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Adopting a Risk-Based Approach to Key Stages of the EIA Process

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Risk-based assessment approach

Why?

Concern that traditional EIA may:

- Address a wide raft of issues which have:
  - Poorly understood associated risks (likelihood and consequence), short or long term.
  - Low associated real environmental risks.
  - Some have readily manageable risks.
- Miss key issues (downstream risks for example).
- Be very resource demanding (excessive documentation time and costs).
- Require excessive approvals time, without focusing on the real issues and achieving the best environmental outcome for all stakeholders.

That is, the aim of risk-based assessment is to focus on, and manage, the real issues, to achieve better outcomes.

Not clear if a risk based assessment would be optional, or EPA directed.

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Risk-based assessment

Objectives

- Prediction of future impacts/consequences of proposals, the uncertainties around those impacts and proposals, and development of appropriate management actions
- Devote resources to identification and management of the *real* issues (and audit outcomes of management of those), and do it well.
- NOT to water down current environmental protection requirements or outcomes.

Risk-based assessment

How?

Great objectives, but how? Little advantage if it is just an add-on to existing methods, adds complexity, and/or does not lead to better outcomes.

Issues:

- ***Methods*** – must be consistent, transparent, robust and appropriate.
- ***Stakeholder***s – who identifies key issues, and what is acceptable risk: science or community values or a combination?
- ***Expertise*** – to assess and decide the adequacy and accuracy of risk identification, and proposals to manage those risks.
- ***Staging*** – both within the assessment, and for life of projects.

Risk-based assessment

Methods

- Standard risk assessment methods:
  - Likelihood and consequence tables.
  - Investigations required to better resolve risks.
  - Management/mitigation response/proposals and effectiveness for significant risks.
  - Residual risk after management response.
  - Certainty of outcome.
  - Quantitative vs qualitative.

But outcomes of risk assessment almost invariably subjective assumptions contestable, data usually limited, long term impacts often uncertain – leading to a conservative approach

Risk-based assessment

Stakeholders

- Risks need to be scoped early with a range of values-driven stakeholders – maybe very difficult to get agreement on real issues and real risk; list may be large and data may limited.

  Note EPA Bulletin #9 : *'stakeholders may…expect increased justification of the 'low' (risk) ranking because of the nature of the values at risk'*

- Assessed risks may change as more data become available, leading to scope change – but early identification of key risks allows focus.
- Regulators may not align – legal process conflicts/mixed agendas.
- Procedural fairness – potential for conflict.

Risk-based assessment

Expertise

- Risk assessment experience available, but not a lot in environmental risk.
- Consequence evaluation in the longer term, in particular related to biodiversity, is a key issue. Precautionary principle applies?
- Value of biodiversity – European approach.
- Regulator assessment expertise? Reliance on external support ?
- Industry Working Group Report – 5.10 '...support the use of accredited consultants, certified auditors and establish expert panels to assist agencies in the approvals process…'

Risk-based assessment

Staging

- Assessment will require ongoing evaluation of issue investigation outcomes, as more data become available. This will include issues raised from values-driven stakeholders.
- Initial issue identification broad, narrowing down as certainty increases and key issues evolve and/or are resolved
- Both stakeholders and proponents must recognize risk assessment is a dynamic process; may take time, add complexity. Patience and understanding important.

Risk-based assessment

Staging: scoping ***(after EPA, March 2009)***

Establish context (external)

- Perform initial scan of the environment, identify stakeholders, identify policy requirements and environmental objectives to establish context.

Identify risks

- Identify environmental aspects, relevant environmental factors and potential environmental impacts (risks) arising from aspects. Prepare initial consequence and likelihood tables and risk level matrix.

Initial analysis of risks

- Determine initial consequences and their likelihood, initial risk level and uncertainties after application of standard controls.

Initial evaluation of risks

- Evaluate risk level to determine initial acceptability and if unacceptable whether it is treatable. Determine potential risk treatment. Determine key environmental factors (those at a medium or greater risk level) for detailed analysis. Other factors will be addressed in EMP. Define investigations for key environmental factors

Staging: detailed assessment

Detailed analysis of risks

- Establish detailed context for key environmental factors, refine consequence tables and review risk treatment criteria. Determine risk level to key environmental factors defined after application of standard controls/ management. Identify any new significant issues and consider uncertainty.

Detailed evaluation of risks

- Determine the acceptability of risk to key environmental factors and the degree to which further mitigation or risk treatment is required using risk treatment criteria. Consider whether unacceptable risks are treatable.

