PORT OF **WEIPA**

APPENDIX **A**

Risk assessment methodology

Appendix A Risk Assessment Methodology – Permission System (GBRMPA 2017)

Australian Government
Great Barrier Reef Marine Park Authority

Queensland Government

Internal Procedure

Risk Assessment – Permission System (Revision 1, effective from 04 October 2017)

***Purpose**: To explain the process used within the permission system to assess risks posed by proposed activities.*

***Target audience**: Primarily staff from the 'managing agencies' and secondarily, applicants seeking a permission.*

Alert / safety / special considerations: Where a risk or hazard to the managing agencies themselves is identified in the course of undertaking risk assessments in the Permission system, these must be reported and managed in accordance with the managing agencies respective risk management policies and frameworks.

Objective/s

1. To implement a consistent and transparent approach to the identification of risks and their associated avoidance, mitigation or offset measures.

Context

2. The Marine Parks are jointly managed by the Great Barrier Reef Marine Park Authority (GBRMPA) and the Queensland Parks and Wildlife Service (QPWS) – collectively referred to as 'the managing agencies'.
3. This procedure applies to the Commonwealth Great Barrier Reef Marine Park and the Queensland Great Barrier Reef Coast Marine Park (the Marine Parks), for joint applications assessed by the managing agencies. The State of Queensland will independently assess any risks relating to activities proposed only within the Great Barrier Reef Coast Marine Park.
4. The managing agencies use risk assessment as the primary tool within the permission system to evaluate risks to the values of the Marine Parks posed by proposed activities. In general, the depth and effort put into a risk assessment will be consistent with the expected level of risk or the potential consequences under analysis.
5. The managing agencies' approach to risk assessment is based on international standards and public sector guidance. A risk assessment improves the managing agencies' ability to make informed and consistent decisions about risks, and how they should be managed.
6. A range of supporting tools and strategies are available to enhance this basic risk assessment procedure. These include expert judgment panels, cost–benefit analysis, toxicological risk assessment, multi-criteria analysis, scenario planning and life cycle analysis. The managing agencies may choose to use a supporting tool or system to better inform the risk assessment, depending on the nature and scale of the proposal and the assessment process being used.
7. The managing agencies are developing additional policies and guidelines on cumulative impact assessment. Once finalised, these will assist with considering how activities and impacts interact over time and space.
8. The managing agencies may require an applicant to prepare a risk assessment using this procedure. Where the applicant is preparing the risk assessment, the managing agencies expect them to use community reference groups, scientific or technical advisory groups and/or whole-of-government consultation to enhance the quality and rigour of the risk assessment. In some cases, the managing agencies and an applicant may develop or review the risk assessment through a collaborative, iterative process.
9. Regardless of how the initial risk assessment is prepared, ultimately the decision makers within the managing agencies will review the risks using this risk assessment procedure and form their own, independent view.
10. This procedure uses standard descriptions of hazards, consequence and likelihood to allow comparison of risks between different types of conduct and to improve the consistency of decision making. However, these descriptions are not prescriptive. In rare cases (for example, a new type of activity that has not previously been contemplated), the decision maker may choose to adjust the descriptions if they are not appropriate to a unique circumstance.

Definitions

Refer to the 'Permission System Policy' for a list of general definitions relating to the permission system.

- *Adaptive capacity,* for the purposes of the Permission system means the potential for a Marine Parks value to adapt to impacts to maintain or improve its condition.
- *Avoidance measures* mean actions that, if implemented, would avoid risk (usually by avoiding exposing a value to a hazard).
- *Cumulative impacts* mean the interaction of effects between one or more impacts and past, present, and reasonably foreseeable future pressures.
- *Consequence* means the outcome of an event affecting objectives; to what degree an impact may affect a value of the Marine Parks (and, as a result, the attainment of objects of the Acts). Consequences may be certain or uncertain and can have positive or negative effects on objectives.
- *Exposure,* for the purposes of the Permission system means the magnitude, frequency and duration of a Marine Parks value's contact with a hazard.
- *Hazard* means a source of potential harm; a situation, action or behaviour that may negatively impact a Marine Park value, whether intentionally or unintentionally; some may be outside the jurisdiction of the managing agencies and therefore unable to be controlled through the joint permission system (such as global greenhouse gas emissions). In ecological risk assessment, sometimes hazards can be referred to as 'stressors' or as 'risk sources'.
- *Impact* defined in the Great Barrier Reef Marine Park Regulation as *relevant impacts* of proposed conduct or permitted conduct, means:
  a. the potential direct and indirect impacts of the conduct, and the potential cumulative impacts of the conduct (in conjunction with other conduct, events and circumstances), on the environment, biodiversity, and heritage values, of the Marine Park or a part of the Marine Park; or
  b. the risk of the proposed conduct restricting reasonable use by the public of a part of the Marine Park and the extent of that restriction (if any).
- *Initial risk,* for the purposes of the Permission system means the risk posed to Marine Parks values based on an applicant's proposal.
- *Likelihood* means the chance of an event happening; may be determined based on probability or frequency.
- *Marine Parks values* mean the values of the Marine Parks as defined in the 5-yearly *Outlook Report*.
- *Mitigation measures* mean process to modify risk, and can involve avoiding the risk, removing the hazard/ risk source, changing the likelihood, changing the consequenes, or sharing the risk).
- *Offset measures,* for the purposes of the Permission system mean actions that, if implemented, would compensate for likely impacts and therefore may counteract some consequences.
- *Permission system* means the regulated system of managing activities in the Marine Parks which require permission, accreditation, notification or exemption from the managing agencies. Refer to the Permission system policy for more information.
- *Residual risk*, for the purposes of the Permission system means the risk posed to Marine Parks values after all possible avoidance and mitigation measures have been exhausted; the final risk level.
- *Risk*: defined by the Australia/New Zealand Standard for Risk Management (AS/NZS 31000:2009) as the "effect of uncertainty on objectives." Within the permission system, "risk" relates to uncertainty as to whether the objects of the Acts can be achieved.
- *Risk event*: a change in situation; something happening or not happening (when it was expected); an incident or occurrence that exposes a value to a hazard
- *Sensitivity*: the degree to which a Marine Park value is responsive to a specific impact.
- *Severity*: how serious a consequence would be if it occurred; the degree of degradation that would occur to a value if that consequence occurred.
- *Vulnerability*: the degree to which a Marine Park value is susceptible to degradation from impacts. Vulnerability is a function of the value's exposure, sensitivity and adaptive capacity.
- *Zone of impact*: the geographical area that may be exposed to direct, indirect, consequential or cumulative impacts from the proposed activity.

