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Cumulative Environmental Impact Assessment Industry Guide

Adaptive Strategies

INDUSTRY GUIDE



Cumulative Environmental Impact Assessment Industry Guide

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Executive summary

The assessment of cumulative environmental impacts is increasingly an area of focus for the community, industry and government.

In areas of multiple existing or proposed operations, the understanding of the combined effects of activities on the environment is vital to delivering well-planned, well-managed and sustainable development.

The Australian mining industry has a commitment to continuous improvement of its environmental performance, including the assessment of positive, negative, indirect and cumulative impacts of new projects.¹

The concept of cumulative environmental impact assessment is not new; however, the requirements and expectations for project proponents to undertake cumulative impact assessments continues to evolve.

Accordingly, the Minerals Council of Australia has prepared this industry guide to assist individual proponents/companies in conducting well-designed, leading practice cumulative environmental impact assessments. The guide is intended primarily for mining industry environmental planners and their consultants who are responsible for preparing environmental impact assessment documentation. However, it is hoped that the guide may also be useful to regulatory bodies and other interested stakeholders in understanding cumulative impact assessments.

Generally, cumulative impact assessment can be approached in two distinct ways, namely project-initiated assessments (arising from project-specific environmental

impact assessments) and regional (strategic) planning studies. This guide primarily addresses project-initiated assessments however, where relevant, the guide also briefly discusses regional approaches to cumulative impact assessment.

Compiled with expert input and from an examination of cumulative impact approaches around the world, the guide provides a range of advice, frameworks and tools to manage the various elements and challenges encountered in undertaking cumulative impact assessments within the normal project approval processes in Australia. The key findings and recommendations in the guide are:

- The assessment of cumulative impacts should not be an automatic requirement for all projects. Cumulative impact assessments should be undertaken only where there is a likelihood of significant impacts on identified environmental values from more than one activity.
- No single approach to cumulative impact assessment can satisfy the unique circumstances faced by all projects. Cumulative impact assessments should be 'fit for purpose' and avoid overly prescriptive processes.
- Cumulative impact assessments can and should be applied at different scales with different aims, methodologies and governance. The approach taken should be rigorous but adapted to suit the

¹ http://www.minerals.org.au/focus/sustainable_development/enduring_value

specific circumstances faced. It should be risk-based and consider only those factors that are materially affected.

- Data sharing requirements should be proportionate and material to the regulatory need, and commercial in confidence should be preserved. There is a role for governments to facilitate data access, including the disclosure of data where it is not commercially sensitive.
- In determining the scope of a cumulative impact assessment the access to information is crucial. Therefore, due to constraints on access to third party information, only the following projects should be included:
 - Certain projects (existing or confirmed) – these include those in operation, those that have commenced construction or have made a financial announcement
 - Reasonably foreseeable projects – these include those projects where financial forecasts are positive and have been approved and commencement announced.

Speculative projects should not be included. This includes projects which have been referred and/or announced but are not under assessment.

The benefits of appropriate and well-designed cumulative impact assessment are numerous; however, the consequences of poorly designed or inappropriate assessments can be significant. These can include increased and unnecessary costs, project delays, loss of community confidence and greater uncertainty for proponents.

Undertaking a successful cumulative impact assessment is not necessarily straightforward. Throughout the process there will be numerous challenges that will need to be managed and solved. The realities of complex scientific assessments are that there is rarely an ideal set of data or time-series to complete the assessment. As such the process must be designed and managed in an adaptive manner to accommodate the unique circumstances that will apply.

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1 Introduction

The primary aim of this guide is to assist individual proponents/companies in accounting for cumulative environmental impacts within normal project approval processes in Australia.

Cumulative impact assessment (CIA) is an approach to environmental impact assessment (EIA) that aims to consider the effects of multiple actions or impacts on the environment. CIAs are conducted across the actual and potential impacts of a number of activities or projects that may combine over time and/or space with appropriate limitations by reference to the action being assessed and its foreseeable impacts. The concept of CIA is not new but has been given a greater importance and focus in Australia over recent years.

CIAs are, or should be, undertaken in the following circumstances:

- as part of project-specific EIA, where there is a likelihood of significant impacts from more than one operation or activity;
- to provide supporting information to master planning or individual project assessments, where there is a likelihood of significant impacts as a result of the activities of more than one operation; and
- to inform a broader statutory planning scheme or strategic assessment (often at a regional scale).

CIA is increasingly required as part of the regular project specific EIA process (at both state/territory and Commonwealth levels). Terms of reference or guidelines for project-specific environmental assessments now almost always include a requirement to provide information on the cumulative impacts of similar, neighbouring, regional or associated projects, yet little guidance is provided by those who require them on how to undertake such assessments. Where cumulative impact assessment is required it needs to be appropriately scaled and designed to address the relevant levels of risk from combined activities.

The methodologies for conducting CIAs are

not particularly well understood, described or standardised. In part this is due to the need to customise or adapt assessments to the location and circumstances, but also due to the difficulty in developing and designing meaningful cumulative impact studies at different scales.

With the increasing requirement to provide more detailed cumulative impact information as part of project-specific EIA, and the increased scrutiny on these assessments, it is imperative that rigorous but practical methods and approaches to CIA are used, and that the response is proportionate to the regulatory need.

Significant risk to progressing project-initiated CIAs exists if the approach undertaken:

- is inappropriate or inadequate, e.g. involves a scope of work that is difficult or impossible to deliver, such as detailed forecasting or quantitative assessment of future actions or projects where limited information is known
- leads to a significant over-estimate of impacts or a consideration of impacts that do not subsequently occur, or vice versa, an underestimate of impacts due to a non-consideration of future projects or the effects of current activities
- disregards the existing environmental context or ambient environmental conditions (existing baseline and natural variation)
- is inconsistent or difficult to compare with other assessments, reports or regulatory processes
- is scientifically flawed or weak, and/or
- is difficult to understand, particularly for public stakeholders and/or regulators.

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The consequences of poorly designed or inappropriate CIAs can include increased and unnecessary costs, project delays, loss of community confidence and support, legal challenges, and/or project refusal.

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The consequences of poorly designed or inappropriate CIAs can be significant. These include increased and unnecessary costs, project delays, loss of community confidence and support, legal challenges, and/or project refusal.

Accordingly, industry and other stakeholders may benefit from the development and appreciation of leading practice approaches to CIA that inform and educate all interested parties on the issues to be considered, the validity of the processes and the options available. This document is intended to assist and inform Minerals Council of Australia member companies in their responses to regulatory requirements to consider cumulative impacts. It does not present a simple one size fits all solution nor a definitive industry position on this issue, but aspires to progress better and more consistent understanding of this complex issue and sound approaches.

1.1 Purpose of this guide

The aim of this guide is to provide a set of frameworks and approaches to CIA relevant to the mining sector. It is designed to assist and inform Minerals Council of Australia members on reasonable and consistent approaches in responding to regulatory requirements to undertake CIAs.

The guide provides general advice on conducting CIAs within a minerals and resource industry context. The guide focuses on the four main phases in undertaking a CIA, being:

1. Understanding
2. Scoping
3. Analysis
4. Monitoring and review.

This guide is supported by a number of case studies. The publication of future case studies is encouraged as a means of providing up to date examples of CIAs and evolving, innovative and informative approaches.

1.2 How to use this guide

It is anticipated readers of this guide will have diverse information needs, depending on their role in project management and implementation, and previous familiarity and experience with CIAs.

The guide is not intended to be read from cover to cover as a detailed implementation manual. This guide is also not intended as a technical or scientific method for conducting

CIA. A number of such guides are already available (for example Hegmann *et al.* (1999) and IFC (2013)) and readers are encouraged to consult these manuals for detailed guidance on CIA practice. A list of information sources is provided in Chapter 7.

Instead, readers of this guide are encouraged to dip in and out of the various sections depending on information needs and available time. An Environmental Impact Statement (EIS) study manager with little familiarity in CIA might for example read the whole guide before commencing an assessment. Alternatively a business manager might wish to only read sections 1-3 to gain an overview of the CIA approach. As such, this guide is more a reference document than an instruction manual.

1.3 Who should use this guide

The guide is designed to provide practical advice and methods to assist mining companies in undertaking CIAs.

The guide is intended primarily for mining industry environmental planners and their consultants who are responsible for preparing EIA documentation.

Importantly, this guide is not intended to be a one size fits all approach to CIA. Instead it aims to provide an overview of CIA approaches for environmental factors and the range of tools that can be employed to assist companies in responding to regulatory requirements. It is not possible to provide definitive guidance for all cases and CIA must always be 'fit for purpose'. It is not intended for material from this guide to be selectively used to apply a single approach to CIA.

1.4 What does this guide cover

The guide examines the different CIA approaches that can be used to fit different circumstances and scenarios that arise in the Australian mining sector.

The guide highlights that CIA should be 'fit for purpose' and avoid overly prescriptive processes.

CIA can and should be applied at different scales with different aims, methodologies and governance. The approach taken should be rigorous but also adaptive to different scales, locations and situations, and proportionate to the risk involved.

In preparing this guide it was also evident there are a number of approaches to CIA and strategic assessments applicable to the mining industry that do not fit within existing regulatory frameworks for standard project based EIAs. In broad terms, CIA can be approached in two distinct ways, namely:

- project-initiated assessments (arising from a project-specific EIA); and
- regional (strategic) planning studies.

This guide primarily addresses project-initiated CIA; however, where relevant, the guide also briefly discusses regional approaches to CIA. This is to ensure the different types of CIA are understood and where each approach may be used, particularly to help understand where regional approaches are beneficial or necessary rather than CIA arising from the assessment of a specific project.

1.5 What this guide does not cover

This guide assumes the user has a basic knowledge of EIA fundamentals within the Australian mining context.

The guide is designed to provide advice on appropriate frameworks, scope and governance of CIA studies, but does not delve into the technical detail of cumulative impact science. There are numerous publications, models and information sources on the science of assessing cumulative impacts for many biophysical parameters. Where possible, reference to these publications has been included in Chapter 7 Information Sources.

This guide focuses primarily on CIA of biophysical elements and does not include guidance on assessing cumulative impacts of socio-economic factors. However, some components of the guide may be useful in the consideration of these other factors. In other words, this document is more a practical guide than a comprehensive academic text.

2 What is cumulative impact assessment?

There are various definitions of CIA that appear in guidelines, assessment and approval requirements and legal findings. Globally or nationally, no methodology for quantifying cumulative impacts has been established that has gained wide acceptance.

In most instances, and in line with the one size does not fit all concept, the most appropriate definition will be determined by the specific circumstance of the project and study to be undertaken in light of the relevant legal requirements applicable.

2.1 Types of cumulative impact assessment

Outlined below are four major 'types' of CIA approaches currently in use.

1. Cumulative impact of combined elements of a single project/activity

- The most simplistic definition of cumulative impact, as it does not account for other projects
- The approach is to consider the combined effects of all elements of a single project on multiple environmental values
- Cumulative impact has been interpreted this way in legal challenges to *Environment Protection and Biodiversity (EPBC) Act 1999* decisions.² Cumulative impacts must arise (either directly, indirectly or as a consequence) from the action referred, i.e. without consideration of other actions.
- Consideration of combined effects of all project elements is generally now considered as part of standard individual project EIA, and could be viewed as current leading practice
- While some case law supports this definition, it is not the approach or

concept generally accepted in Australia when CIAs are being considered.

2. Contributing impacts of a single project/activity on an existing baseline or current health of the system

- This definition accounts for the combined effects of a proposed project and previous actions, i.e. provides a historical context
- This enables an ongoing and adjusted baseline and condition trend of the impacted entity to be evaluated over time
- An example of this might be a project that will result in the loss of 10 ha of particular vegetation type, of which 10,000 ha has already been cleared within the region.

3. Cumulative impact of multiple projects/activities on a single environmental value or asset

- This assesses the impact of several, or all, relevant projects on a single environmental element
- To date this approach has predominantly been used in regions, catchments or defined locations to measure and manage elements such as dust, air quality, noise or water. Its use on elements of biodiversity (flora and fauna) is less common
- Examples include the Fitzroy Basin Water Quality Program, Hunter Salinity Trading Scheme and the Independent Review of Cumulative Impacts on Camberwell (noise, dust, emissions).

² E.g. King v Forest Practices Tribunal [2008] TASSC 1.

4. Cumulative impact of multiple projects/ activities on multiple/all environmental values/assets (with each value/asset assessed separately or by system)

- Broadest definition of cumulative impact and aligns with commonly seen definition of “successive, incremental and combined impacts of past, present and (reasonably) foreseeable actions” (WA EPA (2012))
- Numerous technical issues and potential legal limits in setting scale (spatial, temporal) and scope (what other projects to consider)³
- This approach is relatively straightforward in primarily greenfield scenarios or a defined precinct where proposed projects are known, e.g. Abbot Point CIA
- It can be extremely difficult on a broad regional or global scale, particularly if data are unavailable. Regional and State planning schemes and assessments are often better placed to manage the effects of multiple actions across a broad scale.