Table A1.4: EPA Risk Matrix

		Consequence category					
		6	5	4	3	2	1
		Negligible	Minor	Moderate	Major	Massive	Catastrophic
Likelihood category	1 - Almost certain	Low	Medium	High	Extreme	Extreme	Extreme
	2 - Likely	Low	Low	Medium	High	Extreme	Extreme
	3 - Possible	Very Low	Low	Low	Medium	High	Extreme
	4 - Unlikely	Very Low	Very Low	Low	Low	Medium	High
	5 - Remote	Very Low	Very Low	Very Low	Low	Low	Medium

Extreme Risk:	Modification of proposal may be required. Further detailed investigations and detailed discussion in EIS/ERMP. Detailed discussion and agreement with EPA/DEWHA or other government departments on proposed studies.
High Risk:	Further detailed investigations and detailed discussion in EIS/ERMP. Detailed discussion and agreement with EPA/DEWHA or other government departments on proposed studies.
Medium Risk:	Further studies required and discussion in EIS/ERMP. Detailed discussion and agreement with EPA/DEWHA and other government departments on studies.
Low Risk:	Brief discussion in EIS/ERMP. To be addressed in subsequent Environmental Management Plans, works approvals and licences for the Project. Studies may be undertaken and reported in the EIS/ERMP if confidence level is low.
Very Low: Risk	Very brief notation in the EIS/ERMP. To be addressed in subsequent Environmental Management Plans, works approvals and licences for the Project.

Staging: mitigation

Treat/mitigate risks

- Mitigate according to hierarchy of control (eliminate, substitute etc…). Apply best practice. Refine consequences table to facilitate management response. Determine management responses based on risk level. Prepare management plans (including monitoring program).
- Involve multiple internal stakeholders and management – not just one Department.
- Don’t rely on external help, often the solution may be close by.

Risk based-assessment

Application

- To date EPA cautious – Bulletin 9 (December 2009) identifies issues: consistency of terms, consequence evaluation, range in stakeholder views.
- Being trialed on Chevron's Wheatstone and API's West Pilbara Iron Ore Project.
- EPA believes better suited to big rather than smaller projects.
- Would seem though that smaller projects could be dealt with the same way, especially if risks limited.
- Small projects can have big risks – need consistency.