Related policies / procedures / legislation

11. This procedure should be read in conjunction with the Permission system policy and the other policies, guidelines and standards outlined in Appendix 1 of that document.

12. Complementary legislation allows for the operation of a joint permission system, and includes:
    12.1. *Great Barrier Reef Marine Park Act 1975* (Cth) and *Marine Parks Act 2004* (Qld) (the Acts).
    12.2. Great Barrier Reef Marine Park Regulations 1983 (Cth) and Marine Parks Regulation 2017 (Qld) (the Regulations).
    12.3. Great Barrier Reef Marine Park Zoning Plan 2003 (Cth) Marine Parks (Great Barrier Reef Coast) Zoning Plan 2004 (Qld) (the Zoning Plans).

Required forms / equipment

13. The preferred format for recording risks is provided at Attachment 1.

Procedure

14. The standard process for the identification and management of risks associated with the permission system is outlined in Figure 1 and described in more detail below.

15. Throughout the process, regular communication and consultation is recommended between the managing agencies and an applicant for permission.

16. Refer to the Application guidelines for more information about the managing agencies' expectations for different types of applications.

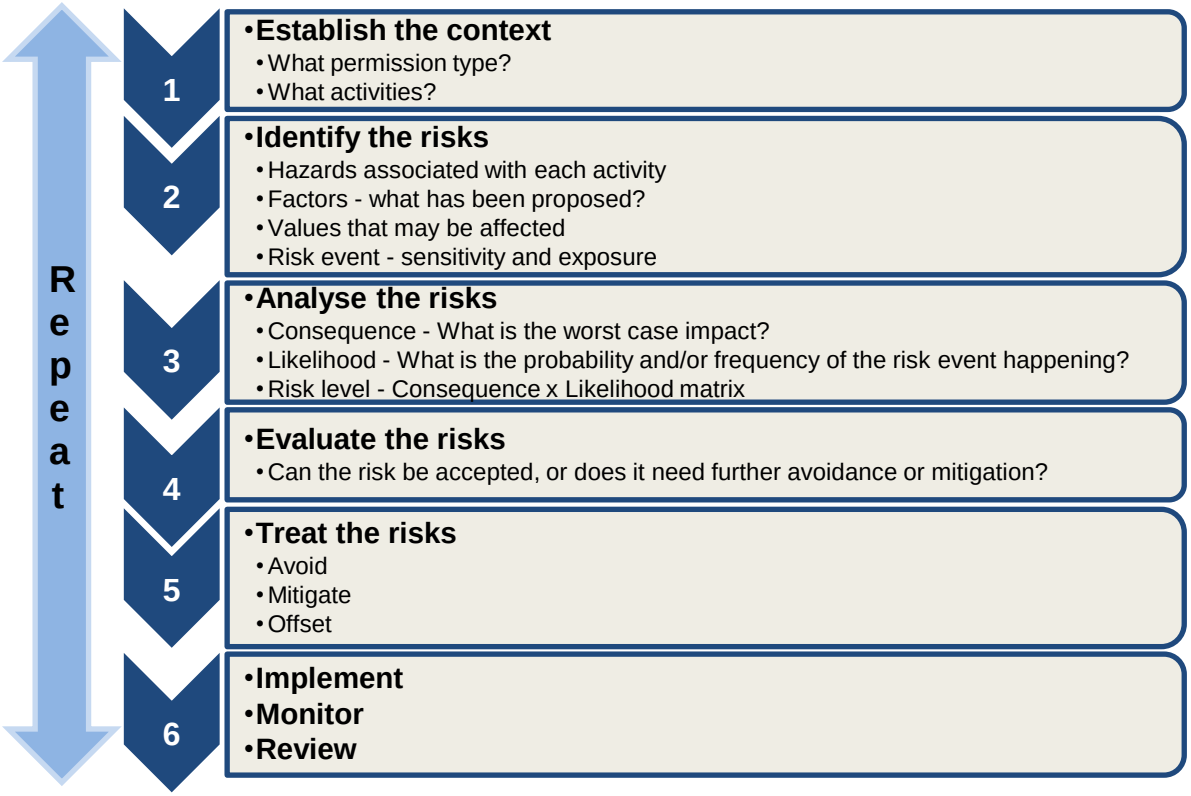

Figure 1: Summary of procedural steps

Dealing with uncertainty

17. Uncertainty, in the context of assessing risks, comes from a range of sources. Uncertainty can be addressed by clearly defining the scope of the assessment, using plausible scenarios, setting specific assumptions and parameters, estimating the degree of uncertainty and the probable range of predictions based on that uncertainty.

18. Expert or informed judgements are a mechanism for dealing with uncertainty by providing a traceable account of the steps taken to reach key findings, and to estimate uncertainty or confidence in those findings.

19. The **precautionary principle** is defined in the Great Barrier Reef Marine Park Act as the principle that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage. In seeking to allow ecologically sustainable use of the Marine Parks in accordance with the objects of the Acts, the managing agencies apply the precautionary principle. Within the permission system, this means that if uncertainty is high and risk is high, permission is unlikely to be granted.

