Government of **Western Australia**
Department of **Water and Environmental Regulation**

Procedure

DRAFT Procedure for environmental offsets metric inputs

For use with the WA environmental offsets metric

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Department of Water and Environmental Regulation
8 Davidson Terrace

Joondalup Western Australia 6027
Telephone +61 8 6364 7000
Facsimile +61 8 6364 7001

National Relay Service 13 36 77
www.dwer.wa.gov.au

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Contents

Tables

1. Scope

This procedure has been developed to assist users of the Western Australia environmental offsets calculator and guideline (WA metric) understand the ranges of metric inputs and their rationale.

2. Context

Environmental offsets are used to counterbalance the significant residual impacts on biodiversity of proposals and clearing regulated under the Environmental Protection Act 1986 (EP Act).

The WA environmental offsets framework comprises the:

- *Policy* (2011) – outlines principles for the use of offsets; developed to provide certainty, predictability and transparency to government and businesses
- *Guidelines* (2014) – complement the policy by clarifying how environmental offsets will be determined and applied
- *Register* (2013) – a central public record of all offset agreements in WA, providing transparency and accountability
- Metric *calculator* and *guideline* (2021) – a calculator to assist help quantify offsets and guidelines on how to use it.

In designing the WA metric calculator and guideline, the department has refined elements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) *offsets assessment guide* (calculator) and related '*how to use*' guidance (2012) and consulted with stakeholders. *Appendix A* provides a summary of changes from the EPBC Act calculator.

The WA offsets calculator uses a balance sheet approach to quantify impacts, rehabilitation credits and the environmental benefits of proposed offsets in a macro-based Excel spreadsheet with embedded formulas. It is a quantitative tool to help users determine the minimum offset required to address the significant residual impact identified for an environmental value.

The department has developed this draft procedure to improve the consistency and transparency of offset calculations, noting the need for guidance on metric inputs has been highlighted in several appeals determinations[1].

As for the WA metric, this procedure may be applied to all land-based biodiversity offsets required as a condition of EP Act approvals and in the intensive and extensive land use zones, excluding those proposals which use the Pilbara Environmental Offsets Fund. It includes a rehabilitation credit calculation to acknowledge the

[1] Appeal Number 034 of 2019 Minister's appeal determination and Appeal Numbers 046 and 047 of 2019 Minister's appeal determination

importance of onsite rehabilitation in reducing a project's environmental impact. It cannot be used for research or other indirect offsets.

Proponents should follow this procedure after they have applied the mitigation hierarchy (see section 3 of the *guidelines*) and found that offsets are required to counterbalance their project's significant residual impacts.

Proponents can use the WA metric to estimate offset requirements in advance of approval and implementation of a project. Although it may be possible to enter a range of variables in the calculator, many of these will be hypothetical examples if they are not consistent with the policy or guidelines. This draft procedure provides additional background, the ranges of metric inputs and their rationale. Worked examples of metric inputs are provided in the *metric guideline* (Appendix B: Case studies).

A proposed offset (and metric inputs) should be consistent with the policy, guidelines and metric guideline. It is the proponent's responsibility to provide sufficient evidence and justification for metric inputs and calculations. The calculator does not determine if the impact is acceptable or offset is suitable. It is the decision-maker's role to determine if a proposed offset counterbalances the significant residual impact. Decisions are made on a case-by-case basis and considering the reasonableness of the outcome.

Definitions related to offset types are provided due to frequency of use in this procedure:

- on-ground management:
  - revegetation – re-establishment of native vegetation in degraded areas; and
  - rehabilitation – repair of ecosystem processes and management of weeds, disease or feral animals
- land acquisition offsets – protection of environmental values through improved security of tenure or restricting the use of the land (ceding, land purchase or conservation covenants).

3. Legislation

Offsets may be required as conditions of approval in Ministerial Statements (Part IV) or clearing permits (Part V) of the EP Act.

4. Outcome

The outcome of this procedure, once finalised, is to support use of the WA metric by providing the ranges of metric inputs and their rationale. This will improve rigour, consistency and transparency in decision-making, and provides opportunity for better alignment between EP Act offset requirements and EPBC Act conditions of approval.

5. Have your say

The department is seeking feedback on the following questions:

1. Is this procedure clear? Can you understand and apply it?
2. Are the input values consistent with your experiences of impact assessment? (for example, as an proponent or an appellant)?
3. Are there any omissions, or alternatives that should be included?
4. What are the implications of using the procedure and/or the input values; for example, if the offset estimates are larger or smaller than anticipated?
5. How is this procedure consistent with or different from EPBC Act assessments?
6. Are there better ways that risk of future loss can be estimated for revegetation offsets (see Section 9.6 *Risk of future loss*)?
7. Any other comments?

6. Step 1: Determining conservation significance

6.1 Conservation significance score

This information adds to Appendix A: Additional information for determining scores in the *WA metric guideline*.

The conservation significance score is the sum of the likelihood of extinction (related to the level of threat for a particular species or ecological community, if applicable) plus the probability of catastrophe. The annual probability of extinction is an estimate of the average chance that a species or ecological community will be completely lost in the wild each year, given recent rates of decline.

The WA metric uses pre-entered scores for State and Commonwealth threat status and environmental values (refer to Table A2 of the metric guideline). The WA metric uses the annual probability of extinction and probability of catastrophe percentages consistent with the EPBC Act 'how to use' guide for threatened species and ecological communities. The WA metric also provides functionality to consider environmental values which do not have a threatened status, but where the assessment has determined a significant residual impact.

The user would usually enter the type of environmental value and WA threatened status, which automatically generates the conservation significance score. If the WA calculator is being used for bilateral assessments, the EPBC Act threat status should be used. The threat status for a particular species or ecological community may differ; however, for WA assessments the WA threat category should be used.

If there is evidence that the conservation significance score is not correct or if the impact would lead to a change in threat status, the user may enter an alternative score. In such cases, the full rationale should be provided; for example, peer-reviewed scientific evidence that a species or ecological community has a different annual probability of extinction than the current threatened status or that the assessment process has found the impact would likely change the threat category. If the user manually enters the conservation significance score, they should add the 0.1% probability of catastrophe (see Appendix A of the metric guideline for more information).

Higher threat status (i.e. higher annual probability of extinction) weights calculator results to result in larger offset requirements.

If the environmental value is a conservation area, the conservation significance score does not apply and an offset ratio should be used. This is because the likelihood of extinction or probability of catastrophe do not apply to conservation areas in the same way as they do for other environmental values. If conservation area type of environmental value is selected in step 1, the calculator prompts the user to enter a ratio.

6.2 Area or feature?

Metrics allow the impact site and the offset site be compared using the same units. The WA calculator can be used whether the impact and offset quantum is measured by area (hectares) or the number of features.

Most proposed impacts and offsets will be assessed using area mode; for example, areas of threatened ecological community, vegetation or fauna habitat. If the impact is to be measured by number of features; for example, number of hollows, trees of breeding capacity, or individual plants, then feature mode will be used.

The calculation of significant residual impacts and offsets differ according to whether area or feature mode is selected. If it is appropriate to calculate impacts and offset quantum in both area and feature mode, users should do these calculations separately (see section 8.1 *Part A: Significant residual impact calculation – area and feature*).

7. Quality

7.1 Methodology for determining quality at impact sites and offset sites

Measures of quality are used for significant residual impacts at the impact site, any proposed rehabilitation credit and the offset site. This information adds to Appendix A: Additional information for determining scores in the *WA metric guideline*.