Table 1 (adapted after Harriman and Noble (2008)) outlines some of the characteristics of project-initiated (driven by a conventional single project EIA) approaches and strategic, regionally based approaches. It is important to note that strategic assessments are generally initiated by government bodies/regulators or in partnership with industry. It is unusual and difficult for proponents to undertake a strategic assessment on their own.

Not all CIAs are the same and no particular approach is better or worse than any other; rather the different approaches will better fit a particular scenario based on scale, context and timing. Aligning the assessment methodology with the capacity to deliver answers appropriate to the circumstances is a key element of ensuring that the approach taken is ‘fit for purpose’, refer section 5.1.

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Not all CIAs are the same and no particular approach is better or worse than any other, rather the different approaches will better fit a particular scenario based on scale, context and timing.

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³ Federal case law that it is the regulator’s responsibility to inform proponents of which projects should be included within a cumulative impact assessment study (see WA Land Authority (Landcorp) v Minister for Sustainability, Environment, Water, Population and Communities [2012] FCA 226).

Table 1 Characteristics of strategic and non-strategic approaches to cumulative impact assessment (adapted from Harriman and Noble 2008)

Aspect	EIA-driven approaches	Strategic, regionally based approaches
Description	Assessment of single, multiple projects or multi-component activities	Assessment of proposals, plans or programs for a particular region, industrial sector or across sectors
Regulatory characteristics	Single or multiple proponents	Single industry sector, government agency responsible for resource sector, regional planning or administrative authority governing body
Trigger	Cumulative effects of project actions on specified environmental values* in the project locations, or cumulative effects of multiple projects on a region or regional environmental values	Cumulative effects of proposed or existing sector-based plans or development initiatives Cumulative environmental change or regional land use planning initiatives Can include cumulative effects of project actions on specified environmental values, as well as impacts on defined regional thresholds
Scope	Non-strategic, project focused	Strategic and less constrained in focus
Temporal bounds	Project life cycle and past, present and reasonably foreseeable future developments in the project's region	Past, present and reasonably foreseeable activities, plans; and longer term futures of regional environments and economies
Spatial bounds	Site specific, focused on direct on-site and off-site impacts	Boundaries of sector initiatives (e.g. regional expansion of mining activity) or the planning region under consideration as defined by natural features or by regional authority
Environmental objective	Generally to ensure effects are within acceptable levels	To achieve predetermined environmental (and social and economic) objectives. Also to limit more regionally based impacts/system thresholds and provide certainty for future planning

* Environmental values – analogous to receptors, receivers, assets or valued resources.

Strategic assessments under the EPBC Act

Strategic assessments under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provide for an alternative structure and approach to CIA. Strategic assessments are often conducted as an alternative to project-specific assessments or through regional planning processes supported by various planning statutes.

EPBC Act strategic assessments enable a consideration of the impacts arising from multiple activities deriving from a policy, program or plan, across a large (landscape or regional) scale or industry sector.

A wide variety of policies, programs or plans can be subject to a strategic assessment under the EPBC Act including:

- Regional-scale urban developments
- Large-scale industrial or resource precinct or growth plans
- Regional public policy and/or management regimes
- Infrastructure policies or plans.

EPBC Act strategic assessments allow approval of classes of actions (e.g. development activities, specific measures associated with implementing policy or management programs). Actions undertaken in accordance with an

endorsed policy, program or plan that has been subject to strategic assessment do not require separate referral or individual approval under the EPBC Act (though they may still require state approvals).

The timeframes for conducting and completing a strategic assessment under the EPBC Act are more flexible than a site-specific assessment, with few statutory time requirements.

The process starts with an agreement between the Commonwealth Government and the strategic assessment partner (or proponent). Important milestones can be negotiated at commencement and arrangements established to ensure collaborative working relationships throughout the assessment process.

Conducting a strategic assessment can reasonably be expected to take a little longer than a site-specific assessment; however, there are substantial and longer term benefits in the minimisation of assessment requirements flowing to the individual development actions.

To date strategic assessments under the EPBC Act have largely been applied to urban land development plans. There are, however, recent (current) examples of their application to existing and proposed mining and related infrastructure in the Pilbara region of Western Australia and Queensland (Great Barrier Reef).

2.2 Cumulative environmental effects

The sources of environmental effects range from simple additive impacts to complex interactions of stressors, and are not necessarily brought about by only one activity or cause. For instance, change in vegetation cover across a region may be attributable to several different types of industries interacting in time and space, rather than a single development or

sector. Causes of environmental change also include natural variability and anthropogenic climate change.

In the context of the mining industry, cumulative environmental effects can be generalised into four categories as defined in the following table.

Table 2 Causes of cumulative environmental effect

Space crowding	Time crowding	Interactive effects	Indirect effects
<p><i>Space crowding</i> occurs when a system is disturbed by several similar activities, or by different activities producing a similar effect, in an area too small to assimilate the combined impacts. (Rees 1995)</p> <p><i>Nibbling</i> is an incremental form of space crowding and is the gradual disturbance and/or loss of land and habitat (Court <i>et al.</i> 1994).</p> <p>For example: Development of two or more mines and supporting infrastructure resulting in vegetation clearance concentrated in a local area.</p>	<p><i>Time crowding</i> occurs when impacts are so close in time that the impact of one action are not dissipated before the next occurs. (CEARC 1986)</p> <p>For example: Sequential and on-going discharge of mine waste water into rivers/creeks.</p>	<p><i>Interactive effects</i> can be additive or compounding, reflecting the interactive nature of ecosystems.</p> <p>Additive is the simple linear addition of one impact on another, whereas compounding is when two or more agents combine to cause an impact.</p> <p>Antagonistic effects can also occur, where the combined impact of more than one agent is less than the sum of the individual impacts. (Canter and Kamanth 1995)</p> <p>For example: Additive dust effects from the construction and operation of adjacent operations</p> <p>Compounding dust and noise effects combining to disturb wildlife and alienate habits.</p>	<p><i>Indirect effects</i> are secondary impacts arising as a result of the direct effect, and include the impacts of activities facilitated by a project, including reasonably foreseeable impacts from downstream users.</p> <p>For example: New roads to access a mine provide new invasion pathways for weeds and pest species.</p> <p>Activities of farmers using irrigation as a result of the construction of a dam.</p>

3 When is cumulative impact assessment appropriate?

CIA is useful when information on the combined effects of projects is necessary to provide confidence to proponents, decision makers and the public about the broader context and longer-term environmental conditions likely to result from an action, project or projects.

Importantly, CIA is not always necessary and undertaking CIA should not be an automatic requirement for all projects. CIA should be undertaken only where there is a likelihood of significant impacts on identified environmental values from the combined effect of two or more activities, and where one or more of the following applies:

1. Information on regional level impacts is required to support project-specific assessments and approvals – particularly where required by assessment terms of reference
2. A series of projects are planned or currently underway within a region but where project timelines or governance structures do not align or provide sufficient lead time to conduct a strategic assessment
3. A large degree of uncertainty exists, that can be materially reduced, in terms of:
 - the spatial and/or temporal definition of an impacted region
 - limited information on impact pathways on specific values or assets of high priority
 - limited understanding of regional impact thresholds.

Approaches and examples for dealing with this uncertainty are provided within this Guide.

In many instances it is a regulatory

requirement that a project proponent undertake a CIA and it is commonly incorporated in EIA to some degree. This has both positive and negative aspects. A single proponent will be able to control, to some degree, project management aspects such as scope, timing and budget; however it may be limited in terms of access to important data and management of impacts (avoidance, mitigation and offsetting options) that are outside of the proponent's direct responsibility or capacity to influence.

Of particular importance in understanding and managing cumulative impacts is regional and state planning activities. This is most pertinent where the CIA required is large in scale. In this, management is through informed planning that utilises regional assessments, zoning, tenure and land use plans to direct appropriate activities and manage impacts on sensitive areas, communities and assets.

Additionally, if regional plans are in place, project or precinct scale CIA can then use the planning context to address potential impacts at a finer resolution. This approach was supported by the Independent Review of the Port of Gladstone (Commonwealth of Australia (2013), which concluded:

Planning and management solutions should be site specific and 'fit for purpose' within the local and regional environmental and social context, including having regard to cumulative pressures.

Other countries are adopting regional level CIAs. The Canadian Council of Ministers of the Environment (CCME) recently released the Canadian Regional Strategic Environmental Assessment (RSEA) framework. The framework allows project based performance assessment by establishing regional environmental targets, limits, and thresholds against which to monitor and evaluate subsequent development and management actions.

Core methodological principles are identified as:

- Futures oriented
- Alternatives based
- Adaptive
- Proportionate to environmental risk
- Multi-scaled, sectored and ecosystem based.

CIAs can be approached in a variety of different ways using different impact assessment frameworks. Each has strengths and weaknesses and seeks to answer cumulative impact questions from different perspectives. Understanding whether a CIA will be useful at all and, if so, which approach will be most appropriate to apply, is therefore critical to success and ensuring expectations are met.

The following section outlines the breadth of approaches that can be taken in CIA and provides the tools to select the right approach to properly address cumulative impacts. As CIA is evolving, the understanding among regulators and the community is also developing. Tools are therefore provided to cross check that expectations are appropriate and to avoid any mismatch.

One form of CIA (project-initiated) will be of most relevance to individual mining proponents. This approach is therefore examined in more detail in this and the following sections.

3.1 Scenarios and circumstances in which CIA can be applied

Below are some common examples of scenarios where the cumulative impacts from mining activity may warrant further analysis or consideration:

1. Air emissions need to be assessed for their potential to change ambient air quality in surrounding airshed and consequent impacts on human health
2. Noise impacts on nearby sensitive receptors need to be assessed with reference to existing ambient noise conditions
3. Water discharges from a number of operations have the potential to combine with existing pollutant loads to increase downstream pollutant concentrations and potentially impact a water resource or ecosystem
4. Groundwater extraction combines with extraction from surrounding bores to reduce groundwater input into a sensitive groundwater dependent ecosystem
5. Clearing of native vegetation to establish mining infrastructure occurs in an area that has already been heavily cleared, with consequent concerns that further fragmentation of the remnant vegetation will reduce connectivity below ecological thresholds
6. Removal of habitat of a threatened species is required in an area where the existing threatening processes remain substantially unmitigated and where additional future developments have been foreshadowed, with consequent concerns that the combination of these pressures will result in a decline in numbers to below those required to sustain a viable population.

Many of the scenarios described above will be familiar to those who have been involved in the preparation of conventional EIA documentation. Scenarios 1 to 4 in particular are routinely addressed in EIA using numerical modelling techniques that incorporate the inputs of the project under assessment and existing activities in a river catchment or airshed to predict the resultant ambient environmental quality. For impacts to physical environmental parameters, the concepts of cumulative assessment are not new and have been practiced for some time. Similarly, contemporary EIA practice incorporates the potential environmental impacts from additional related (facilitated) development that may arise from the existence of the project undergoing assessment. Moving beyond the core components of the project subject

to assessment, to include development that may be spatially distant or not directly under the control of the proponent, is therefore not entirely novel either. Seen in this context, CIA can be viewed as a spatial and temporal extension of the more familiar EIA practices and approaches.

3.2 Legal requirements

Explicit legal requirements for project-initiated CIAs vary across the Australian jurisdictions. Additionally, legislation and supporting regulations and guidelines are constantly evolving. Accordingly, companies looking to undertake project-initiated CIA should seek specific information and advice on the legal requirements in their relevant jurisdiction(s).

In most jurisdictions the need to consider cumulative impacts is established through the respective frameworks for conventional EIA and more directly specified through the terms of reference for a project-specific impact assessment (such as an EIS). CIA is not always specifically mentioned in EIA statutes. Where not expressly referenced it may still be a relevant consideration for the regulator, on the basis of the definitions and objectives of the legislative regimes, which reference concepts such as ecologically sustainable development. In addition, an expectation for assessment of cumulative impacts is often created through guidance documents prepared by the relevant regulator, some of which have legal effect. This position is supported by relevant case law.

3.3 Case law

The limited case law relevant to cumulative impacts relates to challenges to individual projects. The case law provides some guidance on the applicability and scope of CIA and how it should be undertaken, although the judicial statements are generally indicative rather than prescriptive.