Dealing with vulnerability

20. As the Marine Parks values are generally broad categories (for example, “bony fish”), a value may contain some species, groups, or locations which are more vulnerable than others.

21. Vulnerability is considered during Step 3b of the process (determine the severity of consequences).

Step 1: Establish the context

22. Key questions in establishing the context:
    22.1. What is the project or activity?
    22.2. What permission is required? (Use Table 1 and the Zoning Plans).

23. Use Table 1 to identify which permission, or multiple permissions, would be required for the proposed activity. Refer to the Zoning Plans and the Application guidelines for more information on the different permission types.

24. Identify specific activities or tasks associated with the permission type. For example, the permission “Operating a facility – including building” for a new jetty may include activities such as:
    24.1. Installation of piles
    24.2. Installation of decking and rails
    24.3. Installation of utilities such as lights and water
    24.4. Use of the jetty for fishing and small recreational craft
    24.5. Use of the jetty for large recreational or commercial vessels.

Table 1: The types of permission able to be granted under the Zoning Plans

Permission types
Carrying out works - reclamation
Carrying out works - beach protection works
Carrying out works - dredging
Carrying out works - dumping of spoil
Carrying out works - harbour works
Collecting – other than limited collecting
Conducting a tourist program
Conducting a vessel or aircraft charter operation
Conducting an aquaculture operation
Conducting an educational program, other than a limited educational program
Fishing involving - taking in a harvest fishery other than an accredited harvest fishery
Fishing involving – conduct of a developmental fishery program
Navigating a managed vessel, aircraft or ship
Operating a facility - building, assembling, fixing in position, maintaining or demolishing the facility
Operating a facility - constructing or operating mooring facilities for vessels or aircraft
Operating a facility - operating a landing area or facility for aircraft
Operating a facility - discharging waste from the facility
Operating a fishing industry service vessel
Operating a vessel or aircraft in 1 vicinity for more than 14 consecutive days
Operating a vessel or aircraft in 1 vicinity for more than 30 days in any period of 60 days
Program to take animals or plants that pose a threat to - human life or safety
Program to take animals or plants that pose a threat to - marine ecosystems of the Marine Park
Program to take animals or plants that pose a threat to - the use or amenity of a part of the zone or an adjacent area
Research, other than limited impact research (extractive) or limited impact research (non-extractive)
Traditional use of marine resources
Any other purpose that is consistent with the objective for the zone

Step 2: Identify the risk events

25. A risk event occurs when a value is exposed to a hazard to which that value is sensitive.

26. Identifying risk events involves identifying hazards, values that are sensitive to that hazard, values that may be exposed to that hazard, and the impacts that may occur.

Step 2a: Identify the potential hazards from the proposed permission

27. This step requires identification of potential hazards associated with each event.

28. The most common potential hazards to Marine Parks values are listed below. For consistency, the assessment should use these standard hazards to the greatest extent possible. Other hazards may occur less frequently and can be considered on a case-by-case basis.
    - 28.1. **Acid sulphate soils:** Exposure of potential acid sulphate soils.
    - 28.2. **Artificial light or change in natural light:** Artificial lighting including from resorts, industrial infrastructure, mainland beaches and coastlines, vessels and marine infrastructure such as navigational aids. Change in the amount of natural light available, such as by shading or water clarity.
    - 28.3. **Change in current or future human use pattern:** Limiting as well as opening up options for current or future use. Disturbing or excluding other users. Changes to aesthetics or changes in the ambience of an area.
    - 28.4. **Change in hydrodynamics:** Altered waves or water currents, generally only experienced at a local scale; causes could include increased vessel traffic or speeds, installation of a new facility (such as a breakwater), carrying out works such as dredging or seabed levelling.

28.5. **Change in ecological processes:** Ecological processes comprise a number of functions including: microbial processes, particle feeding, primary production, herbivory, predation, symbiosis, recruitment, reef building, competition and connectivity. Changes in these processes can have direct and indirect effects on other species such as depletion of prey or predators.

28.6. **Change in noise:** Noise from human activities, both below and above water. Changes to aesthetics or changes in the amenity of an area.

28.7. **Change in nutrients:** Increases or decreases in chemicals that support plant growth (such as nitrogen, phosphorus, potassium, carbon, silicon, calcium, magnesium and sulfur); causes could include waste discharge, sewage discharge from an outfall pipe or diffuse land-based run-off.

28.8. **Change in salinity:** Increases or decreases in the amount of freshwater or saline water flowing into the Marine Parks.

28.9. **Change in sea temperature:** Increases or decreases in the temperature of seawater, such as discharging unusually hot or cold water into the Marine Parks.

28.10. **Change in sedimentation:** change in the inflow, dispersion, resuspension or consolidation of sediments; causes could include vessel anchoring, barge landings on beaches, construction activities, snorkelers stirring up sand, dredging, and disposal of dredge material. Changes to aesthetics or changes in the amenity of an area.

28.11. **Change in wind patterns:** Changes in the strength, direction or frequency of winds may have consequences for local sea temperature; inshore ocean turbidity through resuspension of sediments; island formation; and the distribution of planktonic larvae. Changes are generally experienced at a local or “micro” scale, such as installing a new facility which blocks or re-directs nearby winds.

28.12. **Contamination of air:** Release of gases or particulates into the atmosphere, other than greenhouse gases.

28.13. **Contamination of water or sediment:** Potentially toxic substances entering the Marine Parks through point source discharge or diffuse land-based run-off, groundwater seepage or leaching; includes metals, hydrocarbons, medicines, hormones, natural or artificial substances produced by industrial, domestic, agricultural (including herbicides, insecticides, fungicides).

