

Department of Planning and Environment



Audit of Commercial Dredging and Extraction on Coastal Crown Land

Summary Report

February 2023

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Acknowledgement of Country

The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

Published by NSW Department of Planning and Environment

dpie.nsw.gov.au

Audit of Commercial Dredging and Extraction on Coastal Crown Land

First published: February, 2023

Department reference number: DOC22/280589

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Cover photo: Dragline dredge extracting sand from the mouth of an estuary:
Malcolm Robertson

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Introduction

This report presents a summary of an audit undertaken by NSW Department of Environment and Planning – Crown Lands (Crown Lands) and consultants BMT of commercial dredging and extraction operations on coastal Crown land in New South Wales (NSW). The report has been funded under Stages One and Two of the Marine Estate Management Strategy 2018-2028 (MEMS)

Background

Commercial dredging and extraction on coastal Crown land provide economic benefits to the New South Wales (NSW) economy and supports the current and increasing construction demands of the state. However, these operations can pose significant threats to the environmental, social and recreational values of the marine estate.

In 2013 the NSW Government established the Marine Estate Management Authority (MEMA) under the *Marine Estate Management Act 2014*. The vision for the NSW marine estate is a healthy coast and sea, managed for the greatest wellbeing of the community now and into the future. In 2016-17 the MEMA undertook a Threat and Risk Assessment (TARA) for the NSW marine estate. This identified that dredging in estuaries, posed risks to the marine estate and associated receptors (BMT WBM, 2017). These risks included hydraulic and morphological changes within the estuary, as well as water pollution, wildlife disturbance and sedimentation (Figure 1). The most vulnerable receptors to these impacts were identified as saltmarsh, mangroves and seagrass communities, and threatened and protected species.

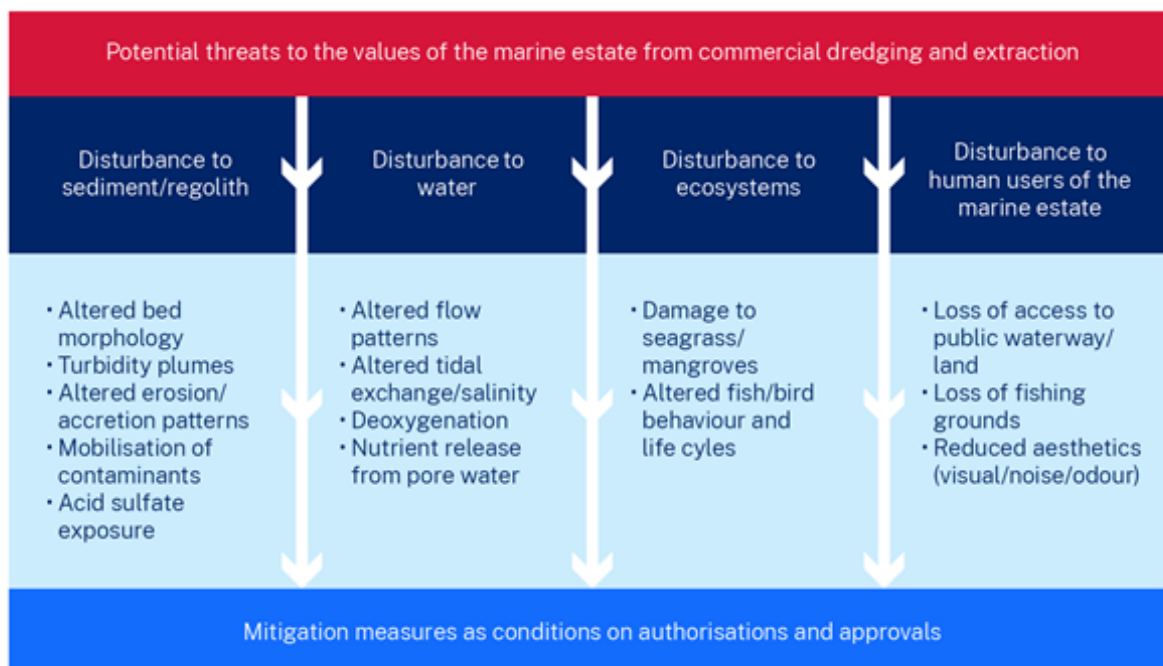


Figure 1. The range of potential threats to the values of the marine estate from commercial dredging and land-based extraction operations that should be considered when determining approval and licence conditions (see pages 44 -45 of the MEMS).

Recognising the potential impacts of commercial dredging and extraction on these receptors, and the lack of information on these activities occurring within the NSW marine estate, the MEMS set the following management action (under Management Objective 2, page 44):

2.1 Assess and manage cumulative and legacy impacts for estuary entrance modification and dredging by: auditing commercial dredging in estuaries.

In addition to dredging, other methods of commercial extraction of sand and gravel also occur on coastal Crown lands, and it was efficient to include these in the audit. Figures 2, 3 and 4 show the various methods of commercial sand extraction used in coastal NSW.

