GOVERNMENT OF
WESTERN AUSTRALIA

Guideline for Cumulative Impact Assessment

Environmental Protection Authority

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Contents

1. Purpose

The purpose of this guideline is to provide an overview of what cumulative impact assessment (CIA) is and how it is undertaken as a part of environmental impact assessment (EIA) under Part IV of the Environmental Protection Act 1986 (EP Act) in Western Australia (WA). It provides the basis for a consistent approach to CIA to be applied by proponents, across the majority of environmental factors and across the different regions of WA.

This guideline is intended to clarify the EPA's expectations of proponents for CIA and aims to improve information quality on cumulative impacts, supporting informed decision-making and improved environmental outcomes.

The EPA recognises that with increasing pressure from development on parts of WA's unique environment, as well as other pressures such as climate change, it is imperative to strengthen CIA as a process. Reflecting this, cumulative impacts were added to the definitions provided in section 3(1)(b) of the EP Act as part of amendments made to the EP Act in 2020. This makes it explicit that the EPA's consideration of impacts on the environment must include cumulative impacts.

As a high-level guidance document, this is not a technical guide to undertake CIA, nor specific to any environmental value. The need for specific environmental factor guidance will be considered in future reviews of the EPA's environmental policy suite.

This guideline should be read in conjunction with the *EIA Practice Guide*, the *Statement of Environmental Principles, Factors, Objectives and Aims of EIA* (SEPFOA), and the Environmental Factor Guideline and Technical Guidance documents.

2. Overview of CIA

Cumulative impacts are the total impacts on the environment of a proposal combined with one or more past, present or future activities and pressures. CIA considers the impacts of a proposal on the environment in the context of other past, current and future activities and pressures affecting the same environmental value, to ensure outcomes remain consistent with the EPA's objectives over time. The environmental impacts of greenhouse gas emissions (GHG) are treated differently from other factors with respect to cumulative impacts. For GHG emissions, proponents should continue to follow the approach outlined in the EPA's Greenhouse Gas Emissions Environmental Factor Guideline.

CIA is not new; the EPA has always required CIA to be conducted as part of EIA. A simplified comparison between cumulative impacts and environmental impacts (without a cumulative focus) is provided in Table 1. Additional points of difference between CIA and EIA (conducted without consideration of cumulative impacts) are highlighted in textboxes throughout the guideline.

Table 1: Comparison of environmental impacts and cumulative impacts

Environmental Impacts	Cumulative Impacts
Single project focus	Multiple activities/pressures
Direct/indirect effects	Total effects
Short to medium term	Long term
Local scale	Regional scale

As with EIA and CIA, the EPA considers the holistic impacts of a proposal as part of its decision-making process. Holistic Impact Assessment (HIA) is distinct from CIA. While CIA evaluates cumulative impacts of the proposal in combination with other activities and over time, HIA considers how the proposal's impacts connect and interact across the environment as a whole, including all relevant environmental factors and values.

CIA should not be viewed as an opportunity to dilute the potential impacts of a proposal, nor should it focus solely on the incremental impacts of a proposal. CIA is also not simply a listing exercise.

CIA does not require detailed retrospective assessment of the impacts of past and current activities, since the characterisation of the baseline at the time of an assessment already takes into account the impacts of past and present activities and pressures.

CIA is not a generic, one-size-fits-all process as the process and expectations will depend on the type of environmental value, the state of the existing environment, the type of proposal, the availability of data along with other issues identified. This results in a bespoke CIA for each proposal with requirements being determined during the scoping process or pre-referral.

Stakeholder engagement is a critical component of CIA (as it is in EIA). Engaging stakeholders early and meaningfully provides valuable local knowledge, context and builds legitimacy and trust in the assessment process. Stakeholders can be a key source of information about existing pressures and values in the region, helping to ensure that cumulative impacts are properly understood and addressed.

Proponents are expected to take reasonable steps to gather relevant information and to assess the cumulative impacts of their proposals, in accordance with the definition of impacts under s. 3 of the EP Act. The EPA Services directorate within the Department of Water and Environmental Regulation (DWER), which supports the EPA to deliver its EIA functions, also has an important role to play, in guiding and supporting the CIA process.

The EPA may lead or contribute to regional or strategic CIA, which can inform and reduce the need for proposal-level CIA. Regional or strategic CIAs might be found in regional plans, strategic assessments, strategic advice prepared under s.16 of the EP Act or strategic planning instruments under the Planning and Development Act 2005. Potential Cumulative Impacts of Proposed Activities and Developments on the Environmental, Cultural and Social Values of Exmouth Gulf, released by the EPA in 2021, is an example of a regional CIA that may support future EPA assessments in that region.

3. CIA Process

CIA is structured around three main steps: scoping, assessment and decision-making, followed by post-assessment activities. A high-level visual summary of the CIA process is shown in Figure 1. Scoping should begin early, prior to referral, to ensure that key environmental values and potential cumulative impacts are identified from the outset. The timeframes for CIA align with the EIA process as outlined in the EIA Practice Guide.

Throughout these steps, the mitigation hierarchy should be applied to identify opportunities to avoid, minimise, or offset impacts. Appendix A provides tools and resources to support each step of the process and Appendix B provides illustrative scenarios demonstrating how CIA may be applied in practice.