To understand case law on cumulative impacts, it is important to be aware that each case specifically relates to the laws of the particular jurisdiction relevant to the project; a case about a statutory provision in one state is not necessarily relevant to a different statutory provision in another state. In the federal sphere, cases concern the specific and detailed legislative requirements of the EPBC Act, its Regulations and relevant guidelines.

State laws about cumulative impacts may be expressed in more general terms, so the principles emerging from state or federal cases are not necessarily interchangeable.

A series of case law summaries is provided in Appendix 1. These leading cases are categorised according to the relevant jurisdiction. As cases from other countries with similar laws and similar legal systems can be relevant, two foreign jurisdictions are also briefly mentioned.

The overall position coming from most of the case law is that cumulative impacts may be a relevant consideration and can be taken into account even where the statute does not expressly require it. Further, the extent of the cumulative impacts to be considered will largely be at the discretion of the decision-maker. That discretion must be exercised reasonably and any assessment must properly relate to the project. However, the cases generally demonstrate that cumulative impacts are not a mandatory (i.e. a 'must') consideration for decision-makers.

Additional judicial consideration demonstrates that there is no consensus on the appropriate type of CIA approach to be used, so the need for and scope of any CIA needs to be determined on a case-by-case basis. However, the courts make it clear that a distinction must be drawn between an action and its impacts, where cumulative impacts are those impacts arising, either directly or indirectly, from the action which is the subject of the referral in the context of its environment.

4 Elements for success

Undertaking a successful CIA is not straightforward. Throughout the process there will be numerous challenges that will need to be managed and solved.

The reality of complex scientific assessments is there is rarely an ideal set of data or time-series to complete the assessment. As such the process must be designed and managed in an adaptive manner to accommodate the unique circumstances that will apply.

At a broad level there is a common set of elements that need to be in place in order for a CIA to be successful. Table 3 has been adapted from the Commonwealth Government's *Guide to Undertaking Strategic Assessments* (SEWPaC 2011) which provides a summary of the elements necessary for strategic assessments, noting that they are equally applicable to CIAs.

Additionally, specific to CIA there are a number of recurring challenges to success. Five of the most common are briefly outlined below. Further information and ways to address these are outlined in following sections of this guide.

4.1 Forecasting of other projects

The terminology commonly used in setting the requirements and scope for a CIA is to consider “past, present and reasonably foreseeable future activities”.

Past and present activities are relatively easily assessed by considering the ambient or current environmental conditions and, where known, the trend of environmental values and indicators. In many instances this is already done as a part of standard EIA processes.

Determining what constitutes a “reasonably foreseeable future activity” can be much more difficult and complicated. On the whole CIAs undertaken in Australia have relied upon information from publicly announced projects and those contained in government assessment databases, e.g. major projects registers, to determine what future projects are proposed.

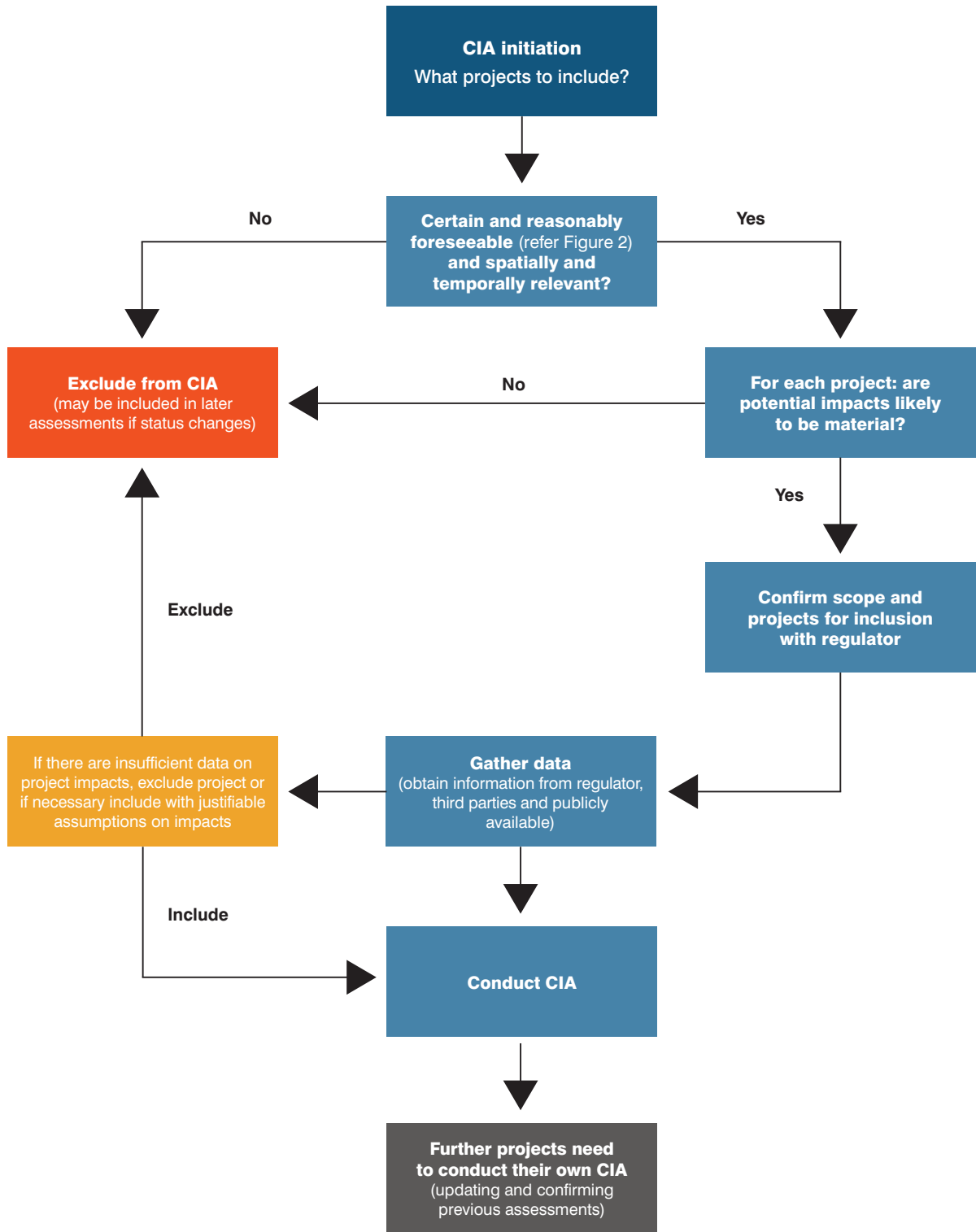
A significant issue in this approach is that an announced project or one that is in a formal project approval process is not a reliable forecast of projects that will go ahead. It does not factor in issues such as current and projected commodity prices; increasing the risk that the scale of potential regional activities is over-estimated. Additionally, the timing of project commencements can alter, making it difficult to assess the temporal aspect of impact and change.

Figure 1 provides an overview of the general process for determining which projects should be included or excluded from a CIA.

Table 3 General elements for a successful cumulative impact assessment
(adapted from SEWPaC 2011)

Timing	The timing has to be right to start a CIA and the scope must accommodate the time available for statutory decision making and business needs. For example, there needs to be a clear link to a business case that has considered the regulatory process to ensure that integration of the outcomes can be achieved in a timeframe that does not necessarily extend project approvals or commencement.
Imperative	There needs to be a clear imperative from the party (organisation or group) that is driving the CIA. This includes a legislative need and/or an identified information gap based on cumulative impact risks. Lack of imperative may result in the process drifting or unnecessary costs and time delays for proponents and government.
Leadership	Leadership from both the party conducting the CIA and the relevant regulator/s is critical. Inadequate management of the process has major risks as the process unfolds. Governance arrangements involving senior engagement from all parties should be established early in the process.
Collaboration at all levels	CIA is often a collaborative process. Collaboration at all levels between the party or parties conducting the CIA and the relevant regulator is necessary to move the process forward and deal with arising issues.
Honesty	Developing and maintaining an honest approach to the assessment is critical. This is the approach that is most likely to generate trust and provide opportunities to achieve the best outcomes.
Expectation management	All parties involved in the CIA need to set and then meet clear expectations. These need to cover scope; timeframes; access to data; information quality and detail; scientific methods used; and the use of results. Clear communication regarding the ability to meet expectations is critical throughout the process.
Outcome focus	An ongoing focus on the outcomes to be achieved is vital. Expected outcomes need to be developed early in the project by all parties and referred to throughout.
Agreed timelines & project management	Having clearly agreed timelines and proactively managing the project throughout the process are vital for all parties. The use of adaptive management approaches and dealing with uncertainty are critical to ensure that the CIA does not continually extend in time and scope (i.e. the risk of shifting goal posts).

Figure 1 Broad process for determining projects for inclusion in cumulative impact assessment



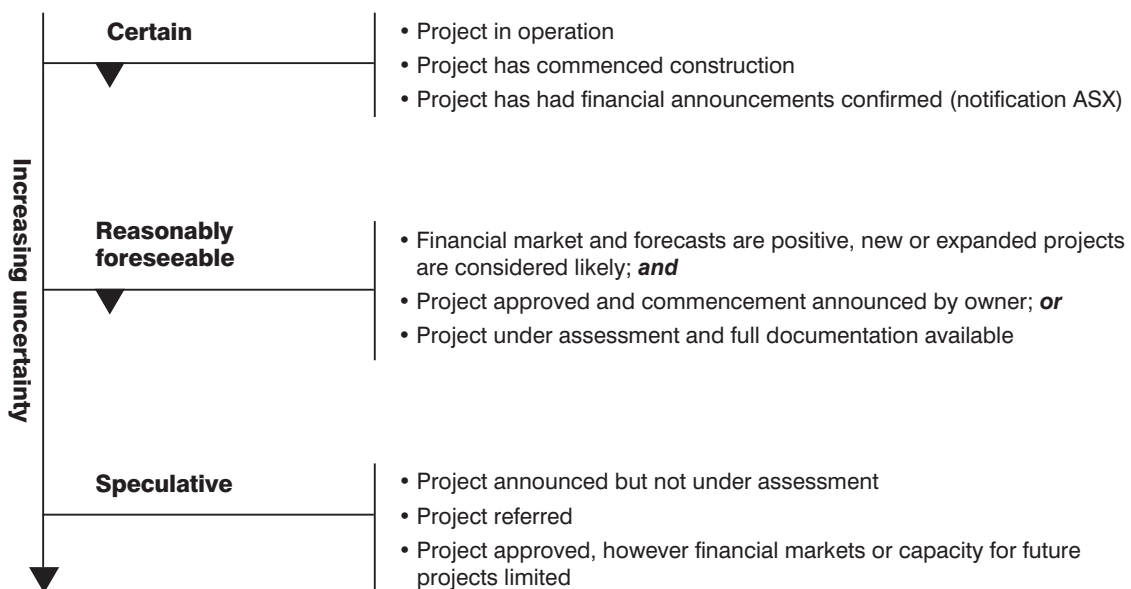
The level of forecast certainty decreases the further into the future the proposed projects are planned (Figure 2). It is imperative that CIAs consider the likelihood and uncertainty of project forecasting. For project based cumulative impact studies it is unwise and technically difficult to deal with projects and scenarios that begin to fall into the “speculative” category. Many projects that are referred, assessed and even approved do not eventuate; therefore it is important to filter out to the extent possible those projects where there is less certainty they will proceed. Where there is a moderate level of uncertainty about projects and the likely impacts, the cumulative impacts should be carefully considered. In some circumstances it may be appropriate for potential future impacts to be excluded and if necessary addressed by future proponents. Proponents and regulators need to reach a

practical consensus on what projects should or should not be included.

If the circumstance arises that a project must be included but limited or no publicly available data can be sourced it may be necessary to make assumptions about its potential impacts. In such cases assumptions should be justifiable and based on actual analogues, such as typical or previous values from similar projects, known or standardised outputs (such as emissions or regulated limits) or from careful modelling and forecasting. In such cases the basis for assumptions should be fully documented.

Alternatively, it may be appropriate for these issues to be considered more closely through strategic assessment style approaches undertaken by governments or in government-industry partnerships.

Figure 2 Decreasing certainty of project forecasting



4.2 Baseline data

Baseline data provide a benchmark against which potential impacts can be anticipated and change measured. Gathering and accessing useful baseline information on third party projects and impacts can be one of the greatest challenges in conducting CIAs. Undertaking all the necessary baseline studies and monitoring to inform a CIA can be expensive and time consuming (establishing long-term informative data sets can take many years).

In almost all instances CIAs are dependent on access to existing data often held by third parties (for example, government agencies, universities and other commercial corporations). Options for data sharing and access are discussed further in Section 5.8.

Baseline data can provide detail on the cumulative pressures of existing activities in the region (mining and non-mining) and may be used to inform impact prediction and identify priority areas for mitigation and management.

