

Potential cumulative impacts of proposed activities and developments on the environmental, social and cultural values of Exmouth Gulf

in accordance with section 16(e) of the
Environmental Protection Act 1986



The EPA acknowledges the traditional custodians of the Exmouth Gulf and its surrounds – the Baiyungu, Yinikurtira and Thalanyji people – and pays respect to their Elders past, present and emerging. The EPA acknowledges the Nganhurra Thanardi Garrbu Aboriginal Corporation in sharing its values and knowledge of Exmouth Gulf in the EPA's preparation of this advice.

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Summary

This report provides the Environmental Protection Authority's (EPA) advice to the Minister for Environment under section 16(e) of the *Environmental Protection Act 1986* on the potential cumulative impacts of proposed activities and developments on the environmental, social and cultural values of Exmouth Gulf.

Exmouth Gulf and the surrounding area are recognised as significant and valuable assets for Western Australians, and their unique environmental, social and cultural values are acknowledged globally. Many of the ecological communities and species assemblages associated with the Gulf area are geographically distinct and are at the limit of their ranges (e.g. tropical-arid mangrove community). The EPA considers that there is an opportunity to protect and enhance the current state of these key values. This includes incorporating the knowledge and values of the traditional owners by ensuring they are key partners in the future environmental protection and management.

The EPA recognises that Exmouth Gulf is under increasing pressure from uncoordinated human activities and development. The values of the Gulf are fragile and there is a risk that impacts from existing and potential pressures may not be sustainable when considered cumulatively. An integrated management approach should be adopted to address the multiple uses and cumulative pressures in the Gulf.

The health and connectivity of the environmental, social and cultural values of Exmouth Gulf are dependent on continued investment in protection and conservation with respect to its globally-significant geographical location, biodiversity, productivity and ecological function. The land and sea environments of the Gulf are interdependent ecosystems, and vital to the health and connectivity to the Ningaloo Coast World Heritage Area and the broader Pilbara coast.

The EPA considers that the cumulative impacts study and provision of strategic advice to the Minister is applicable to decision-makers and proponents alike. The EPA submits recommendations and advice to the Minister for Environment around three themes:

1. protecting the environmental, social and cultural values of Exmouth Gulf and its surrounds
2. EPA expectations for assessing future compatibility of activities and developments in Exmouth Gulf and its surrounds
3. integrating management of the land and sea environment of Exmouth Gulf.

Protecting the environmental, social and cultural values of Exmouth Gulf and its surrounds

The key values of Exmouth Gulf are described in section 2 of this report. While key values were identified across the entire Gulf and its surrounds, the EPA considers the eastern and southern portions of the Gulf to be critical environmental assets of exceptional value that should be protected. The values are under increasing pressure from existing and proposed activities and development, so formal protection should be a high priority.

The EPA recommends a very high level of protection for the eastern and southern portion of Exmouth Gulf and adjacent hinterland (e.g. coastal dunes and coastal plains), and that the establishment of marine and terrestrial protected areas is co-designed with traditional owners as partners in its future protection and management. The EPA recommends that the protected areas should encompass both the land and sea environment to capture the important connectivity and ecological function between landscapes, including the intertidal and supratidal flats.

The EPA also recommends a high level of protection for key values that are of local significance for Exmouth Gulf, including sensitive areas such as Qualing Pool, Camerons Cave, Cape Range Subterranean Waterway and the islands of Exmouth Gulf.

EPA expectations for assessing future compatibility of activities and developments in Exmouth Gulf and its surrounds

The EPA recommends that any future activities and development must be compatible with the protection of the key values. The EPA will apply particular scrutiny to activities and developments that may be incompatible with the protection of the key values, including values of local significance for Exmouth Gulf. The EPA also recommends a review and update of relevant environmental policy, planning and guidance mechanisms to align with the advice and recommendations in this report.

The EPA expects the following in its consideration of future activities and developments in Exmouth Gulf and its surrounds:

1. Broad regional context

Proposed activities and developments will need to demonstrate compatibility with the protection of key values in Exmouth Gulf and its surrounds. The values of the land and sea environments are unique assets of global significance and the consideration of any potential impacts to those values requires a precautionary approach. There is an opportunity to strengthen the protection of the Gulf through avoidance of activities and developments that could use alternative locations. The features of the Gulf that make it suitable for many proposed activities and developments are also present in other Western Australian coastal locations. These alternative locations have access to existing infrastructure, and sites that have already experienced a level of environmental disturbance.

2. Critical site selection

Within Exmouth Gulf, avoidance of environmental disturbance should be a key consideration for all new developments in site selection. There are opportunities to concentrate activities in existing disturbance sites, which is consistent with the mitigation hierarchy. The EPA will scrutinise activities and developments that affect key values of local significance.

3. Protect key social surroundings values

Proponents of activities and developments will need to demonstrate explicit regard and protection of the Aboriginal heritage and culture; values of dark sky and low atmospheric pollution; and local heritage and identity, which are critical assets of the social surroundings in Exmouth Gulf.

4. Adaptable design and infrastructure

The EPA will scrutinise activities and developments that lock in pressures or impacts for long periods or are likely to induce cumulative impacts. Proponents of activities and developments will need to demonstrate adaptability in design and approach to protect the key values and ecological processes in a dynamic ecosystem. The EPA recognises that some key values of Exmouth Gulf are already under pressure from multiple activities. The EPA considers that adaptability in design is critical to ensuring ongoing protection and resilience of the dynamic Gulf ecosystem and its ecological processes and functions.

5. Cumulative impacts

The EPA will scrutinise proposals that have a potential impact on the key values of Exmouth Gulf in the context of existing and other reasonably foreseeable future activities and developments. Proponents of proposed activities and developments will be expected to demonstrate that the risks to key values will not be significantly elevated as a result of potential cumulative impacts. Proponents should demonstrate a comprehensive understanding of the environment they propose to operate in at a regional scale, including ecological connectivity, to improve consideration of cumulative impacts. The EPA notes that there are opportunities within the mitigation hierarchy to reduce cumulative impacts of proposed activities and development.

6. Climate change considerations

Climate change is a pervasive pressure affecting Exmouth Gulf that will interact with both existing and proposed pressures from activities and development. It has the potential to have a significant impact on environmental values. Proponents of activities and developments will be expected to evaluate how climate change is likely to interact with the existing and foreseeable future pressures as part of potential cumulative impacts, and to include measures demonstrating adaptation and resilience to climate change.

Integrating management of the land and sea environment of Exmouth Gulf

The EPA recommends an integrated management approach to ensure the conservation and enhancement of the key values of Exmouth Gulf.

An integrated management approach has been applied to other multi-use locations, such as Cockburn Sound, Leschenault, Peel Harvey and Vasse Geographe Catchment areas. These approaches should be evaluated to guide the establishment of an integrated approach that is appropriate for the management and protection of the key values of Exmouth Gulf.

The EPA recommends establishing a coordinating body, with clearly defined roles in the environmental protection, planning and management of Exmouth Gulf and its surrounds.

The EPA acknowledges that significant knowledge gaps exist for Exmouth Gulf, relevant to the advice and recommendations in this report. The EPA emphasises the opportunity to address these knowledge gaps to support environmental protection, consistent with the EPA's objectives, which informs policy and decision-making relevant to the Gulf.

1 Introduction

On 19 August 2020, the then Minister for Environment (Minister) requested the Environmental Protection Authority (EPA) provide advice under section 16(e) of the *Environmental Protection Act 1986* (EP Act) on the potential cumulative impacts of proposed activities and developments on the environmental, social and cultural values of Exmouth Gulf (see Appendix A). Specifically, the request sought advice on the:

1. current state of the key environmental, social and cultural values in Exmouth Gulf
2. potential impacts on those values posed by existing activities and developments including, but not limited to, industrial activity (including oil and gas support), transportation and logistics operations, commercial and recreational fishing, and tourism
3. potential impacts on those values by proposed activities and developments including, but not limited to, the Subsea 7 proposal, the Gascoyne Gateway proposal, and the K+S salt proposal
4. compatibility of future developments with the key environmental, social and cultural values in the Exmouth Gulf.

As part of the functions of the EPA in the EP Act, section 16(e) provides that the EPA may 'advise the Minister on environmental matters generally and on any matter which the Minister may refer to it for advice, including the environmental protection aspects of any proposal or scheme, and on the evaluation of information relating thereto'.

This report presents the EPA's advice pursuant to section 16(e) of the EP Act. The environmental, social and cultural values considered are in accordance with the definitions under the EP Act and the EPA's framework of environmental factors and objectives (EPA 2020).

The EPA recognises the increasing importance of assessing and managing cumulative environmental impacts. This is established in section 3(2)(1B) of the amended EP Act, where the assessment of proposals includes the consideration of cumulative effects of the impacts of a proposal. The assessment of cumulative impacts broadly encompasses the successive, incremental and combined impacts of one or more activities on the environment, arising from past, present and reasonably foreseeable future actions. Consideration of cumulative impacts shifts the focus from a single activity, development or proposal to the receiving environment as a whole.

There are a number of existing and new proposals in the Exmouth Gulf area that are relevant to the Minister's request for advice, including:

- K+S Salt Australia Pty Ltd's Ashburton Salt Project
- Gascoyne Gateway Ltd's Single Jetty Deep Water Port and Renewable Hub
- Z1Z Resorts Pty Ltd's Ningaloo Lighthouse Resort Project
- Main Roads Western Australia's Yardie Creek Road Realignment Project.

It should be noted that, since initiation of this strategic advice, Subsea 7's Learmonth Pipeline Fabrication Facility proposal and the related Shire of Exmouth's Local Planning Scheme 4 Amendment 1 have both been terminated. Therefore, the scope of this strategic advice does not provide consideration of these activities.

The cumulative impacts study presented in this report was conducted at a strategic level, drawing upon existing scientific evidence, expert advice and stakeholder knowledge. The potential impacts of the existing and new proposals listed above were considered in the provision of this advice; however, this report and supporting information should not be construed as being detailed assessments of those proposals.

Location

For the purpose of this strategic advice, the EPA has characterised the spatial extent of Exmouth Gulf as the entire portion of state coastal waters located between the North West Cape peninsula, the Muiron Islands and mainland Western Australia (WA), and the adjacent land from Vlamingh Head to Urala Station (see Figure 1).

The scope of this advice is inclusive of key locations on the western side of Exmouth Gulf, including the town of Exmouth and adjacent road infrastructure, Vlamingh Head Lighthouse, MG Kailis Fisheries, and the Australian Department of Defence (Defence) lands and facilities. While this advice does not provide explicit consideration of the western portion of North West Cape peninsula (that being the Cape Range National Park and Ningaloo Marine Park), the EPA provides this strategic advice with a holistic consideration due to the inherent complexity and integrated connectivity between the Exmouth Gulf and adjacent land and sea environments.

The geographic context and key named features of Exmouth Gulf are presented in Figures 1 and 2, respectively. Figure 1 focuses on land tenure, project proposal footprints and other key spatial boundaries (e.g. Ningaloo Coast World Heritage Area). Figure 2 provides reference information for select features in Exmouth Gulf, which may be referenced specifically in the report. The two figures provide geographic information referenced in the report; additional maps are provided in Appendix B.

Overview of approach

For delivery of this strategic advice, the EPA and the Department of Water and Environmental Regulation partnered with the Western Australian Marine Science Institution (WAMSI), who contributed technical and expert support on the values and pressures associated with Exmouth Gulf. The WAMSI report provides information on:

- The key values (environmental, social and cultural) of Exmouth Gulf – including current state of the values, and level of confidence pertaining to the values – in the form of a literature review aligned with the EPA's environmental themes of sea, land, water, air and people.
- The current and forecasted uses of Exmouth Gulf.
- A qualitative risk assessment using a consequence versus likelihood approach to evaluate the impact or risk of a pressure against a key value. A detailed list of key values was consolidated at a high-level, prior to consideration in the qualitative risk assessment.
- The relationship between key values and environmental pressures of Exmouth Gulf, derived from the qualitative risk assessment process.
- Knowledge gaps that require further consideration to improve our understanding of Exmouth Gulf, identified against each EPA theme.

The WAMSI report forms the technical basis of the EPA's strategic advice and provides key information and materials that underpin the EPA's recommendations. The WAMSI report and supporting documentation have been appended to this advice (see Appendix C).

In preparing this strategic advice, the EPA engaged extensively with the public, Exmouth community, and stakeholders across sectors to seek their input and improve the EPA's understanding of the values, activities and environmental pressures in and around Exmouth Gulf. A list of contributors and summaries of input and consultation are provided in Appendices D, E and F.

Input received during the engagement process formed the basis of understanding a detailed list of key values and pressures associated with Exmouth Gulf, including over 230 distinct values and more than 48 pressures. The values and pressures information has been consolidated and analysed for this strategic advice.

The EPA established an Exmouth Gulf Perspectives Group to support the process with the provision of advice and input encompassing a broad consideration of strategic issues pertaining to the Gulf. The group comprised six representatives from the following sectors: conservation; marine environment and fisheries; Exmouth Gulf community; ports and development; traditional owners; management and environment.

The EPA extends its appreciation to those who generously contributed to the strategic advice, particularly WAMSI, members of the Perspectives Group, the Nganhurra Thanardi Garrbu Aboriginal Corporation, the Exmouth community, and all those who made submissions or were interviewed during the process. Their continued willingness to engage and provide valuable information was crucial to this process. Any omissions from the list of contributors are unintentional.

Terminology

The following terms hold specific meaning for the purpose of this advice:

Exmouth Gulf is used to describe both the sea and adjacent land components of the environment.