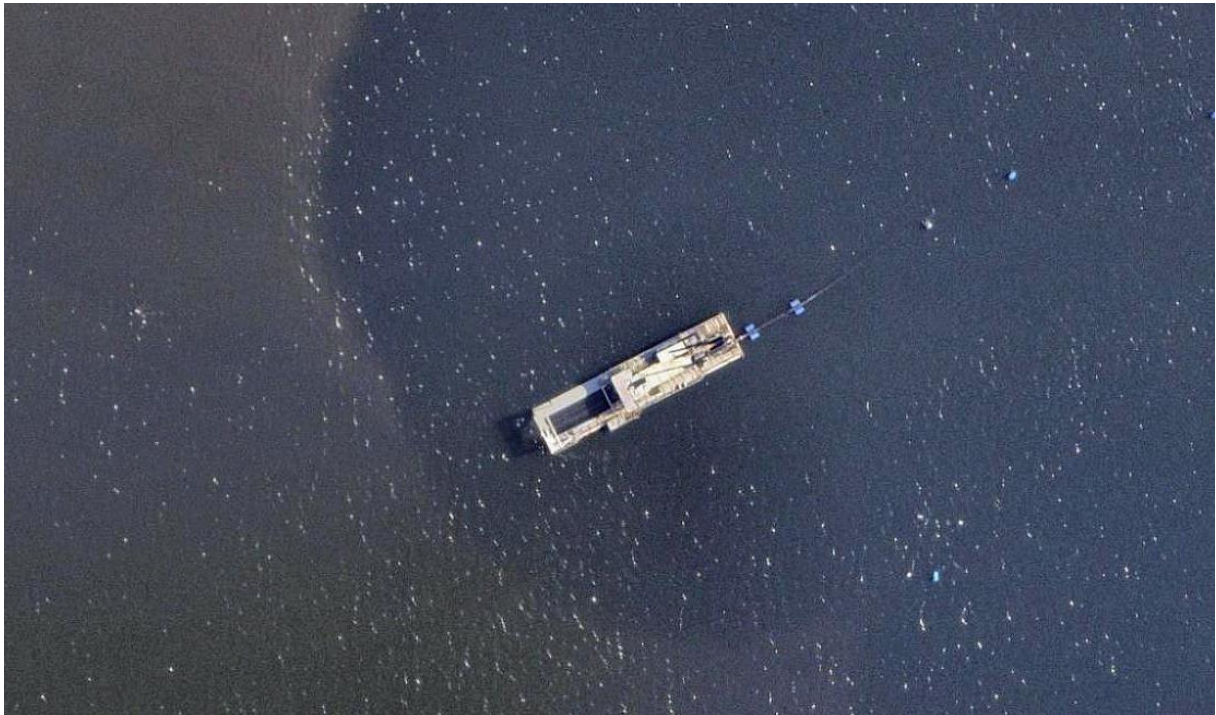


Figure 2. A typical dredge operating in the Shoalhaven Estuary showing the effect on bottom topography (Image from NearMaps, 2023).

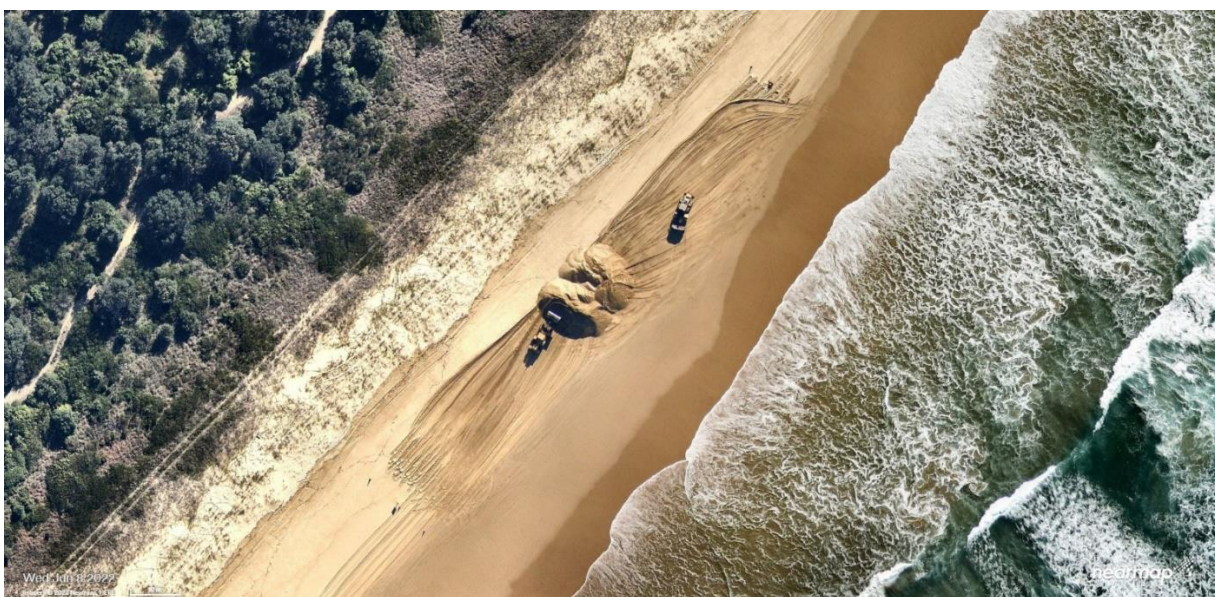


Figure 3. Example of a land-based extraction operation on Boambee Beach (Image from NearMaps, 2023).