There is also a need to consider the concept of a 'shifting baseline'. The development of a baseline as a snapshot of a system at a particular point in time will in most cases represent an already impacted system that may include the effects of past activities. The analysis of background data will need to consider the extent to which past activities contribute to existing impacts and whether those activities need to be considered in the assessment.

Useful sources of information can include:

- federal and state referral and EIA documentation (for other actions that have been referred/assessed)
- environmental licence registers and licence documentation
- environmental databases such as the National Pollutant Inventory (<http://www.npi.gov.au/>)
- land use maps and aerial photos
- State of the Environment Reports.

Comprehensive information therefore is not necessarily a pre-requisite to cumulative impact management. CIA models that take an adaptive management approach may be a means of enabling impacts to be managed in the absence of up-front comprehensive information.

4.3 Scoping, design and methodology

Careful scoping is an essential step in conducting CIA. Summarised below are key issues to be considered, defined and have appropriate boundaries developed:

- Set boundaries – spatial and temporal
- Issues identification i.e. habitats, noise, clearing, dust. These should be restricted to those relevant to the regulatory/approvals pathway.
- Agreement on environmental values/assets e.g. threatened species, water resources
- Identify actions for which cumulative impacts will be considered (see above regarding consideration of past, present, future activities)
- Initial identification of potential significant impacts and effects – allows methods to be tailored to address relevant issues
- Incorporation of an adaptive capacity to scope, so that as new information and understanding of impacts and impact pathways occur (e.g. groundwater surface water connectivity), boundaries can be adjusted accordingly.

The study design and methodology will be dictated largely by the project and the outcomes of the scoping stage. CIA is not a 'one size fits all' process. Key tools that can be useful include modelling, spatial analysis and mapping, interaction matrices, and expert opinion.

4.4 Collaboration and data sharing

Access to data can be a significant enabler or limitation in conducting CIAs. Considerable data exist in many areas that would support a CIA. Accessing this can save time and money but also ensures consistent and informed results are produced.

The type, quantity and quality of data will vary considerably across locations and issues. In the mining context, this will generally be dictated by the level of development or exploration that has already occurred in the area (e.g. greenfield v brownfield precincts).

Having proper arrangements for data sharing and access is essential. This includes collaborative relationships as well as legal

and commercial agreements. Options for data sharing and access are discussed further in Section 5.8 and Chapter 6 provides case study examples of different data sharing models. Regulating authorities are already imposing conditions on approvals that require assessment information to be made publicly available.

Data sharing should not be imposed by regulators for its own sake, but should be required only where it relates to the regulatory need. This is important to keep the CIA centred on the management of cumulative and material impacts on agreed environmental values. Not to do so would impose considerable costs in data management, modelling and compliance on both industry and government for little regulatory benefit.

In some instances, information required to model cumulative impacts may present challenges in terms of preserving commercial confidentiality and intellectual property. Where this is the case, the role of governments in facilitating data access and sharing should not be underestimated as they often hold or have access to the information needed, and can also help to overcome these challenges, although they should be aware that they are also not immune from these issues. Note also the comments in the *Landcorp* case summarised in Appendix 1 highlighting the obligation of government decision-makers to disclose all relevant information to proponents. The challenges of data storage and different bureaucratic structures can however make it difficult to find, retrieve or correlate this information.

Some key principles for data sharing are provided below:

1. Gaps or a paucity of data are not necessarily critical flaws if reasonable estimates of missing data can be made or if an adaptive management methodology is adopted
2. Absolutes in terms of data and knowledge are rare; gaps and uncertainty can be managed and overcome
3. A precautionary approach may be required by regulators in the absence of certainty
4. Data gathering for data sake should be avoided; more data are not necessarily better. The quality of data and the applicability of results are more important than the size of the data file.

5. Government should disclose information relevant for EIA to proponents, where material is not commercial in confidence, and advise third parties that data may be provided to assist future CIA
6. Commercial in confidence material must be respected; however, companies and organisations should work cooperatively to deliver the best possible environmental outcomes and decision-making. This will benefit the industry more broadly.
7. As there are always budget and time constraints, new studies should be prioritised to the most important and best value for effort information.

4.5 Reasonable and shared expectations

At the outset of a CIA it is important all stakeholders (proponents, regulators and active interested third parties) have the same expectations of the likely outcomes, process and limitations of the assessment.

Establishing these expectations can be achieved by utilising various tools including:

- Developing clear, comprehensive written terms of reference specific to the assessment to be undertaken – remembering that one size does not fit all
- Supporting the terms of reference with a published rationale for the methodology, scope and data specifications to be used
- Conducting workshops and in-person briefings with key stakeholders to obtain input and reach a mutual level of understanding
- Clearly identifying the limitations and boundaries of the assessment at commencement and in the production of results/conclusions.

5 Preparing and undertaking a cumulative impact assessment

This section focuses on the steps required to prepare a CIA. Where relevant, reference is made to suitable guidance material in national and international publications and relevant case study examples.

The aim of this section is to sufficiently outline a CIA approach within an Australian context, leaving readers to follow up additional detail within the identified resource documents.

A list of useful information sources is contained in Chapter 7; however, some key documents that will be useful in planning and conducting a CIA include:

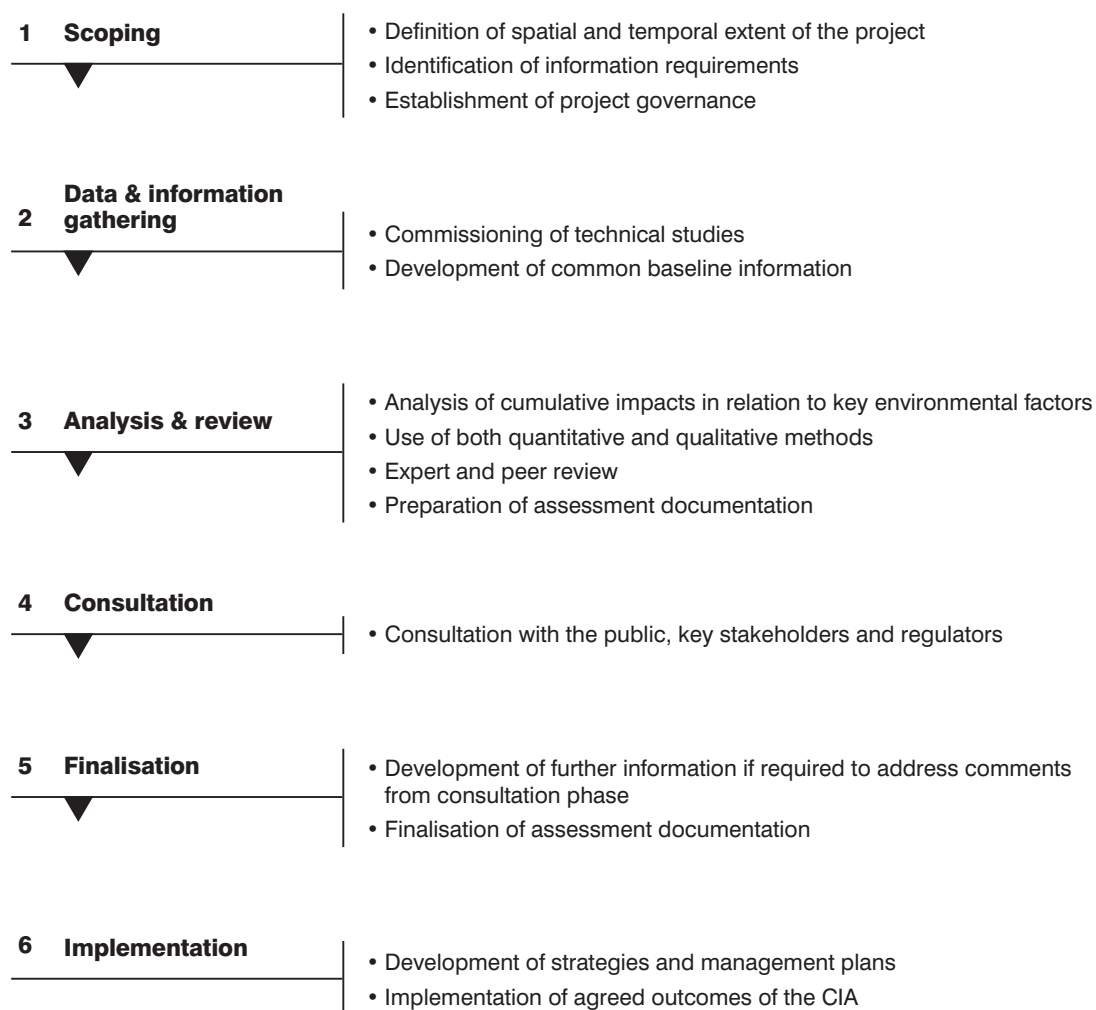
- ***Cumulative Impacts – A Good Practice Guide for the Australian Coal Mining Industry.*** Australian Coal Association Research Program, Brisbane. (Franks *et al.* 2010).
- ***Cumulative Effects Assessment Practitioners Guide.*** Prepared by AXYS Environmental Consulting Ltd and the CEA Working Group for the Canadian Environmental Assessment Agency, Hull, Quebec (Hegmann *et al.* 1999).
- ***Good Practice Handbook Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets.*** International Finance Corporation (IFC 2013).

The section focuses on answering the following key questions (adapted from Hegmann *et al.* 1999):

- Do we need to assess everything?
- How do we identify what is important to assess?
- How large an area around the action under review do we have to assess?
- What other actions should we consider?
- How do we get information on actions we don't control?
- For what time period should cumulative impacts be assessed?
- How do we determine the significance of cumulative effects?
- What do we need to do about these cumulative effects?

It is important to note that CIA is not a prescriptive process. It can be applied at different scales, to different projects, and with different aims. Figure 3 depicts a general approach to CIA that can be adapted and applied to most scales and scenarios. CIAs should be undertaken and completed in parallel to project-specific EIA, ideally using the same public consultation process.

Figure 3 **General stages of cumulative impact assessment**
(Open Lines 2012)



“

CIA is not a prescriptive process. It can be applied at different scales, to different projects, and with different aims.

”

5.1 Ensuring CIA is ‘fit for purpose’

Section 2.1 described four broad types of CIA, which include:

1. Cumulative impact of combined elements of a single project
2. Contributing impacts of a singular project on an existing baseline or current health of the system
3. Cumulative impact of multiple projects on a single environmental value
4. Cumulative impact of multiple projects on multiple/all environmental values.

Each type approaches the questions of cumulative impact in a different way with consequent differences in scope, spatial and temporal bounds. Critically, some approaches to cumulative assessment are not generally suitable to be undertaken by mining proponents and are best undertaken by governments. Ensuring that proposed CIA is ‘fit for purpose’ is therefore critical to ensuring expectations are met and resources are applied effectively and efficiently.

This guide focuses on the practicalities of undertaking project-initiated CIAs, which is the most relevant to mining companies. Noting that an increased use of partnerships and collaborative approaches are emerging, recognising the choices involved and the strengths and limitations of project-initiated CIA is therefore key to ensuring the assessment is appropriately targeted. It also allows for more constructive discussion with regulators, where issues or tensions over scope arise.

In many instances the terms of reference or guidelines for a project assessment will require a proponent to undertake some form of CIA. Frequently, requirements for cumulative assessment will be less specific than the conventional questions asked of the assessment. While this provides greater flexibility, it increases the opportunity for misalignment of regulator and proponent expectations. Some examples of the types of cumulative impact requirements are provided in Table 4.