Quality is a measure of how well a particular site supports a specific environmental value (i.e. the ecological requirements of the environmental value) and contributes to its ongoing viability. Users should determine quality by evaluating the key ecological attributes of the environmental value. These attributes may include:

- habitat requirements and variability: nesting, breeding, foraging, dispersal, migration and/or roosting requirements of a species; ecological components and occurrence states for an ecological community, wetland/watercourse, vegetation/habitat; habitat values of a conservation area
- lifecycle and population dynamics: key life cycle stages of a species or ecological community, and how these impact its population viability or ecosystem integrity
- movement and distribution patterns: how a species population or ecological community functions across the landscape/seascape
- threatening processes: those processes contributing to the loss of a species, ecological community, wetland/watercourse, vegetation/habitat or conservation area
- wetlands/watercourses: biological condition, pests and diseases, chemical condition (e.g. water quality and acid sulfate soils), and physical condition (e.g. soil, geology and landform).

Following Table 1, users should select the quality score that represents **a best fit for the combination of vegetation condition, site context and habitat attributes for the relevant environmental value**. Users should provide evidence (e.g. survey information, habitat or remaining extent in the local area) to support the selected quality score. The methodology to estimate quality of the impact site and offset site should be as consistent as possible.

The weighting given to each factor depends on the ecological requirements of the impacted environmental value (e.g. the condition of the vegetation at a site may be more important to the survival of a particular species than the site's position in the landscape). For example, the same patch of native vegetation may be **both**:

- a quality score of 4 for highly cleared vegetation type calculations, to reflect the degraded vegetation condition, lack of representative species and high threat level; and

- a quality score of 8 for fauna habitat where the vegetation comprises mature trees providing important habitat functions (e.g. connected to other areas of habitat, presence of foraging, roosting or breeding habitat) for the species.

Where the impact is on an ecological community with a small number of known occurrences (or represents a high proportion of area or number of individuals or critical locations), the overall quality score would likely be high (e.g. 9 or 10) to recognise the site context and habitat attribute components of quality.

For species habitat that is either one of a small number of known populations, represents a high proportion of known individuals or is otherwise a significant population (e.g. range extension or is genetically isolated), the overall quality score for the impact area would likely be high (e.g. 9 or 10) to recognise the site context and habitat attribute components of quality (regardless of vegetation condition).

Users should determine quality separately for each biodiversity value. The proposed offset (or package) would need to ensure all environmental values are addressed.

Where an area has multiple environmental values, or inputs used (e.g. rehabilitation of existing vegetation and revegetation of cleared vegetation on the same site), users should do separate calculations for each. This enables them to use the different quality scores as required. Quality scores should not be combined or averages for multiple environmental values.

There is no direct way of including a quality score for landscape values (e.g. ecological linkages, corridors or remnant vegetation that are significant in a highly cleared landscape). Instead, selection of an offset site should ensure these values are addressed.

An offset should deliver an improvement in quality for the impacted environmental value or an improvement in long-term protection, or both. Obtaining improvements in quality over time requires significant on-ground management effort, thus users should clearly link the purpose of the proposed actions with the impacted environmental value. The future quality is relative to the starting point, so users need to provide a rationale for future quality. The calculator allows users to quantify the improvement in the quality of a site over time.

Table 1: Quality scores – what they mean

	Condition		Site context	Habitat attributes
Quality Score	**Keighery vegetation condition scale (intensive land-use zone)**	**Trudgen vegetation condition scale (extensive land-use zone)**	**Examples**	**Examples**
10	**Pristine:** Pristine or nearly so, no obvious signs of disturbance; 0% weed cover.	**Excellent:** Pristine or nearly so, no obvious signs of damage caused by the activities since Europeans.	**High site context means (any or all):** The site is well connected to areas of native vegetation. Generally has a low edge to area ratio. Provides landscape-level connectivity. Site is within the significant and/or highly impacted part of the species or ecological community's range. The site location or occurrence of an environmental value comprises a high proportion of the known area, number of individuals or distribution.	**High habitat attributes means (any or all):** The site has low threat levels compared with other areas of habitat. The site provides foraging, nesting and/or dispersal habitat. Where breeding habitat is a limiting factor for the species: breeding. Habitat would usually have a very high quality score to recognise the importance of nesting habitat.
9	**Excellent:** Vegetation structure intact; disturbance affecting individual species; weeds are non-aggressive species; 1–5% weed cover. For example, damage caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.			
8	**Very good to Excellent**	**Very good to Excellent**		
7	**Very good:** Vegetation structure altered; obvious signs of disturbance; 5–25% weed cover. For example, disturbance to vegetation structure caused by repeated fires; the presence of some more aggressive weeds; dieback; logging; and grazing.	**Very good:** Some relatively slight signs of damage caused by the activities of Europeans. For example, some signs of damage to tree trunks caused by repeated fires and the presence of some relatively non-aggressive weeds such as *Ursinia* or *Briza* species, or occasional vehicle tracks.	**Moderate site context means (any or all):** The site provides some connection to areas of native vegetation. Adjoins or within proximity of an ecological linkage. Vegetation at the site may be fragmented, but forms part of a network/movement corridor. Provides landscape-level connectivity. Site is within the significant and/or highly impacted part of the species or ecological community's range.	**Moderate habitat attributes (any or all):** The site may have some threats evident but also displays some resilience. The site provides foraging and/or dispersal habitat.
6	**Good to Very good**	**Good to Very good**		
5	**Good:** Vegetation structure significantly altered by very obvious signs of multiple disturbances; retains basic vegetation structure or ability to regenerate it; 25–50% weed cover. For example, disturbance to vegetation structure caused by very frequent fires; the presence of some very aggressive weeds at high density; partial clearing; dieback; and grazing.	**Good:** More obvious signs of damage caused by the activities of Europeans, including some obvious impact on the vegetation structure such as caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones.		

	Condition		Site context	Habitat attributes
Quality Score	**Keighery vegetation condition scale (intensive land-use zone)**	**Trudgen vegetation condition scale (extensive land-use zone)**	**Examples**	**Examples**
4	**Good to degraded**	**Poor:** Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of activities of Europeans such as grazing or partial clearing (chaining) or very frequent fires. Weeds as above, probably plus some more aggressive ones, such as *Ehrharta* species.	**Low site context means (any or all):** Site is not connected to areas of native vegetation. Site is not within an ecological corridor. Generally fragmented vegetation (high edge to area ratio). Site is within the species or ecological community's range.	**Low habitat attributes means (any or all):** High degree of threats are evident (e.g. weed invasion, feral animals where relevant to the environmental value). Little foraging and/or dispersal habitat available.
3		**Poor to Very poor**		
2	**Degraded:** Basic vegetation structure severely impacted by disturbance; scope for regeneration but not to a state approaching good condition without intensive management; 50–75% weed cover. For example, disturbance to vegetation structure caused by very frequent fires; the presence of very aggressive weeds; partial clearing; dieback; and grazing.	**Very poor:** Severely impacted by grazing, fire, clearing, or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species, including aggressive species.		
1	**Degraded to Completely degraded**	**Very poor to Completely degraded**		
0	**Completely degraded:** The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.	**Completely degraded:** Areas that are completely or almost completely without native species in the structure of their vegetation, i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.		

7.2 Notes on quality at an impact site

- Where a proposed action impacts wetlands or watercourses, users should consider chemical/physical condition, hydrological function and relevant biodiversity components in the quality score.
- Where a proposed action impacts on conservation areas (user enters a ratio) this does not include a quality score. However, if the area also comprises other environmental value (for example threatened fauna habitat, wetlands, highly cleared vegetation type), then the user enters quality scores for those environmental values. A proposed offset should counterbalance the conservation area as well as any other impacted environmental values.