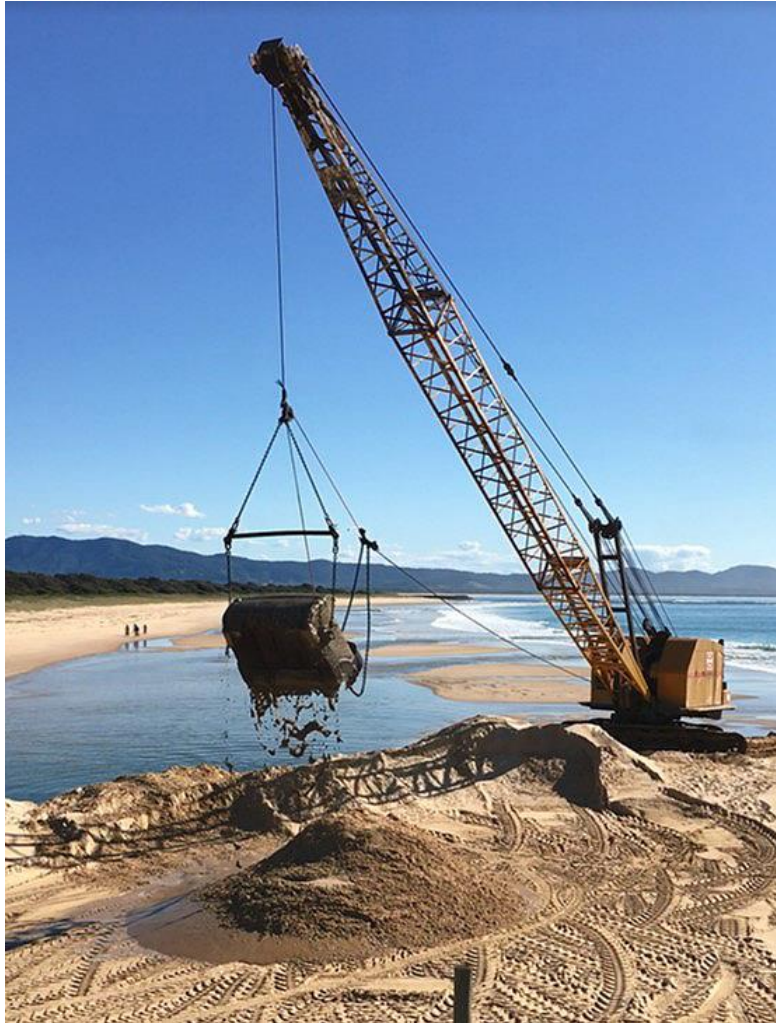


Figure 4. Example of a land-based dragline dredge extracting sand from the entrance of Back Creek estuary, South West Rocks (Photographer: Malcolm Robertson, 2023)

Purpose and Scope of the Audit

Under Stages One and Two of the MEMS, Crown Lands were funded to undertake an audit of commercial dredging and extraction operations on coastal Crown land, and to develop and implement recommendations for improving management to address threats to the marine estate. The audit documented the licences that have been issued under the *Crown Land Management Act 2016* (CLM Act) with respect to these operations, providing an evaluation of each licence within the regulatory framework and how management may be improved to address the risks to the marine estate identified in the TARA. The audit was undertaken by Crown Lands in mid-2019 to early 2022, with additional support provided by BMT in assessing the individual licences and licensing framework.

The audit included the following:

- Description of the legislative and regulatory framework for licensing and managing commercial dredging and extraction operations on coastal Crown land, including the interaction of relevant legislation.

- Description of all commercial dredging and extraction operations occurring on coastal Crown land and/or licenced under the CLM Act. This provided the status, environmental context, extraction volumes and royalties, and licensing conditions of each commercial dredging and extraction operation in NSW. This section includes a discussion of the alignment of these licences with other dredging-related approvals. To protect the commercial privacy of licensees, information collected for the audit has been de-identified in this report where it applies to individual operations.
- A benchmarking study including:
 - A review of national standard and guidelines for commercial dredging and extraction to identify key environmental controls for similar operations. The key standards and guidelines used were from NSW and Queensland government resources, noting these states explicitly manage these types of operations differently to other dredging and extraction works.
 - Benchmarking of the current active commercial dredging and extraction operations against the controls defined from the review of national standard and guidelines. This included a review of sensitive habitats for each current active commercial dredging and extraction operations.
- Recommendations for:
 - Improving the framework for licensing and managing commercial dredging and extraction on coastal Crown land
 - Improving the existing operations and licences under the *CLM Act* including specific recommendations for active licences.

