

Holistic Impact Assessment

– A View from the West

Angus Morrison-Saunders

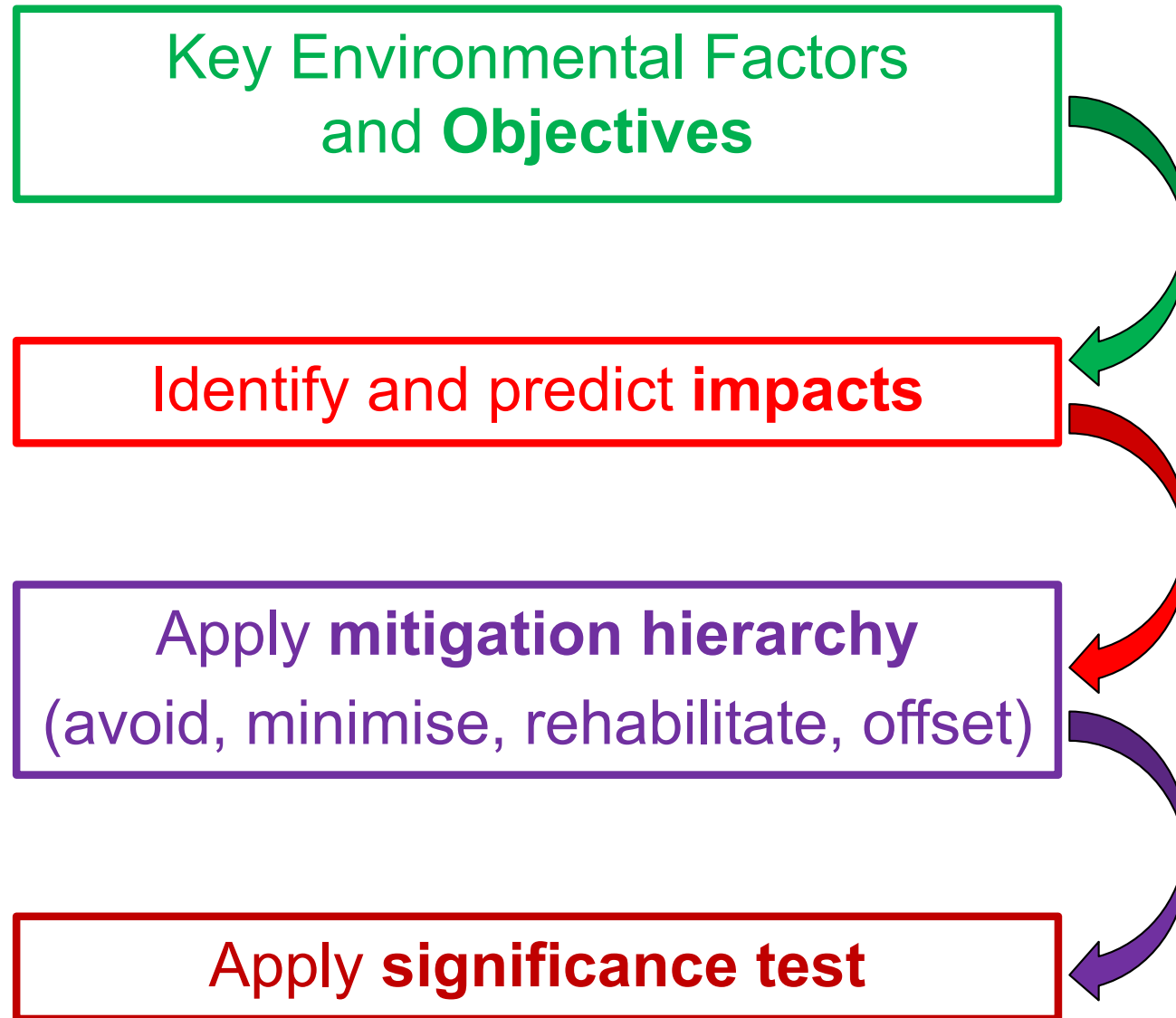
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15 Feb 2018

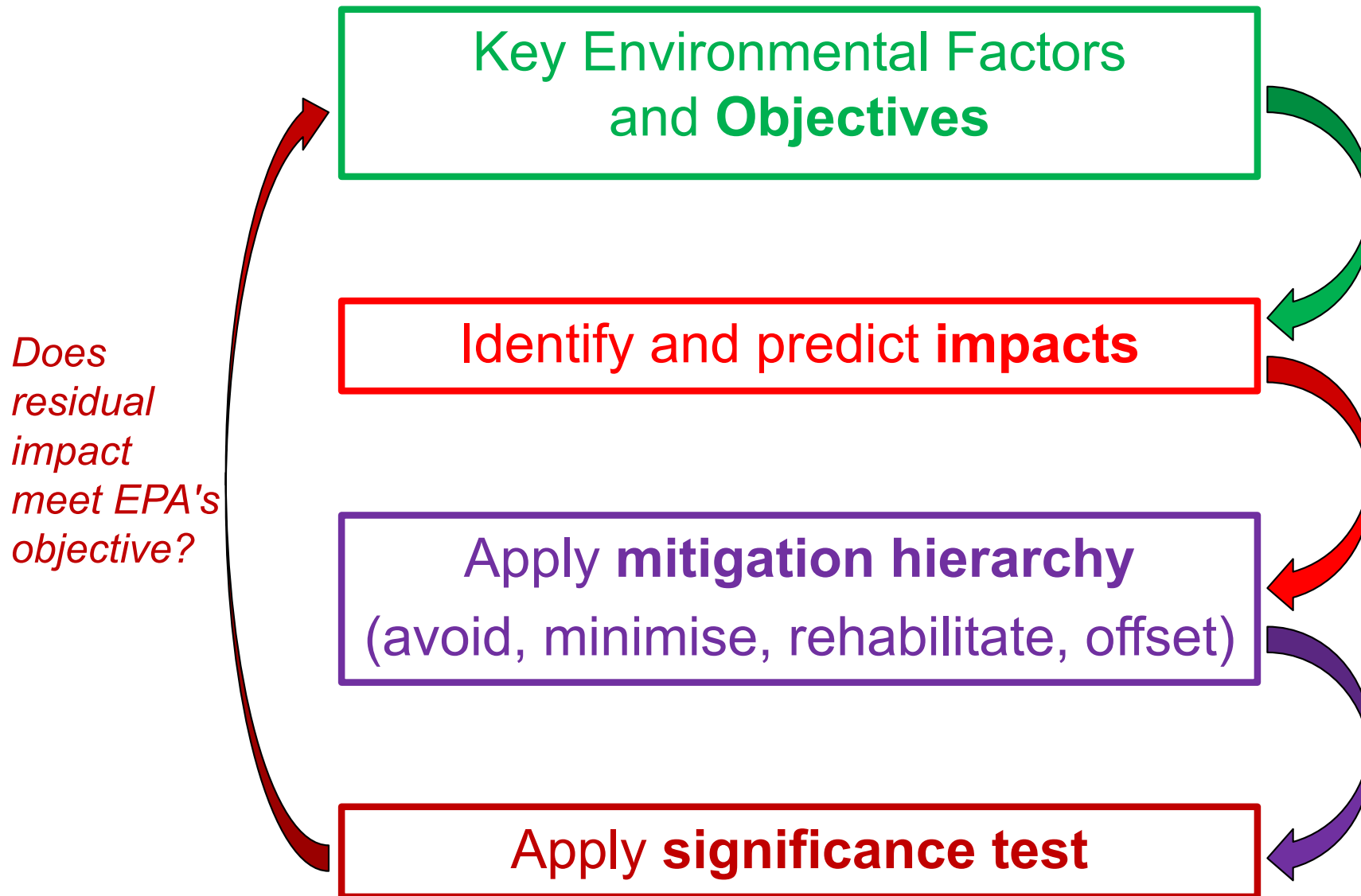
Reimagining approvals - Strategic approaches to support Impact Assessment