Table 5 provides a checklist of key questions that may initiate a CIA together with guidance

Table 4 Examples of cumulative impact assessment requirements included in terms of reference

Cumulative impact assessment requirement in ToR	Project	Legislation	Jurisdiction
<p>The EIS must identify and address <u>cumulative impacts</u>, where potential project impacts are in addition to existing impacts of other activities (including known current and potential future expansions or developments by the proponent and other parties in the region and vicinity).</p> <p>The EIS must also address the potential cumulative impact of the proposed action on ecosystem resilience. Where relevant to the potential impact, a risk assessment must be conducted and documented.</p>	North Galilee Basin Rail Project	<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Federal
<p>Estimate the demand for potable and raw water for the operational period (in ML per annum) and discuss this in relation to the resource capacity and current use <u>with particular reference to the cumulative impacts on water resources</u>.</p>	Mt Todd Gold Project	<i>Environmental Assessment Act 1994</i>	NT
<p>Discuss potential direct/indirect (including downstream) <u>and cumulative impacts</u> to fauna as a result of the proposal, and provide quantitative data on impacts of the proposal to species of conservation significance.</p>	Christmas Creek Iron Ore Mine Expansion	<i>Environment Protection Act 1986</i>	WA
<p>Investigate and outline the potential effect of the development on the coastal and marine environment, <u>including cumulative impacts associated with the proposed development</u> both on and around the site, (including water quality) and the Australian Giant Cuttlefish aggregation area and offshore marine habitats.</p>	Port Bonython Bulk Port Export Facility	<i>Development Act 1993</i>	SA
<p>Conduct an assessment of the likely impacts of the development on the environment, focussing on the specific issues identified below, including: – an assessment of the likely impacts of all stages of the development, <u>including any cumulative impacts</u>...</p>	Mt Thorley Continuation Project	<i>Environmental Planning and Assessment Act 1979</i>	NSW
<p>Where relevant, this section must contain an assessment of the <u>potential cumulative impacts of the proposal</u>, based on existing and other formally proposed developments in the region, which have not been addressed in previous sections. Interactions between biophysical, socio-economic and cultural impacts of the proposal should be discussed.</p>	Langloh Coal Mine	<i>Environmental Management and Pollution Control Act 1994</i>	TAS
<p><u>Cumulative impacts</u> on the environmental values of land, air and water and cumulative impacts on public health and the health of terrestrial and aquatic ecosystems must be discussed in the relevant sections. This assessment may include air and water sheds affected by the Project and other proposals competing for use of the local air and water sheds.</p>	Bowen Basin Coal Growth Project	<i>State Development and Public Works Organisation Act 1971</i>	QLD

Table 5 Key cumulative impact questions
(Adapted from Hegmann *et al.* 1999, IFC 2013)

Question	Best fit	
	EIA approach (project-initiated)	Strategic regionally-based approach
What are the likely additive or incremental impacts of the proposed activity?		
Does the proposed activity have the potential to incrementally adversely affect an environmental value beyond an acceptable threshold?		
How much of the total cumulative effect is attributable to a future mining project or multiple projects?	●	
Are the combined effects of multiple initiatives overloading natural capacity?		
What is the effects-based contribution of multiple projects?		
Will other existing and future actions cause or potentially cause impacts that may interact with the potential impacts caused by the mining proposal under review?		
What are the preferred regional environmental conditions or objectives?		
What are the potential cumulative impacts of various regional land use alternatives?		
What are the opportunities or constraints to current and future development in the region (both mining and non-mining)?		●
What are the potential cumulative impacts to environmental values that are impacted by other non-mining activities in the region?		
How can the proponent of the activity responsibly mitigate, monitor and manage significant individual or multiple, project-based contributions to cumulative impacts?	●	
How can positive impacts be enhanced and negative impacts of development be avoided in the region?		
How can risks to the mining sector and the regional environment be reduced?		●
How can multiple proponents collaboratively mitigate, monitor and manage significant multiple contributions to cumulative impacts?		●
How should future mining development be regulated?		
Should this mining project and related projects (such as port and rail) proceed on technical, design and engineering grounds given the likely additive or incremental impacts?	●	
Are alternative spatial or temporal configurations to this mining project and related projects possible to mitigate project based cumulative impacts?		
What are the alternative development scenarios given the development vision for mining in the region?		
What are the potential cumulative impacts of each alternative scenario for expanding mining activity in the region?		
What are the opportunities and constraints on expanded mining development?		●
What is the best development scenario for mining in the region?		
What are the alternative development scenarios (including non-mining) for the region to meet broader regional, sustainability, or policy-oriented goals or objectives?		

(Adapted from Hegmann *et al.* 1999, IFC 2013 and Harriman and Noble 2008)

on whether that question is best aligned to or satisfied by EIA driven or strategic, regionally-based approaches. The checklist can be used to review EIA requirements. If the assessment requirements primarily relate to those matters better addressed through strategic approaches, then the EIA requirements may be unrealistic and need revision. Alternatively a strategic assessment may be worth considering if circumstances are favorable for such an approach to be adopted. In these circumstances, consideration should be given to further engagement with the regulator to clarify their expectations and bring the scope of the CIA into alignment with those aspects that are best addressed through project-initiated approaches.

As planning for the CIA proceeds and the proposed approach potentially evolves, these questions can be revisited to ensure it remains 'fit for purpose' and avoids any disparity arising from 'scope creep'.

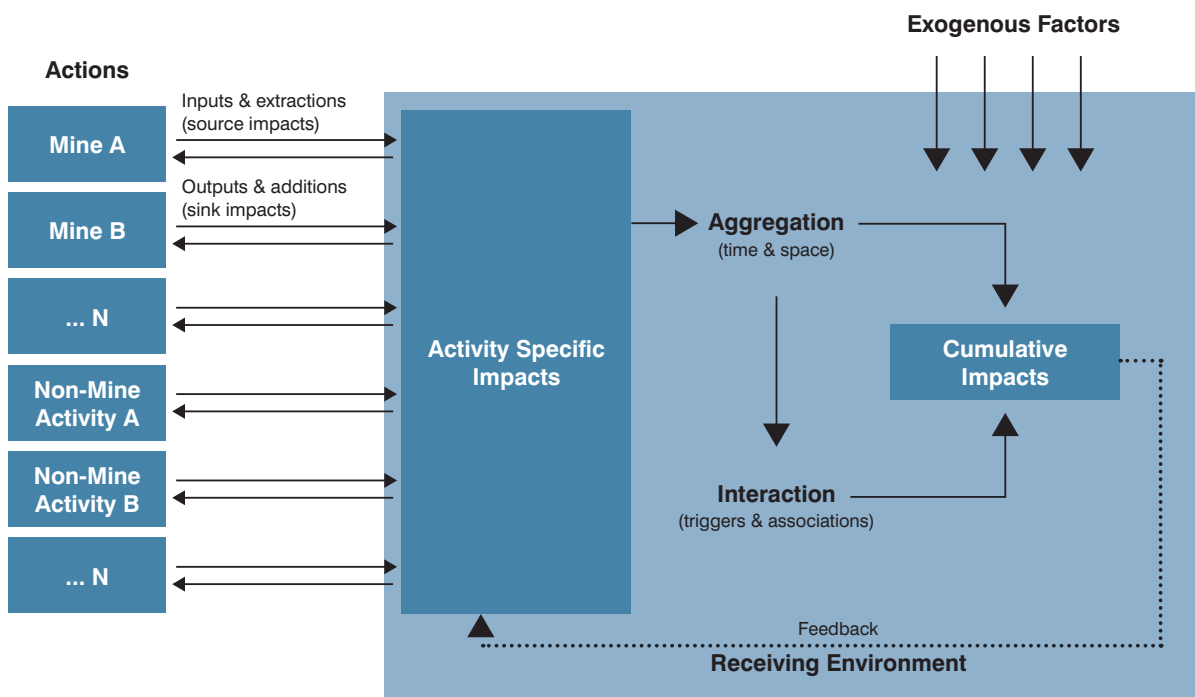
5.2 Getting the focus right

Although conventional EIA and CIA share a common and familiar framework, they fundamentally differ with respect to the central

focus of the assessment. Cumulative impacts can be looked at from the perspective of an identified environmental value or sensitive receptor such as a threatened species or a water resource. The cumulative impacts are assessed on the resultant change in the condition of the environmental value or sensitive receptor (IFC 2013). CIA will often focus on the regional context and relative condition of an environmental value, while conventional EIA usually focus on the direct impacts of a project at a local or site-specific scale. At the broader scale or CIA level there is often a greater level of uncertainty due to limited site-specific or regional data requiring a more adaptive management approach.

Franks *et al.* (2010) stresses the importance of understanding impact pathways, cause and effect relationships, as well as source and sink impacts. It advocates a system approach to understanding the totality of impacts to a receiving environment, (represented in Figure 4). The influence of external factors on the receiving environment and the historical trend in the study area provide context for interpreting impact assessment results.

Figure 4 Conceptual framework of the cumulative impacts of mining (Franks *et al.* 2010)



5.3 Scoping – terms of reference, temporal and spatial extent, projects and activities

As with conventional EIA, good scoping is the key to optimising effort in data gathering, impact analysis and mitigation for a CIA. A shallow analysis is unlikely to meet regulator or community expectations while ‘assessing everything’ may overwhelm project team leaders and decision-makers, with the potential to distract from the real issues at play and lead to wasted (and costly) effort.

It is recommended that a documented and justifiable risk assessment approach be used to identify the key elements of the CIA. With the additional complexities of integrating potential impacts from other projects and assessing multiple impact pathways and interactions, a poorly scoped cumulative impact assessment can quickly become unmanageable.

There are five tasks in the scoping phase:

1. Issues identification
2. Selection of environmental values or sensitive receptors
3. Setting of boundaries (spatial and temporal)
4. Identification of other actions
5. Initial (high level) identification of potential impacts and effects.

Typically, some guidance on project-initiated CIA will be established through the terms of reference (or guidelines) issued to scope the overall EIA for the project. Guidance for the CIA component however is likely to be less detailed than the project-specific impacts.

While consultation with key stakeholders may not be explicit in the terms of reference for CIA, the acceptance of outcomes can be considerably enhanced by targeted engagement during scoping. This is particularly important for identifying regional issues of concern and in the selection of the relevant environmental values / sensitive receptors (tasks 1 and 2 above).

Task 1 – Issues identification: assessing what’s important

Many issues to be addressed within the CIA will have been addressed in the project-specific EIA albeit with a different focus. However, the broader focus of the CIA may lead to the identification of a wider or slightly different range of concerns (Hegmann *et al.* 1999).

A key strategy here is to focus only on those cumulative impacts to which the project may actually be a contributing factor. While the environmental value is at the centre of the cumulative assessment this doesn’t mean that every potential impact of regional concern to that value needs to be addressed. For example, while loss of habitat to a threatened species may be of regional concern, there may be no reason to incorporate those potential impacts into a project-initiated CIA if the mining project under assessment does not contribute to long term habitat reduction (as might be the case for a new or expanded mine on land previously cleared of remnant vegetation). In these circumstances it is important to clarify in the EIA documentation why these aspects have not been addressed, i.e. the basis on which it has been concluded that there is no significant impact.

In project-initiated CIA a key consideration regarding the inclusion of an issue is also whether its assessment will influence the approval decision by the regulator (Hegmann *et al.* 1999). Early discussion with the regulator can give valuable insight in this regard as can engagement with other organisations such as regional land or catchment management bodies, local government authorities, local and traditional owners and Aboriginal Land Councils.

Task 2 – Selection of environmental values/sensitive receptors

Sensitive environmental values are at the centre of CIA because in their various forms they tend to be at the end of ecological pathways and are therefore the ultimate recipients of impacts. They integrate the cumulative effects of different pressures and activities (IFC 2013). They form the investigative focal point for a CIA and concerns will typically be expressed over a larger scale such as a regional population, catchment or aquifer (Hegmann *et al.* 1999).

The choice of appropriate environmental values forms a key part of the scoping process for a CIA. Table 6 provides some examples of environmental values that are commonly considered. Separate jurisdictions may have their own set of identified environmental values, such as the Western Australian OEPA’s “EAG 8 – *Environmental factors and objectives*”. For assessments fulfilling EPBC Act requirements, the identification of matters of national environmental significance (MNES) forming the controlling provisions for the action, in effect function to identify the environmental values.

Table 6 Examples of typical environmental values include in cumulative impact assessment

Environmental component	Regional issue of concern	Environmental value/ sensitive receptor	Examples of indicators
Air	Effects of particulate, SO _x and NO _x emissions on human health	Residential areas, schools and hospitals near emissions stack	Exceedance of Air NEPM standard
Surface water	Over-extraction resulting in altered flow regimes	Other water users within the consumptive pool	Exceedance of sustainable yield/ reduced water security for other licensees
Groundwater	Over-extraction resulting in lowering of aquifer water level	Groundwater dependent ecosystems	Spring flows to groundwater dependent ecosystem
Vegetation	Loss of threatened species from land clearing, reduced population viability	Threatened species and associated habitat	Regional population of the threatened species
Fauna	Bird mortality from consumption of contaminated water at retention pond	Granivorous birds in the region (high dietary water needs)	Regional populations of the identified finch and parrot species
Resource use	Alienation of land, restriction of access	Local Aboriginal community, recreational fishers, harvested species	Stakeholder concerns/ complaints

Task 3 – Setting boundaries

Deciding the extent of the assessment area (spatial boundaries) and how long into the past and the future (temporal boundaries) to examine and assess is particularly important. By definition, CIA expands the horizons of a project assessment, spatially, temporally and/or conceptually. Finding the right balance between the practical constraints of time, budget and available data, and the adequacy of the analysis, can be particularly challenging.