28.14. **Direct damage, removal or destruction of non-living things:** Whether intentional or unintentional; examples could include removing a heritage artefact, beach protection works, divers knocking over rocks, anchors dragging through silt or sand, and vessel groundings.

28.15. **Direct death or removal of living things, including vessel strike:** Intentional or unintentional direct killing of plants or animals or removing them from the Marine Park; examples could include taking coral samples for research, accidental death of a turtle after being struck by a boat, removing mangroves to construct a facility, dredging seagrass, vessel grounding on coral.

28.16. **Direct injury or disturbance of living things, including translocation:** Intentional or unintentional direct non-lethal injury or disturbance to wildlife; examples could include divers touching turtles, snorkelers kicking coral, moving coral bommies out of an area to be dredged, or taking non-lethal tissue samples for research.

28.17. **Exotic species or diseases:** Introduction or increase in non-endemic species or diseases; examples could include accidental release of exotic fish from aquaculture operations; shellfish attached to boat hulls; virus released through the discharge of wastewater; exotic corals released from domestic aquariums; seeds transported on clothing; feral rats transported to an island with goods.

28.18. **Marine debris:** Human manufactured material discarded, disposed of or abandoned in the marine and coastal environment, including discarded fishing gear and plastics.

29. Explain the relevant factors associated with the activity. This includes:
    29.1. the magnitude, frequency and duration of the activity
    29.2. any avoidance or mitigation measures being proposed by the applicant
    29.3. any existing management controls, such as plans of management or other legislation.

    See example in Table 2 below.

Table 2: Worked example of activity, hazard and factors

Activity	Hazard	Factors	Value	Risk Event?		Impact
				Sensitivity	Exposure	
Installation of piles	Change in noise	• Max sound level predicted is 250 decibels at 200-400 Hz. • Sound will be generated in bursts, with one strike every 10 seconds for approximately 30 minutes. • Following a 10 minute break to relocate the pile driver to the next pile, another burst will occur. • 35 piles are to be driven over 20 days during Nov-Dec.				

Step 2b: Identify the values potentially affected

30. Using the outputs of Step 2a, identify the values that may be affected by the hazard (either positively or negatively), using the list of values in Table 3. As a guide, Tables 6.6, 6.7 and 6.9 from the Great Barrier Reef Region Strategic Assessment Report may assist with understanding the linkages between hazards and values. Further detail may be found in the series of permission system value guidelines.

Table 3: Values of the Great Barrier Reef Marine Park

Biodiversity	
Islands	Channels and canyons
Beaches and coastlines	River deltas
Mangrove forests	Mangroves
Seagrass meadows	Seagrasses
Coral reefs	Macroalgae
Lagoon floor	Benthic microalgae
Shoals	Corals
Halimeda banks	Other invertebrates
Continental slope	Plankton and microbes
Open water	Bony fish
Saltmarshes	Sharks and rays
Freshwater wetlands	Sea snakes
Forested floodplains	Marine turtles
Heath and shrublands	Estuarine crocodiles
Grass and sedgelands	Seabirds
Woodlands	Shorebirds
Forests	Whales
Rainforests	Dolphins
Terrestrial ecosystems that support the Region	Dugongs
Traditional owner heritage	
Cultural practices, observances, customs and lore	Stories, songlines, totems and languages
Sacred sites, sites of particular significance, places important for cultural tradition	Indigenous structures, technology, tools and archaeology
Historic heritage	
Historic voyages and shipwrecks	Other places of historic significance
World War II features and sites	Historic lightstations
Other heritage	
Other heritage values – social, aesthetic and scientific	World heritage values and national heritage values
Commonwealth heritage values	Natural heritage values
Social values	
Understanding	Aesthetics
Appreciation	Human health

Biodiversity	
Enjoyment	Personal connection
Access	Equity
Empowerment	
Economic values	
Income	Employment

Step 2c: Determine if a risk event may occur – sensitivity and exposure

31. Determine whether a risk event may occur. A risk event only needs to be considered if two things are true:
    - 31.1. The value is sensitive to that hazard
    - 31.2. The value may be exposed to that hazard.

32. Consider **sensitivity** – is the value sensitive to the hazard creating an impact, that is, is it likely to change in response to the hazard? For example, corals are highly sensitive to changes in water temperature, whereas whales are not.
    - 32.1. Low sensitivity – Value is not known to be affected by the hazard
    - 32.2. Medium sensitivity – Value is known to be slightly affected by the hazard (sub-lethal effects)
    - 32.3. High sensitivity – Hazard has well-documented negative impacts on the value (lethal effects are possible)
    - 32.4. Uncertain – There is a high degree of scientific uncertainty, or no knowledge about the value's sensitivity.

33. Consider **exposure** – is the value likely to be exposed to the hazard? For example, if the area likely to be impacted by the activity does not contain any seagrass, then seagrass is unlikely to be exposed to any hazards. Keep in mind when determining the zone of impact that all types of known or suspected impacts are to be considered -- direct, indirect, consequential and cumulative impacts[1].
    - 33.1. Low exposure – The value is not known to occur in the zone of impact, or has been reported as a rare, unusual visitor. There are no reasons to believe that the value occurs in the zone of impact.
    - 33.2. Medium exposure – The value has occasionally been reported in the zone of impact, or there is reason to believe that the value occurs in the zone of impact.
    - 33.3. High exposure – The value is commonly reported or known to occur in the zone of impact.
    - 33.4. Uncertain - There is a high degree of scientific uncertainty, or no knowledge about the value's occurrence or range.

Use the matrix in Table 4 to determine whether a risk event needs to be considered in the assessment. A worked example is provided in

[1] Formal cumulative impact assessments will only be required for inclusion within Public Information Packages, Public Environment Reports and Environmental Impact Statement permit assessment approaches.

34. Table 5 below.

Table 4: Does a risk event need to be considered in the assessment?