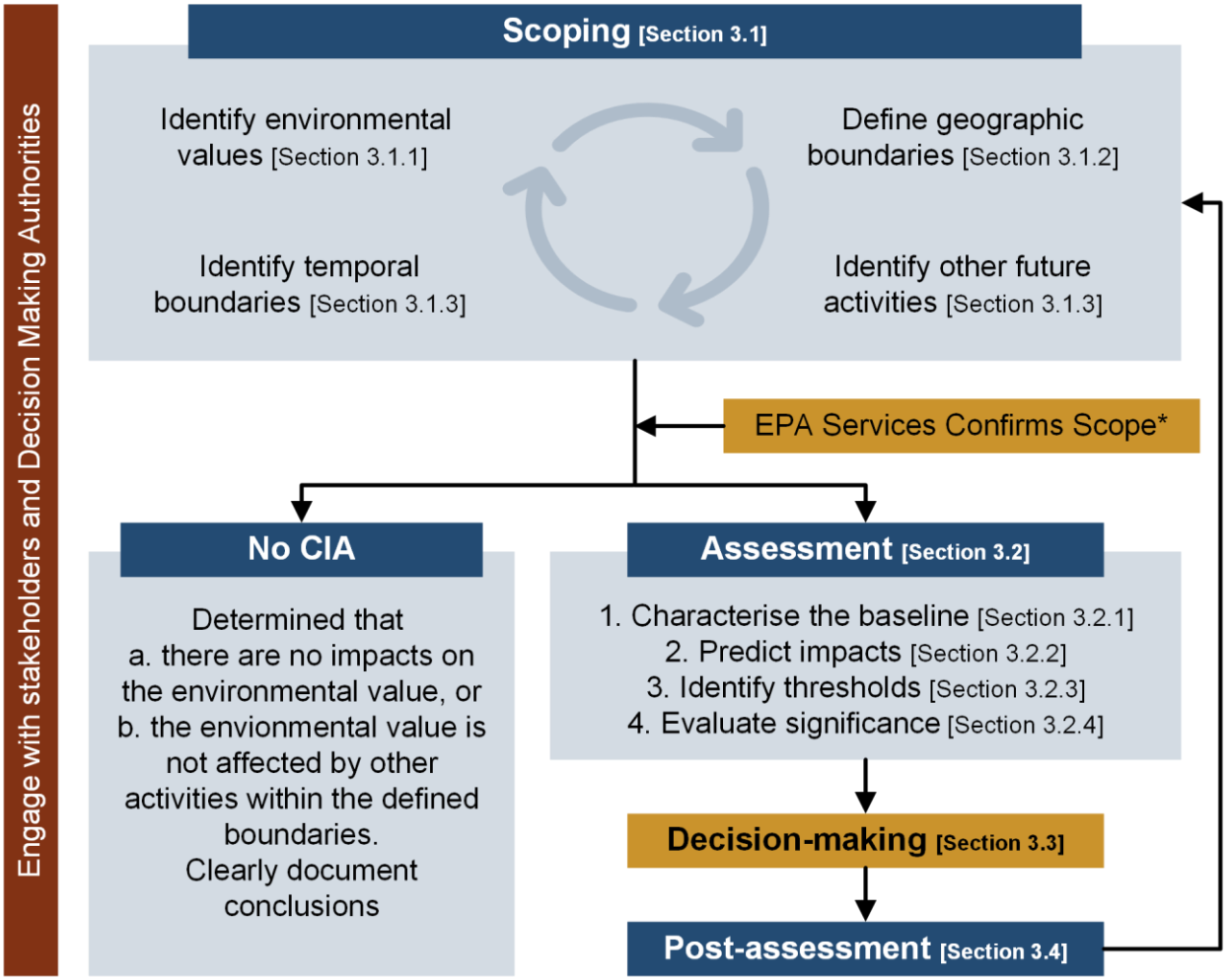

Figure 1: High-level summary of the CIA process

4. Scoping

Scoping decisions for CIA are determined through discussions between proponents (and their consultants) and EPA Services, commencing with pre-referral meetings. They may also be informed by consultation with other Decision-Making Authorities (DMAs) and other areas of the DWER.

Each CIA will be unique, and specific requirements should therefore be defined at pre-referral or the scoping stage of the assessment. The EPA will take a pragmatic approach to determining any requirements for CIA.

As part of scoping, it is important to consider impact pathways, the connections between activities or pressures and the environmental values they may affect. Understanding these pathways will help to identify which values, boundaries, and future activities should be included in the assessment.

4.1.1 Environmental Values

What environmental values should be subject to CIA?

Scoping requires the identification of the environmental values for which additional CIA considerations might be required. These considerations involve a structured assessment of

future activities and pressures acting on the environmental values to add value to EIA.

CIA will not be required for all environmental values. There may be environmental values in a region which are under cumulative pressure and of concern, but if the proposal has no potential impact on the environmental value, then it is not the responsibility of that proponent to assess the cumulative impacts on the environmental value. In this instance, CIA will not be required for that value (and its relevant factor). In some cases, the proposal at hand may be the only activity likely to impact on a particular environmental value of concern at present and into the future (e.g. a short-range endemic invertebrate), in which case CIA (i.e. consideration of future activities and pressures) will not be required. However, such impacts, if significant, would still need to be assessed as part of regular EIA for that proposal. Scenarios 1 and 2 of Appendix B illustrate cases where CIA was not required for an environmental value due to either no direct impacts or no cumulative impacts.

In most cases, scoping of environmental values for inclusion in the CIA will be the same as scoping for EIA in general. This is because the guidelines for significance evaluation (outlined in Section 6 of the EPA's SEPFOA) take an environment-centred perspective, and require consideration of cumulative impacts from past, present and future activities. Therefore, environmental values that are impacted by the proposal and are also under cumulative pressure should be scoped into the EIA as well as subject to CIA. The exception is the case mentioned above where the proposal is the only activity likely to impact on a particular environmental value.

4.1.2 Geographic Boundaries

What geographic boundaries should apply?