Key values encompass the environmental, social and cultural values of Exmouth Gulf, in the context of the definitions in the EP Act and the EPA's framework of environmental factors and objectives.

Foreseeable future means within the next five to 10 years; except for references to climate change, which includes the next 20 years.

Drivers and pressures are presented in the context of drivers-pressure-state-response model; with *drivers* being organised by sectors (e.g. shipping, fishing, mining, tourism/visitation, pastoralism and defence) or forces (e.g. climate change) that may cause change in a system. *Pressures* being the events resulting from the driver. For example, shipping would be the *driver*; vessel strike is a potential *pressure* under shipping.

Cumulative impacts encompass the successive, incremental and interactive impacts of one or more activities on the environment, arising from past, present and reasonably foreseeable future activities. The EPA recognises that cumulative impacts may act in numerous ways, including additive or interactive.

The above terms should be read as described, unless specified otherwise.

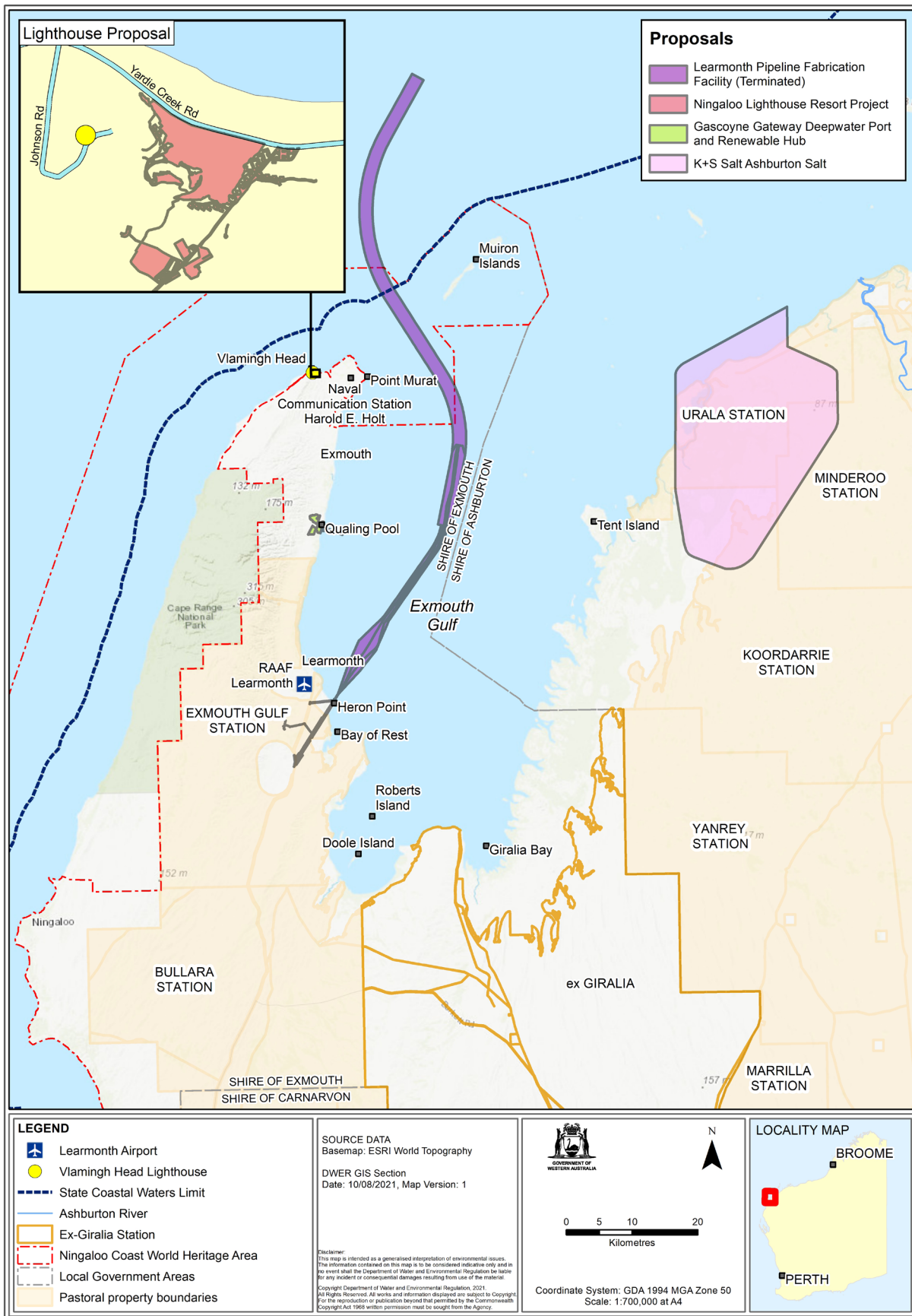


Figure 1: Regional location of Exmouth Gulf with key land tenure and proposal boundaries



Figure 2: Locations of interest in Exmouth Gulf

1.1 Overview of Exmouth Gulf

Physical geography

The Exmouth Gulf is a large, shallow embayment located on the eastern side of the North West Cape peninsula within the Carnarvon Bioregion and Cape Range subregion (CAR1; Thackway & Cresswell 1995). The physical geography of the area is characterised by limestone ranges, a fringing coral reef, and sandplains and dunes surrounding the shallow embayment (Russell 2004). The physical landscape reflects geologic processes spanning over 150 million years, including tectonic and sedimentary activity, the separation of the Gondwanan supercontinent and changes in climate and sea levels (Russell 2004). The region is typified by semi-arid to arid, sub-tropical climate and vegetation, characterised by the possibility of significant cyclonic activity (Kendrick & Mau 2002; Beard 2015).

The broad scale geomorphology of the North West Cape peninsula is composed largely of tertiary and quaternary marine limestone and sediments (Wyrwoll et al. 1993; Kendrick & Mau 2002). Alluvial sediments and coast deposits predominantly form the western Exmouth Gulf foreshore (Wyrwoll et al. 1993), characterised by narrow coarse-grained pebble beaches abutting low intertidal limestone platforms (Kolkovski & Machin 2004).

The southern and eastern shores of Exmouth Gulf are comprised primarily of extensive mud flats and sand flats, with infrequent occurrences of limestone platforms and coral outcrops (Kolkovski & Machin 2004). Well-developed tropical-arid zone mangroves and blue-green algal mats are the dominant benthic communities and habitats along the southern and eastern shores of the Gulf and behind these communities is an extensive tidal salt flat up to 15 kilometres wide. The low-lying mud, sand and salt flat areas are subject to large-scale inundation, particularly during storm and cyclone surge events (Kolkovski & Machin 2004).

The North West Cape peninsula is dominated by the Cape Range landform, characterised by rugged topography and a maximum elevation of about 300 metres, adjacent to the relatively flat coastal plains and dunes adjacent to Exmouth Gulf (Allen 1993; Kolkovski & Machin 2004). The Cape Range landform consists of sandstone and limestone formations, including the Tulki and Trealla Limestones that contain extensive karst features such as caves and subterranean waterways.

The eastern Exmouth Gulf hinterland is primarily coastal deposits, sand dune and plains and alluvial plains and valley systems, characterised primarily by low topography (Wyrwoll et al. 1993; Van de Graaff et al. 1980). The southern Exmouth Gulf hinterland is characterised by more prominent topographical relief, including the Giralia Range.

Human occupation and Exmouth settlement

The North West Cape peninsula has been utilised by the Baiyungu, Yinikurtira and Thalanyji (also known as Jinigudira) people for at least 30,000 years (Morse 1993). The Exmouth Gulf and its surrounds (including inshore islands) remain a significant area for traditional owners, represented by registered and unregistered cultural heritage sites and continued use for cultural practices. These cultural practices are sophisticated, reflecting deep understanding of the environmental systems of Exmouth Gulf and the importance of ongoing stewardship and management by traditional owners (DBCA 2020a).

The town of Exmouth was established to provide services to the United States Naval Communication Station Harold E. Holt and the Learmonth Royal Australian Air Force (RAAF) Base in the 1960s. The town remains closely connected to Australian Defence services and operations. In addition to the defence industry, the Exmouth economy is largely driven by tourism and visitation to the region, including the Ningaloo Coast World Heritage Area, Cape Range National Park, and the Exmouth Gulf.

The Shire of Exmouth experienced population growth of 20 per cent from 2006 to 2016, reporting a residential population of 2,486 in 2016 (ABS 2017). The population of the town of Exmouth fluctuates significantly over the course of each year, expanding to over 6,000 people during the peak tourist season (generally April to October each year) (Shire of Exmouth n.d.).

The EPA received detailed public input regarding the strong connection the Exmouth Gulf community has with their local environment, and the recognition of the unique location of their town in close proximity to globally significant environmental assets (see Appendices D and E).

Land tenure and use of Exmouth Gulf

Current land tenure surrounding Exmouth Gulf is provided in Figure 1. Land tenure in and around the Gulf is dominated by Crown land and leases, reserves, freehold land and Unallocated Crown Land (UCL). Freehold land is concentrated around the town of Exmouth, and to its immediate south, including land designated for residential, commercial and industrial purposes. The dominant land uses outside the town of Exmouth includes defence, pastoral activities (i.e. grazing permitted stock), conservation and mining/exploration leases (Kendrick & Mau 2002).

Crown lease tenure includes six pastoral stations adjacent to Exmouth Gulf, with boundaries of coastal pastoral stations extending to 40 metres above the high-water mark. The pastoral stations in the region are primarily stocked with cattle. Exmouth Gulf Station and Bullara Station have obtained diversification permits under the *Land Administration Act 1997*, which allow for pastoral based tourism such as camping, short-term accommodation and tours.

The Commonwealth of Australia is an important landowner within the region. The North West Cape peninsula contains several Commonwealth land parcels used for Department of Defence purposes, including the Learmonth RAAF Base, Naval Communication Station Harold E. Holt, and the Learmonth Solar Observatory. The Shire of Exmouth leases the Learmonth airport from the Commonwealth for civil aviation purposes, which services the local community and offshore operations.

Several inshore islands within the Exmouth Gulf embayment area are classified as nature reserve within WA's conservation estate. There are plans to increase the management and protection status of inshore islands within the Gulf and along the Pilbara coast (DBCA 2020a). The northern portion of the Gulf overlaps with the Ningaloo Coast World Heritage Area, including nature reserves and conservation areas within the Muiron Islands Management Area (CALM 2005; UNESCO 2011). The northern portion of the Gulf within the World Heritage boundary also contains areas designated for general use, recreation and sanctuary zones. The Exmouth Gulf inshore islands and Ningaloo Coast World Heritage areas are managed by the Department of Biodiversity, Conservation and Attractions (DBCA).

The southern and eastern portions of Exmouth Gulf are adjacent to the ex-Giralia pastoral station, currently owned and managed by DBCA. The tenure of ex-Giralia is currently UCL and managed for conservation purposes. Ex-Giralia and a large portion of the east coast of Exmouth Gulf is proposed for inclusion in WA's conservation estate as part of the State Government's *Plan for Our Parks* (DBCA 2019).

Native Title was granted in 2019 to the Baiyungu, Yinikurtira and Thalanyji (also known as Jinigudira) people for areas across the Gascoyne region (WCD2019/016). The Nganhurra Thanardi Garrbu Aboriginal Corporation is the prescribed body corporate for management and protection of the land and sea country of Exmouth Gulf. The corporation has entered into Indigenous Land Use Agreements (ILUAs) and Joint Management Agreements with the State Government through DBCA for some parts of the North West Cape peninsula, including areas within and adjacent to the Ningaloo Coast World Heritage area (WI2020/011).

1.2 Relevant policy, legislation and management

Exmouth Gulf represents a demarcation between the Gascoyne and Pilbara administrative regions. The western and southern land portions are governed by the Shire of Exmouth, while the eastern land portion falls within the Shire of Ashburton (see Figure 1).

Planning activities and related decision-making in the Exmouth area is subject to the Western Australian planning framework, including the State Planning Policy 6.3 – Ningaloo Coast (WAPC 2004) (SPP 6.3). The EPA considers the guiding principles and policy objectives of SPP 6.3 remain relevant and valuable for planners, developers and planning decisions in Exmouth Gulf.

As part of the engagement process for this strategic advice, the EPA requested advice across government for transparency in utilisation of Exmouth Gulf (see Appendices D and E). Table 1 provides information regarding the key agencies, and government role for activities in the Gulf.

Table 1: Government role in Exmouth Gulf

Government agencies and organisations	Role in Exmouth Gulf	Key legislation
Australian Bureau of Meteorology (BOM)	Joint operation of the Learmonth Solar Observatory	<i>Meteorology Act 1955</i> (Commonwealth)
Australian Department of Defence (Defence)	Operation of key infrastructure and air space	<i>Defence Act 1903</i> (Commonwealth)
Department of Biodiversity, Conservation and Attractions (DBCA)	Management of land and sea reserves	<i>Biodiversity Conservation Act 2016</i> ; <i>Conservation and Land Management Act 1984</i>
Department of Jobs, Tourism, Science and Innovation (DJTSI)	Lead agency for State significant projects and State Agreements	<i>Government Agreements Act 1979</i>
Department of Planning, Lands and Heritage (DPLH)	Administration of pastoral leases and other Crown lands	<i>Land Administration Act 1997</i>
Department of Primary Industries and Regional Development (DPIRD)	Management of commercial and recreational fisheries; Biosecurity management	<i>Biosecurity and Agriculture Management Act 2007</i> ; <i>Fish Resources Management Act 1994</i>
Department of Water and Environmental Regulation (DWER)	Management and regulation of the environment and water resources	<i>Environmental Protection Act 1986</i> ; <i>Rights in Water and Irrigation Act 1914</i>
Department of Transport (DoT)	Operation of Exmouth Boat Harbour	<i>Marine and Harbours Act 1981</i>
Ningaloo Coast World Heritage Advisory Committee (NCWHAC)	Provides advice to Commonwealth and State on all matters regarding the World Heritage Area	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
Pastoral Lands Board (delivered through DPLH)	Administration of pastoral leases	<i>Land Administration Act 1997</i>
Shire of Ashburton	Local government authorities	<i>Local Government Act 1995</i> ; <i>Planning and Development Act 2005</i>
Shire of Exmouth		
Tourism WA (delivered through DJTSI)	Tourism development and opportunities in Exmouth	<i>Western Australian Tourism Commission Act 1983</i>

The EPA notes that, while the above government agencies have a role in Exmouth Gulf, the coastal waters and foreshore areas lack Gulf-wide coordination and management.