The audit methodology is summarised by Figure 5.

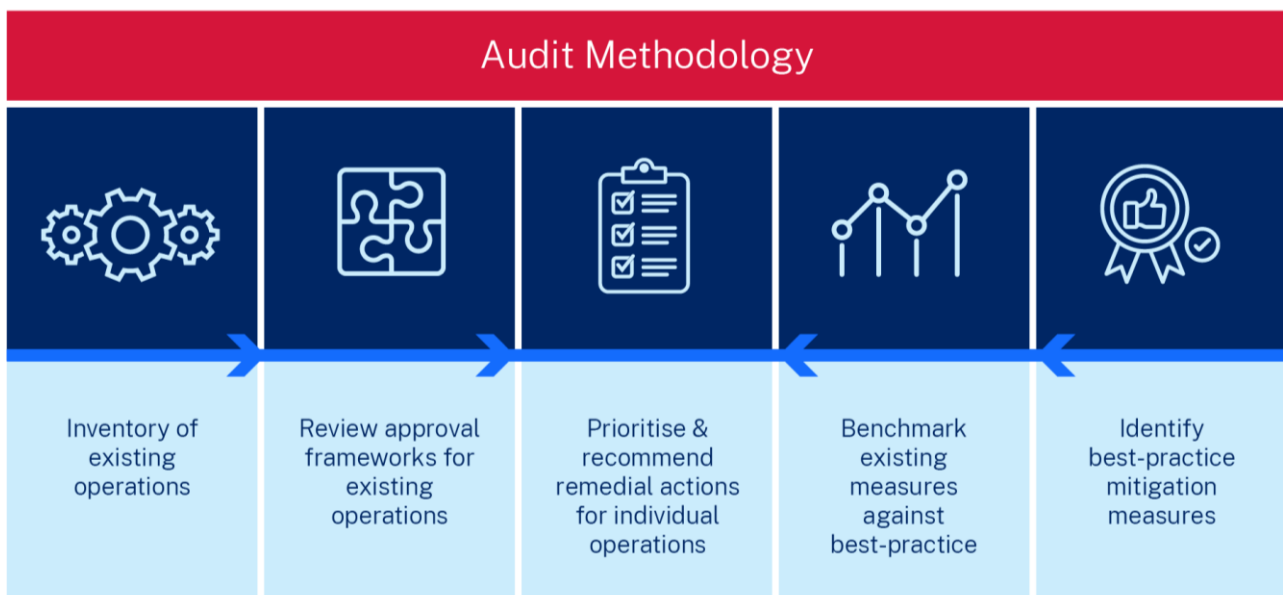


Figure 5. The audit approach: determining actions by comparing existing operating conditions to best-practice benchmarks for addressing threats to the values of the marine estate.

Audit Findings

Review of Existing Licences

In 2019 the audit identified 26 commercial dredging and extraction operations on coastal Crown land in NSW, that were licenced under the CLM Act. The licences have been issued over a period from 1966 through to 2022 under a variety of different legislative regimes and mechanisms. By 2022, when the audit concluded, 13 of those licenced operations remained active and the remainder were either latent (inactive) or had expired during the audit period. Of the latent licences, almost all are ready for close-out, with only one subject to handover and potential reactivation.

The licences cover a range of different operation types, from small to large operations, located in rivers, estuaries, ocean beaches and on mobile sand dunes. The operations include both in-water and land-based activities and target a range of sand and gravel materials. All active operations are for the extraction and resale of these materials. However, several operations also serve a secondary function of controlling navigation or sand drift at the extraction site. Several latent operations also related only to coastal management operations such as supply of sand for dune renourishment, undertaken by local government authorities, rather than for commercial supply.

The total annual quantity of material theoretically allocated from coastal Crown land in NSW (including the amount allocated to latent licences) is close to 1,100,000 m³ (approximately 1,600,000 t) of which 800,000 m³ (1,130,000 t) is available under active licences. However, the total volume actually extracted under the active licences in 2019 was approximately 275,000 m³ or 376,000 t (Figure 6).