7.3 Notes on quality at an offset site

- Complete survey information may not be available for the offset site (e.g. in accordance with the EPA's technical guidance for *flora and vegetation* or *vertebrate fauna*); however, the user needs to provide evidence that the offset site currently has sufficient area and quality of the relevant environmental value and/or that there is confidence the area will do so in future.
    - For land acquisition offsets, this means providing habitat information, vegetation/habitat mapping or aerial photos to verify metric inputs.
    - For on-ground management offsets, this means providing sufficient detail in a revegetation or threat management plan about the activities to be undertaken at the site, a schedule, species lists and the reasoning for expected increase or improvement in quality of the environmental value.
- Users can only predict improvements in quality as a result of the offset in the calculations where they have included sufficient management actions that directly relate to the environmental value:
    - Improvement in quality requires significant management to address threats (e.g. weed management, fire management, fencing to remove grazing pressure, removal of vehicle access where these threats are degrading the quality of the vegetation).
    - No change in quality – can be without management or less intensive management (e.g. fencing only).
    - Some degradation of existing quality (i.e. counterfactual provided by the future quality without offset field) may be assumed if there are active threatening processes, but evidence of decline must be provided over recent years.
    - Improvements to quality are relative to starting quality (e.g. 1 to 4 or 5, 3 to 6, 5 to 7) and may be reasonable improvements depending on the starting condition and proposed management actions; however, very large improvements in quality (e.g. 1 to 7) are likely to be unrealistic.

  - The relationship between the proposed actions and the environmental value being improved should be clear. For example, if the environmental value is Carnaby's black cockatoo habitat, the proposed actions may be fire management to improve food availability or fencing to reduce grazing pressure and improve recruitment of foraging species. Other actions such as rubbish removal or preventing vehicle access may improve the native vegetation onsite but not necessarily improve the fauna habitat.

- Offsets that provide additional area or habitat in highly cleared or fragmented areas within the known range of the species or ecological community are desirable.
- Offset locations may consider the known range for the species or ecological community, but often it is preferable for the offset location to be close to the impact area.
- Starting quality of 0 or 1:
  - The offset site should provide the benefit of site context (e.g. connectivity to existing vegetation or habitat benefits), therefore quality should be higher than 0 to start, even for a cleared area. It is unlikely the decision-maker would accept an offset site with no site context.
  - A rehabilitation credit does not always provide the benefit of site context and therefore starting quality of 0 may be possible for this calculation if the site is cleared.
- For fauna habitat, the offset site should be located near the known habitat. It should be within the known species or ecological community's range, and comprise suitable habitat. If the area is not currently habitat, the user must provide evidence that it will comprise suitable habitat in the future as a result of implementation of the offset.
- The user should provide sufficient certainty that an area of native vegetation provides current habitat or could be improved to provide future habitat. Surveys conducted outside the appropriate season would be unlikely to provide such certainty.
- The offset should be relevant to the impact – site selection should ensure it has current or future relevance to the environmental value. It is unlikely the decision-maker would accept offsets with no immediate value to the impacted environmental value (e.g. outside the known range, vegetation does not contain habitat species).

7.4 Notes for comparison of quality at impact sites and offset sites

- Relative quality of impact site compared with offset site:
  - 'Offset site at least the quality of the impact site' is a requirement of the EPBC Act policy and 'how to use' guidance, which may limit consideration of revegetation or rehabilitation offsets.
  - The WA framework does not have this rule, but in practice considers the comparative quality of impact and offset areas during case-by-case evaluation.
  - As part of offsets and wider native vegetation reforms, the department is seeking to prioritise revegetation and rehabilitation offsets in highly cleared landscapes. Simultaneously, the department is seeking to improve on-ground management offsets through better planning and implementation. Case-by-case evaluation of impact and offset sites and the suitability of a proposed offset will continue in WA.
  - Offset site selection should take into account the known range of a species or ecological community, improve the extent or quality of native vegetation and consider landscape-level values such as landscape connectivity.
- The significant challenges in revegetating species diversity and structure for vegetation-based threatened or priority ecological communities are acknowledged. Therefore:
  - Revegetation projects should consider the site context of occurrences to connect, buffer or manage threats to existing occurrences. Revegetation should focus on using the most appropriate native species to provide habitat for the impacted species while also considering soil type, context and history of use.
  - Rehabilitation projects should involve actions to improve the quality of an existing occurrence of an ecological community to address threats (e.g. weed control, grazing management, vehicle access and hydrological management). There may be potential to include infill planting of cleared or degraded areas.

8. Step 2: Calculating significant residual impact

The WA calculator breaks the significant residual impacts calculation into three parts:

- Part A: gross quantum of the impact at the project site
- Part B: credit for any onsite rehabilitation which provides biodiversity benefits
- Part C: automated calculations of the significant residual impact.

8.1 Part A: Significant impact calculation – area and feature mode

The user should enter the quantum of the impact at the project site, and calculate each environmental value separately. If area mode is used, the impact area is adjusted for quality.

The user should switch to feature mode when the environmental value is better measured by numbers than area; for example, individuals, hollows or trees of breeding capacity. As feature mode measures presence/absence of the feature (with at least a minimum level of functional value), there is no adjustment for quality.

If the quality of the impact site varies and/or multiple environmental values are impacted, separate calculations are required, for example:

- Fauna species A habitat, all good quality (area mode)
- Fauna species B habitat, all good quality (area mode)
- Fauna species B number of nesting trees (feature mode)
- Threatened ecological community, poor quality section (area mode)
- Threatened ecological community, good quality section (area mode)

Itemisation in this way ensures that the offsets address each impacted environmental value.

If quality is consistent for the impact site, it may be possible to use one calculation per environmental value. If the quality of the impacted environment value varies widely, separate calculations are required, informed by the resolution of survey data.

The feature mode is designed to account for environmental values which are not adequately captured by area. In most cases feature mode would be used in addition to area mode.

8.2 Part B: Rehabilitation credit

Rehabilitation is an important step in the mitigation hierarchy (see section 3 of the *guidelines*). In environmental management more broadly, the third step in the hierarchy may be referred to as mitigate (avoid, minimise, mitigate, offset), but in the case of biodiversity values, the only type of mitigation available is rehabilitation.

Rehabilitation conditions may be needed to ensure the site is safe, stable, non-polluting and capable of sustaining an agreed post-mining land use environmental impact at the project site. Rehabilitation to this minimum standard would not likely provide a biodiversity benefit and would not normally be an offset.

Rehabilitation credit is intended to acknowledge the importance of onsite rehabilitation in reducing a project's environmental impact. Consistent with section 3 of the guidelines, proponents may use a rehabilitation credit to reduce the significant residual impact before the offset calculation in cases **where the rehabilitation brings a biodiversity benefit for the impacted value**. This means it would be additional to the site management actions required to stabilise landforms. Alternatively, a rehabilitation credit may be applied in part of the project area which will not be impacted by development.

A rehabilitation credit calculation must be undertaking in accordance with a revegetation or rehabilitation plan approved as part of a clearing permit, Ministerial Statement or approval under the *Mining Act 1978*. The rehabilitation credit would normally be used where the clearing is temporary, and where it will achieve biodiversity benefits within a reasonable timeframe (i.e. within the foreseeable future, 20-year timescale). The rehabilitation provided needs to be of sufficient quality to return, maintain or improve biodiversity values to the site.

If the rehabilitation is unlikely to provide biodiversity benefits within a reasonable timeframe, then the rehabilitation credit should not be used. Generally, a rehabilitation credit will not apply for natural regeneration in the absence of active onsite on-ground management, except in circumstances when encouraging natural regeneration is a requirement of approval.

