts on naturally vegetated areas and protect the values they support. When applied at the strategic level during the design phase of a regional or district structure plan, this guidance will aid in meeting the EPA's objectives for relevant factors (e.g. Flora and Vegetation, Terrestrial Fauna, Inland Waters). Most of the guidance is also appropriate to consider at the more detailed stages of planning and development.

Design should be informed by surveys carried out by suitably qualified people in accordance with EPA technical guidance. Surveys must be undertaken as early as possible in the land planning and development process to inform land use decisions on prioritising different areas of vegetation or assessing the significance of any proposal impacts. Figure 2 demonstrates how the guidance is applied.

The guidance has been organised under headings corresponding to each step in the mitigation hierarchy. For further information on the mitigation hierarchy, see the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA 2021). The EPA expects proponents to show evidence they have applied the mitigation hierarchy in their proposal.

(a) Existing urban environment

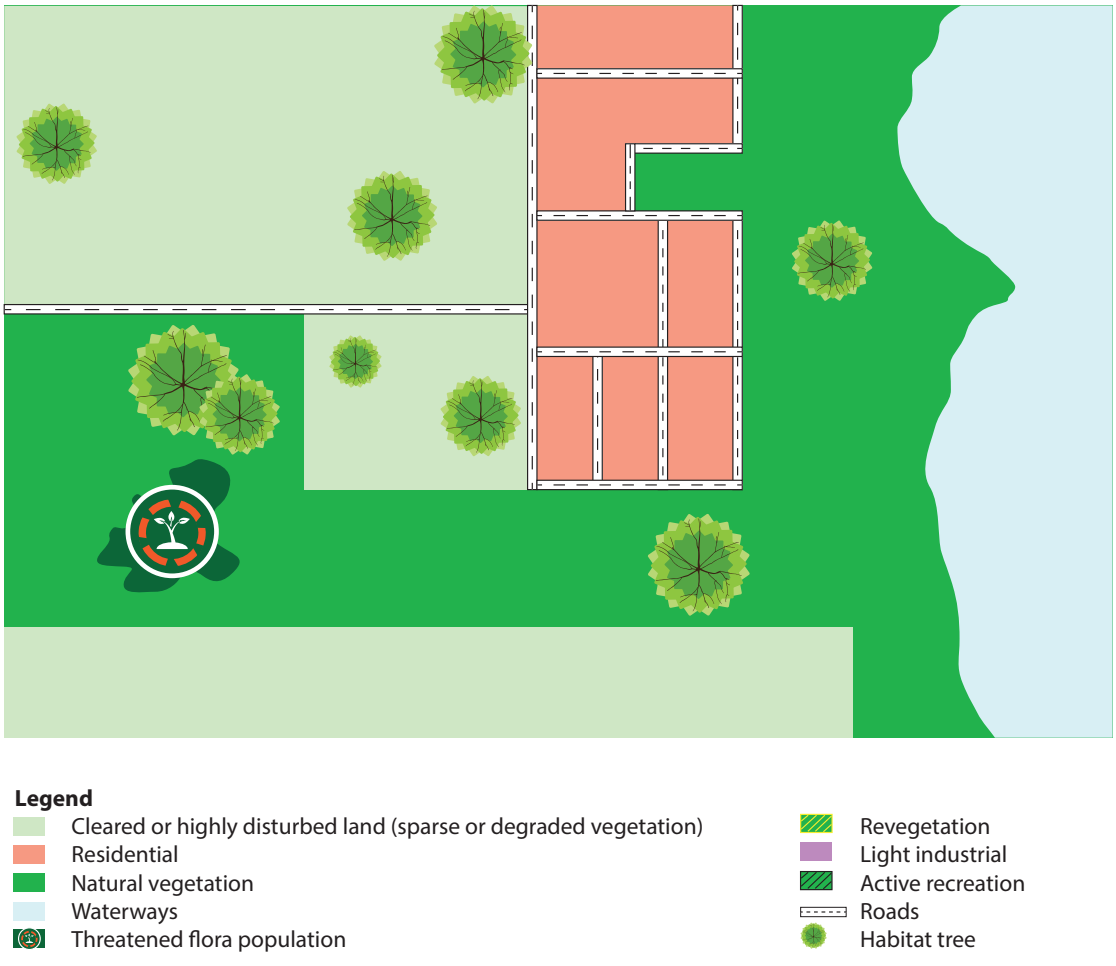
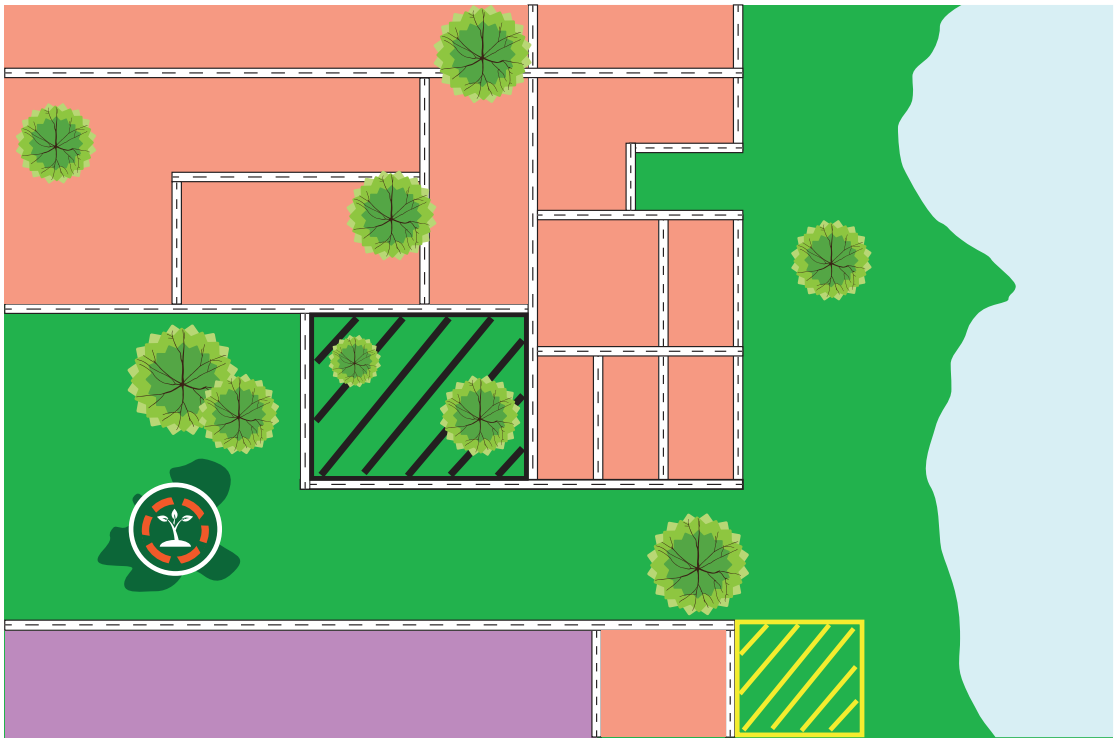