Previous recommendations by government for Exmouth Gulf

Exmouth Gulf has been the subject of various advice and recommendations by State and Commonwealth Government over the past 50 years.

The eastern and southern portions of Exmouth Gulf, including nearshore waters, have been recognised as a significant environmental asset since the 1970s (EPA 1975), with recommendations for inclusion in the WA conservation estate multiple times since the 1990s (CALM 1994). Exmouth Gulf was also considered in conjunction with the Ningaloo Reef for World Heritage listing; however, the final boundary for the World Heritage area excluded most of the Gulf (WHCC 2005; UNESCO 2011).

2 Key values and pressures

This section addresses the key questions from the Minister's request (see Appendix A):

- section 2.1 addresses the current state of the key environmental, social and cultural values in Exmouth Gulf
- section 2.2 addresses the potential impacts on key values posed by existing and proposed activities and developments
- section 2.3 addresses the compatibility of future developments with key values in Exmouth Gulf.

The EPA's advice and recommendations relating to the above are provided in section 3.

2.1 State of values in Exmouth Gulf

The EPA has considered the key values of Exmouth Gulf within the context of the definitions under the EP Act and the EPA's framework of environmental factors and objectives (EPA 2020). This comprises 14 environmental factors across five themes (sea, land, water, air and people; EPA 2020). A complete list of the key values considered in this process are referenced in Appendix C.

The EPA's framework, which is applied in the assessment of proposals and schemes under Part IV of the EP Act, provided a useful structure for organising environmental information in the preparation of this report.

The current state (i.e. condition) of all key values in Exmouth Gulf were evaluated on a scale ranging from very good to very poor, based on existing knowledge gathered through relevant scientific and other literature and expert input. Based on the preliminary evaluation of key values, no key values were categorised in a state of very poor condition (see Appendix C). Most key values were considered as good or very good condition; however, the EPA notes uncertainty is associated with the scoring of key values.

The EPA acknowledges that a lack of data and lack of understanding of the ecological system underpins the considerable uncertainty about the state of many of the key values. Key values found to be in a poor state should be the subject of further on-ground investigation and management to validate findings and ensure current state conditions do not deteriorate to unsustainable levels through further activities and development, particularly from cumulative impacts.

The EPA provides the following information regarding the key values of Exmouth Gulf, and current state of these values within each of the EPA's five themes. Section 2.3 provides a summary of the key values of most concern across all themes (see Table 2).

Sea

EPA factors: benthic communities and habitats; coastal processes; marine environmental quality; and marine fauna.

The sea environment of Exmouth Gulf is inherently connected and ecologically interdependent with the adjacent Ningaloo Reef and Pilbara coast.

The coastal waters of Exmouth Gulf are characterised as a shallow and turbid embayment, with primarily soft sediment communities dispersed with limestone reefs and coral bommies. Seagrass is found in the shallow waters of the Gulf, which provide important feeding habitat for marine turtles and dugongs (*Dugong dugon*). Sponges and filter feeders are associated with hard limestone areas with more significant communities occurring in deeper water. Corals occur at Bundegi Reef, on isolated shoals and at low densities on the pavement reefs.

Exmouth Gulf is a significant location for marine fauna due to the relatively sheltered waters and diversity of habitats, resulting in a biodiverse range of species including marine mammals, invertebrates, teleost fish, elasmobranchs, and seabirds and shorebirds (Fitzpatrick et al. 2019).

The sea environment of Exmouth Gulf is an important location for humpback whales (*Megaptera novaeangliae*), particularly for mother and calf pairs resting during seasonal migration. In addition, the Gulf has significant habitat for many other conservation significant fauna (e.g. marine turtles, dugongs, sawfish (*Pristis* spp.), sea snakes and whale sharks (*Rhincodon typus*)) and charismatic marine fauna (e.g. dolphins and manta rays). Both traditional owners and the Exmouth community identified strongly with the values associated with marine fauna.

The embayment also supports populations of marine fauna targeted for commercial purposes, including the brown tiger prawn (*Penaeus esculentus*), western king prawn (*Penaeus latisulcatus*) and blue endeavour prawns (*Metapenaeus endeavouri*), which are targeted species for prawn trawlers as part of the Exmouth Gulf Prawn Managed Fishery.

East Exmouth Gulf

The eastern and southern portions of Exmouth Gulf are relatively intact environments with wide coastal mudflats, tidal creeks, fringing mangroves, and algal mats dominating the landscape. This area includes the largest discrete community of mangroves in WA, outside of the Kimberley region (ANCA 1996).

The entirety of the east coast of Exmouth Gulf, including the salt flats and sand dunes, is listed as a wetland of national importance (WA007) due to its significant environmental values and ecological function. The benthic habitats and communities of east Exmouth Gulf significantly contribute to fuelling productivity within the larger embayment and provides significant feeding habitat for dugongs and marine reptiles, and nursery habitats for marine fishes and crustaceans (WHCC 2005).

Mangrove communities in the eastern and southern portions of Exmouth Gulf also support an important shorebird population. The area is recognised as a nationally and internationally significant bird area due to species abundance and presence of migratory species.

The eastern portion of Exmouth Gulf is largely uninhabited and inaccessible from the land due to its remote location and challenging terrain, although intermittent access occurs via small boats during optimal tidal and weather conditions. Prawn trawlers do not operate within nearshore areas of the eastern and southern portions of Exmouth Gulf, as these are designated nursery areas within the Exmouth Gulf Prawn Managed Fishery (DPIRD 2018; see map reference in Appendix B).

The EPA considers the eastern and southern portions of Exmouth Gulf are critical assets to WA and require a very high level of protection. The EPA makes a specific recommendation in this regard (see section 3.1).

Current state

The current state of values for benthic communities and habitats, marine environmental quality, and coastal processes of Exmouth Gulf ranges from poor to very good (see Appendix C). Coral communities were found to be in a poor state due to sensitivity to bleaching after marine heat stress events, and the presence of coral rubble in some portions of the embayment suggested degradation of coral over time.

The current state of values for marine fauna ranges from very good to poor condition. Humpback whales were the only marine fauna categorised as in very good state for Exmouth Gulf; the EPA considers that this rating may be an outcome of the protection and management associated with the species listing under both the *Environment Protection and Biodiversity Conservation Act 1999* and the *Biodiversity Conservation Act 2016*. Marine fauna values found to be in a poor state include marine reptiles (sea snakes and marine turtles), dugongs, and seabirds and shorebirds. These values were determined to be in a poor state as a result of their conservation significance, regional and global population decline, historical harvesting

rates for marine turtles and dugongs, and distinct habitat requirements, which are threatened by competing activities and use.

Further, seabirds and shorebirds were found to be in poor condition, primarily due to direct disturbance of burrows and nests from trampling and unmanaged off-road vehicles on foreshore and coastal dune areas.

The current state of teleost fish (e.g. bony fish), shovelnose rays, sawfish and dolphins in Exmouth Gulf are unknown due to a lack of information. However, anecdotal evidence suggests the current state of some teleost fish species such as trevally, red emperor and coral trout populations may be poor due to their popularity as targeted recreational fishing species.

Mangrove, algal mats and samphire communities on the eastern and southern portions of Exmouth Gulf are in good to very good condition, due to the remoteness of the location and lack of anthropogenic impacts. The EPA considers that these intertidal communities should be retained intact because of their ecological connectivity to the whole of the Gulf. As such, these intertidal communities should be protected due to their environmental significance and important ecological function.

Land

EPA factors: flora and vegetation; landforms; subterranean fauna; terrestrial environmental quality; and terrestrial fauna.

Exmouth Gulf represents a climatic transitional zone between the temperate winter rainfall zone to the south, and the tropical summer rainfall zone to the north (CALM 2004). The hinterland of the Gulf is characterised by limestone ranges, sand dune systems, coastal plains scrub and shrublands.

Coastal plain areas are characterised by *Acacia* shrublands and *Triodia* hummock grasslands. The Cape Range peninsula limestone ranges support endemic and priority flora species, and disjunct populations of flora and vegetation at the extent of their range. Systematic biological surveys, including identification and mapping of flora and vegetation communities outside of the Cape Range peninsula have been identified as key knowledge gaps for the region.

Terrestrial fauna in the area is typical of north-west coastal regions in WA; however, some reptile species are endemic, and some reptile and amphibian populations represent unique species assemblages and disjunct populations at the extent of their ranges.

Small islands are present along the shallow, nearshore areas in the eastern and southern portion of Exmouth Gulf, providing critical refugia for mammals, reptiles, and seabirds and shorebirds. The inshore islands of Exmouth Gulf are considered significant and sensitive locations due their remoteness and provision of habitat for conservation significant flora and fauna (DBCA 2020a).

The Cape Range Subterranean Waterway runs the length of the eastern portion of Cape Range peninsula (see Appendix B) and is listed as a wetland of national importance (WA006) due to the significant presence of locally endemic subterranean fauna (stygo fauna and troglifauna).

The Cape Range karst system spans the Cape Range peninsula and is characterised as a series of arid subterranean landscapes, including caves, subsurface streamways and limestone formations (DEC 1998). The karst system provides critical habitat for unique assemblages of troglifauna including the Camerons Cave Troglobitic Threatened Ecological Community (TEC) and conservation significant stygo fauna such as the blind cave eel (*Ophisternon candidum*) and blind gudgeon fish (*Milyeringa veritas*).

Current state

The state of most land-based values, including terrestrial fauna, subterranean fauna, and terrestrial environmental quality, could not be determined due to a lack of available information (see Appendix C).

The current state of values for flora and vegetation ranged from good to poor condition, with coastal dunes in Exmouth Gulf considered poor primarily due to extensive degradation of dune vegetation from off-road vehicles and unmanaged camping.

The current state of the inshore island values of Exmouth Gulf are described as in good condition. The EPA considers that, given the environmental significance and sensitivity of the inshore islands, the inshore island of Exmouth Gulf should be protected and the condition of the values improved.

The key values of the karst system, reptiles, amphibians, and all subterranean fauna are of concern due to limited available information; therefore, a precautionary approach should be applied with respect to activities and development that may impact them. The EPA also considers that protection status may be appropriate for these values due to their environmental significance and sensitivity to change.

Air

EPA factors: air quality and greenhouse gas emissions.

Little information regarding the air quality of Exmouth Gulf could be sourced for this strategic advice, reflecting a lack of relevant publications and studies. However, the EPA received advice from Defence and the Learmonth Solar Observatory that air quality conditions in Exmouth are optimal for radio-frequency communications, and space and solar observation activities due to the low atmospheric pollution, reliably dark skies, and distance from industrial areas including heavy pollution emitters.

Current state

Based on the abovementioned advice from Defence, the air quality values in Exmouth Gulf are described as being in very good condition (see Appendix C). The EPA notes the importance of preserving the very good condition of air quality in Exmouth Gulf, so as not to interfere with the abovementioned activities, as well as for reasons of human health and amenity and dark sky tourism (discussed below under People theme). The EPA recognises the unique position of the North West Cape peninsula for its very good air quality and dark sky values.

Water

EPA factor: inland waters.

The coastal waters of Exmouth Gulf are adjacent to, and connect with, the anchialine system of the Cape Range karst and unconfined aquifer (WHCC 2005).

Groundwater quality of the Cape Range peninsula ranges from hypersaline to fresh and slightly brackish, with groundwater flowing east from the Cape Range towards Exmouth Gulf. Due to the unconfined and karstic nature of the aquifer, it is highly sensitive to contamination (DoW 2011).

Groundwater flow patterns on the western portion of Exmouth Gulf are affected by the presence of the karst features, forming the underground drainage system of Cape Range Subterranean Waterway. As discussed above, the groundwater systems of Cape Range peninsula serve a critical role in supporting high levels of biodiversity and endemism for subterranean fauna in the region.

The Cape Range peninsula provides a primary source of freshwater to the region via an unconfined karstic limestone aquifer (karstic aquifer system), and areas of the water reserve are designated as Priority 1 groundwater supply area (Water Reserve 34055) (DoW 2011).

The hinterland of Exmouth Gulf is incised by ephemeral rivers and creek lines that drain intermittently into coastal waters during major rain events and cyclones (Start & McKenzie 1992).

Qualing Pool is a series of ephemeral pools, fed from groundwater discharge that flows from Cape Range intermittently into Exmouth Gulf (Allen 1993), located directly south of the light industrial area of the town of Exmouth (see Figure 2 and Appendix B). Anecdotal evidence suggests that the pools attract birds, mammals and reptiles as a freshwater source. The EPA notes that Qualing Pool is of significant social and cultural value for Aboriginal people and the local community.