The area under consideration in a project-initiated CIA is the area in which the environmental value under consideration occurs, including where other stresses may also affect that value. Since this may include activities more distant from the environmental value than the mining project under review, CIAs will usually involve a larger area than that considered during the conventional EIA (IFC 2013) and it is unlikely that the same spatial

boundary will be relevant across all of the environmental values. A number of techniques and ‘rules of thumb’ can be usefully applied to determine spatial boundaries for analysis:

1. Zone of influence – that is the area beyond which an impact becomes trivial or non-detectable on an environmental value (e.g. air emissions).
2. Risk assessment approaches routinely applied in EIA can inform the CIA boundaries. The complexity of determining impact thresholds for more complex relationships will usually require reliance on professional judgement and consideration of risk to determine the spatial extent of the analysis. Here an adaptive management approach can be useful, where spatial boundaries are first set using professional judgement and changed later if data suggest an altered boundary is required.

3. For biodiversity values such as native vegetation and threatened species, the spatial boundary for analysis should be ecologically defensible with reference to regional distribution, dispersal/movements, home range, etc.

While in theory the temporal boundaries of a CIA should extend back in time to a pre-impact condition and into the future until environmental values have recovered and effects become trivial, this is rarely practical. In practice, scenarios addressed in the CIA typically commence with current conditions and extend into the future to a point where there is still a reasonable level of certainty.

Task 4 – Identification of other actions

During the scoping phase, actions need to be identified that have caused or may cause effects and may interact with effects caused by the action under review. Past actions may need to be considered such as a non-operational mine that is continuing to discharge into the same catchment.

As outlined in section 4.1, the consideration of future actions in the CIA is often the cause of much uncertainty since basic information upon which to predict likely impact pathways is often limited, potentially not in the public domain and certainly not under the direct control of the proponent of the action being assessed.

Hegmann *et al.* (1999) describe a set of criteria for categorising future actions into certain, reasonably foreseeable and hypothetical. As outlined in Section 4.1, pragmatism dictates that only those actions categorised as certain and some reasonably foreseeable actions that could have a significant cumulative impact with the project under review should be considered.

Certain actions are those where:

- Project is in operation
- Project has commenced construction
- Project has had financial announcements confirmed (e.g. ASX notification).

Reasonably foreseeable actions include:

- Financial market and forecasts are positive, new and expanded projects are considered likely; **and**
- Approval has been granted and commencement announced by owner; **or**
- Regulatory review for approval is currently

underway and documentation is available.

A major consideration for selecting these other actions is whether the action causes similar effects on the same environmental values/sensitive receptors as the project under assessment.

Another consideration relates to facilitated/ ancillary actions that are projects and activities that may occur if the project under assessment is approved (e.g. associated rail, port, utility supply or accommodation projects). These will need to be identified in order to assess the indirect impacts of a proposal.

Special consideration of the requirements of the EPBC Act should be noted. Under the EPBC Act the decision maker is obliged to have regard to the 'relevant impacts' on the matters protected under Part 3 of the Act (i.e. MNES). Impact is defined to include direct and indirect consequences of the action. Indirect consequences are defined to include a facilitated (secondary) action that might be considered by the proponent or a reasonably foreseeable consequence. While the EPBC Act makes no specific mention of cumulative impacts, the Act does require a proponent to consider the combined effects of the action and any facilitated actions.

An example is where a mining project is the subject of conventional EIA in which project-initiated CIA is required. The project requires the construction of two related projects, a new railway line and port for transport and export of the commodity. In turn those related projects are likely to result in additional shipping and dredging (facilitated actions). Two mines (A and B) in the region are known to be entering into discussions with the new rail and port operators to secure use of the facilities for their operations. Two other mines in the region (C and D) have other transport options and are unlikely to utilise any new rail and port facilities. From the perspective of including related and facilitated actions in the CIA, it would be reasonable to include the rail, port and mines A and B but not mines C and D.

In considering future actions (whether facilitated or otherwise), if there is a high degree of uncertainty (i.e. they are not certain or reasonably foreseeable), then it would be reasonable to exclude them from assessment and indicate to the regulator that those matters would be more appropriately addressed when they are properly defined in a separate proposal for individual EIA, through Strategic

Assessment based approaches or as part of regional land use planning processes.

In all circumstances, it is wise to make the rationale for inclusion or exclusion of other activities clear in the assessment documentation along with a clear statement of the limitations that arise.

All actions that meet the spatial and temporal criteria established for the CIA must be described in sufficient detail to allow potential impacts on the environmental values to be characterised. Generally those actions with a higher degree of certainty will have the most information with less information available as certainty decreases. Typically, information on the following will be relevant (similar to most EIAs):

- Location, physical size and spatial distribution of project components
- Project components and supporting infrastructure
- Expected life of operations and any seasonal variation
- Transportation routes and modes
- Approvals received.

Invariably, information on some or all of the above will not be readily available for every identified action, particularly those that are less certain. In these circumstances the assessment must rely on all available public information and the limitations this places on the assessment should be clearly indicated.

If assumptions have been used to overcome information gaps, these should be clearly stated and the uncertainty explained (Hegmann *et al.* 1999). Sensitivity analysis may be appropriate where the assessment is heavily reliant on assumptions.⁴ Above all, the reasonable steps taken to collect information should be documented in the assessment and, where appropriate, discussed with the regulator to ensure these are properly understood.

“

In all circumstances, it is wise to make the rationale for inclusion or exclusion of other activities clear in the assessment documentation along with a clear statement of the limitations that arise.

”

⁴ Sensitivity Analysis is a process which enables the modelling of uncertainty of an outcome, attributed to different inputs or assumptions.

Task 5 – Initial identification of potential impacts and effects

Potential significant impacts on the environmental values from the interaction of the project under assessment and relevant other actions should be identified in the scoping stage. The focus should be on identifying “what is affecting what?” Consistent with conventional EIA practices, a starting point can be the identification of the environmental values (e.g. water) that may be affected by the project under assessment. This can be matched with the identified environmental value affected by

the other actions in the region. Scoping can then proceed by focussing on the relationships between specific impacts from various actions and the environmental values. Interaction matrices are a useful tool to identify the potentially strongest cause-effect relationships and summarise the results.

Summary checklist for scoping phase

Table 7 provides a summary of typical questions that could be considered during the scoping phase of a CIA (adapted from IFC 2013).

Table 7 Typical questions which could be considered during the scoping phase

Typical scoping questions	
1.	Which environmental values or sensitive receptors are affected by the project under assessment?
2.	Are there concerns over existing cumulative impacts on the identified environmental values or sensitive receptors?
3.	Who can provide information clarifying concerns over cumulative impacts on the identified environmental values or sensitive receptors? (e.g. regulator, land managers, other projects, local governments)
4.	What area is occupied by each identified environmental value or sensitive receptor (beyond the immediate footprint of the mining development)?
5.	How far can the effects on the identified environmental value or sensitive receptor travel (including those arising from the project under assessment and other stressors affecting the environmental value)?
6.	Over what timeframe (past and present) should impacts on identified environmental values or sensitive receptors be considered, taking into account the operation of the project under assessment and other activities under consideration?
7.	What is the existing condition of the identified environmental value or sensitive receptor?
8.	What are the indicators used to assess the condition of the identified environmental value or sensitive receptor?
9.	What additional data might be required to assess the condition of the environmental value or sensitive receptor and who may have some of this information?
10.	Are there any other past, existing or planned activities affecting identified environmental values or sensitive receptors?
11.	Who holds information relevant to past, existing or planned activities; is it in the public domain, and is it in a form that is useable in a cumulative impact assessment?
12.	Are there any natural disturbances or stressors affecting identified environmental values or sensitive receptors?
13.	What are the key potential impacts that could affect the long-term sustainability or viability of the environmental value or sensitive receptor?
14.	Are there known or predictable cause – effect relationships?
15.	Can these impacts and risks interact with each other?

5.4 Assessing cumulative impacts: tools and techniques for robust assessments

It is very important to remember that in a project-initiated CIA, it is the project's contribution to future cumulative impacts that need to be identified and communicated. Broader concerns may be expressed by regulators or the community during negotiation/consultation on the terms of reference or in the conduct of the assessment. However keeping the central focus on the project's contribution to cumulative impacts is key to ensuring the assessment exercise remains manageable.

Once a detailed scoping exercise has been undertaken to determine the relevant projects, environmental receptors and potential impacts to consider, an assessment of the cumulative impacts can be undertaken. As discussed above, this is most appropriately undertaken for individual environmental values, considering the impacts of all relevant projects (noting that these may not all be the same for each receptor). The following sections outline the steps in the recommended assessment process:

1. Determine the baseline
2. Determine what constitutes a significant impact
3. Set thresholds
4. Estimate cumulative impacts, and
5. Determine the significance of potential impacts.

Task 1 – Determine the baseline

Determining the baseline means understanding the current extent and/or condition of the environmental values in question, both within the project area and within the region being considered in the CIA. For most values this will involve direct consideration of natural variations, whether seasonal (e.g. bird migrations) or periodic (such as floods and droughts), plus other human actions currently occurring, e.g. current noise or emission levels.

The reason for determining a baseline is to have a benchmark against which to compare how near or far a project and others in the region will push an environmental value towards a level of unacceptable impact (threshold or risk level). Over time baselines will shift as new activities commence and others cease. The key is to have a robust analysis of current conditions against which to compare a future prediction and clearly define the baseline to be used.

Task 2 – Determine what constitutes a significant impact

A key element in defining what needs to be assessed is determining what is material. In most cases and regulatory frameworks there is a focus on 'significant' impacts. What constitutes significant impacts varies depending on the regulatory arrangements, the environmental values being considered (biotic or abiotic) and the levels of acceptable impact. Broadly, in determining what might be considered a significant impact, the following should be considered:

- The current state or status of the environmental value
- The ecology, nature and use of the value (e.g. is it mobile or sedentary, is it a resource for other users)
- Existing threats to the value
- Resilience and ability to recover
- The local and regional context (e.g. is the value in decline regionally, is it represented in protected areas etc.)
- The levels of acceptable change
- The likelihood and magnitude of impacts, including certainty, timing, scale, size and duration.

Task 3 – Set thresholds or risk levels

Thresholds, risk levels or desired outcomes are an important element of understanding (and responding to) cumulative impacts. They place limits on the amount of cumulative change (from the baseline) that may occur before an environmental value is at serious risk. Theoretically, if the combined effects of all actions within a region do not exceed a certain limit or threshold, the cumulative effects of an action are considered acceptable. This type of understanding, however, is often hampered by a lack of accepted known or identifiable thresholds.

Thresholds are pre-determined in many instances. These often reflect regulatory requirements regarding human health, for example national air and water quality guidelines. Others may be set on a more regional basis and include thresholds determined in water sharing plans, regional water quality and impact-specific policies. If a region has been subject to some form of strategic assessment or regional planning process, thresholds may already exist and may be linked to the amount/locations of acceptable development and/or impact to environmental

values. Important individual environmental values may have very specific pre-determined thresholds e.g. Limits of Acceptable Change set for Ramsar wetlands. It is recommended that, where they exist and are relevant, pre-determined thresholds be used in project-initiated CIA.

Where pre-determined thresholds do not exist, proponents may be required to develop their own. This will most often be the case for biological parameters such as species diversity, threatened species population numbers, extent of remaining vegetation, etc. In many instances there is not always an objective technique to determine appropriate thresholds, and professional judgement (including expert opinion) must be relied upon. Suitable thresholds may include critical population sizes for a species or a particular percentage loss of vegetation / species habitat (from an historical baseline level). When an actual capacity level cannot be determined, analysis of trends can assist in determining whether goals are likely to be achieved or patterns of degradation are likely to persist. Such thresholds may be expressed as desired outcomes. Setting such thresholds would benefit from consultation with regulators and other relevant stakeholders.

Task 4 – Estimate cumulative impacts

The analysis of cumulative impacts should focus on assessing impacts on selected environmental values. Several approaches are available to assist in determining cumulative effects. These do not necessarily differ markedly from individual project EIA, except for the consideration of impacts from more than one project. There is no one single approach to always be used, nor necessarily one type of approach for specific effects or types of actions. The appropriate method is the one that best provides an assessment of the impacts on the environmental values being examined. Some or all of the tools outlined in Table 8 may be useful in undertaking project-initiated CIA.

The first step in estimating cumulative impacts is to determine the degree of spatial and/ or temporal overlap i.e. whether impacts will occur cumulatively at all. Cumulative impacts are not expected where impacts arising from individual actions never occur at the same time, or impacts originating in one location rarely or never continue on to other locations. However, if there is overlap in either time or space, then a more thorough consideration of cumulative impacts is required.