SENSITIVITY → / EXPOSURE ↓	Uncertain	Low	Medium	High
Low	Case by case decision	No	No	Yes
Medium		No	Yes	Yes
High		Yes	Yes	Yes
Uncertain		Case by case decision		

Table 5: Worked example of value and risk event

Activity	Hazard	Factors	Value	Risk Event?		Impact
				Sensitivity	Exposure	
Installation of piles	Change in noise	• Max sound level predicted is 250 decibels at 200-400 Hz. • Sound will be generated in bursts, with one strike every 10 seconds for approximately 30 minutes. • Following a 10 minute break to relocate the pile driver to the next pile, another burst will occur. • 35 piles are to be driven over 20 days during Nov-Dec.	Dolphins	Medium - Sensitive to sounds in range of 150 Hz to 160kHz.	High - Observed feeding in the area.	

Step 3: Analyse the risks

35. If Step 2 has determined that a risk event may occur, then the assessment needs to analyse the likelihood and consequence of how this may affect a value. These effects are called “impacts”.

36. A “risk level” is calculated based on:
    36.1. the consequence of the impacts to a value (expressed in terms of severity) if a risk event occurs, and
    36.2. the likelihood of that risk event occurring (expressed in terms of probability or frequency).

37. The risk level provides a measure of the level of risk, which is then used to decide the acceptability of that risk and to establish management priorities for treating the risk.

38. Standard descriptions for consequence and likelihood, based on a five-point scale, allow the comparison of different types of hazards within a single risk assessment.

STEP 3a: Determine the possible impacts

39. For each event and hazard, list the potential impacts to relevant values that might reasonably be expected to occur. In other words, identify the worst-case scenario that is also realistic based on what the applicant has proposed.

> **EXAMPLE**
> *Realistic*: Underwater noise may interfere with dolphins’ navigation because the noise proposed is in the hearing range of dolphins and they are common in the area. This may cause a dolphin to beach, resulting in injury or death of the dolphin.
>
> *Not realistic*: Underwater noise could cause the death of a dolphin, even though the noise proposed is not in the hearing range of dolphins and dolphins are unlikely to be within the area impacted by noise.

40. Impacts are distinct effects on some aspect of a value. They are different from consequences (which are considered in the next step); a consequence is the overall outcome on the condition or trend of the value. For plants and animals, the easiest way to differentiate between 'impacts' and 'consequences' is that impacts may affect a single individual, while consequences affect an entire population.

> **EXAMPLE**
> Impact = individual dolphin avoids an important feeding location, spending less time feeding and therefore having less energy for reproduction.
>
> Consequence = dolphin population declines.

41. Consider the full range of values that might be impacted.

> **EXAMPLE**
> Death of a dolphin may impact not only on the biodiversity value of dolphins, but also on social or Traditional owner heritage values associated with dolphins

42. Where quantitative information is available, this should be used to more accurately identify the potential impacts. See an example in Table 6 below.

Table 6: Worked example of impacts

Activity	Hazard	Factors	Value	Risk Event?		Impacts
				Sensitivity	Exposure	
Installation of piles	Change in noise	• Max sound level predicted is 250 decibels at 200-400 Hz. • Sound will be generated in bursts, with one strike every 10 seconds for approximately 30 minutes. • Following a 10 minute break to relocate the pile driver to the next pile, another burst will occur. • 35 piles are to be driven over 20 days during Nov-Dec.	Dolphins	Medium - Sensitive to sounds in range of 100 to 160,000 Hz.	High - Observed in the area resting.	• A resident pod of 8 snubfin dolphins avoid the area for duration of works. • Because the area is important for feeding, this results in short-term reduction in health for these 8 snubfin dolphins. • If other cumulative pressures exist, this reduction in health may result in death or delayed reproduction of up to 8 dolphins.

STEP 3b: Determine the severity of consequences

43. This step moves from impacts on an aspect of a value to considering the consequence – that is, the overall outcome on the condition or trend of the value.

44. Table 7 provides a standardised description of consequences for different general categories of values. These generic descriptions may be supplemented with:
    44.1. Value assessment guidelines, which provide consequence tables unique to specific values.
    44.2. Expert advice may be used to develop a consequence table for a specific value, where value assessment guidelines are not yet available.

45. Carefully consider each value that may experience consequences, and how the severity of these consequences differ depending on the value.

EXAMPLE

If the impact is loss of a single dolphin:

- If the dolphin is from a population that is stable and not experiencing other pressures, then the loss of a single dolphin may have a minor consequence to the overall value of 'dolphins'.
- If that single dolphin is a long-term resident known and loved by the local community, then its loss may have a moderate consequence to the social value of 'personal connection'.
- If that dolphin species is a totem for the local Indigenous group, and the single dolphin lost is a particularly old or valued individual, then its loss may have a major consequence to the Traditional owner heritage value of 'stories, songlines and totems'.

46. Consider at what scale the consequence may occur:
    (a) Local scale – A single bay, reef or island; generally an area less than 100 square kilometres.
    (b) Regional scale – A Natural Resource Management region.
    (c) Widespread scale – Overall condition of the value across multiple regions or across the entire Marine Parks; generally, affecting 50 per cent or more of the value's extent.

47. Consider the vulnerability of the value, or of sub-groups within that value. If there are populations, groups or individuals that are particularly vulnerable to a certain impact, the consequence level will typically be higher.