The appropriate geographic boundaries of the study area are likely to be different for each environmental value. The guiding principle is that geographic boundaries must be environmentally defensible within its regional context, and proponents should justify their proposed boundaries based on good science. Some examples are shown in Table 2.

Table 2: Examples of potential study areas

Environmental Value	Possible Geographic Boundary
Significant Vegetation	Catchment, species extent, ecosystem type or landform system
Water Quality	Aquifer and interconnected aquifers, catchment, estuary, river basin, stream
Migratory Fauna	Breeding grounds, migration routes, roosting sites, total range of affected population

Geographic boundaries should also take into consideration the location of other current and future activities and the pathways through which impacts from these activities might arise.

CIA may result in geographic boundaries that are broader than is typical for EIA. This is because CIA places more emphasis on the geographic boundary for each value being ecologically defensible i.e., reflective of the range of the value within its regional context and taking into consideration the potential impact pathways of other projects.

Choosing boundaries isn't just including large areas or areas with negligible cumulative impact and should be avoided as it can dilute the total impact on the environmental value. In some cases, boundaries may not be easily defined spatially (i.e. airshed) therefore, a narrative to justify these boundaries should be provided. Choosing and justifying boundaries helps focus the CIA, aids decision-making and reduces complexity.

4.1.3 Other Future Activities and Pressures

What other future activities and pressures should be considered?

'Activities' are proposals or developments that are subject to some form of approval process. 'Pressures' includes potential causes of environmental impact other than activities subject to approval processes, for example climate change and invasive species.

Since the baseline characterisation required for EIA already takes into consideration the impacts of past and present activities on the receiving environment, it is not necessary to elaborate the specific impacts of these activities as part of the CIA.

Although, the EPA expects more than just a list of future activities and pressures assessing their impacts will generally not need the same level of detail as for the proposal alone. In this case, a broad-brush assessment is likely to be adequate.

The inclusion of other future activities and pressures in the CIA is the most significant difference over EIA practiced without a cumulative perspective.

Future activities

The EPA recognises that identifying future activities can be challenging. The EPA will assist proponents in identifying proposed and/or future activities but expect proponents to attempt to identify activities to inform CIA during pre-referral.

In determining what activities should be considered, the EPA expects proponents to consider proposals or developments that are subject to a significant statutory approvals process. This will typically include proposals or developments referred under:

- Part IV of the EP Act
- The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
- The Petroleum and Geothermal Energy Act 1967 (PGE Act)
- Proposals identified within an approved strategic assessment under either the EP Act or the EPBC Act.

Proponents should also have regard to other approval processes that may contribute to cumulative impacts, such as:

- Activities authorised under Part V of the EP Act (e.g., Clearing Permits, Works Approvals, Licences)
- Mining proposals under the Mining Act 1978 where clearing may be permitted
- Proposals that are no longer operational but have ongoing environmental impacts (e.g., leaching from tailings dams)
- Urban developments under planning legislation and processes
- Land zoned urban or industrial in regional and local planning schemes.

When identifying what other approval processes are to be considered, effort should be applied strategically.

Refer to Appendix A for resources to assist in identifying future activities.

The initial identification of future activities to be included in the CIA should occur at the scoping stage. However, new activities may materialise after scoping. In such cases, the EPA may require their inclusion to ensure that the CIA reflects the best available information and appropriately informs the EPA's assessment. While the EPA will retain flexibility, the general 'cut-off' point (after which new activities and pressures will not be required to be considered) is at the submission of the proponent's Environmental Review Document (ERD).

Induced impacts occur when other activities are likely to proceed because the proposal goes ahead. These should be acknowledged even if there is not enough information to describe them in detail. For example, a new port may encourage new industries, or a tourism development may change visitor behaviour.

It is acknowledged that the level of detail available about future activities may be limited, particularly for proposals with longer timeframes. To support CIA, the EPA strongly encourages the sharing of relevant information between proponents, within the bounds of commercial confidentiality. This helps ensure that the EPA has access to the best possible information when forming its assessment and recommendations on whether a proposal should be implemented. The EPA is also actively engaged in initiatives such as the Index of Biodiversity Surveys for Assessments (IBSA) and the Index of Marine Surveys for Assessments (IMSA), which aim to improve the availability of environmental information and further support CIA.

Other pressures

In addition to activities, pressures such as climate change or invasive species may also contribute to the cumulative impacts on certain environmental values. Proponents should consider the potential impacts of climate change on the environmental value, including potential changes in sea level1, rainfall, temperature, frequency of storms etc. The impact of other known pressures (e.g. invasive species, dieback) should also be considered as part of the CIA, notwithstanding that these pressures may have also been considered in listing processes under the Biodiversity Conservation Act 2016 (BC Act) and the EPBC Act that in turn inform scoping.

4.1.4 Temporal Boundaries

What temporal boundaries should apply?

CIA involves the consideration of both the past and the future. However, it is usually not necessary to define a historical start date since the baseline characterisation will already reflect the impacts of past activities.

[1] For example, State Planning Policy 2.6 *State Coastal Planning Policy* establishes an 'allowance' for sea level rise, based on a vertical sea level rise of 0.9 metres over a 100-year planning timeframe to 2110. Proponents with developments in, or adjacent to, intertidal habitats are therefore required to consider the effects on environmental values from the agreed quantum of sea level rise as part of CIA.

The appropriate future temporal boundary will generally be defined as the life of the proposal under assessment (if defined), including the life of any impacts that may continue post-closure. For ongoing projects (e.g. infrastructure), the future temporal boundary should reflect the life of the future activities to be included in the CIA. It is acknowledged that the detail and accuracy of available information about future activities and pressures will decrease as timelines increase, and this should be taken into consideration when determining an appropriate future temporal boundary. Typical future temporal boundaries are generally between 20-50 years, however, these may extend beyond this for certain environmental values.