Current state

The current state of groundwater system values in Exmouth Gulf are described as poor due to the limitation in freshwater resources, abstraction rates, low rainfall and high sensitivity to contamination (see Appendix C). Groundwater systems are also significant in the provision of karst landforms and habitat for endemic subterranean fauna. The EPA notes that degradation of groundwater systems from abstraction and localised drawdown in Exmouth Gulf has been recognised as a risk to environmental values since establishment of the Exmouth township in the 1960s.

The current state of surface water systems in Exmouth Gulf is also described as poor, particularly on the Cape Range peninsula, due to previous disturbance and low rainfall. Per- and polyfluoroalkyl substances (PFAS) have been detected in surface water adjacent to Defence infrastructure and found to be a low-exposure risk to ecology (Defence 2019a; Defence 2019b; Defence 2019c). The EPA notes PFAS contamination is being appropriately managed and remediated by Defence.

People

EPA factors: social surroundings and human health.

The key amenity values of Exmouth Gulf include wilderness and aesthetic qualities, significant dark sky values, and the local community's ability to access and use the Gulf for both land and sea recreational activities. The amenity values around wilderness and aesthetic qualities were prevalent in the communications received from the Exmouth community and are recognised as one of the outstanding universal values in the neighbouring Ningaloo Coast World Heritage Listing (DAWE 2010; UNESCO 2011).

Exmouth Gulf contains significant spiritual, cultural and historical heritage for the Yinggarda, Baiyungu and Thalanyji traditional owners, who have maintained their connection to country since the assertion of European sovereignty.

For the Yinggarda, Baiyungu and Thalanyji traditional owners, Exmouth Gulf is an important connection to country within a historical and current context, with several locations holding specific spiritual and cultural significance: Qualing Pool; Tent, Doole and Roberts islands; and the eastern Gulf (see Figure 2). Both traditional owners and the Exmouth community expressed strong connections and identified with the amenity values as being integral to their well-being.

Land adjacent to Exmouth Gulf contains strategically significant infrastructure for Defence, who has operated in the area for over 50 years and remains an important industry to the local economy. Other key economic industries for Exmouth town are tourism, commercial prawn trawling, pastoralism and scientific research (DBCA 2020b).

Tourism is particularly important to Exmouth and is a large contributor to the economy at a local, regional and state level (DBCA 2020b). Tourism is largely seasonal and dependent on the unique and diverse environmental values of the area, including access to the Ningaloo Coast. Tourism activities in Exmouth Gulf include megafauna interactions, snorkelling and diving, recreational and charter fishing, and beach recreation. Exmouth has been identified as an optimal location for viewing solar events due to its reliable dark skies (as discussed in the Air theme above), including the April 2023 total solar eclipse.

Potable water supplies for Exmouth residents, industry and holidaymakers are dependent on the existing Exmouth Town Water Supply (TWS) borefield (location map in Appendix B). The Department of Water and Environmental Regulation has advised that, while groundwater extraction from the TWS borefield has

been close to the licensed entitlement for a number of years, fresh groundwater supplies further south of Exmouth town are currently underutilised.

Current state

The current state of values for social surroundings and human health in Exmouth Gulf ranges from good to very good (see Appendix C). The current state of pastoralism values could not be determined due to a lack of certainty and relevant information.

The current state of Aboriginal heritage and cultural values has not been formally characterised. However, the EPA consulted with the Nganhurra Thanardi Garrbu Aboriginal Corporation, who described concerns regarding the current state of fish stocks, an increase in people on country, and emphasised the need to protect culturally and spiritually significant areas, such as Qualing Pool. The EPA acknowledges further work should be undertaken with the traditional owners to integrate cultural knowledge and values to improve the understanding of the state of Exmouth Gulf.

The current state of potable water for human use is good, however the EPA notes this condition is dependent on the existing parameters for water use within the current water licence entitlement. Any significant residential, industrial or tourism growth in Exmouth Gulf would likely require an extension of the existing TWS borefield, to ensure the continued appropriate management of groundwater resources (DoW 2011).

2.2 Existing and forecasted pressures

Historical activities

The EPA recognises that the current state of values in Exmouth Gulf have been shaped by a variety of drivers and pressures operating across a range of timescales. The Gulf has been an important location for Aboriginal people undertaking traditional activities for at least 30,000 years (Morse 1993), including hunting, fishing, and collection of plants for traditional medicine and food. The Gulf has been utilised in various capacities more recently, with pastoralism, defence and commercial fishing activities predating establishment of Exmouth township and continuing through the present. The EPA notes that there is relatively little information available that provides insights into how these historical activities have impacted on the values of the Gulf.

The EPA has assessed proposals in Exmouth Gulf over the past 30 years across various industries, including mariculture and commercial fishing, offshore and onshore oil exploration, coastal infrastructure, limestone quarrying and salt farm projects. Some of these activities, such as limestone quarrying and commercial fishing are still relevant and operational today, while others, such as oil exploration within the Gulf, are no longer relevant or being actively pursued, at least within the foreseeable future.

While there is a broadly held view that Exmouth Gulf is a relatively pristine environment, the long history of development has contributed to considerable environmental change. Existing and emerging pressures are adding cumulatively to these environmental impacts. The evaluation of the current state of the key values presented in section 2.1 reflects the impacts of these historical activities and developments.

Current and future activities and development

The EPA sought information from various stakeholders and the public regarding current and potential future activities and developments within Exmouth Gulf. These are driven primarily by the following sectors: shipping, fishing, mining, tourism/visitation, development, pastoralism, and Defence. These drivers are intentionally broadly defined, and each encompasses a range of potential pressures and therefore impacts. Description and details of the specific drivers and pressures considered are provided in Appendix C.

Commercial fishing, pastoralism and Defence activities in Exmouth Gulf are well established and regulated, and likely to continue unchanged within the foreseeable future. However, Defence activities and operations in the Gulf are potentially at risk from future activities and development that increase light and atmospheric pollution.

Activities such as mining (e.g. limestone quarrying) and aspects of tourism/visitation (e.g. organised tours) are currently being undertaken within Exmouth Gulf and are operated and managed by permits and licences. Both sectors are likely to expand within the foreseeable future.

Mining activities in Exmouth Gulf may expand through the pursuit of salt farming, potash extraction and the continuation and expansion of limestone quarrying.

Tourism/visitation numbers have been steadily increasing in Exmouth (DBCA 2020b); however, impacts on projected changes to tourism associated with the COVID-19 pandemic are not yet known. There is an emerging concern from the local community that the influx of State tourists during the COVID-19 pandemic border restrictions, which were prevalent from at least June 2020 through to the publication of this report, may be contributing to the degradation of key values, particularly relating to amenity, and land and sea recreation. Projected tourism and visitation growth for Exmouth Gulf requires careful consideration and coordination in terms of carrying capacity, management and the provision of services.

Recreational fishing outside of the Ningaloo Marine Park, and aspects of tourism/visitation (e.g. camping and off-road driving) are current activities in Exmouth Gulf that are not adequately managed. Recreational fishing and tourism/visitation are related sectors; therefore, it is likely that the expansion of tourism/visitation in the foreseeable future would also result in an increase in recreational fishing activities, both spatially and temporally.

It is challenging to determine all shipping activities currently taking place in Exmouth Gulf due to the lack of strategic management and regulation over the entire Gulf embayment. However, information provided to the EPA during consultation indicated the use of Exmouth Gulf by recreational boating vessels, cruise ships, commercial vessels passing through the area, and oil and gas support vessels. Shipping activities within the foreseeable future may include seismic surveying, dredging for infrastructure, and development of a new port facility or extension of the existing Exmouth Marina. The EPA expects the presence of marine vessels in the Gulf would also increase over time.

Current residential, commercial and industrial development in Exmouth Gulf is primarily constrained to the boundaries of Exmouth township, road corridors and Defence land and properties. The Shire of Exmouth is projecting population growth in the foreseeable future and indicated that future development is likely to be constrained within the existing town boundary rather than expanding into new areas (Shire of Exmouth 2019). Other development may occur in Exmouth Gulf in the foreseeable future in the form of road works and realignment, and development or expansion of tourism and worker accommodation.

Climate change

Climate change was considered in the suite of relevant current and foreseeable future pressures for this study; however, the temporal context for foreseeable future was extended to consider a minimum of 20 years to better acknowledge the full effects of climate change in the environment. Climate change was categorised with severe weather events as a key driver, encompassing long-term climatic changes driven by global warming and other severe climatic or weather events outside the natural range of variation that could wipe out a vulnerable species or habitat (adapted from Salafsky et al. 2008).

Climate change has been identified as a clear driver for potential cumulative effects across environmental values, with a recognition of the role of climate change as a widespread threat to coastal environments specifically (He & Silliman 2019). Exmouth Gulf is vulnerable to the potential pressures of climate change, with the pressures from marine heatwaves, tropical storms and cyclones, sea level rise, fire and atmospheric temperature changes affecting key values across the EPA's five themes. The impacts of

climate events such as marine heatwaves, sea level rise and changes to cyclonic and extreme weather events have been recorded in the Gulf and its surrounds and are expected to continue in the absence of mitigation measures (see Appendix C – section 7).

2.3 Potential cumulative impacts of current and proposed projects

Analysis of pressures in Exmouth Gulf

The EPA has focused on key pressures stemming from eight overarching drivers affecting Exmouth Gulf: shipping, fishing, mining, tourism/visitation, climate change, development, pastoralism, and Defence. These were determined based on critical evaluation, expert input and consultation.

A qualitative risk assessment process was undertaken to understand the pressures on the key values of Exmouth Gulf. The EPA notes that the risk assessment process was undertaken based on the best knowledge available at the time, and informed by technical expertise, community input, and industry and government advice. A complete methodology and analysis of the qualitative risk assessment process is provided in Appendix C.

The EPA notes that some activities in Exmouth Gulf can be classified as both a key value and a pressure. For example, depending on an individual's perspective, recreational fishing activities or nature-based tourism might be considered as either a key value or an existing pressure for the Gulf. For these activities, the EPA has taken an impartial view and analysed both perspectives. The relationships across values and pressures add a level of complexity to the qualitative risk assessment.

The EPA considers the qualitative risk assessment process an important starting point to understand the existing and potential future pressures on Exmouth Gulf, including potential cumulative impacts. The qualitative risk assessment can be used to inform proposal-based environmental impact assessments in the Gulf region and further detailed research into this dynamic and sensitive ecosystem. Some of the key information gaps that would improve our understanding of the dynamic ecosystem of the Gulf and its surrounds are outlined in the supporting documents (see section 13 of Appendix C).

Key concerns

Exmouth Gulf is a multi-use area (see Appendices C, E, F), with various drivers and pressures across sectors occurring without cohesive coordination or integrated management. The EPA notes that the condition of some of the key values of the Gulf are in a degraded state, largely due to current and potentially historic activities. Further, the EPA considers that the condition of key values of the Gulf are likely to continue to degrade over time without improved coordination and management of current and future activities and development.

The lack of cohesive coordination or integrated management of current activities in Exmouth Gulf has elevated the risk across most of the values. The EPA is concerned that the elevated risk to key values is also associated with the lack of consideration of how pressures are acting cumulatively on key values. As such, the EPA recommends the establishment of a coordinating body across stakeholders and industry to support the environmental protection, planning and management of the Gulf (see section 3.3).

Table 2 presents those key values that are of particular concern to the EPA due to the cumulative pressures already acting on them, organised by relevant EPA theme. The pressures of concern were identified through the qualitative risk assessment process using a consequence versus likelihood approach, with the table summarising only the key pressures of concern evaluated against those values at greatest risk. The EPA recognises that the key values of concern identified in Table 2 are already under pressure from a cumulative perspective and will therefore be subject to particular scrutiny from the EPA.

The EPA emphasises that this list of key values of concern in Table 2 is not exhaustive and that any proponent engaging with the EPA will be expected to evaluate the state of Exmouth Gulf at the relevant time, recognising the dynamic system in which they propose to operate. These key values of concern will be considered and scrutinised in future environmental impact assessment processes, where relevant to a proposal, with a particular emphasis on pressures and impacts from a cumulative perspective. Table 2 also provides an important basis for other decision-makers, including the proposed future integrated management entity.

The analysis also highlighted that most key values in Exmouth Gulf are considered at medium to high-risk across all sectors, which included evaluation of the associated drivers and pressures of sector-based activities. Table 3 summarises the relationship between the different drivers (i.e. sectors or forces) and the key values identified as high-risk due to current and proposed activities from those drivers, organised by EPA theme and factor.

The EPA recognises that the details underpinning why particular key values are considered at high or medium-risk are important contextual information, particularly for decision-makers and stakeholders. The comprehensive qualitative risk-assessment analyses and detailed understanding behind these summary tables are provided in Appendix C. The EPA emphasises the role of the mitigation hierarchy (avoid, minimise, rehabilitate) to avoid elevating the risk of any one or series of values, noting the strong connectivity between and within the key values in Exmouth Gulf and its surrounds.

Table 2: EPA’s key values of concern for future development compatibility and consideration of potential cumulative impacts. The consideration of values of concern includes both existing and potential future activities exerting pressure, organised alphabetically.