February 15 & 16, 2018. GHD offices, 180 Lonsdale St, Melbourne.

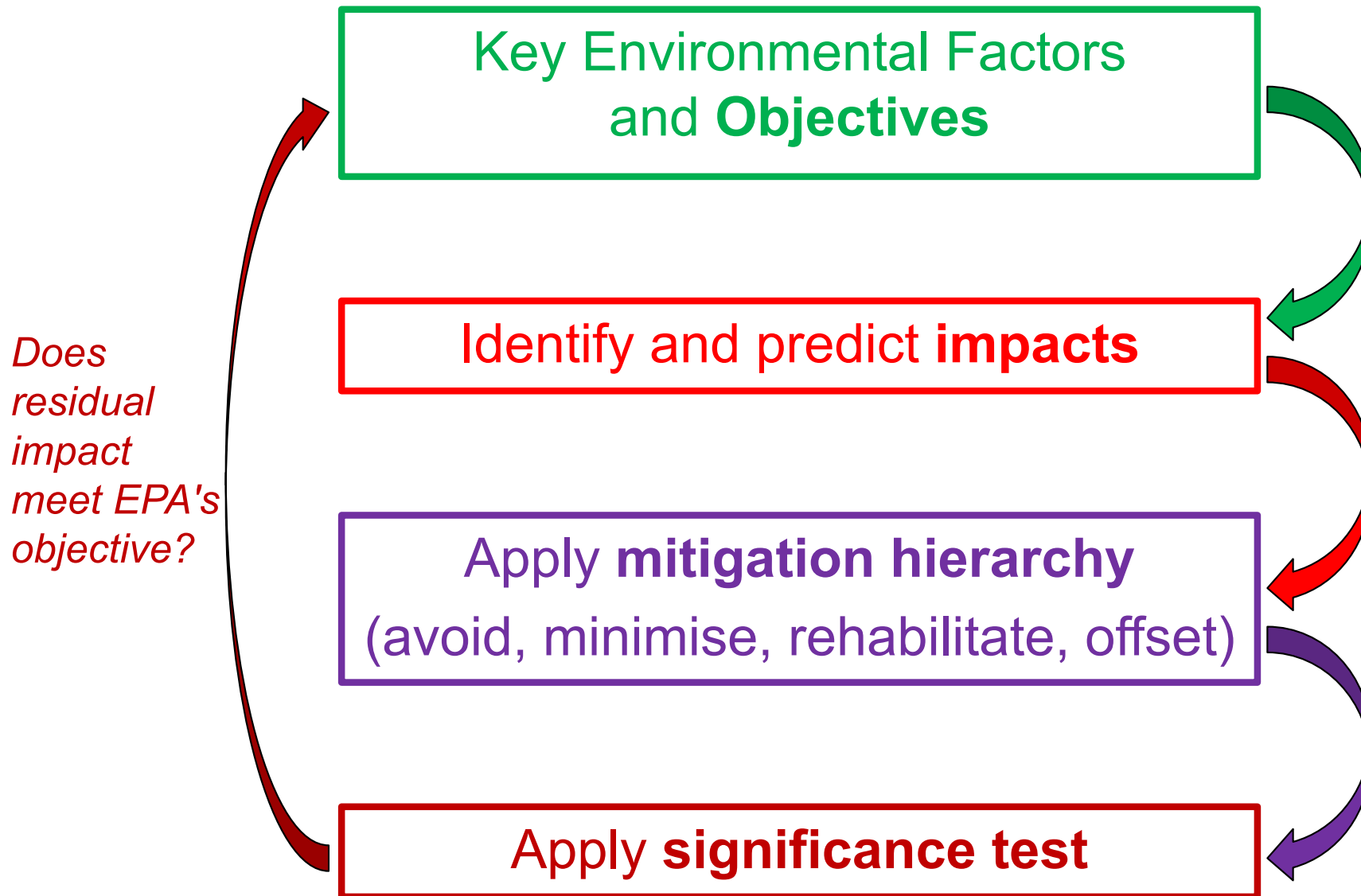
Main elements of EIA in WA



Main elements of EIA in WA



Main elements of EIA in WA



Reductionist...?

A comment from 2000...

A potential weakness with the EIA process adopted by the EPA in Western Australia is that it ***risks being reductionist.***