The articulation of a future temporal boundary is more explicit in CIA than in EIA without a cumulative perspective, though in practice the life of the project under assessment is likely to be a reasonable timeframe in both cases.

4.2 Assessment

4.2.1 Baseline

How should the baseline be characterised?

Baseline characterisation is required for each environmental value for which CIA is required within the defined geographic boundary. As the boundary expands, less precise or accurate methods of data collection may be acceptable, for example use of satellite imagery, databases and remote sensing rather than detailed on-ground surveys. The information requirements for baseline characterisation should be discussed with EPA Services, informed by the state of knowledge and the current condition of the environmental values of concern.

The baseline characterisation step of CIA is about understanding the regional context of the proposal. This is already required for EIA without consideration of cumulative impacts, although this guideline includes some more specific information requirements (see below). The baseline characterisation information should be included in the 'local and regional context' section of an ERD.

To inform the CIA, characterisation of the baseline for each relevant environmental value may include:

- The current condition of the value in relation to any relevant thresholds (see Section 3.2.3)
- Activities and pressures currently impacting the environmental value
- The range of natural variation of the environmental value
- Historical trends and future predictions of the condition of the environmental value without the proposal or other future activities (but including other pressures such as climate change where information is available).

The state of knowledge about some environmental values may not be sufficient to inform a robust characterisation of the baseline at the time the ERD is prepared. In presenting the baseline characterisation, the proponent should provide an overview of the status of scientific knowledge about the environmental value and key areas of uncertainty.

4.2.2 Impact Prediction

How should cumulative impacts be predicted?

The prediction step of CIA should analyse the potential impacts of the proposal under assessment together with those from other current and future activities and pressures. The aim

of this step is to identify in broad terms, what the future impacts on important environmental values may be, to inform the EPA's assessment.

Impact prediction for CIA will generally require similar approaches and analytical techniques to that used in EIA in general. The key difference is that not only the potential impacts of the proposal under consideration are assessed, but also the effects of future activities and other pressures. This introduces higher levels of uncertainty that need to be acknowledged and managed.

Analytical techniques for CIA will depend on the environmental value being assessed. Where specific tools are available, proponents should use them to support their CIA (for example, GIS-based spatial overlays, conceptual models of impact pathways or scenario analysis, air quality or hydrogeological modelling). Specific analytical requirements should be determined as part of the scoping process. It is intended that the EPA's factor-specific technical guidance will be updated over time to provide more information about appropriate techniques for predicting cumulative impacts. The following should be considered when predicting cumulative impacts:

- How different environmental values and factors interact
- The appropriate level of detail required, reflecting the purpose of the CIA and the availability of data
- How impacts may vary across different project stages and in relation to other activities. For example, the impacts of mine dewatering could be very different if two mines are dewatering at the same time, compared with sequential dewatering
- The extent to which mitigation measures may reasonably be applied to future activities, to support accurate predictions of environmental outcomes
- How proposed activities in combination with future activities and pressures affect the state of the environmental value
- The most likely environmental outcome, and what is the worst case (with a reasonable likelihood of occurrence)
- The probabilities of occurrence, magnitude and durations of these impacts
- The degree of certainty of the predictions.

It is acknowledged that the inclusion of other activities and pressures in the predictions increases the level of uncertainty in the analysis. Uncertainty should be managed by:

- Potentially using scenario analysis to explore the range of possible environmental outcomes and their likelihoods
- Making conservative predictions, reflecting a precautionary approach
- Documenting all assumptions
- Identifying opportunities for adaptive management in relation to the proposal's contribution to cumulative impacts.

While CIA focuses on the total impact on the environment and resulting outcomes, it can also be useful to predict the proposal's incremental impact compared with all activities. Looking at total and incremental cumulative impacts, and the proposal's impacts alone provides important context to inform EPA's decision-making.

4.2.3 Threshold

What is the threshold for evaluating significance in CIA?

An environmental threshold represents the desired state of an environmental value and therefore should be outcome-focused. It should take the form of an objective or target for the environmental value against which a predicted outcome can be compared. Thresholds could be:

- defined in policy (e.g. National Environmental Protection Measures for air quality; species recovery plans under the BC Act and the EPBC Act; Environmental Quality Criteria defined in the State Environmental (Cockburn Sound) Policy)
- defined in scientific literature (e.g. minimum viable populations of species)
- established through regional-level studies led by government
- informed by public submissions (e.g. no change to visible airborne dust or dust deposition on recreational areas as a result of cumulative mining activities) or expert advice sought by the proponent or the EPA.

Thresholds should be appropriate to the geographic and temporal scale and informed by relevant knowledge. While it is acknowledged that such explicit thresholds may not be readily available, if no threshold exists, the proponent is expected to define one and justify its basis using best available information, scientific reasoning, and alignment with the EPA's factor objectives. As for EIA in general, the onus is on the proponent to make the case that the impact of a proposal is consistent with the EPA's factor objective in the context of past, present and future activities and pressures.

The process of proposing an outcome-focused threshold may be informed by an evaluation of the current state of the environmental value compared with an historic baseline, together with trends over time, in order to make a judgement about how much more change the environment can withstand. i.e. if decline is rapid, this might be a cause for concern.

CIA requires a more explicit focus on thresholds for evaluating significance for specific values than is typical of EIA without a cumulative perspective, although the fundamental question remains whether or not the EPA's factor objective is likely to be met.

4.2.4 Significance

How should significance be evaluated?

As for EIA in general, once cumulative impacts have been predicted, their significance should be evaluated to help inform the EPA's decision-making. Ideally, predicted environmental outcomes from cumulative impacts should be evaluated against any identified thresholds (see 3.2.3). Generally, the closer the predicted environmental outcomes are to a threshold, the more significant the cumulative impacts will be.