Theme	Factor	Key values of concern	Key pressures of concern
Sea	Benthic communities and habitats	Blue-green algal mats	Clearing/disturbance; mining footprint*
		Coral	Climate change (e.g. marine heatwaves)
		Mangroves	Climate change (e.g. tropical storms and cyclones)
		Salt flats	Clearing/disturbance; mining footprints*
		Samphires	Climate change (e.g. tropical storms and cyclones)
		Seagrass	Climate change (e.g. marine heatwaves; tropical storms and cyclones)
	Marine fauna	Coral trout [^]	Recreational fishing; climate change (e.g. marine heatwaves)
		Dolphins	Port infrastructure (including channels); noise pollution (e.g. shipping)
		Humpback whales	Noise pollution (e.g. shipping); disturbance, including vessel strikes (e.g. tourism/visitation and shipping)
		Manta rays	Pollution – rubbish
		Red emperor [^]	Recreational fishing
		Sawfish	Climate change (e.g. marine heatwaves)
		Seabirds and shorebirds	Shipping pollution (e.g. oil, fuel, antifoul); light pollution (e.g. shipping); disturbance – damage (e.g. tourism/visitation)
		Marine turtles	Light pollution (e.g. shipping, residential and tourism); pollution – rubbish; climate change (e.g. tropical storms and cyclones)
	Tuskfish [^]	Recreational fishing	
	Marine environmental quality	Sediment quality	Shipping pollution (e.g. oil, fuel, antifoul)
		Water quality	Shipping pollution (e.g. oil, fuel, antifoul)
Coastal processes	Nutrient flow	Clearing/disturbance; mining footprints*	

[^] Indicator fish species (i.e. coral trout, red emperor and tuskfish) – representing targeted recreational fishing species from different habitats.

* Mining footprint in this context refers to potentially significant activities including mining and resource extraction (e.g. salt farm, potash farm).

Theme	Factor	Key values of concern	Key pressures of concern
Land	Flora and vegetation	Coastal dunes	Development footprints**, including roads (especially tourism); off-road driving
		Coastal plains	Development footprints**, including roads (especially industrial and tourism); off-road driving
		Limestone cliffs and gullies	Development footprints**, including roads (especially industrial and tourism); overgrazing
		Threatened/priority flora	Climate change (e.g. tropical storms and cyclones; fire); development footprints**, including roads (especially industrial and tourism); overgrazing; pests/ feral animals; off-road driving
	Terrestrial fauna	Birds	Atmospheric temperature
		Reptiles	Light pollution (especially tourism and residential); overgrazing; pests/ feral animals
	Landforms	Karst systems	Groundwater drawdown (industrial, residential and tourism)
	Subterranean fauna	Stygofauna	Groundwater drawdown (industrial, residential and tourism)
		Troglofauna	Groundwater drawdown (industrial, residential and tourism)
	Water	Inland waters	Groundwater systems
Surface water systems			Contamination
People	Social surroundings	Intrinsic/wilderness amenity	Development footprints**, including roads (especially industrial and tourism); light pollution (residential, industrial and tourism); off-road driving
	Human health	Potable water	Potable water use (especially from tourism/visitation)

** Development footprint in this context refers to infrastructure including for the purposes of residential, industrial and tourism activities (e.g. ports, accommodation, heavy industry).

Table 3: Values under high risk from current and proposed activities, organised by key drivers (i.e. sectors or forces). Note, not all values-by-sector-based pressure combinations were evaluated (e.g. land values weren't evaluated against pressures from fishing sector)

Factor	Shipping	Mining	Fishing	Tourism/ visitation	Climate change	Development	Pastoralism	Defence
Sea	Benthic communities and habitats	Blue-green algal mats Salt flats			Seagrass Mangroves Coral Sampires			
	Marine fauna	Marine turtles Humpback whales Dolphins Seabirds and shorebirds	Coral trout^ Red emperor^ Tuskfish^	Manta rays Marine turtles Humpback whales Seabirds and shorebirds	Coral trout^ Sawfish Marine turtles			
Marine environmental quality	Water quality Sediment quality							
Coastal processes		Nutrient flow						

^ Indicator fish species (i.e. coral trout, red emperor and tuskfish) - representing targeted recreational fishing species from different habitats.

	Factor	Shipping	Mining	Fishing	Tourism/ visitation	Climate change	Development	Pastoralism	Defence
Land	Flora and vegetation				Coastal plains Coastal dunes Threatened/ priority flora	Threatened/ priority flora	Coastal plains Limestone cliffs and gullies Coastal dunes Threatened/ priority flora	Limestone cliffs and gullies Threatened/ priority flora	
	Terrestrial fauna					Birds	Reptiles	Reptiles	
	Landforms						Karst systems		
	Subterranean fauna						Troglofauna Stygofauna		
Water	Inland waters				Groundwater systems				Groundwater systems Surface water systems
	Social surroundings				Intrinsic/ wilderness amenity		Intrinsic/ wilderness amenity		
People	Human health				Potable water				

Potential cumulative impacts

The qualitative risk assessment identified that all EPA themes (and the key values that underpin each theme) are under pressure across numerous, if not all key drivers. This highlights the potential risks and impacts from a cumulative perspective (see Appendix C). The potential cumulative impacts identified from these drivers are a recognition of temporal and spatial changes resulting from successive, incremental and interactive pressures, which may be significant over time.

The EPA recognises that current and proposed activities and development are exerting or have the potential to exert pressures on the key values of Exmouth Gulf both individually and cumulatively. This study has highlighted important connection between values, as components of the ecosystem, as well as interactions between many of the pressures acting on them. This suggests that cumulative impacts are potentially manifesting through multiple pathways, some simple and some complex. This is of particular concern to the EPA, particularly as these interconnected pathways between values and pressures are challenging to map, making it difficult to avoid, minimise and manage cumulative impacts. Future planning and management of the Gulf should consider these interactions and complex pathways as part of a best-practice approach.

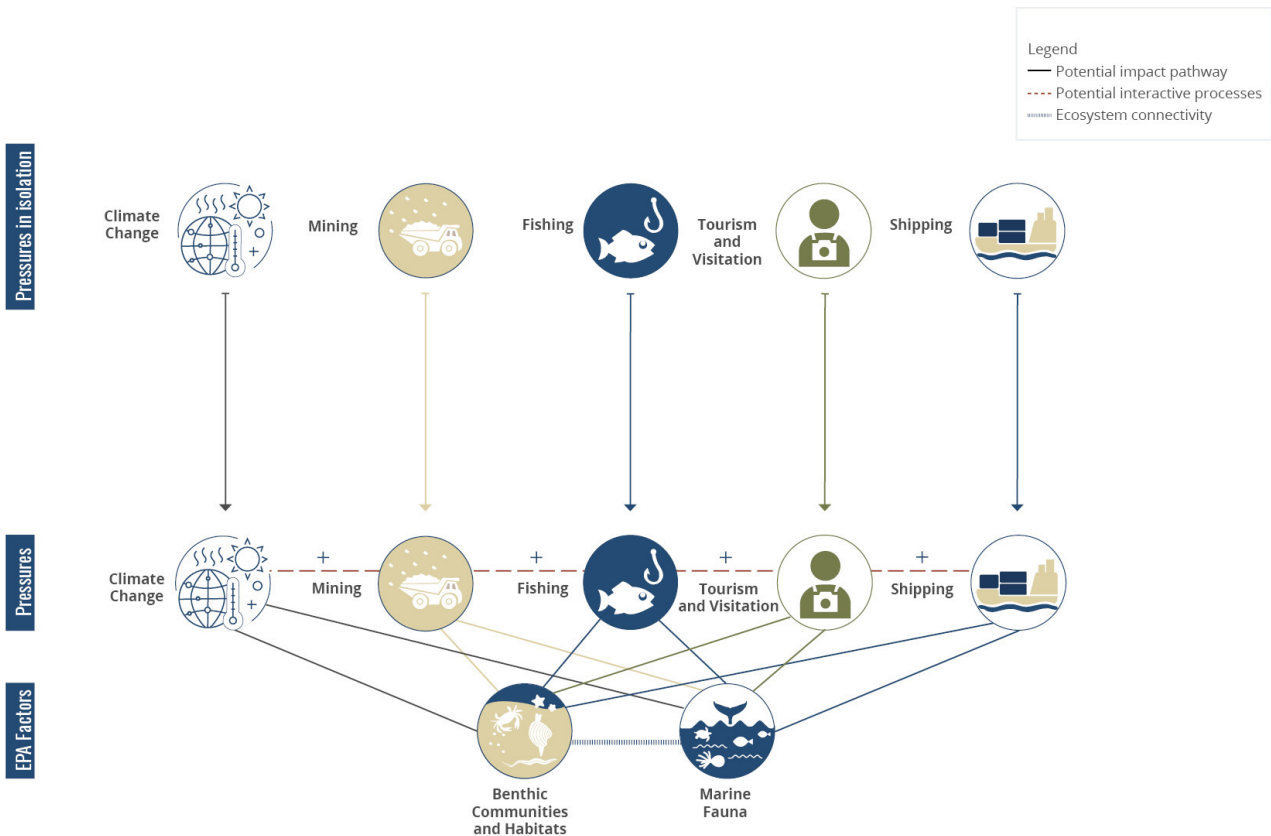


Figure 3: Sea Theme conceptual diagram – pathways illustrating consideration of pressures acting on values, in-isolation to consideration of connectivity between pressures acting on values (i.e. potential cumulative impacts). EPA factors presented are indicative of key values. Sector-based drivers evaluated under the sea theme included: climate change, mining, fishing, tourism and visitation and shipping.

The EPA recognises that there are multiple approaches to illustrate ecosystem connectivity that encompass the interconnected pathways between the values and the pressures. The connectivity and network pathways presented in Figures 3 and 4 are illustrative exemplars using information gathered through this study. The initial conceptual diagram illustrates shifting consideration of pressures acting in-isolation (e.g. direct impacts) to consideration of the interactive pathways between pressures affecting key values as potential cumulative impacts (see Figure 3). The conceptual pathways in Figure 3 can be expanded and tailored to a specific activity or development in Exmouth Gulf. In Figure 3, the EPA factors are representative of the numerous key values that sit beneath each factor. Additional conceptual illustrations of potential cumulative impact pathways in the Gulf applied to other EPA themes are provided in Appendix G.

The EPA recognises that the network pathways between pressures and the key values are extensive and complex, reflecting the connectivity of the key values and the dynamic environment of the Gulf. The EPA examined some of the detailed interactions and relationships between key values and pressures of concern for Exmouth Gulf (see Table 2), within the conceptual pathways. The EPA provides exemplar diagrams in Figure 4 (A-C), with indicative network pathways between pressures and the key values most vulnerable to the cumulative impacts of those pressures. The network pathways also illustrate how the cumulative impacts from the indicative pressures can affect other key values within and across EPA factors and themes. The potential pathways of connectivity between values and pressures may be direct, indirect or cumulative (i.e. successive, incremental or interactive) in the ecosystem.