Figure 2: Examples of (a) an existing urban environment where new development is (b) well planned and (c) poorly planned for the protection of naturally vegetated areas

(b) Example of well-planned development within the existing urban environment



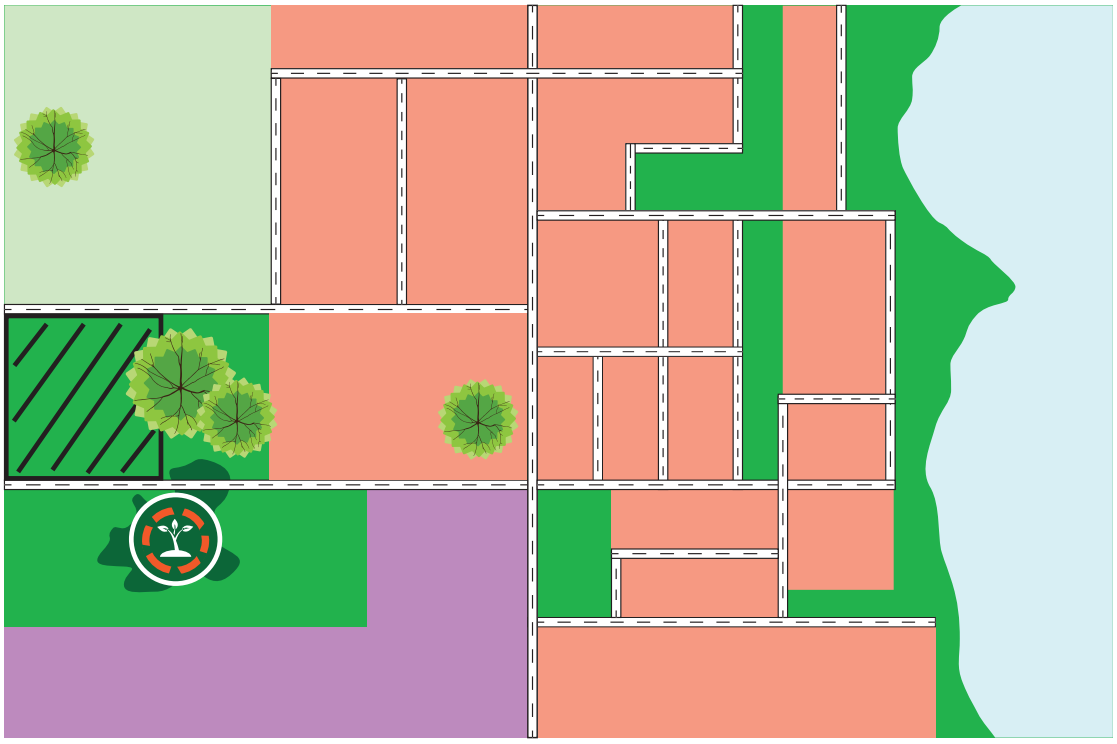
Legend

- Cleared or highly disturbed land (sparse or degraded vegetation)
- Residential
- Natural vegetation
- Waterways
- Threatened flora population
- Revegetation
- Light industrial
- Active recreation
- Roads
- Habitat tree

The example of the well-planned development within the existing urban environment:

- locates the new development in existing cleared or highly disturbed areas
- retains the threatened flora population and contiguous natural vegetation in a large, regularly shaped area
- retains the ecological linkage with a diversity of vegetation types (upland and wetland)
- sets back the new development from waterways and wetlands
- uses roads and shared paths to clearly demarcate the naturally vegetated area from adjoining land uses, preventing development encroachment and providing fire protection
- revegetates degraded vegetation to increase the size of the naturally vegetated area
- retains habitat trees in larger lots (rural-residential), road reserves and public access ways, as well as in the active recreation area.

(c) Example of poorly planned development within the existing urban environment



Legend

- Cleared or highly disturbed land (sparse or degraded vegetation)
- Residential
- Natural vegetation
- Waterways
- Threatened flora population
- Revegetation
- Light industrial
- Active recreation
- Roads
- Habitat tree

The example of poorly planned development within the existing urban environment:

- locates the new development on a naturally vegetated area rather than on cleared or disturbed land
- severs the ecological linkage to the waterway
- isolates natural vegetation areas in small, fragmented and irregularly shaped areas
- puts infrastructure in a large block of natural vegetation, causing disturbance and fragmentation
- does not clearly demarcate the land uses adjoining the naturally vegetated areas
- subjects the threatened flora population to edge effects and encroaching development
- does not clearly differentiate the new residential areas from the naturally vegetated area
- does not revegetate or enhance the natural vegetation
- retains few habitat trees within new development areas.

9.1 Avoiding impacts to naturally vegetated areas

9.1.1 Locate development on existing cleared land

Avoid development over intact naturally vegetated areas (see Figure 2). Where development over naturally vegetated areas is unavoidable, it should be focused on cleared parts of the site, followed by areas of least conservation value – as determined through vegetation, flora, fauna and habitat surveys undertaken in accordance with EPA technical guidance.