Table 5.1: Environmental Factors, Risk Rankings and Proposed studies

Environmental and Social Factor (Receptor)	Environmental and Social Objective	Relevant Aspects (Stressor/Project Activity)	Risk Ranking	Investigations Proposed
Benthic Primary Producer Habitat (BPPH) BPPH in the vicinity of the Wheatstone Project is distributed sparsely and at discrete locations within the study area. The main BPPH in the study area include sparse macroalgae, corals and mangroves along the shoreline. Seagrasses are sparsely distributed and ephemeral. The macroalgae occur in greatest abundance on all the shallow shoals and platforms which surround the offshore islands (e.g. Thevenard, Twin Islands). The fringes of such platforms are frequently colonised by corals, but not always. For example, corals occur along the south and northeast sides of the Thevenard Island platform but are sparse along other parts. Corals also occur on shoals and sea mounts located near the 10m isobath (e.g. Roller Shoal, Saladin Shoal, Ward Reef). Mangroves are located along the mainland coast in the Ashburton Delta, Beadon Creek and adjacent creeks through to Coolgra Point. They also occur around the Mangrove Islands located further east. Most of the seafloor in the vicinity of the proposed channel (and between the mainland shore and Thevenard Island) is comprised of relatively barren sand and silts. Sponge and whip gardens do occur sporadically where hard substrate forms the seafloor - usually close to shore.	To maintain ecological function, abundance, biodiversity, productivity and geographic distribution of marine primary producers and their habitats To effectively address stakeholder concerns in relation to any impacts on marine fauna	• Dredging • Physical presence of marine infrastructure • Vessel Movements • Construction activities • Discharges • Leaks and spills	**High** **Low** **Low** **Low** **Very Low** **Medium**	**Benthic Habitat Mapping** Grid mapping of subtidal habitats, intertidal habitats including islands and limestone platforms; delta and associated mangal communities; includes seasonal variation and identification of reference sites. Understand post-cyclone succession. Review survey results in terms of time since a cyclone disturbance. **Marine Fauna Assessment** Field surveys to assess critical species habitat, seasonal use **Receptor Thresholds** Development of mortality threshold limits (sedimentation/turbidity/light) for sensitive BPPH receptors. **Dredge Plume Impacts** Hydrodynamic modelling of sediment transport using validated model to simulate dredge plan and dredge log and derived PSDs obtained by geotechnical investigation along channel. Subsequent analysis of model output to derive zones of impact and influence using derived BPPH mortality thresholds. **Assessment of BPPH Loss** Application of EPA guidance No: 29 including definition of acceptable Management Unit, estimation of previous BPPH loss and calculation of percentage cumulative loss within MU. **Authorized Discharges, Spills and Leaks** Assessment based on anticipated plant design and operations and inventory of potential leaks and spills **Spill and Discharge Modelling** Hydrodynamic and water quality modelling in the vicinity of plant site and platform **Social Impact Assessment (SIA)** Assessment of local uses and values, through consultation with key stakeholders in the Onslow community (SIA study)
Marine fauna (includes EPBC listed, fish and benthic infauna) Protected Marine Fauna known to occur in the region include turtles, cetaceans, and dugong. Green turtles are common around the offshore islands where nesting occurs in abundance. Flatback Turtles are known to nest mainly along the mainland coast but at low density. Humpback Whales are known to move through the region on their northern and southern migrations to and from the Kimberley. Exmouth Gulf is known to be an important resting area for these whales with peak numbers occurring between July and September. Blue Whales are known to occur in the deep waters offshore. The deepwater environment is within the outer part of the North West shelf, an oceanic region off the Pilbara and Kimberley coasts. The ocean in this region is recorded as having diverse benthic invertebrate communities and fish fauna.	To maintain the abundance, biodiversity, productivity and geographic distribution of marine fauna	• Dredging • Physical presence of marine infrastructure • Vessel movements (Protected marine fauna) • Vessel movements (other marine fauna including fisheries) • Construction activities • Discharges (EPBC) • Leaks and spills • Visual Impact (light emissions) • Acoustic emissions during operations and construction	**Medium** **Medium** **Medium** **Low** **Low** **Very Low** **Low** **Medium** **Low**	**Turtle Surveys** Assessment of habitat use onshore and on islands for breeding during respective species' breeding seasons Assessment of previously identified potential nesting and foraging areas for predominant flatback species using drop-camera survey techniques. **Marine Mammals** Continuous acoustic logging at sites approximately 20 km and 30 km offshore from plant site and a tracking grid on Wheatstone site Repeat marine mega fauna aerial surveys conducted to assess migration and use patterns. **Fisheries** Description of existing fisheries and identification of any potential risks (e.g. habitat loss; coastal process and flood plain changes) arising from the project during both construction and operation **Noise** Assessment of marine noise emissions arising from construction and operational activities and assessment of risk to marine fauna **Emissions, discharges, spills** Assessment of light emissions, authorised discharges, spills and leaks, and assessment of risks to marine fauna and associated