(a) Potential connectivity and cumulative impacts across sea theme

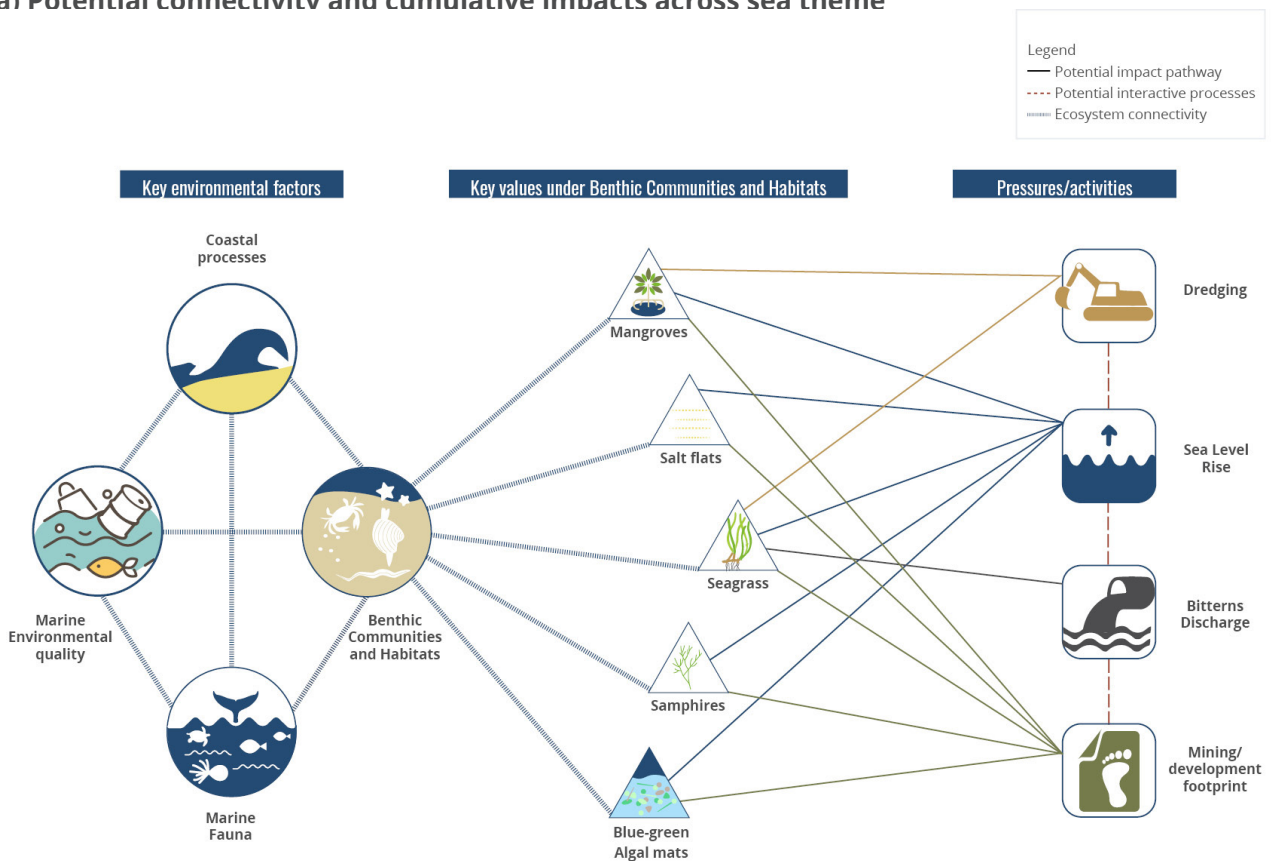
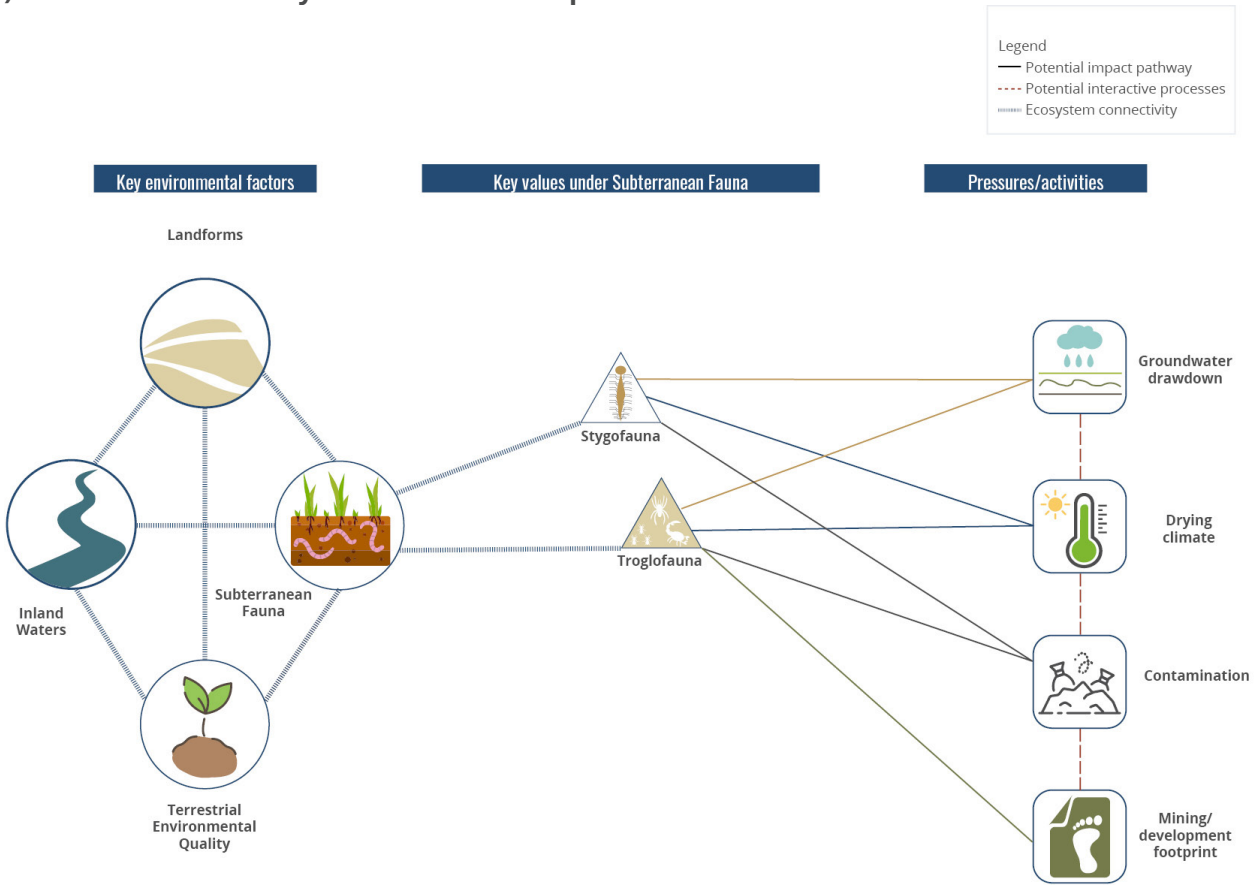
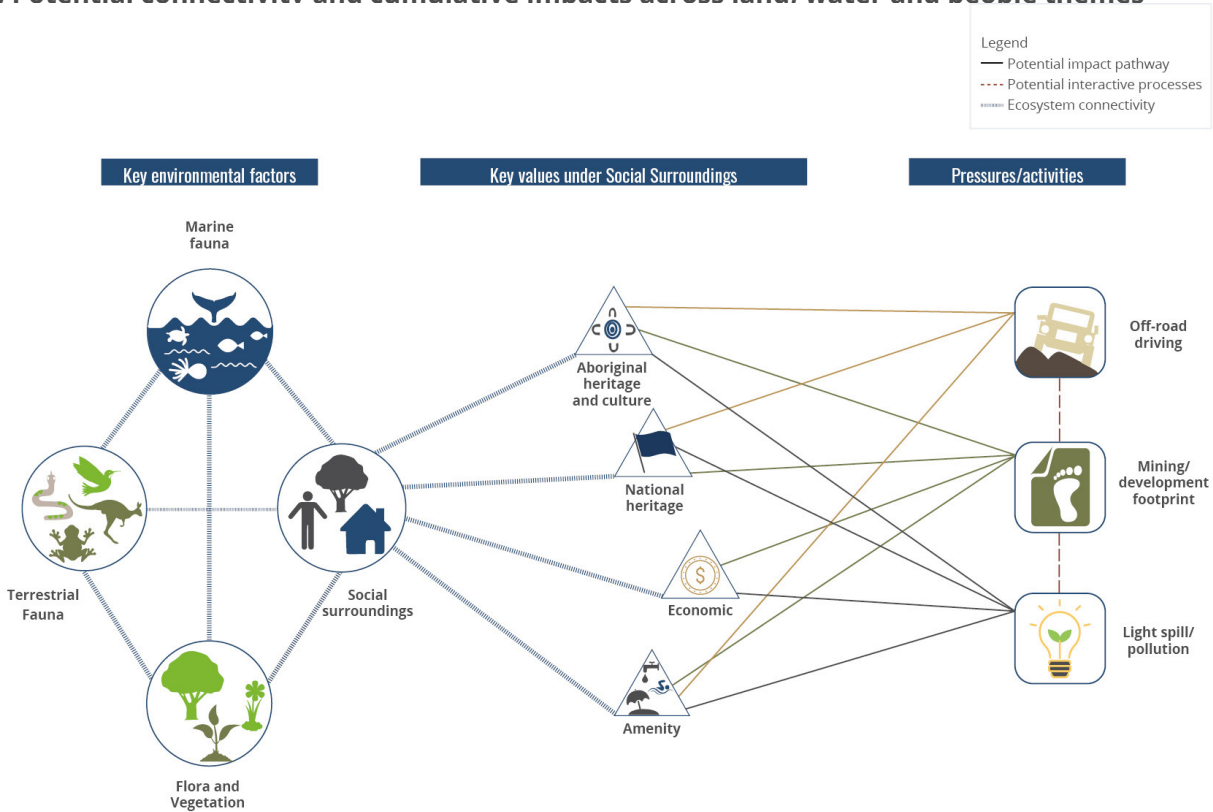


Figure 4: Exemplar diagram illustrating cumulative impact pathways for potential connectivity between key values and pressures of concern for (a) sea theme - benthic communities and habitats, marine fauna, coastal processes and marine environmental quality; (b) land theme - subterranean fauna, landforms, terrestrial environmental quality and water theme - inland waters; (c) people theme - social surroundings, land theme - terrestrial fauna and flora and vegetation, and sea theme - marine fauna.

(b) Potential connectivity and cumulative impacts across land theme



(c) Potential connectivity and cumulative impacts across land, water and people themes



The exemplar diagrams illustrate that key values are under pressure across activities and this has potential cumulative impacts across the Exmouth Gulf ecosystem, particularly given the interconnectedness and interdependence of key values across the EPA's factors. For example, under Figure 4a, the key value of sea grass is potentially impacted by all the illustrated pressures (i.e. dredging, sea level rise, bitterns discharge and mining footprint). Given that sea grass is an important benthic habitat for marine fauna and is a key indicator for marine environmental quality, the potential cumulative impacts pathways in the environmental system may be extensive.

The EPA recognises that further consideration of cumulative impacts is needed for specific activities and development proposals that factor in the relevant spatial and temporal context. The EPA notes that the role of cumulative impacts is relevant across all the drivers and pressures considered in this report. The EPA encourages further investigation of the detailed network pathways between key values and pressures, inclusive of direct, indirect and cumulative impacts in the Exmouth Gulf environment.

3 Advice and recommendations

Findings

The Exmouth Gulf and surrounding area has distinct environmental, cultural and social values that are unique and significant at a global scale. Many of the ecological communities and species assemblages associated with the Gulf and its surrounds are geographically distinct and are at the limit of their ranges (e.g. tropical-arid mangrove community).

There is an opportunity to protect and enhance the current state of those key values. The key values are part of healthy land and sea country and the traditional owners are key partners in the future management of those values.

The Exmouth Gulf is increasingly under pressure from uncoordinated human activities and development. The key values of the Gulf are under pressure and fragile due to existing activities and developments. There is a risk that impacts from both existing and potential pressures may not be sustainable when considered cumulatively. An integrated management approach should be adopted to address the multiple uses and cumulative pressures in the Gulf.

The health and connectivity of the distinct values of Exmouth Gulf are dependent on continued investment in protection and conservation with respect to its important geographical location, biodiversity, productivity and ecological function. The Gulf land and sea environments are interdependent ecosystems, and thus vital to the health and connectivity to the Ningaloo Coast World Heritage Area and the broader Pilbara coast.

The EPA provides advice under the following three themes:

1. protecting the environmental, social and cultural values of Exmouth Gulf and its surrounds
2. assessing future compatibility of activities and developments in Exmouth Gulf and its surrounds
3. integrating management of the land and sea environment of Exmouth Gulf

3.1 Protecting the key values of Exmouth Gulf and its surrounds

Numerous reports have recognised the significance of all or parts of Exmouth Gulf, since at least the 1970s (EPA 1975; CALM 1994); however, little formal protection of the Gulf and its surrounds exists. Whilst key values were identified across the whole of the Gulf and its surrounds, the EPA considers the eastern and southern portions of the Gulf as critical environmental assets of exceptional value, which should be protected. The values are increasingly under pressure from existing and proposed activities and development and formal protection should be a high priority.

The EPA recommends a very high level of protection for the eastern and southern portion of Exmouth Gulf and adjacent hinterland areas (e.g. coastal dunes and coastal plains), and that the establishment of marine and terrestrial protected areas is co-designed with traditional owners as partners in its future protection and management. The EPA recommends that the protected areas should encompass both the land and sea environment to capture the important connectivity and ecological function between those landscapes, including the intertidal and supratidal flats.

The EPA supports the proposed Giralia National Park nomination into the conservation estate as proposed in the State Government's *Plan for Our Parks*, and the potential for protection of marine intertidal and nearshore areas in the eastern and southern portions of Exmouth Gulf for conservation and recreational use. The EPA considers that the benefits of a complementary marine protected area adjacent to the proposed Giralia National Park would enhance the protection and management of key values of the Gulf. The Exmouth Gulf Managed Prawn Fishery designated nursery boundary (see Appendix B), adjacent to the proposed Giralia National Park could be a starting point in enhancing marine protection.

In considering marine protection, the following should be recognised: the Gulf is a multi-use area; the existing capabilities of DBCA for conservation and management; the role of traditional owners as key partners; and furthering existing joint management initiatives.

The EPA recommends a high level of protection for key values that are of particular local significance within Exmouth Gulf, including sensitive areas such as Qualing Pool, Camerons Cave, Cape Range Subterranean Waterway and the islands of Exmouth Gulf (see Figures 1 and 2; and Appendix B for map references).

3.2 Assessing future compatibility in Exmouth Gulf and its surrounds

The EPA recommends that any future activities and development must be compatible with the protection of the key values. The EPA will apply particular scrutiny to activities and developments that are incompatible with the protection of the key values. This includes activities and developments that are incompatible with values of local significance within Exmouth Gulf.

EPA expectations

The EPA expects the following in its consideration of future activities and development of Exmouth Gulf and its surrounds:

1. Broad regional context

Proposed activities and developments will need to demonstrate compatibility with the protection of key values in Exmouth Gulf and its surrounds. The values of the land and sea environments of Exmouth Gulf and its surrounds are unique assets of global significance that require a precautionary approach. There is an opportunity to strengthen the protection of Exmouth Gulf through avoidance of activities and development proposals that could use alternative locations. The features of Exmouth Gulf that make it suitable for many proposed activities and developments are also present in other Western Australian coastal locations. These alternative locations have access to existing infrastructure and sites that have already experienced a level of environmental disturbance.

2. Critical site selection

Within Exmouth Gulf, avoidance of environmental disturbance should be a key consideration for all new developments in site selection. There are opportunities to concentrate activities in existing disturbance sites, which is consistent with the mitigation hierarchy. The EPA will scrutinise activities and development that have an impact on key values of local significance.

3. Protect key social surroundings values

Proponents of proposed activities and developments will need to demonstrate explicit regard and protection of the Aboriginal heritage and culture; values of dark sky and low atmospheric pollution; and local heritage and identity, which are critical assets of the social surroundings in Exmouth Gulf.