Where clear thresholds do not exist, a qualitative approach should be applied, in accordance with the list of significance considerations in the EPA's SEPFOA. Consideration may also be given to trends identified during baseline characterisation (see 3.2.1). If the condition of an environmental value is deteriorating rapidly, then any additional impacts on this environmental value are more likely to be considered significant.

It is important to take a precautionary approach to significance evaluation as the levels of uncertainty may be higher for cumulative impacts.

A fundamental principle of CIA is that the cumulative impacts of a proposal on a value may be significant even if the impact of the proposal alone is not, in cases in which the condition of the value is already close to a threshold.

Scenarios 3 and 4 of Appendix B illustrate cases with potential cumulative impacts to an environmental value with an evaluation of whether the impact would be significant.

Evaluating the significance of predicted cumulative impacts generally follows the same approach as evaluating the significance of the proposal's individual impacts. However, explicit consideration should be given to how close the predicted environmental outcomes are to any known thresholds.

It is recommended that proponents provide the following information to support the evaluation of impact significance for each value:

- Residual impacts of proposal (incremental)
- Predicted cumulative impacts (total)
- Predicted environmental outcomes arising from cumulative impacts
- Evaluation of significance of cumulative impacts based on proximity to known thresholds, trends, levels of uncertainty, and other considerations listed in the SEPFOA.

4.3 Decision Making

CIA may inform the EPA's recommendations as to whether the proposal should go ahead and if so, under what conditions. Consideration of future activities may result in alternative conditions to ensure environmental outcomes are maintained over time. When assessing impacts and associated management measures, the EPA will ensure that conditions are proportionate to the impacts of the proposal, not the total impacts from all activities affecting the environmental value.

The EPA's obligations to make recommendations as to whether a proposal should be allowed to proceed, and if so under what conditions, remain the same, noting that the inclusion of cumulative effects within the definition of impacts in the EP Act means that cumulative impacts must be considered by the EPA in making these recommendations.

4.4 Post Assessment

Post-assessment processes under Part IV of the EP Act include changes to proposals or conditions after a Ministerial Statement has been issued. These changes are managed under s.45C (non-significant amendments), s.40AA (significant amendments) and s.46 (inquiries into conditions). Cumulative impacts need to be considered in each of these processes.

Amendments under s.45C require the assessment of the combined effect of the original proposal and the proposed change, which is in itself a form of CIA. While s.45C amendments are minor and do not introduce significant new impacts by definition, proponents should demonstrate why the amendment does not result in significant cumulative impacts when also considering other past, present and future activities and other pressures. This reasoning supports the EPA's decision that the change can be managed under s.45C.

Under s.46, the Minister may request that the EPA inquiries into whether conditions in a Ministerial Statement should be changed. Where changes to conditions could alter

environmental outcomes or interact with other proposals, the EPA may require a CIA to understand cumulative impacts on environmental values.

Where a significant amendment is proposed under s.40AA, the EPA will assess the amendment in the context of the approved proposal. CIA may be required if the amendment introduces new environmental impacts, substantially increases existing impacts, or affects environmental values already under cumulative pressure. Proponents should provide sufficient information when referring a significant amendment to enable the EPA to determine whether CIA is required.

5. Glossary

Activities	Proposals that are subject to some form of primary approval
Baseline	The reference condition of the environment against which impacts are assessed; describes the environment before the proposal.
Cumulative impacts	The total impacts on the environment of a proposal combined with one or more past, present or future activities and pressures
Cumulative Impact Assessment (CIA)	CIA considers the impacts of a proposal on the environment in the context of other current and future activities and pressures affecting the same environmental value, to ensure outcomes remain consistent with the EPA's objectives over time.
Decision-making Authority (DMA)	Any public authority empowered to make decisions in respect of a proposal under legislation other than Part IV of the EP Act. This term is also used broadly to refer to Western Australian government agencies with portfolios related to the environment.
Environmental Factors	The EPA uses environmental factors as an organising principle for EIA. Environmental factors provide a systematic approach to organising environmental information for the purpose of EIA and a structure for EIA documents. The EPA has 14 environmental factors, organised into five themes: Sea, Land, Water, Air and People.
Environmental Impact Assessment (EIA)	An orderly and systematic process to evaluate a proposal (including its alternatives), its effects, and mitigation/management of those effects.
Environmental outcomes	Environmental outcomes, in the context of CIA (and EIA in general) are the state of the environment at a particular point in time during implementation or after a proposal has been implemented. Environmental outcomes reflect specific and measurable environmental states. They are environment centric rather than impact centric and are a key EPA consideration to assess whether a proposal is likely to be consistent with an EPA factor objective. Environmental outcomes consider residual impacts, their effect on the environment as well as any offsets.
Environmental value	The EP Act defines an environmental value as a beneficial use or an ecosystem health condition
Future activities	Third party (or proponent) activities which are already approved, are in a government approvals process, or are otherwise reasonably likely to proceed: • Proposals that have been referred and have a publicly available ERD • Existing activities that are reasonably expected to be ongoing.
Impact pathway	The link between one or more activities or pressures and the environmental value/s they affect.
Induced impacts	Impacts arising from activities that are more likely to proceed if the proposal under assessment proceeds.
Mitigation hierarchy	Strategies to, in order of preference; avoid, minimise, rehabilitate or offset the impacts of a proposal on the environment.
Pressures	Potential causes of environmental impact other than activities subject

	to primary approval processes, for example climate change and invasive species
Proponent	The person or entity responsible for a proposal as nominated under s. 38(H)
Proposal	The EP Act defines a proposal as a project, plan, program, policy, operation, undertaking, development or change in land use (including an amendment to any of these).
Significance	The term 'significance' is not defined in the Act. Significance for CIA (and EIA in general) usually means considering environmental values, impact extent, resilience of the environment, and the level of confidence in the information. The matters that the EPA may have regard to in relation to considering significance are outlined in the EPA's Statement of environmental principles, factors, objectives and aims of EIA.
Threshold	An environmental threshold represents the desired state of an environmental value and therefore should be outcome-focused. The thresholds provide the basis for evaluating the significance of cumulative impacts.