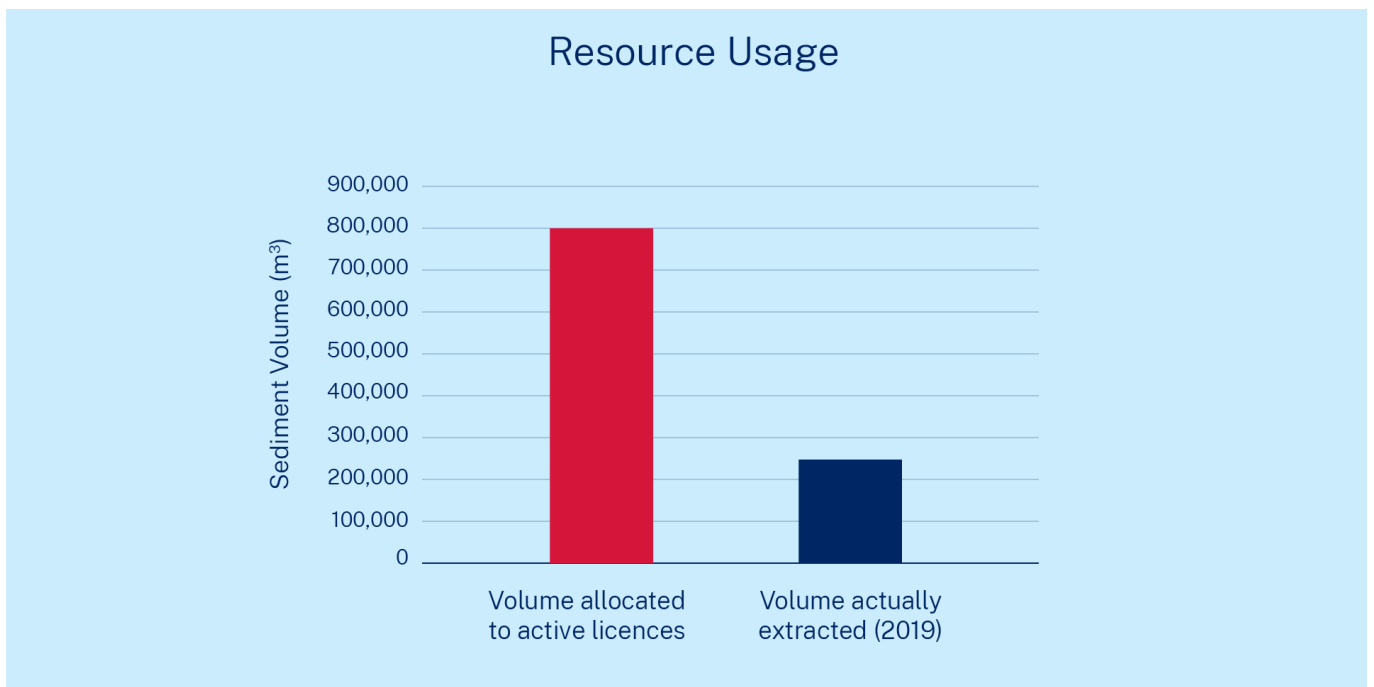


Figure 1. Potential maximum annual volume allocated to active licenced operations and the actual reported volume extracted in 2019.

Regulatory and Approvals Context

Additional to Crown Land licences issued under the CLM Act, most operations were also regulated under one or more of the following regimes:

- i. Development Consent under Part 4 of the *Environmental Planning and Assessment Act 1979*

The EP&A Act requires assessment of all aspects of the development, including construction, stockpiling, dewatering, rehandling and delivery, and decommissioning, as well as the dredging activities. Operations are assessed with respect to Local Environment Plans (LEPs) and other legislation, regulations or environmental planning instruments that are triggered, depending on the nature of the operations and its impacts. Of particular relevance is that the Environmental Planning and Assessment Regulation 2000 establishes the definition of 'Designated Development' for 'Extractive Industries'. Approval applications for projects meeting the designated development triggers are required to be supported by an Environmental Impact Statement (EIS).
- ii. Environmental Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997*

This licence is required by operations extracting over 30,000 tonnes per year and is administered by the NSW Environment Protection Authority (EPA).
- iii. Referral to NSW Department of Primary Industries – Fisheries (DPI – Fisheries) under the Fisheries Management Act 1994.

This referral occurs as part of the Crown lands licence application assessment process and replaces the need for a separate dredging permit from DPI – Fisheries. DPI- Fisheries may require licence conditions to protect key fish habitat, commercial fishing grounds and marine vegetation for example.
- iv. Referral to Transport for NSW – Maritime under the Marine Safety Act 1998

This referral occurs as part of the Crown lands licence application assessment process and addresses any maritime navigation and safety issues
- v. Various State Environmental Planning Policies (SEPPs)

These specify a range of specific issues that must be considered by a development, including some circumstances that prohibit consent being granted, and provide triggers for particular planning pathways to be followed. For example, all operations in this report occur within within the Coastal Environment Area as mapped under the *State Environmental Planning Policy (Resilience and Hazards) 2021*.

Almost all operations were approved subject to an initial Environmental Impact Statement (EIS) or Review of Environmental Factors (REF) depending on the approval pathway.

Due to the overlap of approval and assessment requirements, there are several agencies involved with regulating coastal dredging and extraction, including Crown Lands, local government, DPI – Fisheries, Department of Planning and Environment - Planning, Department of Planning and Environment - Environment and Heritage, Transport for NSW - Maritime and the NSW Environment Protection Authority (Figure 7).