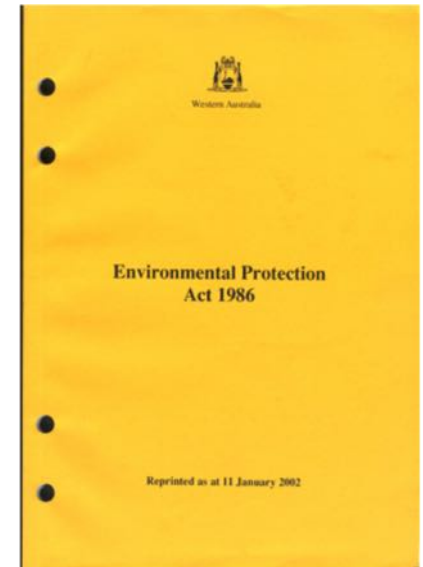
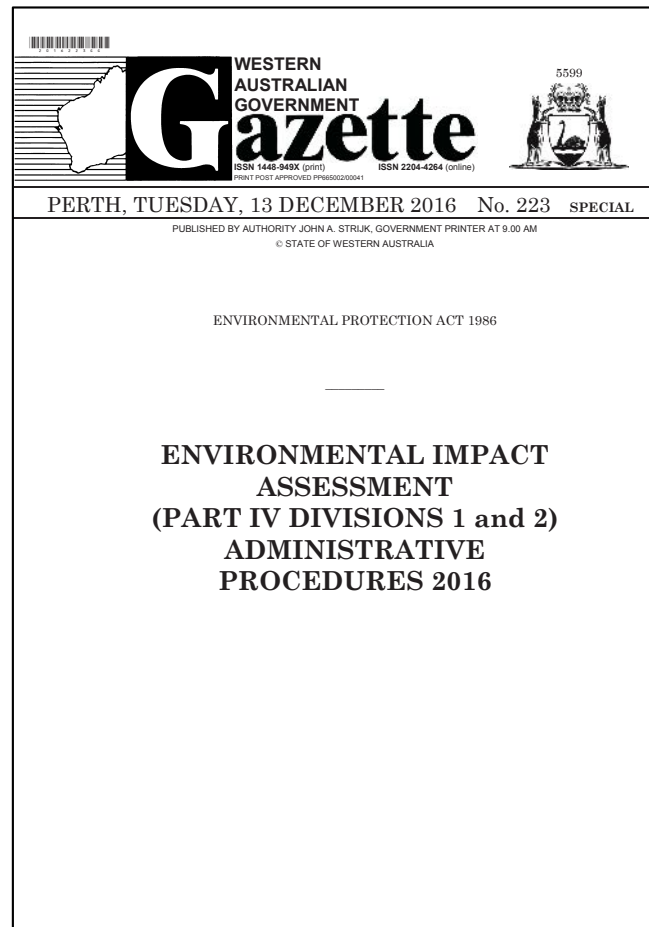
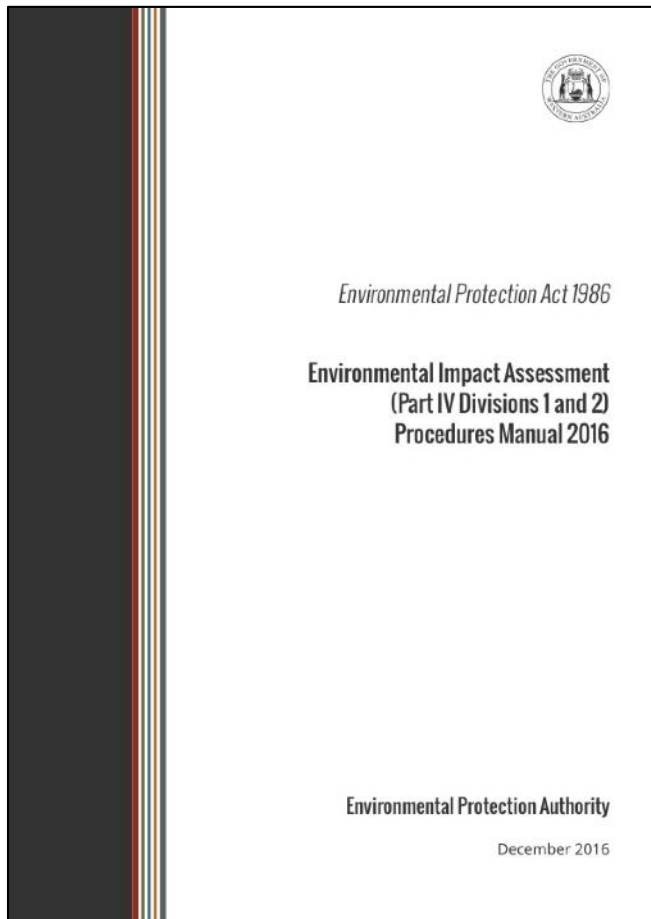
There is a danger that, by breaking each proposal down into discrete parts and assigning environmental objectives to them, it ***may not adequately represent overall environmental functions.***

(Morrison-Saunders & Bailey, 2000, p270)

Morrison-Saunders, A. and J. Bailey 2000.
Transparency in EIA Decision-Making: Recent Developments in Western Australia.
Impact Assessment and Project Appraisal, **18**(4), 260-270.

Holistic Impact Assessment

New provisions in 2016 EIA policy and guidance...(no change to EPAAct)



I was asked to focus on holistic IA provisions in training courses for Office of EPA and consultants (2017)

For the Proponent...

3.1.2.1 Content of the Environmental Review Document

...

An Environmental Review Document includes the following sections:

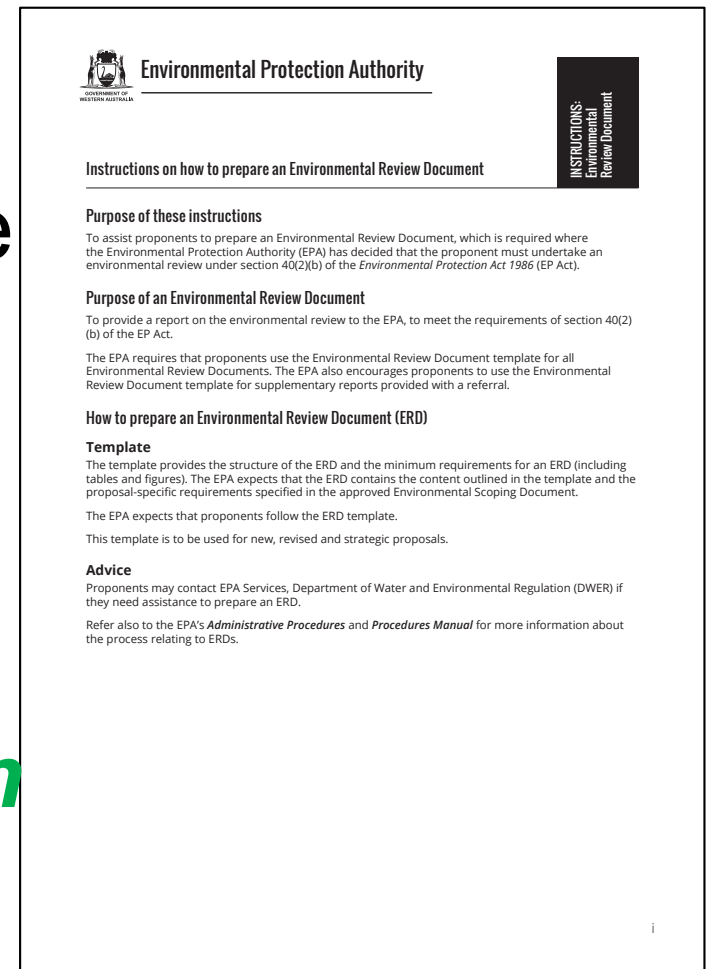
1. Introduction
2. The proposal (including key proposal characteristics)
3. Stakeholder engagement
4. Environmental principles and factors. For each preliminary key environmental factor:
 - EPA factor and objective
 - Relevant policy and guidance
 - Receiving environment
 - Potential impacts and assessment of impacts
 - Mitigation (application of mitigation hierarchy of avoid, minimise, rehabilitate)
 - Predicted outcome (including discussion of offsets)
5. Other environmental factors or matters
6. Offsets
7. Matters of National Environmental Significance
- 8. Holistic impact assessment**