6. Guideline Review

It is intended that this Guideline will be reviewed 12 months after its release. At this point, case studies of CIA practice will be reviewed and considered for inclusion in the Guideline, to provide additional guidance to proponents. In addition, more specific information related to each environmental factor may also be included in future Environmental Factors Guidance and associated technical guidance documents.

Appendix A: Tools and Resources for CIA

The Environmental Protection Authority (EPA) acknowledges that not all data to conduct Cumulative Impact Assessment (CIA) is publicly available. If strategic or regional planning exists for an area, where CIA has effectively already been done, the EPA will take this into consideration. It will not be necessary to duplicate existing data.

The table below provides a non-exhaustive list of resources relevant to Western Australia that can assist proponents with the application of CIA in Western Australia.

CIA Process Step	Resources
General	• EPA policy framework • EPA Environmental Factor Guidelines • EPA Technical Guidance
Scoping (Section 3.1)	
Environmental values (Section 3.1.1)	• Dandjoo • Atlas of Living Australia (ALA) • WA Water Register • Protected Matters Search Tool (PMST) • Species Profile and Threats Database (SPRAT) • Aboriginal Cultural Heritage Inquiry System
Geographic boundary (Section 3.1.2)	• Interim Biogeographic Regionalisation for Australia (IBRA) • Data WA (catchment boundaries, land system mapping, pre-European vegetation mapping, native title determination areas etc.)
Future activities and pressures (Section 3.1.3)	Future Activities • EPA Website • Local Government Authority Websites • PMST and EPBC Act Public Portal • DWER Clearing Permit System • DWER Licences and works approval search • Mines and Mineral Deposits (MINEDEX) • Development WA Website Pressures • State Planning Policies • Conservation Advice and Recovery Plans • State of Environment Reports • Water Resource/Allocation Plans • SPRAT • Bureau of Meteorology (BoM) • World Meteorological Organisation • Land Monitor • ALA
Assessment (Section 4.2)	
Baseline (Section 3.2.1)	• Aboriginal Cultural Heritage Inquiry System • Capture WA • Commonwealth Scientific and Industrial Research Organisation (CSIRO) and BoM • Data.wa.gov • Landgate • Land Monitor • National Maps • Shared Environmental Analytics Facility (SEAF) • SLIP Locate 5

	• WA Water Register • PMST • Species Profile and Threats Database (SPRAT)
Thresholds (Section 3.2.3)	• Australian and New Zealand Guidelines for Fresh and Marine Water Quality • Perth's Coastal Waters Environmental Values and Objectives • Background concentrations of selected metals and total suspended solids in the Kimberley Region (MTR6) • Petroleum hydrocarbon content of shoreline sediment and intertidal biota at selected sites in the Kimberley bioregion, Western Australia (MTR4) • Nutrient-related water quality at selected sites in the coastal waters of the Kimberley Region (MTR5) • Species Profile and Threats Database: Conservation and Recovery Plans listed per species. Priority actions and objectives are published within conservation advice for listed species and communities. • Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria (2017) • DBCA Statewide Vegetation Statistics when considering the 10% and 30% thresholds defined in EPA Guidance Statement No. 33, Chapter B2: Proponents should focus on: • % Pre-European extent in All DBCA Managed Land (portion of Pre-European extent) • % Current extent in All DBCA-Managed Land (proportion of Current Extent), and • % Current Extent in All DBCA-Managed Land (proportion of Pre-European Extent) • Recent advice from DCCEEW, achieving 30 by 30, notes that “managing 30% of land ‘optimally located for conservation’ may be sufficient to improve the conservation status of over 80% of plant and vertebrate species on Earth…” • Evaluating connectivity and Ecological linkages between Perth’s protected areas to support biodiversity (O’Donnell, C, 2020) Table 2, Evaluating Ecological distance thresholds of plants, insects, amphibians, mammals and birds • Inland Waters of the Pilbara, Western Australia (Part 1) • Inland Waters of the Pilbara, Western Australia (Part 2) • Pilbara Water Resource Assessment (CSIRO) • Water Quality Improvement Plan for the Rivers and Estuary of the Peel-Harvey System – Phosphorus Management • Australian and New Zealand Guidelines for Fresh and Marine Water Quality • Rights in Water and Irrigation Act 1914, s4 Objects • Remote Sensing in the Kimberley (CSIRO) • Perth Region Aquifer Modelling System (PRAMS) • Integrated surface water and groundwater modelling to support the Murray Drainage and Water Management Plan, south-west Western Australia (Hall et. al., 2011) • DWER Air Quality Modelling Guidance Notes • SEAF • National Environment Protection Measure - Ambient Air Quality (NEPM-AAQ) • National Environment Protection Measure - Air Toxics (NEPM) • DWER Draft Guideline – Air Emissions • DWER DRAFT Guideline: Dust emissions • DWER Guideline: Odour • Separation Distances between Industrial and Sensitive Land Uses (GS 3)

Appendix B: Applying CIA — Illustrative Case Scenarios

Introduction

Appendix B provides illustrative scenarios demonstrating how CIA may be applied in practice across different environmental values, project types and regions. They show how scoping decisions, assessment steps and significance evaluations can vary depending on context. These examples are for reference only and should not be used as templates.