Cumulative impacts may be additive or compounding. Additive impacts are those that see the same impact increasing in magnitude across multiple projects e.g. additive effects of dust emissions from several coal mines. Compounding impacts occur when two or more impacts combine e.g. dust and noise impacts from several coal mines. Both additive and compounding impacts should be considered in a manner relevant to the particular environmental value under assessment. For example, the Abbot Point CIA investigated how several impacts from a precinct level port development (direct habitat loss, dust, noise, general disturbance) might combine to alienate the area for migratory shorebirds.

Task 5 – Determine the significance of potential impacts

Once the cumulative impacts have been determined, the final step in the assessment phase is to determine their significance or acceptability. This can be difficult and even controversial. The significance of the cumulative impact is not judged by the amount of change attributable to the individual project (as it is for the project-specific component in EIA). Rather, it is judged by the degree to which the project in question and others within the region may move an environmental value towards a threshold (as determined in the step above). In some cases, the results will be clear – exceedance of a human health air/water quality guideline will be significant and unacceptable. In other cases, the degree of significance of the impact will be more subjective (and case specific) and can depend on many of the following (Hegmann *et al.* 1999):

- How close the existing situation is to the threshold
- Whether exceedances of thresholds are short-term, one-off or continuing
- Resilience of the value or the system, including ability to recover
- Effectiveness of mitigation
- Size of study area
- Incremental contribution of effects from action under review
- Relative contribution of effects of other actions
- Relative rarity of species
- Significance of local effects
- Magnitude of change relative to natural background variability.

Table 8 Tools for undertaking a project-initiated cumulative impact assessment

Tool	Data inputs required	Spatial/temporal coverage	Environmental receptors	Most useful for
Detailed survey	None	Defined spatial area and set individual time periods	Single – multiple similar e.g. dust, numerous threatened species	Filling specific information gaps, highly targeted
Interaction matrices	Basic understanding of environmental receptors and potential impacts	Region of interest and life of project	All relevant included in one analysis	Initial scoping of which receptors may be cumulatively impacted
Impact modelling	Understanding of cause and effect relationships between actions and environmental receptors	Region of interest and life of project	Single to multiple, depending on actions considered	Exploring cause and effect relationships, identifying where several project's impacts may combine
Spatial analysis (GIS)	Descriptive spatial data	Any spatial scale for which data available, single time point per analysis	Single	Visual representation of all potential impacts across area of interest including overlaps, can provide quantitative outputs
Numerical modelling	Detailed data for environmental receptor and projects	Set in model	Physical or chemical e.g. air quality, water, noise. Difficult for biological e.g. threatened species	Obtaining robust quantitative data about physical/chemical receptors
Expert opinion		Dependent on role of expert		Providing expert judgement when data are lacking, validation/review of results

Significant cumulative impacts require further consideration to determine if/how the effects can be reduced via management and mitigation. This is addressed in the next section.

Summary checklist for assessment phase

Table 9 provides a summary checklist of typical questions that could be considered during the assessment phase of a CIA (adapted from IFC 2013).

Table 9 Summary checklist of typical questions which could be considered in the assessment phase

Typical assessment questions

1. What is the existing condition of each identified environmental value or sensitive receptor?

2. What are the indicators used to assess the condition?

3. What additional data are needed and who may already have the information?

4. What thresholds already exist?

5. What are appropriate thresholds for environmental values without pre-determined thresholds?

6. What are the key potential impacts that could affect the long-term sustainability or viability of the environmental value or sensitive receptor? (elaborating on initial analysis during scoping phase)

7. Are there known or predictable, cause-effect relationships?

8. Are impacts additive and/or compounding?

9. How close to the relevant thresholds are the cumulative impacts and is this significant?

5.5 Managing and mitigating cumulative impacts

Managing cumulative effects in a CIA requires, as a start, the same type of mitigation and monitoring that would be recommended in an EIA. Mitigating a local effect as much as possible is the best way to reduce cumulative effects. Mitigating and managing an individual project's impacts as far as possible, even when the project itself does not result in significant impacts, is an appropriate way to reduce cumulative impacts across a region.

It is generally unreasonable to expect a single proponent however to bear the burden of mitigating effects attributable to other actions in the region. Such an approach can significantly disadvantage later projects and be a disincentive to investment.

Ultimately, where cumulative impacts are deemed to be of concern, or are reaching a threshold level of unacceptability, it may be necessary for a broader intervention and mitigation of impact. This may result in increased regulation of activities contributing

to these impacts, for example statutory regimes may be used to create 'air sheds' to manage cumulative emissions, or licensing regimes may be used to limit emissions from a range of sources. As an alternative, there are two key mechanisms for intervention that can be implemented to mitigate cumulative impacts – formal 'impact trading schemes' and regional collaborative initiatives. Examples include:

- Hunter River Salinity Trading Scheme
- Gladstone Healthy Harbour Partnership
- Fitzroy Basin Water Quality Program
- Cockburn Sound Management.

It is worth noting that in many instances a regulatory or prescriptive approach is not necessary and is unlikely to deliver an optimal outcome. In many scenarios, but particularly in well-established mining and/or industrial locations where a multitude of operations already exist, a partnership or collaborative approach may be better. Governments have a strong influence on determining what approach should apply and can instigate collaboration or partnerships

by establishing appropriate frameworks in consultation with industry participants. However, industry also can influence the approach adopted if they are willing to participate and compromise to contribute and make changes voluntarily if needed.

5.6 Offsets

A project-initiated CIA has limits on the extent to which it can address or alter the offset requirements developed through the conventional EIA process. Appropriately, under current regulatory regimes, proponents should not be required to offset cumulative impacts, only for their own contribution to impacts through offsetting any residual significant impacts arising from the project.

It is possible, however, to design an individual project's offsets to take account of cumulative impacts and thereby go some way to addressing cumulative effects. Initiatives could include:

- Collaborating with other proponents in the region with similar offset requirements to align offset strategies and sites
- Contributing to joint partnership arrangements
- Supporting precinct level strategies e.g. port-wide or minerals province-wide activities, particularly if coordinated by an independent third party and/or government.

If there is a driver to address offsets cost effectively and efficiently at landscape scale then it is often better to pursue these through strategic or regional offset programs to which project proponents can contribute. In some instances these programs may be preventative rather than compensatory. For example, project proponents may be able to contribute to programs that relieve the overall pressure from threats to an environmental value and thus reduce the impact a project or series of projects may have.

Specific examples include:

- Feral animal or weed control programs that reduce the threats and pressures on fauna and flora
- Water quality improvement programs to address legacy issues (e.g. Great Barrier Reef Trust)
- Conservation area management and acquisition to improve the representation, size and/or quality of the protected estate.

“

... under current regulatory regimes, proponents should not be required to offset cumulative impacts, only for their own contribution to impacts through offsetting any residual significant impacts arising from the project.

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Data access and sharing is one of the major challenges in undertaking CIA. Privacy, commercial sensitivity, compatibility, storage, archiving and knowledge of what data exist are all factors that make accessing and sharing data both complex and difficult.

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5.7 Managing information gaps and uncertainty

Data requirements for CIAs can be extensive. Often relevant data will not be available or accessible. This is most pronounced when accounting for the impacts of other relevant future projects. Unless future projects have released their EIA documentation, it is very difficult (and inappropriate) to estimate what their impacts will be. Even when EIA documents are available, they do not guarantee that the project will go ahead, or proceed to their full extent and/or result in the predicted impacts.

Determining how much data are required to undertake a robust CIA will be case specific, depend on the willingness and ability of proponents and third parties to invest in data gathering, and regulator/community expectations.

There are a number of approaches for gathering additional data, including:

- Commissioning further studies
- Regulators being proactive in providing publicly available data from other projects and monitoring programs
- Collaborating with other proponents to undertake a joint CIA e.g. Abbot Point CIA
- Estimating data based on analogous projects
- Data sharing arrangements
- Purchasing additional data
- Adopting a risk based approach looking at trends rather than absolutes, thereby reducing the data requirements
- Focussing on monitoring and adaptive management, which allows data gathering post-CIA.

5.8 Data sharing models

As outlined in section 4.4, data access and sharing is one of the major challenges in undertaking CIA. Privacy, commercial sensitivity, compatibility, storage, archiving and knowledge of what data exist are all factors that make accessing and sharing data both complex and difficult. Combining and accessing data on ambient environmental conditions, project impacts and project scopes all present issues that data owners will be sensitive about.

A number of data sharing models exist. Outlined below are some different models that may prove useful in the design of future CIA.

Statutory (public) assessments

Assessments undertaken under statutory process (both EIA and Strategic Environmental Assessment) almost always require the publication of environmental studies and impact assessment results. This information is usually contained in an environmental impact statement or similar document. A limitation of these data is that they are not the base or raw data and are usually available only in printed format. Accessing electronic base data will usually require reaching an agreement with the owner (proponent) of the data. Examples include:

- Environmental Impact Statement
- Regional Strategic Assessments (e.g. Great Barrier Reef Strategic Assessment)
- Catchment/regional plans
- Environmental regulation programs (water licencing programs and reporting systems).

Government lead studies

Government agencies conduct a variety of regional and localised studies, surveys and monitoring (including remote, satellite and aerial imagery collection) to inform land use planning, environmental conditions and state of the environment reporting. Depending on the type of activity proposed, government agencies may have an even broader range of information collected from various sources that may be of use to proponents. This information is usually available either publicly or upon a freedom of information application. In some circumstances procedural fairness may require the disclosure of government held information. Examples include:

- Bioregional assessments (for coal seam gas and large coal mining developments on water resources)
- Hunter River Salinity Trading Scheme.

Government–industry–community partnerships

Increasingly the use of partnerships is emerging as a means to monitor and respond to cumulative impacts and regional environmental conditions. Members of these partnerships are generally able to access relevant data, at least in an aggregated form or where the data have been collected by the partnership. Examples include:

- Lower Athabasca Groundwater Management Framework (GMF)
- Gladstone Healthy Harbour Partnership
- Cockburn Sound Management Council.

Industry collaborations

In certain circumstances it will be evident and mutually beneficial for two or more proponents to collaborate to undertake a CIA. Such circumstances may include where a number of broadly concurrent projects are proposed within an industrial precinct or in a minerals province where existing mining or mining related activity is limited or non-existent (i.e. greenfield locations). In such circumstances data or studies may be shared and co-funded to provide cumulative impact information. Data sharing and funding agreements will be required. In the context of an individual EIA, where the EIA proposes to discuss cumulative impacts on the basis of third party information, it is recommended that this be discussed with the relevant third party to minimise the potential for dispute. The Port of Abbot Point CIA is one example of industry collaboration.

Non-government (grants/funding) initiatives

There is often a considerable amount of data available in non-government organisations, such as universities, research organisations (e.g. AIMS, WAMSI) and in grant-based organisations such as catchment management authorities or non-profit foundations. This information can be accessed via various arrangements, including partnerships, research initiatives, collaborations and direct purchase. An example of this is eReefs (Great Barrier Reef Foundation).

Purchase of data

In instances where data sharing and collaborative approaches are not possible there may remain the option to purchase essential data from third parties.

5.9 Selecting the right cumulative impact approach

As stated in the front of this guide, CIAs are not a one size fits all process. Accordingly it is difficult to provide definitive guidance on what

assessment approach will best fit a particular scenario. The location, the number of projects, the environmental values, legal requirements and the timeframes are all variables that will influence the design of a CIA. Table 10 is therefore provided as a guide only.

Table 10 Indication of possible cumulative impact approach and appropriate scenarios

	Cumulative impact of combined elements of a single project	Cumulative impact of a single project on an existing baseline	Cumulative impact of multiple projects on a single environmental value	Cumulative impact of multiple/all projects on multiple environmental values
Existing mining region with an established baseline and low risk of cumulative effects	●	●		
Existing mining region with reasonably well understood baseline of cumulative effects		●		
Poor baseline, low number of environmental values sensitive to cumulative effects		●	●	
Poor baseline with multiple environmental values				●
Greenfield mining precinct with known or likely number of new projects over time				●

6 Case studies

6.1 Port of Abbot Point Cumulative Impact Assessment

- Precinct scale CIA of multiple projects on all environmental values, with clear scope of included projects – considered only port developments and associated infrastructure and shipping
- Good example of a voluntary CIA prepared in collaboration between four proponents (port authority and three coal mining companies)
- Completed outside statutory framework, but used to support individual project approvals.

Refer: <http://www.nqbp.com.au/abbot-point/>

6.2 Fitzroy Basin Water Quality Program

- Following concerns about mine water releases and the impacts on water quality within the river system in 2008 the Queensland Department of Environment and Resource Management undertook an initial CIA. The assessment attempted to examine the water release impacts of multiple mines.
- Following further flood events in 2011 and 2012 further analysis and refinement, in conjunction with industry, has led to the development of a set of model conditions for coal mines in the Fitzroy basin. Water releases from existing (and potential new) mines are now regulated in a coordinated fashion to ensure the cumulative impacts on water quality do not exceed pre-determined thresholds.
- Water quality is continually monitored and through the Fitzroy River Partnership an annual report card of river health is being produced.