Environmental Impact Assessment
(Part IV Divisions 1 and 2)
Procedures Manual 2016

8. *Holistic impact assessment*

Provide a holistic assessment of the impacts of the proposal on the whole environment. Describe the **connections and interactions** between the parts of the environment (environmental factors) and **discuss predicted outcomes in relation to the environmental principles** and the **EPA's environmental objectives**.

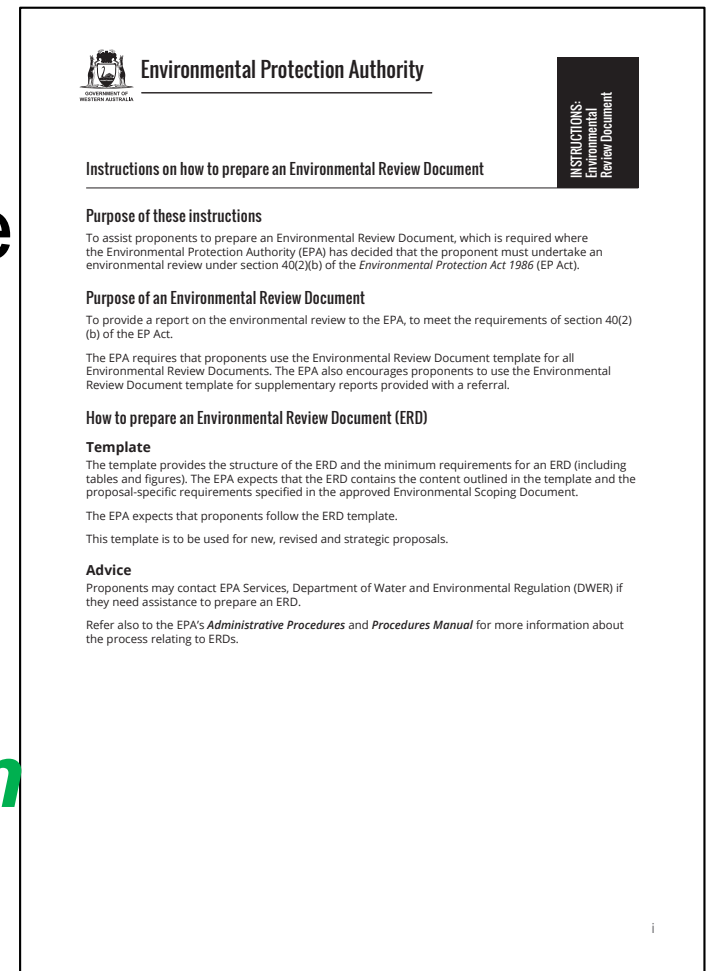
Instructions on how to prepare an Environmental Review Document, pvi



8. *Holistic impact assessment*

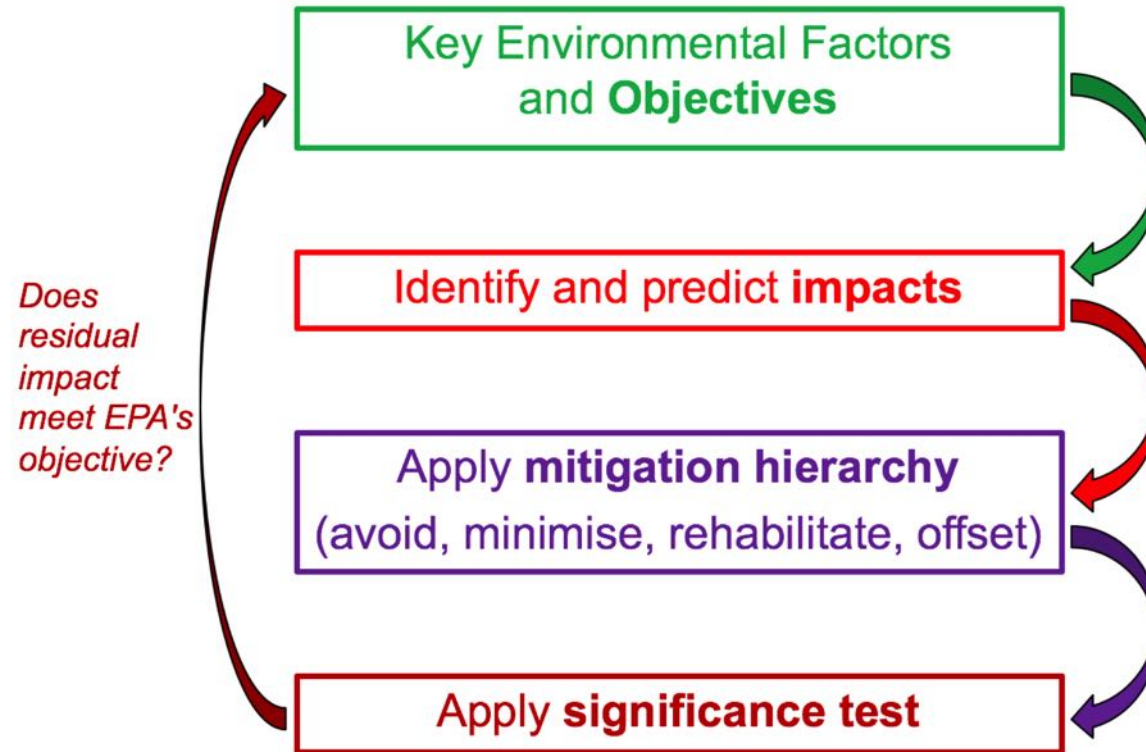
Provide a holistic assessment of the impacts of the proposal on the whole environment. Describe the **connections and interactions** between the parts of the environment (environmental factors) and **discuss predicted outcomes in relation to the environmental principles** and the **EPA's environmental objectives**.