Table 7: Consequence scales

Severity	Biodiversity values	Historic heritage values	Social values	Traditional Owner heritage values
Positive: • Sustained positive impact • The value is noticeably enhanced or improved by the activity	All scales: The activity creates a long-term improvement in the condition or trend of the value *Example: Restoring damaged habitat*	All scales: The activity creates a long-term improvement in the condition or trend of the value *Example: Removing modern-day rubbish from a historic shipwreck*	All scales: The activity creates a long-term improvement in the condition or trend of the value *Example: New, long-term employment opportunities*	All scales: The activity creates a long-term improvement in the condition or trend of the value *Example: Interpretive signage and protective fencing around a significant site*
Negligible: • Little to no negative impact on the value • Difficult to associate any impacts that are observed to a single activity • Within the natural variation and tolerance of the system • Temporary short-term positive impact that does not continue once the activity stops	Local scale: Impact is within the natural variation and tolerance of the system. Recovery <5 years. Regional and widespread scales: No impact at the population or sub-population level, or impact is not discernible or not clearly linked to the activity. *Example: Collection of 20 parrotfish each from 5 different reefs for research purposes*.	Local scale: Impact is reversible and does not detract from the overall heritage value. Recovery <5 years. Regional and widespread scales: No impact, or impact is not discernible or not clearly linked to the activity. *Example: Picking up an artefact to photograph or measure it for research, then replacing it in the same location.*	Local scale: Impact is confined to a small area or interest group that is not vulnerable. Impact is reversible with recovery <5 years. Regional and widespread scales: No impact, or impact is not discernible or not clearly linked to the activity. *Example: Temporary closure of a boat ramp during repair works at a time when another nearby ramp can meet community needs.*	Local scale: Impact is reversible and does not detract from the overall heritage value. Recovery <5 years. Regional and widespread scales: No impact, or impact is not discernible or not clearly linked to the activity. *Example: Temporary loss of access to a fishing site during 3 months of construction, but other sites are able to meet community needs. Once construction finishes, full access to the site is restored*.
Minor: • Temporary, short-term negative impact on value • Changes can be reversed	Local scale: Short-term (<5 years) impact to a site or population which is not sensitive or unique. With minimal human intervention, the value reverts within 10 years to its pre-disturbance state. Regional scale: Temporary (<6 months) impact. With minimal	Local scale: Damage to <5% of a site, or any damage at all to a sensitive or unique site. The removal of <1% of the concreting layer. Some destructive sampling that does not impact the overall stability of the site and is deemed to significantly enhance understanding or appreciation. Intangible aspects (such as public appreciation and	Local scale: Temporary (<6 months) decline in benefits for less than 10% of a single community or stakeholder group. The affected group is able to cope with this temporary impact, after which social indicators return to pre-disturbance levels within 5 years.	All scales: Given the unique and sensitive nature of these values, severity of consequence should be determined in consultation with the Traditional Owners. Generally: Some disruption/damage to a local value, but the impact is short-term and reversible. The community has other opportunities

Severity	Biodiversity values	Historic heritage values	Social values	Traditional Owner heritage values
• Recovery time of 0-5 years can be expected	human intervention, the value reverts within 5 years to its pre-disturbance state. Widespread scale: No discernible impact at the population level. No sensitive or unique sites/populations are damaged or modified, even temporarily.	enjoyment) are temporarily impacted for less than 6 months, with no lasting impact. Regional or widespread scale: Similar impacts, but to more than one site or to a particularly sensitive or unique site.	Regional or widespread scale: No noticeable impacts beyond a local area.	or examples to appreciate the value.
Moderate: • Temporary, medium- to long-term negative impact on value • Changes can be reversed • Recovery time of 5-10 years can be expected	Local scale: Long-term (>5 years) impact to the value. With human intervention, the value can be rehabilitated within 10 years to its pre-disturbance state. Regional scale: Short-term (<5 years) impact to a site or population which is not sensitive or unique. With minimal human intervention, the value reverts within 10 years to its pre-disturbance state. Widespread scale: Temporary (<6 months) impacts at a population level, or to a sensitive or unique site or population. With minimal human intervention, the value reverts within 5 years to pre-disturbance state.	Local scale: Damage up to 10% of a site. The removal of >1% but less than 5% of the concreting layer of a significant site. Digging or excavating the substrate with hand tools to locate artefacts. Intangible aspects are impacted in the short term (6 months to 2 years). Regional or widespread scale: Similar impacts, but to multiple sites. Damage to up to 5% of a sensitive or unique site, but damage can be repaired or does not affect the structural integrity or stability of the site.	Local scale: Noticeable decline in benefits for 10-30% of a single community or stakeholder group. The community is able to compensate for or recover from these impacts within 10 years, though this will require some effort and resources. Regional or widespread scale: Temporary (<6 months) decline in benefits for a single vulnerable stakeholder group and/or for stakeholders at multiple locations, which overall affect less than 10% of all GBR stakeholders. Affected groups are able to cope with this temporary impact (for example, during construction), after which social indicators return to pre-disturbance levels within 5 years.	All scales: Given the unique and sensitive nature of these values, severity of consequence should be determined in consultation with the Traditional Owners. Generally: Significant disruption/damage to a local heritage value which impacts on one Traditional Owner group, but impact is reversible; or minor impacts on multiple values or multiple Traditional Owner groups.
Major: • Sustained, long-term negative impact on value • Changes might be irreversible, depending on	Local scale: Impact may be irreversible at the most affected site. Site/population not unique or sensitive. At less affected sites, with human intervention, the value can be rehabilitated within 20 years to its pre-disturbance state. Regional scale:	Local scale: Damage to 11% to 30% of a site, with potentially irreparable damage to the main fabric of that site. Damage where human remains are affected. Major excavation with power tools. Intangible aspects are impacted in the medium term (2 years to 10 years). Access to the site is blocked for most people for the life of the	Local scale – Noticeable decline in benefits for 30-60% of a single community or stakeholder group. The community may not be able to compensate for or recover from these impacts within 10 years, and major assistance is needed to help the community to transition through the change.	All scales: Given the unique and sensitive nature of these values, severity of consequence should be determined in consultation with the Traditional Owners. Generally: Disruption/damage to multiple local heritage values; or moderate impacts for multiple Traditional Owner groups.