4. Adaptable design and infrastructure

The EPA will scrutinise activities and development that lock-in pressures or impacts for long periods or are likely to induce cumulative impacts. Proponents of activities and developments will need to demonstrate adaptability in design and approach to protect the key values and ecological processes in a dynamic ecosystem. The EPA recognises that some key values of Exmouth Gulf are already under pressure from multiple activities. The EPA considers that adaptability in design is critical to ensure ongoing protection and resilience of the dynamic Gulf ecosystem and its ecological processes and functions.

5. Cumulative impacts

The EPA will scrutinise proposals that have a potential impact on the key values of Exmouth Gulf in the context of existing and other reasonably foreseeable future activities and developments. Proponents of

activities and developments will need to demonstrate that the risks to these key values will not be significantly elevated as a result of potential cumulative impacts. Proponents should demonstrate a comprehensive understanding of the environment they propose to operate in at a regional scale, including ecological connectivity, to improve consideration for cumulative impacts. The EPA notes that there are opportunities within the mitigation hierarchy to reduce cumulative impacts of proposed activities and development.

6. Climate change considerations

Climate change is a pervasive pressure affecting Exmouth Gulf that will interact with both existing and proposed pressures from activities and development. It has the potential to have a significant impact on environmental values. Proponents of proposed activities and developments will be expected to evaluate how climate change is likely to interact with the existing and foreseeable future pressures as part of potential cumulative impacts, and to include measures demonstrating adaptation and resilience to climate change.

Other compatibility advice

The EPA recommends review and updating of relevant environmental policy, planning and guidance mechanisms to align with the advice and recommendations in this report.

Specifically, the EPA recommends review and update of EPA policy and guidance for the *EPA Advice – Protection of Tropical Arid Zone Mangroves along the Pilbara Coastline* (EPA 2001) to support protection of key values in Exmouth Gulf. The EPA considers that the objectives for the Protection of Tropical Arid Zone Mangroves apply to the Exmouth Gulf environment more broadly than mangroves alone, including the importance of recognising the role of primary productivity and connection to the wider marine environment in the Gulf. The EPA considers that connectivity between the coastal environment and the benthic communities and habitats are critical for biodiversity, productivity, ecological function, and the maintenance of ecological processes.

3.3 Integrating management of the land and sea environment of Exmouth Gulf

The EPA recommends an integrated management approach is required to ensure the conservation and enhancement of the key values of Exmouth Gulf.

An integrated management approach has been applied to other multi-use locations, such as Cockburn Sound, Leschenault, Peel Harvey and Vasse Geographe Catchment areas. These approaches should be evaluated to guide the establishment of an integrated approach that is appropriate for the management and protection of the key values of Exmouth Gulf.

The EPA recommends establishing a coordinating body for the environmental protection, planning and management of Exmouth Gulf and its surrounds. It is recommended that the coordinating body would have a primary role in:

1. Sharing knowledge on the state of key values and pressures of Exmouth Gulf and its surrounds to inform conservation, planning and management of key values.
2. Regular monitoring and reporting on the state of the environment for Exmouth Gulf and its surrounds.
3. Ensuring that the traditional owners, in conjunction with traditional knowledge and values, are considered partners in the conservation, planning and management decisions for Exmouth Gulf and its surrounds.
4. Providing input into statutory planning and environmental assessment processes where future decisions are likely to significantly impact on the conservation and enhancement of the key values of Exmouth Gulf and its surrounds. This could include the provision of future community services such as: potable water, sewerage, waste management, roads, accommodation, housing and energy.

-
5. Addressing knowledge gaps that target informing environmental protection, policy and decision-making, such that the objectives of this work are consistent with the EPA objectives and the outcomes are capable of directly improving the environmental planning and management of multiple sectors (e.g. tourism, fisheries, conservation, pastoralism, transport) within Exmouth Gulf and its surrounds.
 6. Considering the implications of climate change and the need to develop adaptation strategies as part of any future conservation, enhancement and management activities.

4 Conclusion

This report highlights the important consideration of potential cumulative impacts for Exmouth Gulf and its surrounds, applicable to all stakeholders and decision-makers with an interest in the Gulf. The EPA considers that the strategic advice in this report is the beginning of a bigger conversation about the importance of recognising potential cumulative impacts for both strategic decision-making and at the individual activity or proposal level. There is a need to address the considerable knowledge gaps to ensure the appropriate protection and health of the Gulf environment now and for the future.

The EPA will consider the learnings from the Exmouth Gulf cumulative impacts study to examine how it improves its own advice on cumulative impacts. The EPA notes the importance of the new clause in the EP Act¹ that explicitly requires the consideration of the cumulative effects of impacts of proposals in the environmental impact assessment process. One of the key learnings has been the importance of understanding the various pathways in which pressures can act on interconnected environmental values that have the potential to cause cumulative impacts.

The EPA recognises there is a role for both government and proponents to ensure that cumulative impacts are considered in planning, protection and management at a state and national level. There is an opportunity to reflect on this Exmouth Gulf cumulative impact study and other jurisdictions on the best practice and pathways to improve the assessment and management of cumulative impacts on the environment. The cumulative impacts study for this strategic advice highlights that proponents should improve their understanding of the regional context of the environment that they propose to operate in as a key consideration moving forward in the cumulative impacts space. Furthermore, proponents will need to give further consideration to how climate change may have an impact on key environmental values in combination with potential proposal impacts.

The EPA will continue to ensure that the environmental impact assessment process remains robust and to improve our understanding of potential cumulative impacts for the protection of the Western Australian environment for all people.

¹ Section 3(2)(1B): A reference in this Act to the effect of a proposal on the environment includes a reference to the cumulative effect of impacts of the proposal on the environment.

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Appendix A: Initiation of section 16(e) advice



Minister for Environment; Disability Services; Electoral Affairs Deputy Leader of the Legislative Council

Your Ref:
Our Ref: 62-22297

Dr Tom Hatton
Chairman
Environmental Protection Authority
Tom.Hatton@epa.wa.gov.au

Dear Dr Hatton

I understand that you are in the process of finalising your assessments on the Subsea 7 Learmonth Bundle Site proposal and related local scheme amendment near Exmouth. I note that since the original Subsea 7 proposals were considered, a number of new and existing potentially significant proposals in and around the Exmouth gulf have been progressed.

I am seeking a thorough understanding as to how these new proposals could add to the cumulative impacts on the distinctive values of Exmouth Gulf. I therefore request that the Environmental Protection Authority (EPA) provide advice to me under Section 16(e) of the *Environmental Protection Act 1986* on the potential cumulative impacts of proposed activities and developments on the social, cultural and environmental values of Exmouth Gulf.

Specifically, I am requesting advice and recommendations on:

- the current state of the key social, cultural and environmental values in Exmouth Gulf;
- the potential impacts on those values posed by existing activities and developments including, but not limited to, industrial activity (including oil and gas support), transportation and logistics operations, commercial and recreational fishing, and tourism;
- the potential impacts on those values by proposed activities and developments including, but not limited to, the Subsea 7 proposal, the Gascoyne Gateway proposal, and the K+S salt proposal; and
- the compatibility of future developments with the social, cultural and environmental values in the Exmouth Gulf.

I believe that this advice will be material to my consideration of the EPA's final reports on the Subsea 7 proposal and the related local scheme amendment. The EPA may therefore think it appropriate to seek a further extension for the provision of their final report to me on this proposal so that the findings of this advice on cumulative impacts can be fully considered.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Stephen Dawson', with a long horizontal flourish extending to the right.

Hon Stephen Dawson MLC
MINISTER FOR ENVIRONMENT

19 AUG 2020



Environmental Protection Authority

Hon Stephen Dawson MLC
Minister for Environment; Disability Services;
Electoral Affairs
Level 12 Dumas House
2 Havelock Street
WEST PERTH WA 6005

Your Ref: 62-22297

Our Ref: DWERT3702

Enquiries: Anthony Sutton, [REDACTED]

Email: [REDACTED]

Dear Minister

SECTION 16E ADVICE ON CUMULATIVE IMPACTS IN EXMOUTH GULF

Thank you for your correspondence, received on 19 August 2020, requesting advice under Section 16(e) of the *Environmental Protection Act 1986* (EP Act) on the cumulative impacts of development proposals on the social, cultural and environmental values of Exmouth Gulf.

The Environmental Protection Authority (EPA) acknowledges the significant and important values present in Exmouth Gulf, and the range of existing and new pressures that have the potential to impact on those values. We have therefore agreed to provide you with advice in line with the matters outlined in your letter.

Since receiving your request, we have commenced the early stages of scoping and planning to deliver this advice. It is clear to us that this will be a significant undertaking, requiring targeted stakeholder and community consultation.

Pending appropriate allocation of resources, we estimate that this advice can be delivered to you by 30 June 2021. The EPA considers it appropriate to delay the provision of our assessments on the Learmonth Pipeline Fabrication Facility and the related local planning scheme until this time.

Yours sincerely

A handwritten signature in black ink, appearing to be 'TH'.

Tom Hatton
CHAIRMAN

21 August 2020

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Appendix B: Additional reference maps

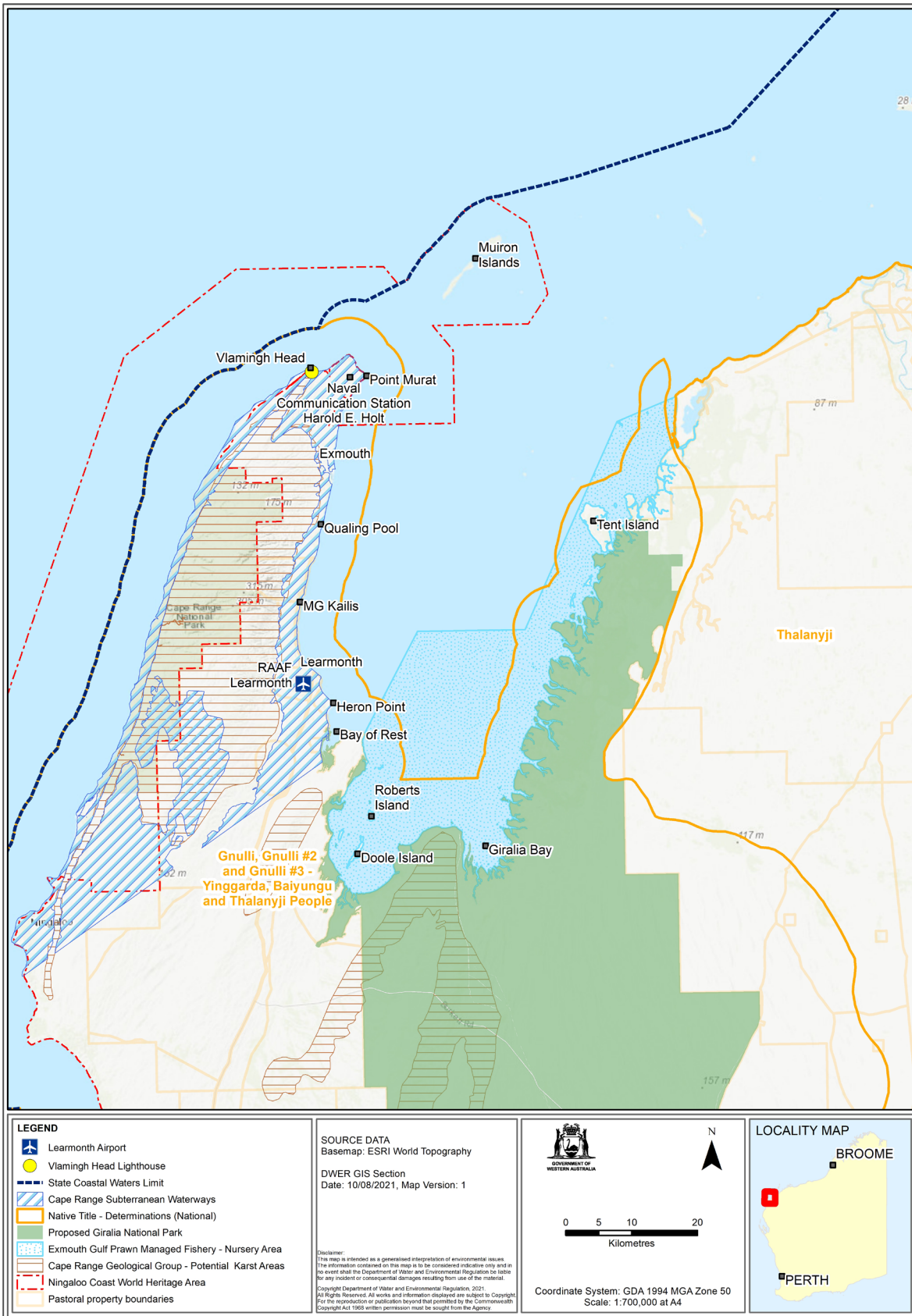
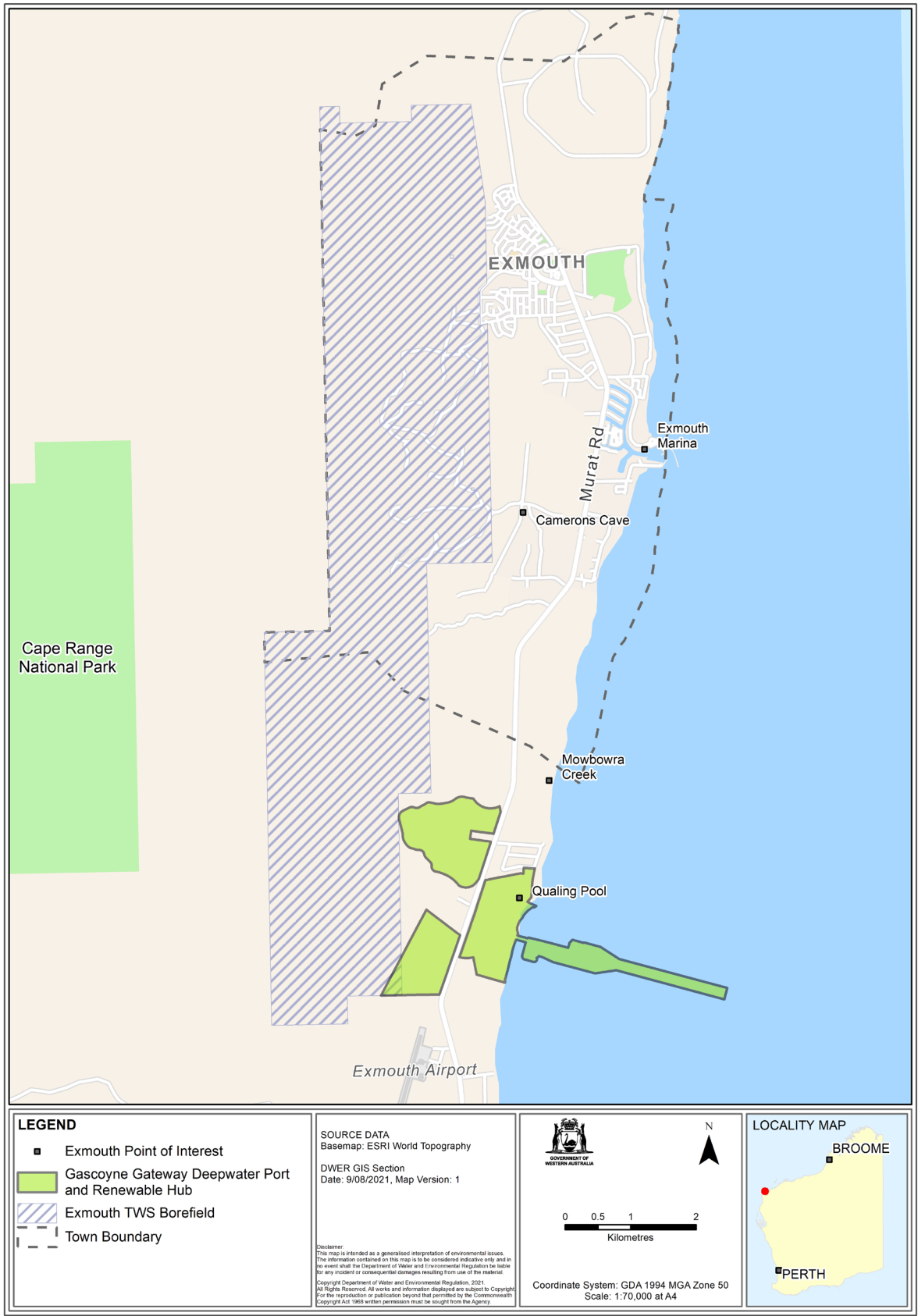