9.1.2 Protect large blocks of naturally vegetated areas

Avoid the fragmentation of larger, naturally vegetated areas into smaller pockets of vegetation so that habitat values are not lost and the vegetation is not degraded (see Figure 2). Large blocks of naturally vegetated areas offer the best protection for biodiversity in the long term and generally have lower management requirements (costs) than smaller and fragmented areas of vegetation (GWA 1995). Small areas of vegetation have low viability, higher management costs to maintain their condition, and are more susceptible to weeds, pest invasion and other degrading processes.

Design the development to retain naturally vegetated areas that represent the area's biodiversity values. Retention of naturally vegetated areas containing or supporting significant conservation values should be a priority. The criteria to identify regionally significant naturally vegetated areas can be used to select the areas for protection. Survey results can be used to identify where the significant conservation values are located and to plot the boundaries of the retained naturally vegetated areas to maximise those values. Important areas for protection should be identified using vegetation and fauna surveys undertaken by suitably qualified people, in accordance with EPA technical guidance and in consultation with relevant agencies.

Retained naturally vegetated areas should:

- include, but not be limited to, the best-condition naturally vegetated areas onsite, ensuring they are representative of the area
- have a low edge-to-area ratio, which is based on the size and shape of the block
- (Large blocks of naturally vegetated areas are preferred over long or irregular-shaped naturally vegetated areas; however, an area with values important for retaining should be considered regardless of its shape.)
- use hard edges (such as roads) to buffer naturally vegetated areas in preference to private land uses (such as housing) immediately adjacent to retained naturally vegetated areas.
- (The location of roads and public areas near naturally vegetated areas improves surveillance, deters vandalism and arson, and avoids individual properties advancing into retained naturally vegetated areas. Roads also provide a separation for bushfire management.)

9.1.3 Infrastructure should not be located within retained naturally vegetated areas

Avoid locating services and infrastructure, including roads and other transport corridors, within or through naturally vegetated areas (see Figure 2). Infrastructure within naturally vegetated areas disrupts the connectivity of these areas and reduces their environmental values and long-term viability through fragmentation and edge effects.

9.1.4 Retain naturally vegetated areas in locations prone to degradation

Avoid clearing naturally vegetated areas where it is likely to cause appreciable land degradation or where there are existing water quality issues (see Figure 3). Removal of vegetation has been associated with a variety of environmental problems including salinity, erosion, increased turbidity and sedimentation of streams, and acid sulfate soils.

Vegetation should be retained on and/or around steep slopes, streamlines, wetlands, coastal areas and water courses. Retaining vegetation supports a variety of ecosystem services including stormwater infiltration. Upper catchments should be conserved to minimise salinity.

Consideration should be given to identifying areas that are at highest risk of degradation as a result of clearing of vegetation. Avoidance, minimisation and rehabilitation measures should be identified to address the potential impact.

This design guidance aligns with the clearing principles (Schedule 5 of the EP Act) and the EPA's *Environmental factor guideline – Terrestrial Environmental Quality*.

Figure 3: Landscape features and retained naturally vegetated areas

9.1.5 Avoid inappropriate development in bushfire-prone areas

Avoiding development in naturally vegetated areas is highly compatible with minimising the risk of fire and its potential impacts on the community. Where protection of significant naturally vegetated areas conflicts with bushfire management measures and significant clearing of native vegetation is the only means of managing bushfire risk, the development will generally not be supported (WAPC 2017).

State Planning Policy 3.7 – Planning in bushfire prone areas and its accompanying guidelines (WAPC 2015b and 2017) outline the requirements to protect people from bushfires and avoid inappropriate development in bushfire-prone areas.