Key Legislation	Roles	Issues addressed	Responsible Agency
Crown Land Management Act 2016	Requires landowner's consent to submit development application and licence to occupy and use Crown Land	Consistent, fair, efficient, transparent and sustainable use of Crown Land (including submerged Crown Land)	DPE Crown Lands
Environmental Planning and Assessment Act 1979	Sets the overall assessment and approval framework	How environmental impacts are considered and the consent authority	DPE Planning / Local Government
Fisheries Management Act 1994	Requires referral during Crown licensing process	Impacts on fisheries and fish habitat	DPI Fisheries
Protection of the Environment Operations Act 1997	Requires environmental protection licence (EPL) for operations extracting over 30,000 tonne	In dredging operations this is mostly concerned with land contamination and water quality	Environment Protection Authority
Marine Safety Act 1998	Requires referral during Crown licensing process	Impacts on navigation and maritime safety	Transport for NSW - Maritime

Other Relevant Legislation or Policies
Marine Estate Management Act 2016
Coastal Management Act 2016
Biodiversity Conservation Act 2016 (NSW) and Environment Protection & Biodiversity Conservation Act 1999 (Cth)
Native Title Act 1993 (Cth), Aboriginal Land Rights Act 1983 (NSW) and National Parks and Wildlife Act 1974
State Environmental Planning Policies (SEPPs): Resilience and Hazards 2021, Resources and Energy 2021, Primary Production 2021 and Planning Systems 2021
Local Government Act 1993

Figure 2. Legislation and other regulatory instruments that must be satisfied when assessing a development application for dredging or land-based extraction operations on coastal Crown land.

The geographical distribution of active, latent and recently expired licences for estuarine and land-based operations is summarised by Figure 8.



KEY













- | | | | | | | | |
|---|--|---|-----------------------------|--|-----------|---|-----------|
|  | Land-based drag line extracting from water |  | Active Operation |  | City/Town |  | Roads |
|  | Land-based operation only |  | Latent Licence |  | Land |  | Motorways |
|  | In-water extraction (dredging) |  | Expired during Audit period |  | Water |  | Rivers |

Figure 3. Overview of commercial dredging and extraction licences on coastal Crown land in NSW. Numbers in some locations indicate multiple licences.

Benchmarking

A benchmarking exercise was conducted for active licences against key environmental controls to address threats and risks to the marine estate. The benchmarking drew from examples of best practice for managing the types of threats and risks specifically presented by commercial sand and gravel extraction. Standards and guidelines from NSW and Queensland government agencies provided the most relevant benchmarks as they treated these types of operations differently to other forms of dredging. Environmental controls were categorised as:

- **Managing sensitive habitats** (e.g. seagrass, saltmarsh, mangroves, rocky reefs) – controls include the use of buffer zones between dredging and sensitive habitat areas as well as monitoring of dredging plumes and environmental responses.
- **Managing water quality** – controls include the monitoring and management of dredging and dewatering plumes.
- **Managing morphological and hydrodynamic change** – controls include survey of changes in the estuary associated with dredging and extraction (including outside the dredging/extraction footprint). This includes changes within both estuaries and the open coast, including consideration of available sediment budgets.
- **Managing contamination** – controls include testing sediment as necessary, with appropriate management of material onshore to avoid the introduction and/or spread of contaminants.
- **Overall management of risks** – controls rely on management and monitoring frameworks (i.e. management plans) to manage specific risks and guide dredging and extraction operations.

These represent the benchmarks that should be met when regulating commercial dredging and extraction operations to ensure threats to the marine estate are controlled. Not all benchmarks are applicable to all operations.

Table 1 presents the benchmarking of the current active commercial dredging and extraction operations against these controls, based on the conditions of the relevant CLM Act licence and other approvals. The results indicate where benchmarks are considered fully satisfied (indicating sufficient control of the relevant threat), partially satisfied (where some controls are in place, but further management may be required) and not satisfied (where few or no controls are in place) as well as where it is uncertain (due to lack of available documentation) or not applicable (due to lack of risk). Key trends noted in the benchmarking study included:

- For dredging and extraction operations, the key controls for managing impacts on sensitive habitats are the use of buffer zones or ‘setbacks’ between the development activity and the sensitive habitat, in addition to the management of sediment plumes from dredging and dewatering operations.
- Water quality management through Crown licence conditions appears to be standard for dredging operations but relies on EPLs for managing onshore works such as stockpiling or dewatering of dredged material.
- Potential morphological and hydrodynamic impacts are managed through the EP&A Act processes but the development of conditions to manage these impacts tends to be limited to

survey of the dredging area only. There are no conditions for broader survey or validation assessments of changes in estuaries and coastal areas.