Refer: <http://www.riverhealth.org.au>

6.3 Hunter Salinity Trading Scheme

- Cumulative impact of multiple projects on a single environmental value (salinity of the Hunter River) and managed through the trading scheme
- Extensive and continuous real-time monitoring of environmental conditions and discharges
- Saline industrial discharges are scheduled and coordinated for times of high river flows and low background salinity levels so that salinity targets are not exceeded because of the discharges
- The total allowable discharge is shared according to the tradeable salinity credits held by dischargers. The program involves online trading of salinity credits between permit holders.

Refer: <http://www.epa.nsw.gov.au/licensing/hrsts/>

6.4 Independent Review of Cumulative Impacts on Camberwell (noise, dust, emissions)

- A review by independent scientific experts of the cumulative impacts of mining, particularly dust and noise impacts, on the community of Camberwell, carried out on behalf of the NSW Department of Planning
- Aimed to establish whether existing impacts on Camberwell are acceptable (i.e. below set thresholds) and to examine whether future mining operations in the area should be restricted in some way
- Recommended measures the NSW Government should require from mining companies as part of future developments to limit the cumulative effects of noise, dust and emissions on the town of Camberwell.

Refer: <http://www.planning.nsw.gov.au/Portals/0/planningsystem/pdf/Camberwell%20Air%20quality.pdf>

7 Information sources

CIA Guidelines

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Appendix 1 – Case law summaries

Federal:

The question of cumulative impacts arises only in the context of whether an action will have or is likely to have a ‘significant impact’ on a matter of national environmental significance.

The leading case about the impact of downstream effects of a project was the full Federal Court decision in the Nathan Dam case, **Minister for the Environment and Heritage v Queensland Conservation Council Inc.** (2004) 139 FCR 24. The Court considered that the Minister’s assessment under s.75(2) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) should have included a consideration of the impacts of the activities of third parties, regardless of the fact that such activities were not within the control of the project proponent, so long as those impacts may be imputed as within the contemplation of the proponent for the action. It was after this case that the EPBC Act was amended to reflect the decision expressly by including the extended definition of impact that includes reference to ‘indirect impacts’.

The cumulative impacts of threats to certain species (the wedged-tailed eagle, the broad-toothed stag beetle and the swift parrot) have been considered in determining whether there is a significant threat to a matter of national environmental significance by a certain action in **Brown v Forestry Tasmania (No.4)** [2006] FCA 1729. Justice Marshall found that the forestry operations of Forestry Tasmania in the area did have a significant impact on the eagle, notwithstanding the presence of other impacts that may be even more significant, because they ‘form part of the well-established cumulative impact of native forest harvesting in Tasmania on the eagle’ (at para [102]).

In **Wildlife Preservation Society of Queensland Proserpine/Whitsunday Branch v Minister for the Environment and Heritage**

[2006] FCA 736, an NGO argued that the cumulative effects of greenhouse gases on climate change ought to be taken into account. Justice Dowsett rejected this approach, stating that the EPBC Act required the impact of the proposal to be assessed, not the impact of worldwide burning of coal (at para [55]).

Similarly, in **Anvil Hill Project Watch Association Inc. v Minister for the Environment and Water Resources** [2007] FCA 1480, it was noted that under the definition of ‘indirect impact’ in the EPBC Act, the project must ‘substantially cause’ that impact. Where there is a large quantum of cumulative impacts, such as is the position in the greenhouse gas cases, there will be a greater difficulty in establishing a causal link.

In the case of **Tarkine National Coalition Inc. v Minister for the Environment** (2014) 202 LGERA 244 (Tarkine No.1), it was confirmed that cumulative impacts are not expressly required to be assessed under the EPBC Act; however, they may be considered by the Minister in making his decisions. Justice Tracey found that any failure on the part of the Minister to make enquiries about and take into account additional factual matters (such as the cumulative effects of other mines in the area) did not give rise to jurisdictional error. It should be noted that, at the date of this guideline, this decision has been appealed and judgement is pending.

Where a decision maker takes into account the cumulative impacts of other actions within the area (perhaps due to an accumulated bank of knowledge through the assessment of other projects), the decision-maker must disclose that information to the applicant, in particular when that information will be relied upon in formulating a decision: **Western Australia Land Authority (LandCorp) v the Minister for Sustainability, Environment, Water, Population and Communities** [2012] FCA 26.

New South Wales:

There has been a greater emphasis on cumulative impacts in NSW than in many other jurisdictions.

In ***Kivi v Forestry Commission of NSW*** (1982) LGRA 38, Justice Cripps noted the extremely wide definitions in the EP&A Act of the words 'environment' and 'an activity' finding that '*for the purpose of determining whether this activity significantly affects the environment, I am entitled to go beyond the area in which the activity itself is being proposed and look to the whole undertaking of which the relevant activity forms a part to understand the cumulative and continuing effect of the activity on the environment. The "environment" clearly enough includes the geographic location in which it is to be carried out and the area of which it is physically a part*'. Evidence of earlier logging was also taken into account in order to determine whether the proposed logging in this case would significantly affect the environment.

Even though an environmental impact statement (EIS) under the EP&A Act does not need to cover every topic and explore every avenue advocated by experts to be valid (***Prineas v Forestry Commission of NSW*** (1984) 53 LGRA 160), subsequent decisions of the Land and Environment Court of NSW (NSWLEC) indicate that an EIS that does not include an analysis of any relevant cumulative impacts will tend to be treated as deficient in NSW.

In ***Gray v Minister for Planning and Others*** (2006) 152 LGERA 258, the decision of the Director-General relating to the adequacy of the EIS in respect of the Anvil Coal project under the EP&A Act was successfully challenged on the grounds that cumulative impacts had not been investigated. Justice Pain found that the approach to environmental assessment under the EP&A Act requiring the application of the precautionary principle necessitates knowledge of impacts, which are cumulative, on-going and long term. Furthermore, a failure to consider cumulative impacts would not adequately address the environmental impact of a particular development where often no single event could be said to have such a significant impact that it would irretrievably harm a particular environment but cumulatively activities would

harm the environment. Justice Pain was following the approach that she had previously taken in ***BT Goldsmith Planning Services Pty Ltd v Blacktown City Council*** [2005] NSWLEC 210 in respect of an appeal against a deemed refusal of a 34 lot subdivision.

The cumulative impact of three power station projects was taken into account by the Minister in granting approval for concept plans for two new base-load power stations under the EP&A Act. The two power stations were under challenge in the case of ***Haughton v Minister for Planning*** (2011) 185, Local Government Environmental Reports of Australia, (LGERA) 373 and as part of the challenge the applicant argued that the cumulative impact of the other projects in the area was required to be taken into account by the Minister. This challenge was dismissed by Justice Craig who found that this had in fact occurred.

Similarly, expert evidence was led and consideration given by Justice Pain in relation to cumulative impacts on groundwater and threatened species and communities in a challenge by activists in ***Hunter Environment Lobby Inc. v Minister for Planning*** [2011] NSWLEC 221. Furthermore, a challenge to an extension of an open cut coal mine on the basis of cumulative impacts relating to noise and dust was successful in ***Bulga Milbrodale Progress Association Inc. v Minister for Planning and Infrastructure and Warkworth Mining Ltd*** (2013) 194 LGERA 347.

Victoria:

The expansion of a coal field supplying the Hazelwood Power Station in Morwood was challenged in ***Australian Conservation Foundation v Latrobe City Council*** (2004) 140 LGERA 100 where President Morris interpreted the requirements of a planning panel instituted under the *Planning and Environment Act 1987* to consider submissions widely so as to include indirect effects of the proposal. His Honour applied the test in the Nathan Dam case (***Minister for the Environment and Heritage v Queensland Conservation Council Inc.*** (2004) 139 FCR 24) outlined above.

In contrast with mining cases in Victoria, cumulative impacts of projects have been

extensively considered in Victoria in planning cases (such as with respect to commercial uses) as well as numerous wind farm cases. For example, a failure by a wind farm proponent to factor in the cumulative impact of its proposed operations with an existing windfarm in the area was remitted to the Victorian Civil and Administrative Tribunal (VCAT) for the hearing of this additional evidence in ***The Sisters Windfarm Pty Ltd v Moyne Shire Council*** [2010] VCAT 719.

Queensland:

In ***Hancock Coal Pty Ltd v Kelly and Ors*** [2014] QLC 12, the Alpha Coal project was challenged by objectors on a number of grounds including cumulative impacts (in particular relating to groundwater impacts) of the project, having regard to other projects in the Galilee Basin. Ultimately Member Smith recommended that the project be approved on certain conditions such as the addition of further groundwater monitoring locations and make good agreements with landholders. This case is an example of where the precautionary approach will be applied where there is uncertainty about potential impacts including cumulative impacts. Member Smith found that the groundwater evidence did not sufficiently address the effects of the proposed mine on off-lease groundwater and on application of the precautionary approach recommended additional conditions relating to groundwater. It should be noted that this decision is currently the subject of a judicial review proceeding, as at the date of this guide.

Tasmania:

Any environmentally relevant activity by a public or private sector body may require environmental impact assessment under the *Environmental Management and Pollution Control Act 1994* (EMPC Act). While there is no express mention of cumulative impact assessment in the EMPC Act, the EPA Board guidelines in respect of assessment (Development Proposal and Environmental Management Plan - DPMP Guidelines) do require these impacts to be addressed. Thus, in ***Tarkine National Coalition v West Coast and Ventures Minerals Limited*** [2013] Tasmanian Resource Management and Planning Appeal Tribunal (TASRMPAT) 103, it

was noted that whilst cumulative assessment is not a requirement for the assessment of the development, in the final analysis, such an assessment was done along the way (at para 87). That case involved an unsuccessful appeal before the TASRMPAT of a West Coast Council decision to approve an iron ore mine. The Tribunal noted the extensive analysis of the cumulative impacts in the DPMP for the project. The Tribunal declined to require an analysis to include possible impacts of future mines stating that, *'an assessment at this time about possible future impacts from possible future mines, would be so fraught with uncertainties and so likely to produce inaccuracies as to be of little, if any, assistance to the Tribunal and thus carry no weight in the Tribunal's assessment of the development application. In the Tribunal's view, such an assessment would lack any reasonable worth or utility.'*

New Zealand:

The analysis of cumulative impacts of a project has been a feature of NZ case law since the early 2000's. Litigation involves consideration of the requirements of the *Resource Management Act 1991* and focusses on the meaning of 'effect'. The Act requires an analysis of the cumulative effects, which may arise over time. In ***Dye v Auckland Regional Council*** [2002] 1, New Zealand Law Reports (NZLR) 337, it was held that 'cumulative effect' does not include the precedent effect of granting a resource authority (in the sense that in the future, the decision maker may grant further resource authorities on the basis of the precedent set), although this will be a relevant consideration.

However, the potential effect of existing and reasonably foreseeable activities will be cumulative and must be considered. In ***Cashmere Park Trust v Canterbury Regional Council*** C48/04, Justice Jackson quoted a passage from ***Emerald Residential Ltd v North Shore City Council*** A31/04:

"[W]hat must be considered is the impact of any adverse effect of the proposal on the environment. The environment is to be taken as it exists, with whatever strengths and frailties it may already have, which make it more or less able to absorb the effects of the proposal". Justice Jackson concluded, *'[I]t would be*

both unfair to the appellants and a dereliction of sustainable management if we could not consider the effects of other possible (but not yet built) permitted discharges from the catchment.”

Furthermore, the receiving environment, not just the project site, will be the area on which cumulative effects will be considered:

Queenstown Lakes District v Hawthorn Estates Ltd [2006], New Zealand Resource Management Appeals (NZRMA) 424 (CA)

Canada:

Assessment of cumulative effects has been required in all environmental assessments since the introduction of the *Canadian Environmental Assessment Act 1992*. (That Act was repealed and replaced by the *Canadian Environmental Assessment Act 2012*.) Therefore, cumulative effect assessment is a standard feature within this jurisdiction. An analysis of effects under the project as scoped as well as other projects or activities is implicit in cumulative effect assessment. Furthermore, a finding of insignificant effects of the scoped projects is sufficient to open the possibility of cumulative significant environmental effects when other projects are taken into account: **Friends of the West Country Association v Canada** (*Minister of Fisheries and Oceans*) [2000] 2 FCR 263. However, only likely cumulative effects must be considered: **Bow Valley Naturalists Society v Canada** (*Minister of Canadian Heritage*) [2001] 2 FC 461,266.



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