Instructions on how to prepare an Environmental Review Document, pvi

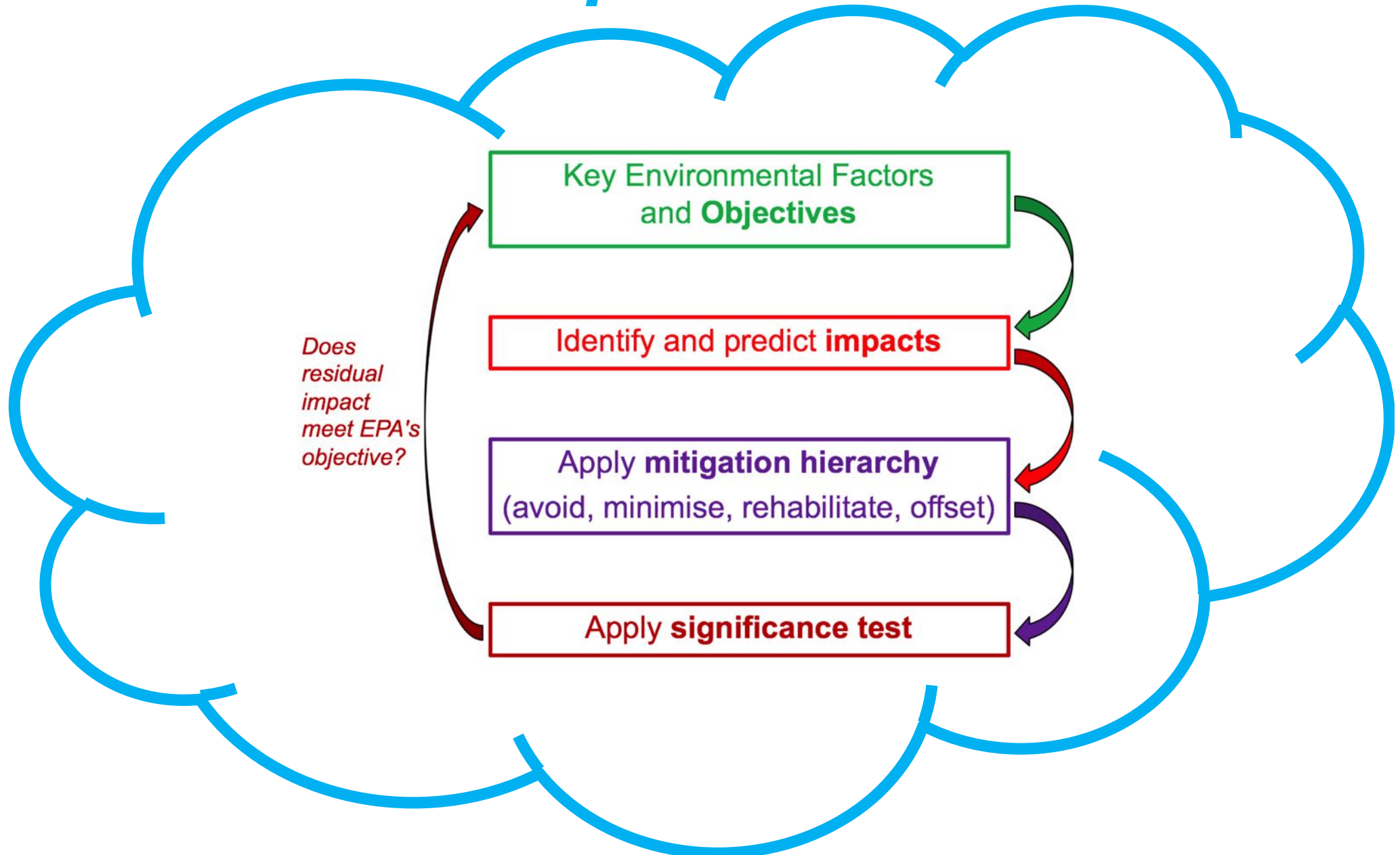


= strategic & sustainability thinking ??

Main elements of EIA in WA




Holistic impact assessment



- *impacts on whole environment*
- *connections & interactions*

3 examples (proponent)

Yangibana Rare Earths Project
Environmental Review Document


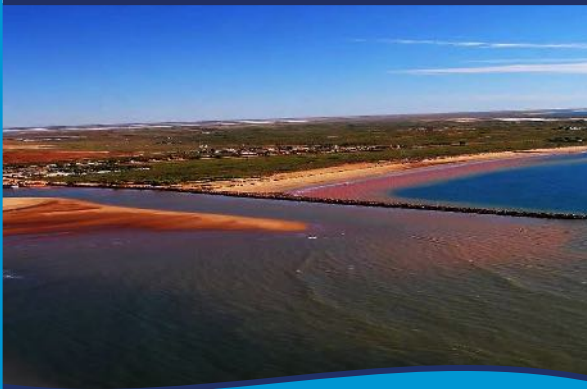


Yangibana Rare Earths Project
Environmental Review Document
30 January 2017

Rev	Document Status			
Rev	Author	Reviewer	Approved	Date
A	Lara Jefferson	DEPA prelim. review		05/01/17
B	Lara Jefferson	Stefan Wolmarans		27/01/17
0	Lara Jefferson		Charles Tan	30/01/17
1	Lara Jefferson		Charles Tan	09/02/17

[1]

Onslow Marine Support Base
Stage 2: Capital Dredging
 Environmental Review Document

PROPONENT:
 Onslow Marine Support Base Pty Ltd

STATUS:
 Rev 1

REPORT NUMBER:
 1702027

ISSUE DATE:
 17th August 2017

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Sino Iron Mine Continuation Proposal
Environmental Review

Prepared for
 Citic Pacific Mining
 by Strategen

 February 2017



8 HOLISTIC IMPACT ASSESSMENT

The greatest benefit of this Project is its contribution to a more sustainable energy market and progress in medical technologies (amongst other technologies and innovations), which plays a key role in satisfying the principle of intergenerational equity.

A thorough understanding of the surrounding environment has been achieved with baseline studies of:

- Flora and vegetation
- Fauna, including vertebrates, short range endemic fauna and subterranean fauna
- Groundwater
- Surface water
- Waste, including AMD and radionuclide assessments
- Soils
- Baseline radiation assessment (air, soil, water)
- Air quality, including dust and greenhouse gas emissions
- Noise
- Visual amenity
- Heritage

A direct impact to flora and vegetation will occur as a result of ground disturbance (approximately 1000 Ha). This also represents potential fauna habitat. Surveys have shown that all flora and fauna species, vegetation types and habitat are well represented outside of the development envelope and thus the proposal satisfies the EPA's objectives for these environmental factors:

- Flora and vegetation: *To protect flora and vegetation so that biological diversity and ecological integrity are maintained.*
- Fauna: *To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.*

Subterranean fauna species were found within the pit footprint. Further consideration of their interconnections with the broader Gifford Creek Priority Ecological Community (the PEC) instigated a regional survey to determine the representation of species outside of the footprint. A greater diversity and species richness was shown to occur in the PEC outside of the Proposal thus demonstrating the direct impacts to the subterranean fauna would not compromise the biological diversity of the ecological community.