Figure B1: Additional environmental spatial information relevant to the values of Exmouth Gulf



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Figure B2: Exmouth town settlement map

Appendix C: Supporting information WAMSI Report

Cumulative pressures on the distinctive values of Exmouth Gulf Final Report June 2021 was prepared by the Western Australian Marine Science Institution (WAMSI) in partnership with the EPA. This report is available on the [EPA website](#).

Appendix D: List of contributors

Organisations

Australian Bureau of Meteorology
Australian Department of Defence
Australian Petroleum Production and Exploration Association Ltd
Bounty Fishing Company
Busselton Dunsborough Environment Centre
Cape Conservation Group
Commonwealth Scientific and Industrial Research Organisation
Cruise Ningaloo Pty Ltd
Department of Biodiversity, Conservation and Attractions
Department of Jobs, Tourism, Science and Innovation
Department of Planning, Lands and Heritage
Department of Primary Industries and Regional Development
Department of Transport
Department of Water and Environmental Regulation
EJs Encounters
Exmouth Chamber of Commerce and Industry
Exmouth Civil Pty Ltd
Exmouth Dive
Exmouth Dive Centre
Exmouth Diving
Exmouth Tackle and Camping Supplies
Fin Focus Research
Gascoyne Development Commission
Gascoyne Gateway Ltd
Giralia Station
K+S Salt Australia Pty Ltd
Kings Ningaloo Reef Tours
Learmonth Solar Observatory
Live Ningaloo
MG Kailis Group
Minderoo Foundation
Network Power Solutions
Nganhurra Thanardi Garrbu Aboriginal Corporation
Ningaloo Fly Fishing
Ningaloo Coast World Heritage Advisory Committee
Ningaloo Marine Interactions
Pastoralists and Graziers Association of Western Australia
Pilbara Ports Authority
Protect Ningaloo
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Tattarang Pty Ltd
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Julie Muir
Julie Waller
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Laura Todd
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Lilas Monniot-Kerr
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Lisa Tully
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Mark Grey
Marian Kieily
Martin Gregory
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Matt McGregor
Matt Roberts
Matthew Quayle
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Megan Spillman
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Michael Tropiano
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Zachary Howman
Zak Gunn

Appendix E: Summary of public submissions (October–November 2020)

The EPA called for community and industry input on current and proposed pressures facing the Exmouth Gulf and how they are/will impact on the area's environmental, social and cultural values. The EPA undertook public consultation for 3 weeks from 21 October 2020 to 11 November 2020.

A total of 321 submissions were received from 316 submitters.

The summary of the public submissions is available on the [EPA website](#).

Appendix F: Exmouth community meeting summary

The EPA conducted community meetings in Exmouth on 22 March 2021. The EPA summarised the feedback received from these community meetings and from feedback forms provided to the EPA. This summary is available on the [EPA website](#).

Appendix G: Conceptual diagrams for EPA themes – potential cumulative impacts pathways

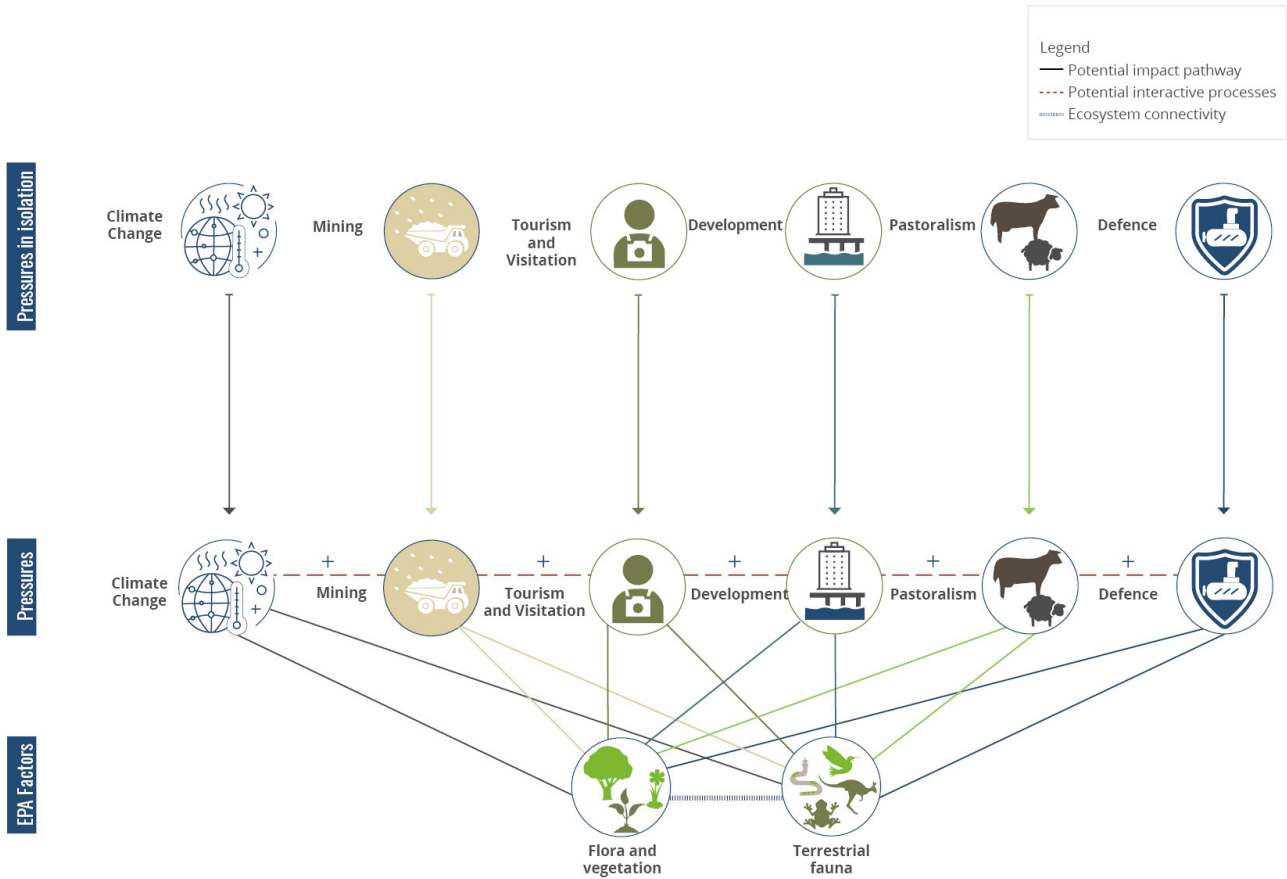


Figure G1: Land theme conceptual diagram – pathways illustrating consideration of pressures acting on values, in-isolation to consideration of connectivity between pressures acting on values (i.e. potential cumulative impacts). EPA factors presented are indicative of key values. Sector-based drivers evaluated against the land theme included: climate change, mining, tourism and visitation, development, pastoralism and defence.

Pressures in isolation

Pressures

EPA Factors

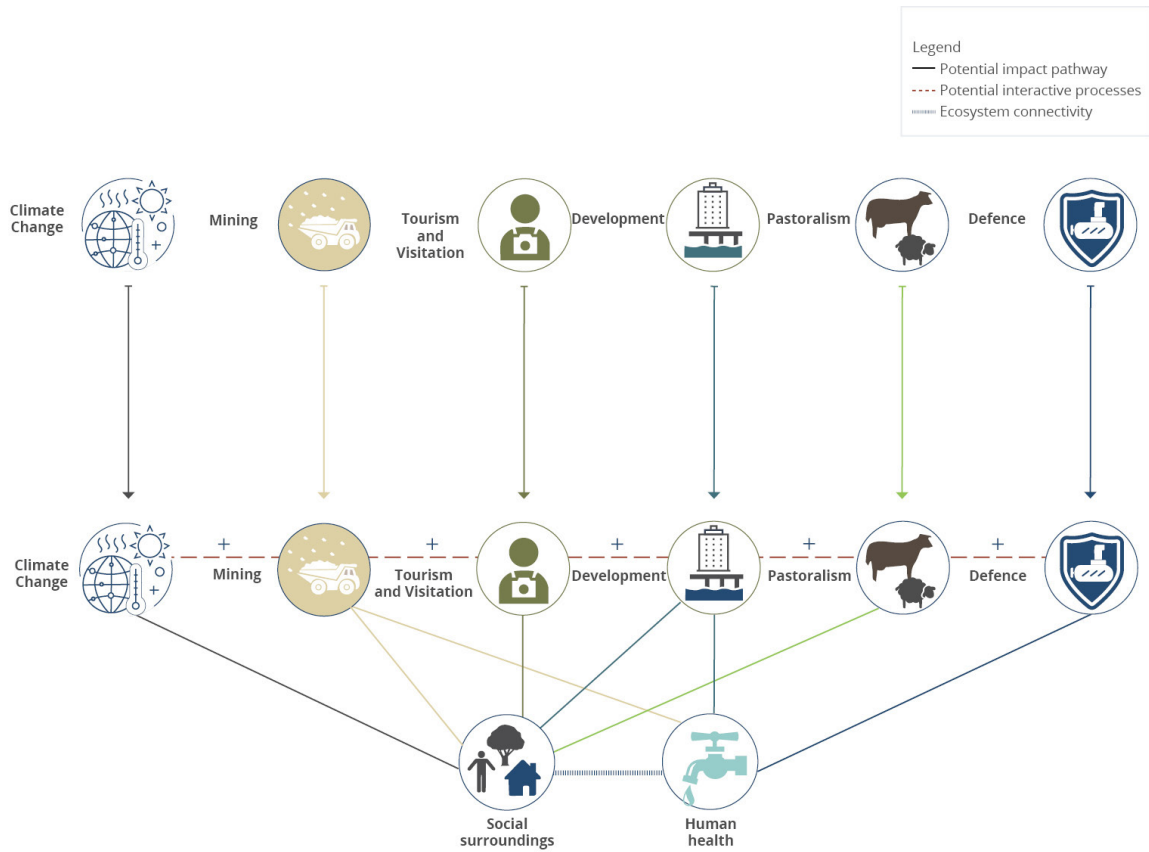


Figure G2: People theme conceptual diagram – pathways illustrating consideration of pressures acting on values, in-isolation to consideration of connectivity between pressures acting on values (i.e. potential cumulative impacts). EPA factors presented are indicative of key values. Sector-based drivers evaluated against the people theme included: climate change, mining, tourism and visitation, development, pastoralism and defence.

Environmental Protection Authority 2021, *Potential cumulative impacts of proposed activities and developments on the environmental, social and cultural values of Exmouth Gulf in accordance with section 16(e) of the Environmental Protection Act 1986*, EPA, Western Australia.

This document is available in alternative formats upon request.

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