CIA is case-specific. Appropriate baselines, boundaries, thresholds and significance tests must be determined for each proposal. These scenarios are illustrative only. Proponents should consult subject matter experts, document assumptions and uncertainties, and ensure the rationale for decisions is transparent and defensible.

Scenario 1 – No impact, no CIA required

Proposal: Large-scale mine and associated infrastructure (mine pits, waste rock dumps, haul roads and a processing plant)

Location: Pilbara region

Environmental value examined for cumulative impacts: Priority Ecological Community (PEC)

Relevant scoping information: The PEC has been identified on tenements leased by the proponent however it has it has been specifically excluded from the Development Envelope during the design phase. As a result, no potential direct or indirect impacts on the PEC from the proposed activities have been identified. No other conservation significant vegetation has been recorded during flora surveys.

Scoping outcome: As the Proposal will not impact the PEC through any direct or indirect pathways, there is no potential for the Proposal to contribute to cumulative impacts on this environmental value. CIA is not required even if the PEC is impacted by other past, present or future activities.

Scenario 2 – Impact, no CIA required

Proposal: Large-scale mine and associated infrastructure (mine pits, waste rock dumps, haul roads and a processing plant)

Location: Pilbara region

Environmental value examined for cumulative impacts: Priority flora taxon

Relevant scoping information: One priority flora taxon will be directly impacted by the Proposal. This flora taxon has a highly restricted natural distribution and is only known to occur within the Proposal's Development Envelope, based on targeted surveys and review of available records. No other known or reasonably foreseeable activities or pressures occur within, or are likely to affect, the taxon's extent over the temporal scale of assessment.

Scoping outcome: While the Proposal will impact the priority flora taxon and this impact requires assessment through regular EIA, no cumulative impacts are predicted as there are no past, present or future activities or pressures contributing to cumulative changes in this value. CIA is not required.

Scenario 3 – Impact, CIA required, no significant cumulative impacts

Proposal: Wind Farm and associated infrastructure

Location: Mid-West region

Environmental value examined for cumulative impacts: Vegetation Association

Relevant Scoping Information: Native vegetation will be cleared for the Proposal. One vegetation association occurs within the Development Envelope and extends locally. To support the preliminary assessment of potential cumulative impacts, the IBRA Subregion has been used to define a geographic boundary for assessment as a precautionary, bioregion-based boundary that encompasses the local distribution of the vegetation association and associated pressures and enables like-for-like comparison with approved and proposed clearing. Other identified future activities within the IBRA Subregion are summarised in Table 1. The temporal 'boundary' is 32 years, defined by the life of the project including construction, operation and decommissioning.

Table 1: Other approved activities within IBRA Subregion

Project	Approval Type	Description	Clearing Extent
Mine	EP Act, Part IV	Mine and associated infrastructure	493 ha
Road Realignment Project	EP Act, Part V, Clearing Permit	Transport infrastructure	68 ha
Pipeline Project	EP Act, Part V, Clearing Permit	Gas pipeline infrastructure	126 ha

The vegetation association has undergone progressive historical loss from agriculture, infrastructure and housing development, resulting in a mosaic of vegetation patches, some in good or better condition while in other areas within IBRA Subregion becoming fragmented and degraded. Cumulative impacts are predicted to occur through both direct pathways (clearing and further fragmentation) and indirect pathways (edge effects, weed invasion and dust deposition).

The proponent identified that within the IBRA Subregion, approximately 80% of the vegetation association remains. Clearing for the projects listed in Table 1 will remove a further 8%, reducing the remaining extent to about 72%. The Proposal would clear an additional 2%, reducing the remaining extent to about 70%.

Scoping outcome: The Proposal has the potential to contribute to cumulative impacts on the vegetation association through additional clearing and fragmentation, in the context of historical loss and existing pressures within the regional vegetation association. There is potential for incremental impacts from the Proposal to combine with past and future activities to adversely affect the condition and extent of the vegetation. A CIA is therefore required to assess the cumulative impacts and determine their significance in relation to appropriate thresholds.

Cumulative Impact Assessment:

<u>Baseline and impact prediction</u>

Clearing already approved for other projects within the IBRA Subregion and clearing for the Proposal would reduce the remaining extent to around 72%. In addition to direct loss of vegetation, cumulative impacts are predicted to occur through indirect pathways, including

increased fragmentation, edge effects, weed invasion and dust deposition, which may further degrade the condition and functionality of remaining vegetation.

The proponent has identified that within the defined IBRA subregion (Mid-West context), the relevant pre-European vegetation association occurs in a landscape that has seen historical clearing, with some vegetation associations occurring within the subregion reduced to less than 50% of their pre-European extent. These figures indicate a fragmented mosaic with reduced ecological resilience and connectivity.

Against this baseline, other approved clearings (e.g., mining, linear infrastructure) in the same subregion continue to incrementally reduce extent and increase edge density. In fragmented agricultural landscapes, edge effects (light, wind, moisture, nutrients) are known to alter plant community structure and function and to propagate inward from patch boundaries, with distance and configuration dependent on local conditions.

The Proposal will require only a small clearing for turbine footprints, access tracks, cable routes and hardstands that will introduce direct clearing and indirect pathways (dust, weeds, edge-related condition decline) into remnant patches and buffers.

In addition to land-use pressures, climate trends for the Mid-West region show declines in cool-season rainfall since the 1970s, increasing fire weather and streamflow reductions, which compounds stress on already fragmented vegetation.