Groundwater assessments included the characterisation of aquifers associated with the proposed mine pit and their interconnectivity with the shallow calcrete aquifer network of the PEC. The fractured rock aquifers associated with the proposed pit dewatering activities were shown to have no interconnection with the calcrete aquifers of the PEC. Consideration of potential impacts from water drawdown associated with pit dewatering activities was also undertaken. A restricted water drawdown impact, associated with the fractured rock aquifers within the pit footprints, also confirmed the lack of connectivity with the PEC habitat and demonstrated this would have no impact on the ecological integrity of the PEC. As such the principle of the conservation of biological diversity and ecological integrity was applied and meets the EPA's objective:

- Subterranean fauna: *To protect subterranean fauna so that biological diversity and ecological integrity are maintained.*

An underwhelming summary list approach...

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90	90	99	99
91	91	100	100

The PEC is also closely associated with the Lyons River, pastoral bores and Aboriginal heritage values of the Lyons River. Concerns of groundwater contamination associated with the geochemical nature of the tailings were raised during consultation with pastoralists and traditional owners. Characterisation of tailings waste revealed that two of the tailings streams will have elevated radionuclides. Design and management of the tailings storage facilities will ensure risk of groundwater (as well as land and air quality) contamination is mitigated (as described in the Radiation Waste Management Plan). Human health was also considered as a result of the naturally occurring radionuclides and the concentration of these in the processing plant. Mitigation of potential impacts will ensure the EPA's objectives are met:

- Terrestrial Environmental Quality: *To maintain the quality of land and soils so that environmental values are protected.*
- Inland Waters Environmental Quality: *To maintain the quality of groundwater and surface water so that environmental values are protected.*
- Human Health: *To protect human health from significant harm.*

Impacts associated with waste management have been considered more broadly. The polluter pays principle has been applied to ensure Hastings bears the cost of containment and encapsulation of tailings with elevated radionuclides in accordance with relevant policy and guidelines. The principle of waste minimisation has been and will continue to be applied to minimise the generation of waste. Waste management (i.e. waste rock landforms and tailings storage facilities) is also a key consideration in the closure phase of the proposal. As such, a Preliminary Mine Closure Plan will be further developed in consultation with relevant stakeholders (including the EPA and DMP).

The consideration of risks associated with implementing the proposal against environmental factors have been assessed (sections 4 and 5). A conservative approach has been taken to determine the management of potential risks to the environment. As such the precautionary principle has been applied and will continue through the implementation of an Environmental Management System (aligned with the international standard ISO 14001) during construction, operations and closure phases of the proposal.

Review of risks, identification of information gaps where there is a lack of full scientific certainty and application of the precautionary principle will be on-going throughout the life of the proposal, including closure. Management plans will therefore remain dynamic and will be reviewed annually to ensure the continual improvement of management performance in meeting environmental objectives (goals) and targets.

Ditto... but even less content



7. Holistic Impact Assessment

Overall actual and potential impacts of the Proposal on the environment are not considered to represent a significant environmental risk on the basis that:

- The EP Act principles and relevant EPA guidance documents have been considered in investigating and evaluating potential impacts of the Proposal on the EPA's environmental factors;
- A comprehensive set of monitoring and management measures have been developed to further mitigate potential impacts of the Proposal on the EPA's environmental factors;
- The proponent has committed to open and transparent reporting of environmental performance throughout the Proposal construction phase;
- Evaluation of impacts against all relevant environmental factors, including other environmental factors determined that the EPA's objectives were considered to be met. Specifically, for the key environmental factors the following outcomes were predicted:
 - **Benthic Communities and Habitats** - the combined impact of the Proposal activities and the consequent outcomes are not considered to pose significant residual risks to the protection of BCH and therefore biological diversity and ecological integrity can be maintained.
 - **Coastal Processes** - the combined impact of the Proposal activities and the consequent outcomes are not expected to pose any significant residual risks to maintaining the geophysical processes that shape coastal morphology and therefore the environmental values of the coast can be protected;
 - **Marine Environmental Quality** - the combined impact of the Proposal activities and the consequent outcomes are not expected to pose any significant residual risks to maintaining the quality of water, sediment and biota and therefore the environmental values are protected;
 - **Marine Fauna** - the combined impact of the Proposal activities and the consequent outcomes are not considered to pose any significant residual risks to the protection of marine fauna and therefore biological diversity and ecological integrity can be maintained; and
 - **Flora and Vegetation** - the combined impact of the Proposal activities and the consequent outcomes are not considered to pose any significant residual risks to the protection of flora and vegetation and therefore biological diversity and ecological integrity can be maintained.



12. Holistic impact assessment

Avoidance has been a key approach for CPM in managing the potential environmental impacts associated with the Proposal. Numerous studies within Cape Preston have been utilised in understanding the potential impacts of the Proposal and mitigation measures have been formulated to prevent potentially significant impacts. The Proposal activities within the port area have been designed to avoid the critical Northern Quoll habitat adjacent to the Proposal footprint.

For significant flora species, vegetation or habitat that is unable to be completely avoided, disturbance will be minimised through the implementation of management measures. These are outlined in the Draft OEMP and include restriction of access and retention of vegetation along creek lines (Appendix 3).

CPM has undertaken stakeholder consultation through the Draft OEMP. Consultation will continue to develop as the Proposal progresses through the operational phases of the project.

'Key' and 'other' environmental factors have been identified in the Draft OEMP. The key environmental factors, impacts and potential residual impacts are summarised in Table 12-1. The continuation of existing management measures will be maintained for each environmental factor.

The proposed Approval Statement is included in the Draft OEMP.