9.2 Minimising impacts to naturally vegetated areas

9.2.1 Locate and manage land uses and development around retained naturally vegetated areas to avoid or minimise adverse impacts

Land uses and activities surrounding retained naturally vegetated areas can affect the viability of the vegetation and fauna through exposure to pollutants and increased water runoff, among other impacts (see Figure 2). Naturally vegetated areas may become infected with *Phytophthora cinnamomi* through transport of contaminated soil or use of contaminated machinery in adjacent areas. Uncontrolled access, weed encroachment and rubbish are common issues, particularly for retained naturally vegetated areas in urban settings. Solutions to avoid or minimise potential impacts should be considered and may include fencing, exclusion zones, spatial separation, engineering or innovative design. Water sensitive design is recommended to minimise impacts on adjacent vegetation from increasing or decreasing availability of water. Hard-edge buffers such as roads are recommended to protect naturally vegetated areas and the values within them from adjacent land uses (see Figure 4).

Naturally vegetated areas are sometimes used as a buffer between industrial areas and other more sensitive land uses such as housing. The vegetation within such buffers should be protected for conservation to ensure its retention. Opportunities to protect naturally vegetated areas within buffers should be taken at the earliest possible stages of the planning process.

9.2.2 Consider the impact of bushfire protection requirements on biodiversity

Where residential areas are situated near bushfire-prone areas, the creation of hazard separation areas and asset protection zones can have significant impacts on naturally vegetated areas (WAPC 2017). This provides an opportunity to minimise impacts through planning and design.

Clearing of asset protection zones and reduction of fuel loads in surrounding areas can contribute to the long-term degradation of naturally vegetated areas. When assessing the impacts on naturally vegetated areas at the design stage, the following bushfire management and protection requirements should be accounted for:

- fire breaks
- access
- hazard reduction areas
- compliance with the applicable bushfire construction requirements of the Building Code of Australia relevant to the site's Bushfire Attack Level (BAL) – as set out in the Australian Standard A3959 – Construction of buildings in bushfire-prone areas.

Bushfire management and protection requirements are expected to be included in the development area of a proposal (not part of the retained naturally vegetated area) and will be factored into the clearing area required for schemes and proposals.

Various options are available to avoid or minimise the removal or modification of naturally vegetated areas and provide adequate hazard separation from vegetation boundaries. These options include modifying the development location, reducing the lot yield, clustering the development, locating driveways and firebreaks together and positioning building envelopes close to the road frontage.

Figure 4: Planting opportunities to protect naturally vegetated areas and improve ecological linkages

9.2.3 Minimises impacts to naturally vegetated areas through site responsive design

Consider designing proposals so as to minimise disturbance to the area's natural topography. Site characteristics can be used to guide the proposal's design to minimise earthworks and retain the sense-of-place and natural aesthetics of the site. This may also enable habitat trees and naturally vegetated areas to be retained. Site responsive design needs to be considered during the earliest stages of a proposal's development so that engineering and infrastructure solutions can be identified.

Opportunities should be sought to retain existing trees (especially those providing habitat for threatened fauna) in new developments, including within road reserves, public access ways, public open space, car parks and on larger lots in rural-residential, residential, commercial and light industrial areas.

9.2.4 Ensure retained naturally vegetated areas are connected to other naturally vegetated areas via ecological linkages

The undesirable effects of fragmentation on naturally vegetated areas can be minimised by planning ecological linkages in the landscape. Ecological linkages are a series (both contiguous and non-contiguous) of patches of native vegetation which, by virtue of their proximity to each other, act as habitat stepping stones that help maintain ecological processes. Ecological linkages support the movement of organisms within and across a landscape and enable them to access refugia during seasonal and climatic variability. Vegetation retained along roads and watercourses, as well as around wetlands, contribute to ecological linkages in the landscape (see figures 3 and 4). Ecological linkages are sometimes referred to as wildlife corridors.

In the urban landscape, ecological linkages and stepping stones of native vegetation can be enhanced by urban greening practices using appropriate planting palettes. Opportunities to enhance ecological linkages in the urban landscape include the use of native species in landscaping, and the restoration of degraded land (e.g. along drainage lines or in public open spaces).

Ecological linkages should be considered at both regional and local scales. Planners and developers should assess current knowledge of ecological linkages in the local and regional area, and work to ensure ecological linkages are identified, enhanced where possible, and not broken. There are many strategic planning documents that identify ecological linkages and these should be used to inform subsequent proposals and statutory land use planning decisions. While ecological linkages are desirable, they should not be established at the expense of retaining large blocks of naturally vegetated areas (see Figure 2).