Impact Prediction summary: Direct cumulative impacts include proposal clearing reducing the remaining extent of the vegetation association at the IBRA-subregion scale and linear infrastructure increasing fragmentation. Indirect cumulative impacts include edge effects (nutrient enrichment at paddock interfaces, weed invasion, altered microclimate), dust deposition on adjacent vegetation, and climate-mediated stress (lower winter rainfall, higher evaporative demand) collectively degrading remnant condition and connectivity over the life of the project.

Threshold determination

The threshold for evaluating significance was defined as the point at which further change would materially compromise the core ecological functions of the vegetation association within the IBRA Subregion. These core functions include the retention of large, high-value remnants, the presence of interior habitat (as opposed to edge-dominated patches), the continuity of ecological linkages between remnant areas and the maintenance of vegetation condition within its natural range of variability. A threshold is approached when observable evidence indicates rapid or sustained decline in any of these attributes. This may include accelerated loss of extent, fragmentation that disrupts linkages, or condition decline that reduces ecological function or resilience.

Significance evaluation

Following review of the available data, the predicted cumulative outcome - a reduction in the remaining extent of the vegetation association from about 80% to 70% following implementation of the Proposal and other approved activities – remains above the threshold at which core ecological functions would be compromised. The vegetation retains sufficient extent, interior habitat and functional connectivity to maintain ecological processes over the proposal's temporal boundary.

While incremental clearing and associated indirect impacts (fragmentation, edge effects, weed invasion and dust deposition) will contribute to cumulative pressure, the scale and intensity of

these impacts are not expected to accelerate condition decline, disrupt key linkages, or materially reduce the resilience of the vegetation association.

Given the current regional context, observed condition of remnant vegetation and defined threshold, the predicted cumulative impacts remain within the environment's capacity to absorb additional change without compromising core ecological functions. Consequently, the cumulative impacts are assessed as not significant.

CIA outcome: The potential cumulative impacts on the vegetation association are not assessed as significant. Although the Proposal contributes additional clearing and indirect pressures within a landscape already subject to historical loss and fragmentation, the predicted cumulative outcome remains above the threshold at which core ecological functions would be compromised. The vegetation association retains sufficient extent, interior habitat and functional connectivity at the IBRA sub-regional scale to sustain ecological processes over the project's temporal boundary.

To support improved environmental outcomes, the proponent should continue to apply the mitigation hierarchy, implement measures to minimise indirect effects such as weed invasion and dust deposition, and monitor vegetation condition to confirm that residual and cumulative impacts remain within the environment's capacity to absorb additional change.

Scenario 4 – Impact, CIA required, significant cumulative impacts

Proposal: Large-scale mine and associated infrastructure (new mine pits, former mine voids, waste rock dumps, haul roads and a processing plant)

Location: Pilbara region

Environmental value examined for cumulative impacts: Groundwater Dependent Ecosystems (GDE)

Relevant scoping information: The Proposal requires mine pit dewatering over a period of 15 years, which is likely to lower the underlying surficial aquifer water table and potentially impact nearby surface water features and GDE. The proponent identified that the underlying aquifer is subject to existing dewatering and borefield abstraction from one of their nearby mines.

A review of historical groundwater monitoring data (standing water levels) in the vicinity of the proposed mine pit indicates that the water table is about 4 m below ground level (bgl) at the GDE margin, varying seasonally. Over the past decade, cumulative abstraction and several dry years have contributed to a net decline of roughly 1 m, with standing water levels appearing to have stabilised in recent years.

The GDE is in moderate condition, showing patchy canopy stress in dry seasons but continued recruitment in more sheltered reaches.

Scoping outcome: The Proposal has the potential to contribute to cumulative impacts on the GDE through a shared groundwater impact pathway associated with mine dewatering, in the context of existing abstraction from nearby operations and documented historical declines in groundwater levels. Given the presence of an environmentally sensitive value, evidence of cumulative pressure on the regional aquifer, and the potential for combined drawdown effects over the life of the Proposal, a CIA is required to assess the cumulative impacts on groundwater levels and GDE.

Cumulative Impact Assessment:

Baseline and impact prediction

Given the documented existing impacts to the regional aquifer, the proponent commissioned groundwater modelling to assess the cumulative effects of additional dewatering. Modelling predicts groundwater levels at the GDE would decline to about 5.5 m bgl at peak drawdown before stabilising and returning toward pre-Proposal levels post-closure.

Threshold determination

The maximum depth at which the roots of the dominant vegetation species can access groundwater (7 m bgl) informed the selection of a more conservative threshold of 5 m bgl. This provides a two-metre buffer to account for seasonal variability and maintains groundwater within the optimal physiological range, reducing vulnerability to cumulative stressors such as multi-year drought, existing abstraction and climate-driven recharge declines.

Significance evaluation

Modelled cumulative drawdown levels at the GDE indicates groundwater levels would decline to about 5.5 metres bgl during peak dewatering, exceeding the 5 m bgl threshold adopted to maintain an adequate buffer and protect the vegetation's resilience. While groundwater would remain technically within the root-accessible zone, the additional 0.5 m of drawdown erodes this buffer and reduces the system's capacity to absorb cumulative pressures such as prolonged dry periods, existing abstraction and climate-driven reductions in recharge. In a landscape already subject to a decade of groundwater decline, this exceedance increases the likelihood of canopy stress, reduced recruitment and localised mortality, leading to contraction of GDE extent. On this basis, the cumulative impacts are considered significant.

CIA outcome: Potential cumulative impacts to the GDE are assessed as significant. To remain consistent with EPA factor objectives, the proponent should adjust dewatering rates and schedules to ensure groundwater levels remain shallower than 5 metres bgl at the GDE margin and implement adaptive groundwater and GDE monitoring with clear triggers and contingency actions.