The suitability of a rehabilitation credit depends on an evaluation against the impacted environmental value. For example, it may be possible to provide a rehabilitation credit for fauna habitat where this environmental value will be returned. The same rehabilitation credit area may not be suitable to reduce the significant residual impact for an ecological community if it will not achieve the species diversity, structure and function to be considered relevant for that environmental value (principle 3 of the policy).

The rehabilitation credit section (step 2) of the calculator is similar to fields in the offset section of the calculator (step 3). As revegetation occurs onsite, the proponent is assumed to have control of the site. In the rehabilitation credit section of the calculator there should be no change in risk of future loss of the site. The proponent should ensure that the revegetation is long term and enduring in the same way as an offset (e.g. through development of revegetation plans, use of conservation covenants to provide protection against future impacts). Rehabilitation credit areas will be included as conditions of approval to ensure they are spatially identified and implemented over time.

The rehabilitation credit is calculated differently depending on whether area or feature mode is selected. In feature mode, rehabilitation credit should also bring biodiversity benefits for the impacted environmental value within the proposed

timeframe. For example, rehabilitation credit in feature mode may be used to recognise the value of installing nesting boxes or establishing populations of rare flora within the project area. It cannot be used where the rehabilitation area will not provide the environmental value within the proposed timeframe, such as when revegetation needs decades to mature and develop nesting hollows.

The decision-maker will evaluate the use of rehabilitation credits on a case-by-case basis.

If onsite rehabilitation is not proposed for an impact site, the user should leave blank the fields in the rehabilitation credit calculation components.

8.3 Part C: Significant residual impact calculation

Once the user has completed parts A and B, Part C is automatically calculated as the significant residual impact according to the following formula:

Significant residual impact = Total quantum of impact – Rehabilitation credit

The significant residual impact area or number of features needs to be counterbalanced by an offset.

9. Step 3: Calculating offsets

9.1 Offset value (net present value)

Offsets metrics quantify the environmental value of an offset, risks, time delays, confidence in outcomes and risk of future loss. The WA calculator is designed to be easily understood, and uses plain English as much as possible. The WA calculator uses the term 'offset value' to quantify the benefit of an offset and, strictly speaking, this field in the WA calculator does not have a unit. However, it is easily converted to area or number of features using the 'proposed offset' field. The EPBC Act calculator uses the term net present value.

An offset counterbalances the significant residual impact through increases in quality and/or averting future loss:

Offset value = Environmental value of increase in quality + Environmental value of averted loss

Environmental value of increase in quality

The quality of an offset site may be increased through revegetation, rehabilitation and/or management of threatening processes for the relevant environmental value.

Environmental value of averted loss

Quantifying averted loss relies on the use of counterfactuals to establish what would have happened in the absence of the offset and comparing them to the offset benefit (improvement in quality and protection of the site).

Discounting to account for time and risk

The WA calculator offset value calculation incorporates the conservation significance score (weighted for risk of extinction) and the relevant time horizons in the offset value calculation. In economic terms, the offset value calculation uses discounting to compare impacts and benefits at different time periods. The offset value calculation is designed to show:

- that the benefits provided today are more valuable than the same benefit realised in the future
- that the long duration of offset implementation (i.e. time over which loss is averted) is more valuable than a short duration
- the larger the time horizon for the offset to be achieved, the smaller the offset value (i.e. net present value).

See Appendix A for more details on the formulas used in the WA calculator.

9.2 Offset value calculation – Area mode

The offset value calculation is most commonly done using area mode. The offset value (i.e. offset area requirement when using area mode) is normally calculated

using a 20-year time period, which represents the foreseeable future over which loss is averted. This includes where the offset is in perpetuity.

When a range of inputs are compared, the WA calculator requires the highest offset area for very short time periods, but the area requirement is reduced if the offset provides the environmental benefit for a longer time period.

Although the calculator allows the entry of a range of variables (including hypotheticals), this does not mean they are suitable to use in assessment or accepted in decision-making. For example, an offset with a duration (averted loss) of only a few years would not likely meet the requirements for an offset to be long term and secure (see Section 9.8 *Duration of offset implementation*).

The WA calculator offset value calculation is based on the formula provided in the EPBC Act offsets 'how to use' guidance and adds time until offset site secured factor in potential implementation delays.

9.3 Offset value calculation – Feature mode

It can be appropriate to use both area and feature mode to fully account for all components of the environmental value (notably species habitats). The feature mode is not intended to duplicate offset requirements, but rather to account for environmental values not adequately captured by area. Therefore, the offset value calculation for feature mode has been simplified to avoid potential duplication of site attributes (risk of future loss, time until offset site secured). Adjustment for quality is not required as feature mode uses presence/absence.

See Appendix A for more details on the formulas used in the metric.

9.4 Offset adequate field

The offset adequate field in the calculator is automatically generated and determines whether the offset value is greater than 100 per cent of the significant residual impact (calculated during step 2). This field does not determine if the impact is acceptable or suitable. It is the decision-maker's role to determine if the offset counterbalances the significant residual impact.

9.5 Manual tally for offset packages

If the user is proposing a package of offsets for their project, they should use the calculator for each part and then provide a manual tally to ensure the offset value is greater than 100 per cent of each significant residual impact and to ensure all environmental values are addressed.

9.6 Risk of future loss

The risk of future loss is the estimated likelihood that the environmental values of a site (or offset area if part of a larger site) will be completely lost in the foreseeable future. Risk of future loss relates to anthropogenic events (such as clearing and

water drawdown) only because these are addressed through improvements in protection.

Risk of loss should consider:

- current tenure and land use and any information about future tenure and land use
- environmental and planning approvals currently in place
- zoning, permitted land uses (and compatibility with conservation objectives)
- existing protections under legislation
- any other relevant information about likely future development.

There are two risk of future loss components of an offset; these are designed to measure the difference between:

1. Without offset – counterfactual to estimate what would have happened in the absence of the offset
2. With offset – benefit the offset brings by improving the protection of the relevant environmental value.

Users should quantify the risk of decline through edge effects, partial clearing, weed invasion, changed fire regimes, grazing, climate change etc. in the future quality and confidence fields.

The risk of future loss should consider whether there are any current development approvals, potential for development and rezoning and the protection mechanism, such as change of land tenure or a conservation covenant. A change in the risk of future loss may be achieved by increasing the level of protection provided by tenure or covenant and is site-specific.

Risk of future loss inputs should ideally be informed by real world data; for example, by using a comparison of dates and determining loss of vegetation in the local area over time. If available, users should provide this information in the first instance.

Appeal 034 of 2019 Appeal Convenor's report suggests the use of background risk of loss from a report was prepared by the University of Queensland for the Department of the Environment and Energy[2] for risk of loss metric inputs. It sets out an approach to determine risk of loss scores and provides data on background deforestation as a proxy. Users may consider this methodology, along with other local information, to determine the risk of loss scores. The department investigated the use of this approach but notes it may not be suitable for all sites in WA. See Appendix B for more details about this report.

In the absence of detailed local information, the department has provided estimates of risk of loss that take account of existing environmental and planning approvals,

[2] University of Queensland Threatened Species Recovery Hub 2017, *Guidance for deriving 'risk of loss' estimates when evaluating biodiversity offset proposals under the EPBC Act*, report to the National Environmental Science Programme, Department of the Environment and Energy, April 2017.

zoning, permitted land uses (and compatibility with conservation objectives), and presence of native vegetation. Table 2 has some examples and suggested ranges for risk of future loss without an offset. Table 3 has some examples of offset tenure or zoning and an estimate of risk of future loss. An offset should propose appropriate security to reduce the risk of future loss.