- Contamination is managed by conditions provided under development consents, REF/EIS and EPLs rather than under the Crown Land licences.
- All operations with development consents are required to undertake works in accordance with a management and monitoring plan(s), however there are no standard conditions of a CL licence requiring operations to be conducted in accordance with a management or monitoring plan.

The key findings of this benchmarking exercise were that, while the risk control framework generally satisfied the benchmarks for managing risks to sensitive habitats and water quality, it does not consistently address the risks associated with dredging plumes and morphological and hydrodynamic changes to estuaries. Benchmarking identified a need to reduce duplication and improve consistency and alignment between planning approval processes and associated conditions on developments and activities, licensing processes and compliance generally, ensuring key threats receive the required level of oversight by the most appropriate authority.

Table 1 Benchmarking of active licences (identified here as 1-14) against relevant environmental controls.

ID	Environmental Context	Environmental Controls*				
		Habitats	Water Quality	Morphology	Contamination	Management plans
1	Overlaps with seagrass and mangrove habitat and buffer for Coastal Wetlands and Littoral Rainforest; occurs within Coastal Environment Area	DC	CL/EPL	CL/DC	DC/EPL	DC
2	Occurs within Coastal Environment Area	N/A	CL/EPL			
3	Occurs within Coastal Environment Area	N/A				
4	Occurs within Coastal Environment Area	N/A				
5	Occurs within Coastal Environment Area	N/A	N/A	CL	N/A	CL
6	Overlaps with/adjacent to seagrass and mangrove habitat; occurs within Coastal Environment Area	CL/DC	CL/EPL	CL	DC/EPL	CL
7	Operations onshore but immediately adjacent to seagrass and oyster aquaculture areas; occurs within Coastal Environment Area	CL	N/A	N/A	N/A	
8	Includes area of rocky reef; occurs within Coastal Environment Area	N/A	CL		REF	REF
9	Occurs within Coastal Environment Area	N/A	N/A	N/A	N/A	DC
10	Occurs within Coastal Environment Area	N/A	N/A	N/A	N/A	EPL
11	Occurs within Coastal Environment Area	N/A	N/A	N/A	N/A	??
12	Occurs within Coastal Environment Area	N/A	N/A	N/A	N/A	??
13	Occurs within Coastal Environment Area	N/A	N/A	N/A	N/A	
14	Overlaps with/adjacent to seagrass habitat; occurs within Coastal Environment Area	CL/DC	??	CL/DC	DC	DC

*Acronyms represent the licence under which controls are provided: CL: CLM Act licence, DC: EP&A Act Part 4 Development Consent, EIS/REF: EP&A Act Part 5 assessment, EPL: Environmental protection licence, DPI: DPI – Fisheries imposed conditions. Colours represent adequacy of licence provisions to meet the control benchmark: green is fully satisfied, orange is partly satisfied, red is not satisfied. Question marks (??) represent where there are documentation gaps and thus it is not possible to complete the benchmarking. N/A represents a situation where a control is not required due to lack of risk for the particular operation.

Consultation

Following the benchmarking and audit study, a consultation process was undertaken in 2021 and 2022 with key stakeholders including NSW government agencies, local government and industry. This process involved workshop-style presentations with each key stakeholder to introduce and summarise the audit and its findings. Stakeholders then had an opportunity to discuss the results of the audit and to clarify or correct any information regarding specific operations.

This feedback was incorporated into final copy of the audit document in mid-2022.

Recommendations

Based on the findings of the audit, a suite of recommendations has been developed to improve the administration and management of commercial dredging and extraction operations on coastal Crown land (Table 2), and to reduce associated threats and risks to the marine estate. The recommendations are designed to target three areas:

- i. Development Assessment and Compliance Framework,
- ii. Crown Land Management Framework, and
- iii. Specific Operations / Licences.

A set of standard conditions for consideration was also proposed (see Recommended Standard Crown Licence Conditions for Consideration). The objective of this set of standard conditions for consideration was to strengthen the current gaps within licence conditions as addressed in the benchmarking study. The standard conditions link to the key environmental risks and controls as described in the audit process.

A series of operation specific recommendations were also made, however due to confidentiality are not published in this summary report. The key trends for specific recommendations included:

- Investigate and assess current approval pathways
- Introduction of review or expiry date for licences
- Assessment of morphological and water quality impacts of current operations
- Investigation of risks to sensitive habitats from operations
- Ensure adequate conditions imposed on renewal of licences with current inadequate conditions

Implementation and Next Steps

Since the completion of the audit report, Crown Lands has been actively engaged in implementing the high priority actions as defined by the operation specific recommendations of the audit. This includes the implementation of performance and compliance audit reviews and evaluations of key operations. Crown Lands is also committed to undertaking further detailed evaluations of operations and ensuring license conditions meet contemporary best practice. It is anticipated that these recommendations will be prioritised and converted to actions for implementation by the Department and other relevant agencies, over the next six years of the MEMS.