Same summary list approach... (but with more detail on each bit)

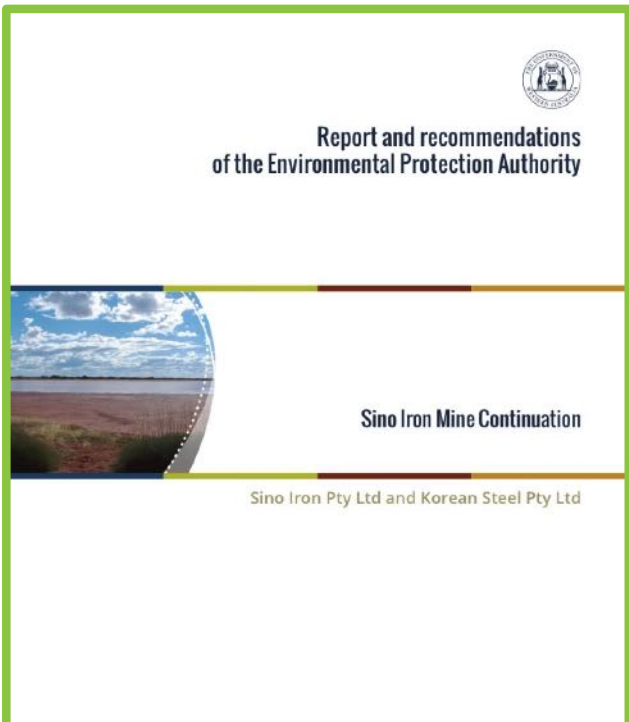


Table 12-1: Assessment of preliminary key environmental factors

Description and potential impacts	Environmental aspect	Mitigation actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	Outcome to demonstrate that Proposal meets EPA objective
Hydrological processes - To maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.				
<p><u>Context</u></p> <p>The hydrological regime at the mouth of the Fortescue River includes:</p> <ul style="list-style-type: none"> high variability in natural flow volumes 	<p>Mine construction</p> <p>Groundwater</p>	<p><u>Avoidance:</u></p> <ul style="list-style-type: none"> incorporate flood modelling data and surface flow data into the design of the Proposal to avoid impacts to hydrological processes. 	<p>A requirement to maintain an approved Environmental Management Plan (EMP).</p> <p>This EMP will specify the methods, procedures and management to avoid and minimise the impacts on hydrological processes.</p> <p>Groundwater abstraction and discharge licence (RIWI Act).</p>	<p><u>Outcomes:</u></p> <ul style="list-style-type: none"> the areal extent of the 0.5 m, 5.0 m and 10.0 m drawdown contours will decrease relative to the existing project the recovery of groundwater is expected to result in a pit lake of approximately 250 m deep in the west pit and 20 m deep in the east pit the regional groundwater levels are not expected to be significantly affected no permanent pools will be significantly affected the cumulative development of all mines on Cape Preston would not substantially increase the areal extent of groundwater drawdown although highly unlikely to occur the inclusion of additional mines to assess cumulative impacts to hydrological processes do not significantly affect groundwater levels; however, Balmoral South borefield will increase the extent of the 1.0 m drawdown contour during mining the predicted mine pit inflows that will need to be dewatered are 8.0 GLpa the discharge of 8.0 GLpa will not substantially affect flows or values of the Fortescue River the development of a Waste Dump adjacent to Du Boulay Creek is not expected to affect
Flora and vegetation - To protect flora and vegetation so that biological diversity and ecological integrity are maintained.				
<p><u>Context</u></p> <p>The Development Envelope is within an active pastoral station that has historically been adversely affected by weed invasion and grazing by stock. The condition of the vegetation within the Cape Preston area ranges from Completely Degraded to Very Good. The majority of the Development Envelope contains vegetation communities of moderate local conservation significance (3035 ha) within the well-represented Newman, Paraburdoo, Rocklea and Horseflats land systems.</p> <p><u>Key Survey Findings</u></p> <p>Extensive flora and vegetation surveys of the Cape Preston area have been conducted over approximately 53 000 ha.</p> <p>No Threatened Flora species as listed under the WC Act are known from within 15 km of the Development Envelope. Thirteen Priority Flora species listed by Parks and Wildlife have the potential to occur within the broader Cape Preston area, with one, <i>Goodenia pallida</i> (P1) having the potential to occur within the Development Envelope. No Priority Flora species were recorded by vegetation surveys within the Development Envelope</p> <p>Thirteen groundwater dependent vegetation communities have been mapped to the west of the Development Envelope, ranging from high to low dependence on groundwater.</p> <p><u>Potential impacts</u></p> <ul style="list-style-type: none"> clearing of native vegetation has potential to affect regional representation of vegetation communities and flora species clearing has potential to introduce/spread weeds 	<p>Clearing of native vegetation</p> <p>Introduced weeds</p> <p>Groundwater drawdown</p>	<p><u>Avoidance:</u></p> <ul style="list-style-type: none"> inspection of the site for the presence of Mesquite or Parkinsonia prior to any machinery being moved to a site maintenance of adequate fire breaks across the mine site and around working areas. <p><u>Minimisation:</u></p> <ul style="list-style-type: none"> restricting clearing to approved areas through the implementation of an internal ground disturbance permit system restricting all vehicles and equipment to within designated tracks and parking areas restricting all earthworks and movements of machinery and vehicles to within marked clearing or disturbance boundaries requirements for all earthmoving machinery to be inspected as clean and free of weed and seed prior to entry and exit from a site monitoring of GDE vegetation as outlined in the GDVMP (Astron 2015) will be conducted and contingency responses activated when trigger levels are exceeded <p><u>Rehabilitate:</u></p> <ul style="list-style-type: none"> progressive rehabilitation of any disturbed areas not required for other future mining activities, sourcing topsoil for rehabilitation from areas of lowest weed 	<p>A requirement to maintain an approved Environmental Management Plan (EMP).</p> <p>This EMP will specify the methods, procedures and management to avoid and minimise the impacts on vegetation and flora.</p>	<p><u>Outcomes:</u></p> <ul style="list-style-type: none"> approximately 7366 ha of vegetation will be cleared by the Proposal with the majority of this occurring in habitat of low to moderate conservation significance and well represented in the region loss of 121.51 ha of vegetation from the Horseflat Land System, a Priority 3iii Ecological Community although this will not result in a significant reduction in the extent of this community with total clearing in the Roebourne Subregion less than 0.5% no Threatened Flora species listed under either the WC Act or EPBC Act will be affected by the Proposal no Priority Flora species as listed by Parks and Wildlife will be affected by the Proposal no change to GDE health is predicted with implementation of the GDE the monitoring plan and related adaptive

For the EPA... (assessment report)

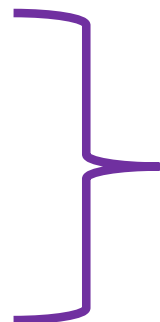
- description of **proposal** and key characteristics
- **context** of proposal in its surrounds, including cumulative impacts
- stakeholder **consultation** and public input.
- **assessment** of each key environmental factor.
- *holistic assessment of acceptability of whole proposal:*
 - *interconnected nature of environment*
 - *s4A principles of EP Act*
 - *objectives for key environmental factors*
 - *cumulative impacts with other proposals*
 - *impacts that integrate across proposal (e.g. mine closure)*
 - *significant residual impacts and offsets.*
- MNES (if a bilateral EPBC assessment)
[(Procedures Manual, s4.2, p34)]