Table 2: Examples of existing approvals and zonings and suggested ranges for risk of future loss without an offset

Existing approvals and zoning	**Suggested range for risk of future loss without an offset and rationale**
Offset site currently does not contain vegetation (risk of loss that reflects the zoning is only used for currently vegetated areas)	0% (no risk of loss in situ biodiversity values as there are none present).
Existing reserve (e.g. change of purpose from recreation to conservation)	Depends on its vesting purpose, generally 5–15% (some risk that the site could be cleared over the next 20 years) but possibly higher for some reserve types which allow extractive use.
Rural	May vary widely, depending on zoning, approved land use and associated activities, and if any specific controls for vegetation retention or existing management. Most commonly 15–20% (moderate risk that the site could be cleared over the next 20 years) is used, but the risk of future loss should consider site-specific information, local and state planning documents.
Urban	Varies widely, for example: • 20–40% (moderate likelihood that the site could be cleared over the next 20 years) for zoned urban deferred or structure plan in place but site-specific approvals in place; • 40–80% (high likelihood that the site could be cleared over the next 20 years) if located in an area that is likely to be developed, and there are site specific current planning and/or environmental approvals in place. Consideration of existing approvals and zoning should also include local planning schemes and any region scheme, along with relevant land use controls such as structure plans.
Road reserves and other infrastructure corridors	20–40% (moderate likelihood that the site could be cleared over the next 20 years), depending on the width of the infrastructure corridor, adjacent land uses and likelihood of being impacted by widening, realignment or maintenance activities.

Table 3: Example offset tenure or zoning and risk of future loss with offset

Offset tenure or zoning	**Suggested range for risk of future loss with offset and rationale**
Reserve vested for a conservation purpose (IUCN I-IV)	Up to 5% (low risk of future loss) because it is most difficult for these tenure types to be changed
Other reserves (IUCN V & VI)	5–10% (low risk of future loss) may not be as secure as IUCN I-IV

Offset tenure or zoning	Suggested range for risk of future loss with offset and rationale
Conservation covenant in perpetuity and registered on title	5–10% (low risk of future loss) may not be as secure as a conservation reserve
Other types of reserves, purpose not inconsistent with conservation (e.g. recreation, water, some other State Forest purposes)	10–15% (low risk of future loss) activities conducted on the land are consistent with the purpose of the reserve
State Forest (potential future harvest), C Class reserve (e.g. mining and conservation purpose)*	15–20% (moderate risk of future loss) potential future timber harvest or extractive purpose
Reserve vested for conservation but location or other characteristics means there is a chance of future developments; for example, infrastructure alignments, exploration, mining or tourism proposals	15–20% (moderate risk of future loss) location, future development or prospectively
Other zoning	The offset should be long term and enduring and therefore needs to provide sufficient security. This means that offset proposals which do not adequately reduce the risk of future loss are not likely to be accepted by a decision-maker.

**Note: this category may be re-evaluated in future given the Premier's announcement on the future forest management plan.*

Risk of future loss for revegetation of cleared areas involves a counterintuitive risk of future loss calculation. Appeals 046 and 047 of 2019 Appeal Convenor's report contains an example of a rationale for revegetation which starts with a zero risk of future (i.e. there will be no loss as there is no current biodiversity value to lose) and use of a background risk of loss figure after the revegetation is established.

An offset should reduce the risk of future loss to an acceptable level, such as through reservation, change of purpose or the use of a conservation covenant. An offset where the risk of future loss after offset remains 20 per cent or higher would not likely be accepted by a decision-maker.

A high risk of future loss without offset may only be used where existing approvals are in place. For these examples, the offset provides significant averted loss as there is high certainty that the impact will occur.

Consultation question:

The approach to risk of loss for revegetation is counterintuitive as the offset appears to increase the risk of future loss. The department is seeking feedback from metric users to improve the consideration of risk of future loss for revegetation offsets.

Are you aware of any better ways to estimate risk of future loss for revegetation offsets?

9.7 Confidence in result

Confidence in the rehabilitation or offset results is the level of certainty that the proposed outcome will be achieved. The confidence in result should take into account the strength and effectiveness of the proposed measures, the capacity of these measures to mitigate the risk of total loss of the site and the proponent's ability to achieve the predicted result. If revegetation is proposed, it should be planned following the department's *Guide to preparing revegetation plans for clearing permits* (2018).

Proponents can provide confidence in the offset result by considering stochastic events (such as drought, flood and bushfire) and by using an adaptive management approach to ensure the implementation risks are addressed.

Table 4 has some examples of estimated confidence values for rehabilitation credits (step 2) or offset results (step 3).

The estimated confidence percentage may be used to compare potential contractors and offset options.

Note that confidence in the rehabilitation/offset result is equivalent to 'confidence change in habitat quality' (bottom confidence score) in the EPBC Act calculator. This score does not measure confidence in averted loss (top confidence score in the EPBC Act calculator). This is because the confidence in averted loss should not be significantly less than 100 per cent.

Table 4: Examples of estimated confidence in rehabilitation or offset result

Estimated confidence percentage	**Relevant to**	**When to use**
50–60% (very low confidence)	N/A	Where there is very low confidence that the proposed actions will result in the desired outcome, this offset or rehabilitation credit is unlikely to be accepted by the decision-maker. The proponent is therefore advised to improve the revegetation or threat management plan. Very low confidence in the rehabilitation credit or offset result indicates the proponent or contractor has limited experience in undertaking rehabilitation for the relevant vegetation type or that the future quality expected may be too ambitious.
70% (low confidence)	Revegetation and on-ground management offsets only	In most cases, low confidence in the rehabilitation/offset result is unacceptable to the decision-maker and the proponent will need to improve the proposed revegetation plan. There may be cases where low confidence in the rehabilitation or offset result may be, such as development of new techniques, where scientific data has indicated low success rates. However, this type of project should have an adaptive management approach to maximise the chances of success. This type of offset may be considered as a research project.

Estimated confidence percentage	Relevant to	When to use
80% (medium confidence)	Revegetation and on-ground management offsets only	The decision-maker generally requires at least a medium level of confidence that the revegetation or offset will achieve the predicted result. This proponent can provide this by planning the on-ground management for revegetation following the department's *Guide to preparing revegetation plans for clearing permits (2018).*
90%	Revegetation credit, on-ground management offsets and land acquisition offsets	Ideally the rehabilitation offset would provide a high level of confidence that the predicted result will be achieved. Proponents can achieve this by ensuring best-practice planning and implementation of revegetation or threat management offsets.
90–95%	Land acquisition offsets only	Land acquisition offsets provide the highest estimated confidence in the predicted result. This is because change of tenure does not rely on implementation of a revegetation or threat management plan and is less subject to environmental risks.
95–100%	On-ground management offsets and land acquisition offsets	May be used if the offset is provided in advance of impact. In the case of on-ground management offsets, this means the offset is mature enough to provide confidence that the offset does or will provide the environmental value.

Note: Confidence in improving the quality of existing vegetation (rehabilitation) is easier to achieve and therefore should be higher than confidence in revegetation (where no vegetation currently exists).

9.8 Duration of offset implementation (time over which loss is averted)

The policy and guidelines require that offsets are enduring, enforceable and deliver long-term strategic outcomes. Users must satisfy these policy considerations separately from the number of years they enter into the duration of offset implementation field.

The offset duration is the number of years over which an offset will be actively implemented, including on-ground management and protection. A timeframe of 20 years is normally used in offset calculations because this represents the foreseeable future and the maximum time over which averting loss can be claimed for protecting land.

A user's offset proposal should be clear about the following aspects of duration of offset implementation:

- on-ground management offsets – number of years of for offset activities to be undertaken plus monitoring period
- land acquisition offsets – 20 years including those sites protected in perpetuity
- for offsets that include both on-ground management and land acquisition, the longer time period should be used.