Severity	Biodiversity values	Historic heritage values	Social values	Traditional Owner heritage values
other cumulative pressures • Recovery time >10 years	Long-term (>5 years) impact to the value. With human intervention, the value can be rehabilitated to pre-disturbance state within 20 years. Widespread scale: Short-term (<5 years) impact to the GBR population, or to a site/population which is sensitive or unique. With minimal human intervention, the value reverts within 10 years to pre-disturbance state.	activity, but could be reinstated in future if the activity ceases. Regional or widespread scale: Similar impacts, but to multiple sites. Damage to 5% to 10% of a sensitive or unique site with some irreparable damage to one aspect of the site's value.	Regional or widespread scale: Noticeable and enduring decline in benefits for a single vulnerable stakeholder group and/or for stakeholders at multiple locations, affecting 10-30% of all GBR stakeholders. The community is able to compensate for or recover from these impacts within 10 years, though this will require some effort and resources.	
Extreme: • Permanent negative impact on value • Changes are clearly irreversible and exceed the value's adaptive capacity	All scales: Clear and probably irreversible impact to the value's condition or trend over multiple locations. Recovery period greater than 20 years, even with significant human intervention. Permanent loss of the value is a real possibility.	Local scale: Damage to more than 30% of a site, with likely irreversible damage to the structural integrity or stability of the site. Artefacts are damaged or removed or the fabric of the site is broken away and scattered. Intangible aspects are impacted irreversibly (even if the activity ceases, the impacts will continue). The activity may result in access being permanently blocked for most people (even after the activity ceases). Regional or widespread scale: Similar impacts, but to multiple sites. Damage to more than 10% of a significant site, with potentially irreversible damage to the structural integrity or stability of the site.	Local scale – Permanent reduction in benefits for more than 60% of a single community or stakeholder group. Regional or widespread scale: The activity causes a noticeable decline in social value for multiple vulnerable stakeholder groups and/or for stakeholders at multiple locations, affecting 30-60% of all GBR stakeholders. Recovery from these impacts within 20 years, though this will require significant effort and resources.	All scales: Given the unique and sensitive nature of these values, severity of consequence should be determined in consultation with the Traditional Owners. Generally: Irreversible loss of a value for any Traditional Owner group.

Step 3c: Determining likelihood level

48. Use Table 8 to identify the likelihood of each event, either as a frequency or probability.
    48.1. Frequency is best suited when the risk event's occurrence or recurrence can be predicted scientifically with reasonable confidence.

> **EXAMPLE**
> A facility having a design standard to withstand a 1-in-50-year flood or cyclone, being exposed to such an event following installation.

    48.2. Probability is more commonly used in permission assessments, as it expresses the chance of a risk event happening.

> **EXAMPLE**
> The event "fuel spill" might be expected to have a 30% chance of occurring. Probability should take into consideration any steps the applicant has proposed to reduce the likelihood of the incident happening (but not steps to reduce the impact should it happen).

    48.3. If both a frequency and a probability can be chosen for the event, then use the one with the greatest likelihood when determining risk.

Table 8: Likelihood scales

Likelihood	Rare	Unlikely	Possible	Likely	Almost certain
Frequency	Not expected in the next 50 years.	Not expected in a 10-year period, but expected in a 30-year period.	Not annual, but expected within a ten-year period.	Not continuous, but at least one or more times in a year.	At least several times in a year.
Probability	Between greater than 0 and 5% chance of occurring. May occur in exceptional circumstances.	Between greater than 5 and 30% chance of occurring. Might occur sometime but not expected.	Between greater than 30 and 70% chance of occurring. Could occur, capable of happening.	Between greater than 70 and 95% chance of occurring. Is expected to occur.	Between greater than 95 and less than 100% chance of occurring. Will almost certainly occur.

Step 3d: Assessing risk level

49. Having determined the likelihood and consequence, Table 9 is used to determine the risk level. Table 9 provides a uniform, single method of grading risks against each other in order to determine a priority order for dealing with the risks identified and deciding whether further mitigation or monitoring is required.

Table 9: Risk matrix for determining risk level

	Severity →				
Likelihood ↓	**Negligible**	**Minor**	**Moderate**	**Major**	**Extreme**
Almost certain	Low 5 ☐	Medium 12 ☐	High 17 ☐	Very high 22 ☐	Very high 25 ☐
Likely	Low 4 ☐	Medium 11 ☐	High 16 ☐	High 19 ☐	Very high 24 ☐
Possible	Low 3 ☐	Low 8 ☐	Medium 13 ☐	High 18 ☐	Very high 23 ☐
Unlikely	Low 2 ☐	Low 7 ☐	Low 10 ☐	Medium 15 ☐	High 21 ☐
Rare	Low 1 ☐	Low 6 ☐	Low 9 ☐	Medium 14 ☐	High 20 ☐

Step 4: Evaluate the risks

50. This step is about deciding how to respond to risk. The options outlined in Table 10 include:
    50.1. Accept or tolerate the risk – In the permission system, this generally means that permission is granted without any additional conditions placed on the proposal.
    50.2. Monitor the risk for now and evaluate again later – This option is rarely used within the permission system, as a decision must be made on whether to grant permission and, if so, with what conditions. However, in some cases permission may be granted for a shorter-than-normal period (such as less than a year) specifically to allow risks to be monitored. Following this review, new permission may be granted (with or without conditions to treat the risk) or permission may be refused (if review has determined that the risks are unacceptable).
    50.3. Avoid the risk – In the permission system, this generally means that permission is refused. In some cases, the overall permission may be granted but specific activities may be refused; for example, permission may be granted to conduct a tourism program but without the activity of swimming-with-whales.