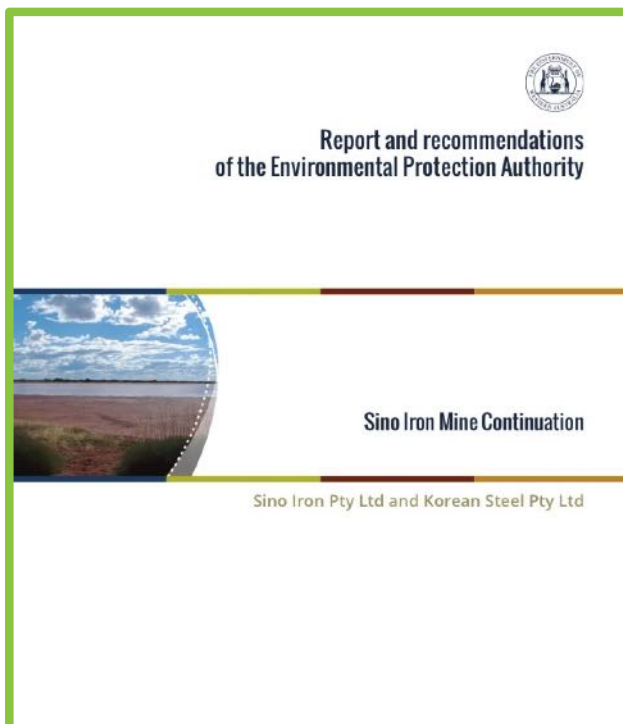
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August 2017



Factors addressed separately and then...



EPA don't engage at all! (no 'holistic assessment of acceptability of whole proposal')

5. Conclusion

In drawing its conclusions below, the EPA has considered the assessment in the previous sections and taken an **holistic** view of the likely residual impacts of the proposal. The EPA has considered the degree of connectivity and inter-relatedness of processes operating across systems and communities that make up the environment.

The EPA has taken the following into account in its assessment of the proposal as a whole, including the likely impacts on groundwater dependent vegetation from groundwater drawdown and the increased inherent risk from exposure of fibrous minerals:

- The impacts to all the key environmental factors.
- The EPA's confidence in the proponent's proposed mitigation measures.
- The relevant EP Act principles (the principle of waste minimisation and the principle of conservation of biodiversity and ecological integrity) and the EPA's objectives for the key environmental factors.
- The EPA's view that the impacts to the key environmental factors are manageable, provided the recommended conditions are imposed.

In addition to the proposed additional condition requiring a Mine Closure Plan, the EPA also recommends that a condition be imposed requiring the proponent to revise all plans required for the approved project that are relevant to this proposal, including the Operational EMP. The EPA also recommends that the revised plans are consistent with contemporary standards, policies, guidelines and procedures, including EPA guidance and guidance from relevant government departments.

Given the above, the EPA has concluded that the proposal is environmentally acceptable and therefore recommends that the proposal may be implemented subject to the conditions contained in Ministerial Statements 635 and 822 and the conditions recommended in Appendix 4.

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Appendix 2

Consideration of principles

[appendix table does include multiple factors in relation to principles]

EP Act Principle	Consideration
<p>1. The precautionary principle</p> <p><i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by –</i></p> <p>a) <i>Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i></p> <p>b) <i>An assessment of the risk-weighted consequences of various options.</i></p>	<p>in considering this principle, the EPA notes that Hydrological Processes, Inland Waters Environmental Quality, Marine Environmental Quality, Flora and Vegetation, Terrestrial Fauna, Air Quality, and Terrestrial Environmental Quality could be significantly impacted by the proposal.</p> <p>Investigations into the biological and physical environmental that have been undertaken by the proponent have provided sufficient certainty to assess risks and identify measures to avoid or minimise impacts. The EPA has recommended conditions to ensure relevant measures are undertaken by the proponent</p> <p>From its assessment of this proposal the EPA has concluded that there is no threat of serious or irreversible harm.</p>
<p>2. The principle of intergenerational equity</p> <p><i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p>	<p>In considering this principle, the EPA notes that the proponent has taken measures to avoid and minimise impacts. In assessing this proposal the EPA has recommended conditions to manage impacts to the key environmental factors identified during the course of this assessment.</p> <p>From its assessment of this proposal the EPA has concluded that the environmental values would be protected and that the health, diversity and productivity of the environment would be maintained for the benefit of future generations.</p>
<p>3. The principle of the conservation of biological diversity and ecological integrity</p>	<p>This principle is a fundamental and relevant consideration for the EPA when assessing and considering the impacts of the</p>

Closing thoughts

Can or will EIA rise above reductionism?



What might a truly holistic IA look like...?

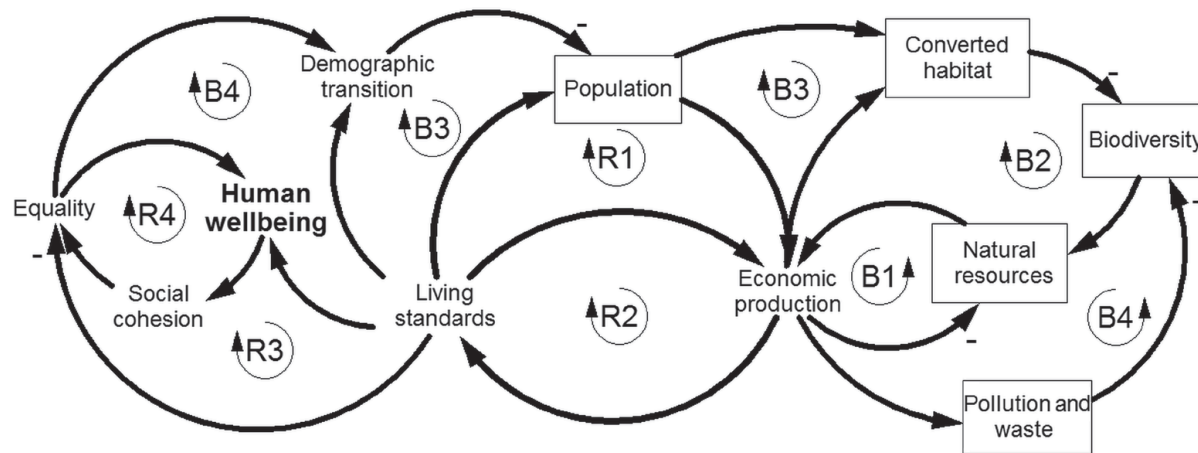


Figure 13.21 Influences on human wellbeing

THANK YOU

Discussion opportunity

Holistic impact assessment

Is something comparable happening in EIA in your part of the world...?

If so, how does it play out in practice?