Table 5 has example values for input into the duration of offset implementation field (step 3). See also *Section 9.1 Offset value (net present value)*.

Table 5: Examples of duration of offset implementation

Number of years	Relevant to	When to use
20 years	Land acquisition offsets	Twenty years is a measure of the foreseeable future, and is the standard entry for land acquisition offsets, including for sites protected in perpetuity (reservation, ceding and conservation covenants).
20 years	On-ground management offsets	On-ground management offsets would usually be undertaken on land which provides sufficient security, such as conservation covenant. Offset security is determined on a case-by-case basis but should be secure, longer term and enduring.
Less than 20 years	On-ground management offsets	If on-ground management activities will be undertaken on land which is already secure, periods of less than 20 years may be considered. In such cases, this entry should reflect the duration of the offset and monitoring period; for example, five-year project plus five-year monitoring period (10 years).

If users enter a time period of less than 20 years in the duration of offset implementation field, they must adjust all other inputs for this time period. For example, if a 10-year period is used, future quality, risk of future loss and time until ecological benefit must all reflect the shorter time over which the loss is averted.

9.9 Time until ecological benefit

Time until ecological benefit is the estimated time difference between the impact and when the environmental benefit of the offset will be realised. The user must take into account any time lag between the start of clearing and the time when an ecological benefit is realised.

Proponents should make their best endeavours to ensure offsets are well planned and take an adaptive management approach. This means that although the user may estimate the time until ecological benefit using the WA calculator, they should not limit the implementation phase of their project to this figure as actions should continue until the intended environmental outcome is achieved.

9.10 Time until offset site secured

This is the estimated length of time between the impact and when the offset site is expected to be secured. The longer the time taken to reduce the risk of future loss, the greater the offset requirement will be. Table 6 includes examples of inputs to the time until offset site is secured (step 3).

Table 6: Examples of time until offset site secured

Number of years	Relevant to	When to use
1	Land acquisition offsets	The smallest number available is one year so use this even if the offset site is already secure, such as when using a banked offset. Note that if the site is not already identified as a banked offset, land already acquired may not be sufficiently additional.
	On-ground management offsets	The smallest number available is one year so use this even if the offset site is already secure, such as on-ground management offsets on land which is already covenanted or reserved. Note that these types of offsets have to demonstrate that they are sufficiently additional.
1–2 years	Land acquisition offsets	When the land has been identified and initial negotiations with the landholder and the acquisition process have begun.
	On-ground management offsets	When the land on which on-ground management will occur has become the subject of negotiations with the landholder to provide security.
3–4 years	Land acquisition offsets	When suitable land has not been identified at the time of assessment.
	On-ground management offsets	When suitable land has not been identified at the time of assessment.
More than 5 years	Land acquisition offsets and on-ground management offsets	Five or more years to secure the offset is not likely to be acceptable to the decision-maker.

10. Conservation areas

The WA calculator allows for entry of a ratio for impacts on conservation areas as the likelihood of extinction and probability of catastrophe (used for threatened species and ecological communities) does not apply. An offset ratio set by the regulatory agency may be appropriate.

The importance of Bush Forever sites (whether or not they are not reserved for conservation purposes) is recognised in *State Planning Policy 2.8 Bushland policy for the Perth metropolitan region* (SPP2.8). Users should apply a ratio consistent with SPP 2.8 as the decision-maker will consider this planning policy during assessment.

11. Early offsets and banked offsets

The decision-maker will consider the time lag between impact and implementation of an offset during impact assessment. Early offsets (in advance of impacts) are desirable as they address this time lag. Early offsets may be challenging to implement where the significant residual impacts of development are not well defined as the evaluation of offset suitability needs to ensure the significant residual impacts

of a proposal are counterbalanced (relevant under principle 3 of the policy). Early offsets need to be identified so that baselines and time periods can be established.

Banked offsets are a form of early offsets where a portion is used for a current approval and remainder available for future significant residual impacts. As for other offsets, long-term security and management of offset bank areas needs to be determined in consultation with the future land manager.

Early offsets need to ensure that a baseline is established so that quality (with and without offset), time until ecological benefit and confidence can be adjusted, depending on when the pre-impact offset is proposed. For example, confidence in or a revegetation offset done in advance can account for the years of implementation which have already occurred (for example this could be as high as 95–100% for an on-ground management offset which is already well advanced). In this same example, the full improvement of quality would be counted (i.e. compared against the baseline established before implementation of the offset) at the time of approval.

12. Minimise duplication

A goal of the WA offsets framework is to minimise duplication between WA and EPBC Act offset requirements. Decision-makers may recognise offsets provided under EPBC Act approvals for the same impacts on the same environmental values under State assessments. However, as there are different decision-making processes under Commonwealth and State legislation it may not be possible to align offset requirements. WA is progressing negotiation of bilateral agreements to further streamline and align offset requirements.

13. Evaluating the suitability of an offset proposal

When assessing the suitability of an offset proposal, the department will examine consistency with all aspects of the offsets framework. Consideration of recovery plans and academic publications can also inform evaluation of the suitability of an offset proposal where relevant.

If there is a risk that the relevant environmental value may not be achieved due to threatening processes (such as spread of phytophthora dieback, changed fire regimes or systemic threats such as climate change), the offset proposal should include adequate management to address this risk. If it is not possible to adequately manage these threatening processes, the proposed offset may not be suitable.

14. Decision-making

The WA calculator and guideline have been developed to support decision-making, and judgement and expertise are required for case-by-case evaluation of potential impacts and proposed offsets. Decision-makers may take other matters into account

(in addition to the metric inputs and calculator result) when determining the significance of residual impacts and the adequacy of proposed offsets. The decision-making process under the EP Act also considers the reasonableness of the outcome.

15. Offset implementation

Proponents should ensure their offsets are well planned and adopt an adaptive management approach during offset implementation.

The department will use implementation reporting to verify metric inputs, such as through annual reporting. Annual reporting should progressively report on implementation and offset outcomes. Progress on offset implementation will be reported in the Offsets Register over time.

Proponents should use adaptive management approach (principle 5 of the policy) for offset planning and implementation, and not be limited by the metric inputs used at the time of assessment. The purpose of the WA environmental offsets framework is to ensure the intended environmental outcome is achieved. For example:

- a figure of seven years' time until ecological benefit may be used in offset calculations, but it may take 10 years to achieve the ecological benefit;
- an on-ground management offset may be planned for five years (followed by five years of monitoring) but, during implementation, the improvement in fauna habitat is delayed due to drought and some areas of revegetation initially being unsuccessful, requiring an additional two years of implementation and extension of the monitoring period; and
- future quality of an offset area was anticipated to be 6, but monitoring over time indicates that the area has not reached that quality, so threat management should be continued beyond the initial timelines.

Any parts of the offset plan which are less successful than anticipated during the planning phase should be reported and revised using an adaptive management approach. If trend data demonstrates that the offsets implementation is likely to be unsuccessful, the proponent should contact the regulator.

Spatial data on the location of offsets is reported on the Offsets Register and provided to data.wa.gov.au. Spatial data can be used to avoid double counting of offset areas and ensure the locations are considered in decision-making outside the EP Act.

16. Impacts on offset sites

Impacts to offset sites should be avoided if possible. In cases where impacts to offset sites are proposed, the assessment will also consider the original impacts (which are no longer offset). This is a case-by-case assessment and there are no defined metric inputs for this situation.

Custodian and review

The currency of this document will be continuously evaluated, and reviewed no later than three years from the date of issue or sooner as required.