9.2.5 Ensure clear and ongoing management responsibilities in retained naturally vegetated areas

Long-term management of retained naturally vegetated areas is required to minimise edge effects and processes that degrade the functions and values of the vegetation over time.

Retained naturally vegetated areas should be placed under secure tenure and managed by an entity that is prepared and willing to accept the long-term management responsibilities and costs for the area. This is particularly important in areas that do not have a region scheme or funding for regional reserves. In areas covered by a region scheme, naturally vegetated areas of high value are best retained through reservation and vesting for conservation purposes.

Site survey results help identify boundary locations and where conservation actions or management intervention may be required (e.g. weed control) and this will influence the most appropriate long-term management responsibilities and arrangements.

9.3 Rehabilitation of naturally vegetated areas

Rehabilitation of naturally vegetated areas may require repair of ecosystem processes, landscaping, hydrological restoration, management of degrading processes and/or planting. This may be to:

- improve the environmental outcome of a land planning or development proposal (e.g. to improve the condition of an area reserved for conservation purposes within a subdivision proposal)
- repair vegetation following a temporary impact (e.g. for a temporary construction footprint)
- create a vegetation buffer between a high-value naturally vegetated area and a disturbed area
- increase the size or connectivity of existing remnants of naturally vegetated areas through planting.

The level of disturbance and the desired outcome will influence whether revegetation, rehabilitation or restoration is appropriate.

Further advice on rehabilitation may be found in the Society for Ecological Restoration's *International standards for the practice of ecological restoration – including principles and key concepts* (McDonald et al. 2016) and *A guide to preparing revegetation plans for clearing permits* (Department of Water and Environmental Regulation 2018).

9.3.1 Restore the ecological function of impacted naturally vegetated areas

Rehabilitation to achieve ecological restoration is a desired outcome. Ecological restoration is the process of supporting the recovery of an ecosystem that has been degraded, damaged or destroyed (McDonald et al. 2016). The ecological function of a naturally vegetated area includes all the biological and physical interactions that occur in an environment.

Surveys undertaken before disturbance, and of surrounding naturally vegetated areas, can be used for reference. These will be particularly helpful if the desired outcome is to return the disturbed area to a state that closely resembles its original vegetation complex or community.

9.3.2 Maximise ecosystem services

It is expected that planners, developers and local governments will rehabilitate naturally vegetated areas to maximise ecosystem services within the limitations of site requirements (e.g. proximity to above- and below-ground services). Ecosystem services provided by naturally vegetated areas include: providing habitat for wildlife; maintaining ecological processes; cooling the environment; managing stormwater by infiltration; and maintaining air quality, soil fertility and water quality.

Ecosystem services can be maximised by:

- selecting locally native species where appropriate
- using structurally diverse plantings
- selecting species with a variety of flowering and fruiting times
- planting known food plants for native fauna species.

9.3.3 Enlarge or connect existing naturally vegetated areas

The value of naturally vegetated areas can be improved by increasing the size and connectivity of remnants (see Figure 4). Revegetation to enlarge or connect existing naturally vegetated areas may be proposed to reduce the environmental impact of land planning or development proposals.

9.4 Offsetting impacts to naturally vegetated areas

The design guidance should be used to address the steps of the mitigation hierarchy – avoid, minimise and rehabilitate – before considering offsets. Where an environmental impact assessment determines there is likely to be a significant residual impact to regionally significant natural areas, the EPA may take into account the WA environmental offsets framework (GWA 2011, 2014) to determine if an offset is acceptable.

Under the *WA Environmental offsets policy* (GWA 2011) and *WA Environmental offsets guidelines* (GWA 2014), offsets are not appropriate in all circumstances because some environmental values cannot be offset. Decisions will be made on a case-by-case basis. Where a proposal is assessed by the EPA, decisions will be documented in the EPA's report to the Minister.

10 References

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