Table A1.5: Preliminary Risk Assessment Results

Reference column (Matters of National Environmental Significance)	Aspect (Stressor/Project Activity)	Project Component	Environmental Factor (Receptor)	Potential Impacts	Standard Controls	Likelihood	Consequence	Risk High Medium Low Very Low	Confidence Level	Proposed Studies	Primary Guidance Material (not intended to be inclusive)	Comments/Assumptions
1A MNES	Dredging • Capital (acute) and maintenance (chronic) • Seabed dredging • Spoil disposal • Subsea pipe installation	• Navigational channel, marine offloading facility, turning basin • Dredge spoil disposal sites (State or Commonwealth Waters) • Pipeline corridors (State and Commonwealth Waters)	**Benthic Primary Producer Habitat (BPPH)** Surveys indicated intertidal area does not have a diverse or abundant BPPH Surveys indicated subtidal areas have low abundance and diversity of BPPH	Critical loss of or disturbance to marine BPPH	Marine facilities layout to take into account the location of BPPH Dredging and pipelay management plan to identify mitigation measures to reduce impacts on BPPH	2	3	H	**Low level** **Uncertainties:** Dredge spoil transportation and settling characteristics As yet unknown whether dredge spoil sites will be in State or Commonwealth Waters	Further surveys are required to ascertain the seasonal abundance of BPPH and to understand marine productivity Modelling and geotechnical surveys are required to determine transport characteristics of marine sediments Impact assessment undertaken to determine impacts on BPPH	EPA Guidance Statements No 1, 29 and 34 Australian and New Zealand Guidelines for Marine and Freshwater Marine Water Quality The National Assessment Guidelines for Dredging	Level of critical loss will be determined once the management unit has been defined Risk ranking is based on loss of marine BPPH Risk ranking assumes regular maintenance dredging Also considered potential flow-on effects to the fishing industry e.g. fish nursery and breeding areas
1B MNES		• Navigational channel, marine offloading facility, turning basin • Dredge spoil disposal sites (State or Commonwealth Waters) • Pipeline corridors (State and Commonwealth Waters)	**Protected marine fauna** Initial surveys indicate nearshore area is not important to protected marine fauna Reefs around small islands (such as Thevenard) are noted as part of their listing on the Register of National Estate (Place ID 10050)	Loss of or disturbance to critical habitat associated with protected marine fauna Potential to directly impact marine fauna Disturbance and avoidance of area by protected marine fauna Heightened community concern Impacts on local tourism operations	Design of dredging program and pipelay operations to reduce risk of entrapment of marine fauna	3	3	M	**Reasonable level** **Uncertainties:** Presence or absence of critical habitats for protected marine fauna Importance of the nearshore waters as migratory pathway or foraging area	Undertake field investigations to identify and map key habitats (foraging and inter nesting) and species, including abundance and seasonal variations Marine fauna survey to determine presence, distribution and seasonal variation Modelling is required to determine transport characteristics of marine sediments Impact assessment undertaken to determine impacts from sediments on marine protected fauna and their habitats Identification of local uses and social values	EPA Guidance Statements No 1, 29 and 34 Australian and New Zealand Guidelines for Marine and Freshwater Marine Water Quality The National Assessment Guidelines for Dredging	Foraging habitat for turtles assumed to be most critical habitat at risk Assessed the likelihood of loss or disturbance to critical habitat important to protected marine fauna
1C MNES		• Navigational channel, marine offloading facility, turning basin • Pipeline corridors (State and Commonwealth Waters)	**Physical marine environment** Sub-tidal, intertidal and foreshore (coastal processes) Initial surveys indicate coastal zone highly dynamic	Impacts on mangroves due to changes to seabed and foreshore profile, and changes to sediment dynamics resulting in increased accretion and or	Marine facilities layout to take into account the coastal process and the importance of these processes for	2	3	H	**Low level** **Uncertainties:** The impact of dredging on coastal processes has not been thoroughly evaluated	Modelling is required to determine transport characteristics of marine sediments, and coastal processes Impact assessment undertaken to determine impacts from	EPA Guidance Statements No 1, 29 and 34 Australian and New Zealand Guidelines for Marine and Freshwater Marine Water Quality	Assumes nearshore dredging works will have an impact on coastal processes Main concerns are impacts on mangroves in Ashburton River Delta

Risk-based assessment

Application: hypothetical example, small project: Magellan exports through Fremantle

- Well known EIA (EP Act s45,46) example with a complex history; bagged containerized lead carbonate through the Port of Fremantle.
- At one level, a very simple proposal, without complex local environmental risk.
- At another level, very complex due to community and politics around the Esperance contamination legacy.
- Probably instructive for application of risk based assessment to controversial projects.

Risk-based assessment

Magellan example

- ***Methodology*** –standard risk assessment approach would be proposed – issues would be where and how could lead escape, how likely, consequences if it did.
- ***Stakeholder***s – In Magellan's case, a major issue. Community, political regulator and technical stakeholders likely would agree on issues, but poles apart on likelihood and consequences (Esperance legacy, Fremantle political opposition). Great differences of opinion on mitigation measures.
- ***Expertise*** – unlikely to reach consensus on where expertise was available or was credible to identify and assess risks (lead impacts, engineering and operational aspects, appropriate monitoring and reporting, organisational management capacity).
- ***Staging*** – very difficult to get past first stage, as stakeholder views difficult to reconcile without prohibitively expensive investigations on even small risks.

Magellan example

How would the conflicts be resolved sufficiently to progress the proposal? Process would likely revert to standard assessment methodology with wide stakeholder consultation, heavily and very conservatively scrutinized and conditioned, as was done.

Likely close parallels with other controversial projects with deep divisions between stakeholders – uranium mining and processing?

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Risk-based assessment: Thoughts for the Future

- The risk based EIA ‘rules’ need to be transparent and consistent – stakeholders, regulators and proponents must accept
- Benefits need to be demonstrated
- Risk-based approach to EIA should assist in development of Part IV license conditions/classification – DEC and others (DMP and DOH).
- Ongoing review mechanisms (Performance Review example).
- Section 45C – risk-based approach.