Document details	
Lead group (custodian)	*DWER Environmental Policy*
Current version	*Draft for consultation*

Appendix A - Comparison of fields and formulas used in WA and EPBC Act calculators

Table A1: Summary of changes from the EPBC calculator

<table>
<tr><th>Change from EPBC calculator</th><th colspan="2">Rationale for change to WA metric</th></tr>
<tr><td>Addition of state values</td><td colspan="2">The field ‘conservation significance’ in the WA metric includes the same threat status categories as the EPBC Act calculator, but adds the other categories for state environmental values (e.g. wetlands, highly cleared vegetation types and conservation areas). Addition of state values also brings flexibility to cater for the increasing knowledge of environmental data (e.g. priority species and ecological communities).</td></tr>
<tr><td>Addition of rehabilitation credit step</td><td colspan="2">Stakeholders have requested more recognition of onsite revegetation or rehabilitation, so the WA calculator includes this step in the mitigation hierarchy to provide transparency in calculations of the significant residual impact.</td></tr>
<tr><td>Addition of feature mode</td><td colspan="2">The WA calculator has included ‘feature’ mode as an option, to calculate impacts and offsets which are not easily measured by area. This simplifies a consideration of several sections of the EPBC Act calculator.</td></tr>
<tr><td>Addition of ratio for conservation areas</td><td colspan="2">The WA calculator includes a user-entered ratio to capture potential impacts on conservation areas (likelihood of extinction or probability of catastrophe do not apply to conservation areas in the same way as they do for other environmental values).</td></tr>
<tr><td>Time over which loss is averted calculation/risk-related time horizon</td><td colspan="2">The WA calculator has been built from the formula contained in the EPBC Act guidance and ensures that offsets with a long duration of offset implementation (i.e. time over which loss is averted) are more valuable than those with a short duration. This calculation is described in more detail in Section 9 Step 3: Calculating offsets and formulas are included in Table A2).</td></tr>
<tr><td>Addition of ‘time until offset site secured (years)’ field</td><td colspan="2">The EPBC Act calculator does not have a field for ‘time taken until the offset site is secured’, therefore does not adjust commencement of the time over which the loss is averted. The WA calculator can be customised for many different situations. The effect of this field is a greater offset requirement where the change in risk of loss takes longer to realise.</td></tr>
<tr><td>Same input names for threatened species and ecological communities</td><td colspan="2">The EPBC Act calculator uses different terminology and sections of the calculator for species habitats and ecological communities. The WA calculator simplifies the approach by using the same input names for all environmental values except conservation areas.</td></tr>
<tr><td>Removes ‘confidence in averted loss’ score to avoid a likely source of error</td><td colspan="2">The EPBC Act calculator has two confidence percentages – confidence change in habitat quality (bottom score) and confidence in averted loss (top score). It is not obvious to most users why these are different and/or how to put a percentage on confidence in averted loss.
The WA calculator removes the confidence in averted loss score and incorporates a fixed value of 100% into the formulas. This is because the confidence in averted loss should not be significantly less than 100% and removes a likely source of error.</td></tr>
<tr><td>Simplification of the language and display</td><td colspan="2">Overall, the WA metric simplifies terminology and inputs to improve the user experience, notably through separating inputs into clear steps and avoiding more technical economic terminology, as outlined below:</td></tr>
<tr><td></td><td>EPBC Act calculator</td><td>WA calculator</td></tr>
<tr><td></td><td>Complex display which is hard to navigate</td><td>Separation into clear steps to guide users</td></tr>
<tr><td></td><td>Annual probability of extinction</td><td>Conservation significance score</td></tr>
<tr><td></td><td>Generic term ‘area’ (cells G19 & G23)</td><td>Significant impact (hectares) (Step 2, cell D16)</td></tr>
<tr><td></td><td>Generic term ‘start area’ (cells Y20 & Y23)</td><td>Proposed offset area (hectares) (Step 3, cell E15)</td></tr>
<tr><td></td><td>Adjusted hectares, separate rows and methodology used for number of features or individuals</td><td>Mitigation credit, significant residual impact and offset value are all automatically adjusted when the user selects area or feature mode</td></tr>
<tr><td></td><td>Risk-related time horizon/Time over which risk is averted</td><td>Duration of offset implementation</td></tr>
<tr><td></td><td>Future area with offset, future area without offset, raw gain</td><td>These automatically generated numbers are used in the calculator but do not need to be displayed, which removes unnecessary complexity for the user</td></tr>
<tr><td></td><td>Net present value</td><td>Offset value</td></tr>
<tr><td>Significantly more guidance to users</td><td colspan="2">The WA metric guideline has details about how to use the calculator, many examples and case studies. The calculator includes embedded guidance.</td></tr>
<tr><td>Removal of other impact calculators which were not used in WA</td><td colspan="2">Some sections of the EPBC Act calculator (threatened species’ birth rate, mortality rate, number of individuals and change in habitat condition, and conversion of on-ground activities to financial contributions) are not used in WA. These are still available in the EPBC Act calculator if required.</td></tr>
<tr><td>Removal of direct link to cost</td><td colspan="2">The WA metric is a tool to help quantify an adequate offset to counterbalance the significant residual impacts of a proposal. The reasonableness of the outcome and cost effectiveness of the offset are separate considerations of an offset decision. The WA calculator removes potential for confusion between offset quantum and costs.</td></tr>
</table>

Table A2: Offsets calculator formulas

Step	WA calculator & formula	Equivalent part of EPBC Act calculator & formula	Notes
Step 1: Determining conservation significance	**Conservation significance score** Critically endangered = 6.8% Endangered = 1.2% Vulnerable = 0.2% All other options = 0.1% Conservation area = 0.0% (ratio is used instead) OR Manual entry + 0.1% probability of catastrophe	**Annual probability of extinction** Critically endangered = 6.8% Endangered = 1.2% Vulnerable = 0.2% Other probability of extinction may be manually entered.	WA calculator adds the other categories needed for state environmental values. For species or ecological communities without a threatened status, the default value is the 0.1% probability of catastrophe or user-entered ratio for conservation area.
Step 2: Calculating significant residual impact PART A	**Total quantum of impact** **Area** $Total\ quantum\ of\ impact = SI \times \frac{Q_i}{10}$ Where: SI = Significant impact (hectares) Q_i = Quality (scale) [of the impact site as relevant to the environmental value] **Feature** $Total\ quantum\ of\ impact = N_i$ Where: N_i = Number of type of feature on the impact site	**Total quantum of impact** (formula not stated in guidance but it is clear from the spreadsheet) $Total\ quantum\ of\ impact = Area \times \frac{Quality}{10}$	WA calculator uses the term 'significant impact' instead of area for clarity – calculations are the same.
Step 2: Calculating significant residual impact PART B	**Rehabilitation credit** **Area** $Rehabilitation\ credit = \left(\frac{[(Q_{mw} - Q_{mc}) - (Q_{mo} - Q_{mc})] \times C_m}{\frac{(1+S)^{T_m}}{10}} \right) \times A_m$ Where: Q_{mw} = Future quality WITH rehabilitation (scale) Q_{mc} = Current quality of rehabilitation site (scale) Q_{mo} = Future quality WITHOUT rehabilitation (scale) C_m = Confidence in rehabilitation result (%) S = Conservation significance score (%) T_m = Time until ecological benefit (years) A_m = Proposed rehabilitation (area in hectares) **Feature** $Rehabilitation\ credit = \frac{[(N_{mw} - N_{mc}) - (N_{mo} - N_{mc})] \times C_m}{(1+S)^{T_m}}$ N_{mw} = Future number WITH rehabilitation N_{mc} = Start number (of type of feature) N_{mo} = Future number WITHOUT rehabilitation C_m = Confidence in rehabilitation result (%) S = Conservation significance score (%) T_m = Time until ecological benefit (years)	The EPBC Act calculator may be used to calculate the value of onsite rehabilitation but it has not been included as a separate step (can be done manually). If this step is not articulated in the calculator, there is potential for dispute about the significant residual impacts (number and calculation methodology).	Rehabilitation credit is a separate step in the WA calculator to recognise proponent efforts in onsite rehabilitation, and provide transparency in calculations. Rehabilitation credit may only be used where biodiversity values will be returned to the site.