Table 10: Risk evaluation in the permission system

Risk Level	Risk evaluation in the permission system
Low	A few low risks may be accepted. However, multiple low risks may require a broad mitigation or monitoring strategy. These risks should be recorded and monitored.
Medium	Medium risks require further mitigation. Consider whether the activity could be done differently (or in a different location) to reduce the risk. Where the applicant does not propose further measures, the managing agencies may place conditions on the permission. Multiple medium risks may be grounds for refusing approval, if suitable mitigation or offset measures cannot be agreed.
High	If uncontrolled, a risk event at this level may have a significant impact on the Marine Parks. High risks require further mitigation and may be grounds for refusing approval. Mitigation measures need to be reliable, well-tested, and have a high likelihood of success. Mitigation and offset measures should be closely monitored.
Very high	Risk events at this level have the potential to cause irreversible damage to the Marine Parks. Activities with unmitigated risks at this level should be avoided and are likely be refused permission.

Step 5: Treat the risks

51. This step involves deciding what additional avoidance or mitigation measures (also known as treatments) could be implemented to help reduce the risk. Refer to the Assessment guidelines for more information on determining possible risk mitigation measures.

52. Options for treating risks include the following:
    52.1. Reduce the level of the risk by reducing the likelihood and/or the consequences – within the permission system, this can be achieved by either the applicant modifying their proposal, or by the managing agencies placing conditions upon the permission (if granted)
    52.2. Transfer the risk by shifting the responsibility for a risk to another party -- within the permission system, this typically involves indemnities, insurance, deeds and/or bonds
    52.3. Offset the risk – Offsets do not reduce the likelihood of an event or the impacts that may occur. However, offsets can counteract consequences to values.

> **EXAMPLE**
> In the dolphin example used throughout this procedure, dolphins avoiding the area during works may impact on commercial tourism activities in the area. An offset may be proposed to counteract this impact by compensating operators for lost income during the construction period.

53. Key questions in treating risks include:
    53.1. Who has responsibility for implementing the measure?
    53.2. Are the measures feasible – What resources are needed (people, money, technical)? Is the risk reduction worth the extra cost?
    53.3. How reliable and certain are the proposed mitigation measures? Do they pose any additional risks?

54. After further avoidance and mitigation measures are agreed, Step 3 (analyse the risks) should be repeated to re-evaluate the risk given the new measures.

55. After avoidance and mitigation measures have been exhausted (either applied to the risk or discarded as not feasible), the final risk level is called the "residual risk". Step 4 should then be repeated to evaluate the residual risks.

Step 6: Implement, monitor and review

56. Monitoring the effectiveness of risk mitigation measures typically occurs during auditing and compliance activities carried out by the managing agencies after permission has been granted.

57. In many cases, conditions of permission require the permission holder to monitor and report on the effectiveness of risk mitigation measures, or to submit the results of independent audits.

58. Ongoing monitoring and adaptive management can provide an additional layer of risk treatment.

Documenting the risk management process

59. A sufficient level of documentation should be maintained for accountability and to show evidence of the major steps and activities leading to key risk management decisions. The degree of privacy or potential sensitivity of issues should be taken into consideration when deciding how to document the assumptions, methods, information sources and results. In many cases additional information on the medium and high risks will need to be provided.

60. It is suggested that at a minimum a summary table is used for documentation of risk management as part of the assessment report. A single hazard assessment example is provided in Attachment 1.

References / related material

1. Department of Finance, Business, Procurement and Asset Management. 2014, *Commonwealth risk management policy*, Commonwealth of Australia, Parkes, ACT.
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Attachment 1 – Example documentation for reporting on risk management in the permission system

Risk Worksheet – Part 1 – Initial risk

Activity	Hazard	Factors	Value	Risk Event?		Impacts	Proposed mitigation	Consequence	Likelihood	Initial risk level
				Sensitivity	Exposure					
Installation of piles	Change in noise	• Max sound level predicted is 250 decibels at 200-400 Hz. • Sound will be generated in bursts, with one strike every 10 seconds for approximately 30 minutes. • Following a 10 minute break to relocate the pile driver to the next pile, another burst will occur. • 35 piles are to be driven over 20 days during Nov-Dec.	Dolphins	Medium - Sensitive to sounds in range of 150Hz to 160kHz.	High - Observed in the area resting.	• A resident pod of 8 snubfin dolphins avoid the area for duration of works. • Because the area is important for resting, this results in short-term reduction in health for these 8 snubfin dolphins.	None	Moderate – Due to the genetic isolation of snubfin dolphin populations and their relative rarity, even this short-term reduction in health could translate to population decline.	Possible – As the proponent has not proposed any measures to reduce the consequence or likelihood of noise disrupting dolphin behaviour, and dolphins are known to rest within the area likely to be impacted by noise, there is estimated to be at least a 60% chance of disruption.	Medium

Risk Assessment – Permission System (Revision 1)

Risk Worksheet – Part 2 – Residual risk

Additional avoidance, mitigation or offset measures	Post Management		Residual risk level
	Consequence	Likelihood	
Noise reduction gear sufficient to reduce the noise impact zone so that noise does not affect the deeper water where dolphins have been observed resting. Pile driving conducted only for the 2 hours before and after low tide. Resting behaviour has only been observed in the bay during mid- to high-tide. Fauna spotter and cease works if dolphins enter the bay during works. Works are not to resume until dolphins leave the bay.	Minor – The consequence of the risk event has reduced because additional noise reduction gear means that the dolphin rest area is now unlikely to be impacted by noise at a level that would cause dolphins to avoid the area. Instead, dolphins may experience some minor disturbance to their resting patterns. This is not expected to cause any population decline.	Unlikely – The sensitivity of dolphins remains unchanged. However, dolphins are now less likely to be exposed to the hazard, because: • the noise impact zone has been reduced so that it does not overlap with the dolphin resting area • the work schedule has been adjusted to avoid times when dolphins are resting in the bay • a fauna spotter will give the order to cease works if dolphins do enter the bay during works	Low