Step	WA calculator & formula	Equivalent part of EPBC Act calculator & formula	Notes
Step 2: Calculating significant residual impact PART C	*Significant residual impact = Total quantum of impact – Rehabilitation credit*	As credit for onsite rehabilitation has not been included in the EPBC Act calculator, a manual workaround is required if it is included.	The WA calculator separates the calculation of significant residual impacts into steps which provides transparency.
Step 3: Calculating offsets	**Offset value** Offset value = Environmental value of on-ground offset actions (increase in quality) + Environmental value of protection (risk aversion) $Offset\ value\ (area) = \left(\frac{[(Q_{ow} - Q_{oc}) - (Q_{oo} - Q_{oc})] \times C_o}{(1+S)^{T_o}}{10} \times [A_o \times (1 - R_{oo})]\right) + \left(\frac{Q_{ow}}{10} \times \frac{\left[A_o \times \left(1 - \left(\frac{(R_{ow} \times D) + (R_{oo} \times (20 - D))}{20}\right)\right)\right] - [A_o \times (1 - R_{oo})]}{(1+S)^U}\right)$ where: Q_{ow} = Future quality WITH offset (scale) Q_{oc} = Current quality of offset site (scale) Q_{oo} = Future quality WITHOUT offset (scale) C_o = Confidence in offset result (%) S = Conservation significance score (%) T_o = Time until ecological benefit (years) A_o = Proposed offset (area in hectares) R_{oo} = Risk of future loss WITHOUT offset (%) R_{ow} = Risk of future loss WITH offset (%) D = Duration of offset implementation (maximum 20 years) U = Time until offset site secured (years) $Offset\ value\ (number) = \frac{[(N_{ow} - N_{oc}) - (N_{oo} - N_{oc})] \times C_o}{(1+S)^{T_o}}$ where: N_{ow} = Future number WITH offset N_{oc} = Start number (of type of feature) N_{oo} = Future number WITHOUT offset C_o = Confidence in offset result (%) S = Conservation significance score (%) T_o = Time until ecological benefit (years)	**Net present value** $Net\ present\ value = \frac{adjusted\ gain}{(1 + annual\ probability\ of\ extinction)^{\ time\ horizon}}$ $Net\ present\ value = \left(\left(\frac{net\ present\ gain\ in\ quality}{10}\right) x future\ area\ without\ offset\right) + \left(\left(\frac{future\ quality}{10}\right) x\ net\ present\ value\ of\ adjusted\ gain\ in\ averted\ loss\right)$	The WA calculator has been built from the formula contained in the EPBC Act 'how to use' guidance, with the addition of 'time until offset site secured (years)' field. The EPBC Act calculator requires a larger offset at 20 years than for smaller time periods (all other inputs being equal). The WA calculator ensures that offsets with a long duration of offset implementation (i.e. time over which loss is averted) are more valuable than those with a short duration. Time until offset site secured is not included in the EPBC Act calculator. Accounting for different types of time horizons means that the WA calculator can be customised to many different situations. The effect of this field is a greater offset requirement where the change in risk of loss takes longer to realise.

Appendix B – Published risk of loss estimates

The risk of loss component of the offset value (net present value) is determined by:

- the risk of loss without the offset (counterfactual)
- risk of loss with offset
- overall percentage reduction in risk of loss.

Decision-making also considers whether the risk of loss with offset is sufficiently low (long term and enduring under principle 6 of the policy). This means that risk of loss figures need to be as accurate as possible, while acknowledging they rely on predicting the future.

The department investigated the potential to use *Guidance for deriving 'risk of loss' estimates when evaluation biodiversity offset proposals under the EPBC Act (2017)* prepared by the University of Queensland. Use of this report was suggested in the Appeal Convenor's report for Appeal 034 of 2019 for the grant of a clearing permit 7982/1.

The approach suggested the guidance is that the first consideration should be *development pressures which would trigger an offset requirement under any legislation should* ***not*** *be incorporated into the risk of loss figures for the proposed offset site*.

This approach relies on future offset requirements to counterbalance impacts of development. However, there are a wide variety of circumstances in WA which means there is uncertainty about whether future impact would require an offset. For example, not a controlled action decisions for MNES, clearing which is not a significant residual impact (i.e. falls under principle 2 of the policy and no offset is required) or clearing done under exemption do not require offsets.

The report also recommends consideration of the recent loss of vegetation or habitat in the local area. However, in WA there are significant gaps in the collation of data on statutory approvals to clear and extent and condition of native vegetation.

In the absence of more detailed local data, the report then recommends the use of generic forest deforestation data as a proxy background risk of loss, and percentages are provided by local government area (LGA). Investigation of this data revealed several potential issues with using generic forest deforestation data:

- The generic forest deforestation data for use as risk of loss without offset ranges between 0 and 14% for WA LGAs (for a 20-year time period over which loss is averted). The use of low risk of loss figures does not reflect the development pressure on native vegetation in many areas.
- The generic forest deforestation data does not account for inherent risks associated with tenure and zoning (e.g. a different risk of loss would be expected for private land zoned for agricultural or urban purposes compared with reserves even though both are within the same LGA).

- As only woody vegetation could be measured in the methodology, all ELZ LGAs have entries of 0% (or very close). These figures do not reflect the true rate of loss due to methodology (no overstory or very sparse overstory).
- Twelve per cent of all WA LGAs (in the South West and Wheatbelt) were considered 'outliers' in the analysis and the mean is reported for these LGAs. Use of the mean would be an over or underestimate for a significant number of LGAs.
- Neighbouring LGAs which have similar land uses and risks have very different percentages of vegetation loss, which would likely to lead to cross-boundary inequity.
- Use of the percentages would lead to some unintended outcomes for highly cleared LGAs (notably Wheatbelt and urbanised areas in the Southwest).
    - In poorly reserved areas, acquisition of remaining native vegetation may be a desirable offset type. However, if the overall reduction in risk of loss percentage is too low, this potentially drives requirements for a large offset area. Such offset requirements would be unlikely to satisfy the policy principles to be proportionate.
    - Revegetation and rehabilitation offsets are valuable in highly cleared landscapes. Similar to land acquisition offsets, if the background risk of loss percentages are unrealistically low, the value of providing additional native vegetation would not be adequately recognised.

While the method proposed offers some value in helping to define a risk of loss score, the guidance would not likely be suitable for broad use across WA. In the absence of data, WA has some estimates of risk of loss that take account of existing environmental and planning approvals, zoning, permitted land uses (and compatibility with conservation objectives), and presence of native vegetation (see section 9*.6 Risk of future loss*).

Glossary

Additional	Over and above what would have been achieved in the absence of the offset (i.e. is additional to existing legislative or management requirements).
Averted loss	Prevented or avoided loss
Counterfactual	Estimate of what would have happened in the absence of the offset. Often required to establish a baseline.
Discounting	The process of converting an offset implemented in a future time period to an equivalent value received immediately.
Foreseeable future	Time over which the future can be reasonably predicted, usually a period of 20 years is used.
Net present value	A given benefit today holds more value for an environmental value than the same benefit realised in the future

References

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