Table 2: Recommendations from coastal Crown land commercial dredging and extraction audit

Recommendation	Priority	Associated Parties
A. DEVELOPMENT ASSESSMENT AND COMPLIANCE FRAMEWORK		
Development Assessment and Approval under EP&A Act		
<ol style="list-style-type: none"> 1. Develop standard Secretary Environmental Assessment Requirements for commercial dredging and extraction 2. Develop standard conditions for commercial dredging and extraction in coastal areas these may include: <ul style="list-style-type: none"> • beneficial reuse of unwanted materials (a policy to support this may be required) • management and monitoring of water quality • monitoring of changes in coastal areas including estuaries and coastal hazards areas during operations • monitoring and management plans 3. An education program be established to ensure the correct planning pathways are being adopted by proponents and Council. 4. Update the 96/99 Extractive Industries Dredging and Other Extraction in Riparian and Coastal Areas EIS Guidelines (Department of Urban Affairs and Planning, 1996) to reflect best practice. 	High	State gov. Local gov. Industry
Interagency compliance		
<ol style="list-style-type: none"> 5. Undertake interagency and legal consultation to clarify compliance roles. This shall focus on the role of Crown Lands, DPI Fisheries, EPA, Transport for NSW and Local Government. 6. Develop an agreement/protocol for interagency compliance with relevant agencies. This shall include consideration of specific arrangements for the management of each commercial dredging and extraction operation as well as a framework for any new operations that may occur in the future. 	Medium	State gov. Local gov.

Recommendation	Priority	Associated Parties
B. CROWN LANDS MANAGEMENT FRAMEWORK		
<p>Develop guiding principles and supporting materials for commercial dredging processes and approvals under the CLM Act</p> <p>7. The guiding principles and supporting materials (including reviewing the direct negotiation policy) shall inform competitive selection processes and the assessment of land owners consent applications.</p> <p>8. Develop these principles in consultation with DPI Fisheries, EES, Planning and Assessment, EPA, Transport for NSW and local government</p> <p>9. Key considerations for these principles shall include an assessment of extraction on the overall sediment compartment and sediment transport processes relevant to the subject location, as well as the objects and principles of the CLM Act.</p> <p>10. Ensure that the process of considering and licencing commercial dredging and extraction activities considers any relevant coastal management program.</p>	High	State gov. Local gov. Industry
<p>Review licence conditions</p> <p>11. Review the current standard condition set for commercial dredging and extraction licences under the CLM Act.</p>	Medium	State gov.
<p>Crown Land resourcing</p> <p>12. Ensure Crown Lands is appropriately resourced to manage and administer commercial dredging and extraction licences, noting the high profile and risks associated with these operations.</p>	Low	State gov.
<p>Review tenure audit process</p> <p>13. Increase the amount and frequency of licences reviewed by Crown Lands. The tenure audit program currently undertakes audits based on a Risk Management Framework.</p>	Medium	State gov.
<p>Royalties</p> <p>14. Investigate the possibility of retaining income (all or in part) generated from dredging and extraction on Crown Land, and direct it towards resourcing for administration and management of commercial dredging and extraction operations, including estuarine and rehabilitation works or to assist with management, monitoring and compliance of operations.</p> <p>15. For each licence, assess the methodology used for calculating, recording and monitoring the volume of extracted material</p> <p>16. Assess security amounts for the full cost of rehabilitating the site.</p>	Low	State gov.

Recommendation	Priority	Associated Parties
C. LICENCES		
C1. Latent Licences		
Latent licence investigation 17. Investigate the processes involved in closing latent licences and pursue termination.	High	State gov.
Competitive selection process 18. Determine if a new competitive selection process shall be implemented for the latent licence areas to identify new operators (subject to new approvals).	Low	State gov. Industry
C2. Active Licences (except where surrendered under the above recommendations)		
Licences without a specific term 19. Identify a process for reviewing and either renewing or closing those licences without a specified term. If these licences are to be renewed, then preferably they would be transitioned in accordance with the framework at Action 21. 20. Licence reviews undertaken outside of the framework detailed at Action 13, need to include an evaluation of the environmental assessments, management and monitoring programs associated with the current licence. If key risks and threats to the marine estate are identified, then the licence may require new conditions to address risks. If licence conditions are unlikely to address key risks and threats, then the licence may not be renewed.	High	State gov. Industry

Recommendation	Priority	Associated Parties
<p>Licences that do not have an approval under Part 4 of the EP&A Act</p> <p>21. Develop a staged, transitional procedure to ensure that active operations have a contemporary approval under Part 4 of the EP&A Act, including the appropriate environmental assessment.</p> <p>Transitional procedure could include:</p> <ul style="list-style-type: none"> • a 5-year notice period to existing tenant, • within the 5-year notice period conduct a competitive selection process for the extraction site (and if applicable adjoining lands), unless Direct Negotiation clearly meets framework, • Part 4 development assessment process undertaken • Issue approval in accordance with new framework (refer action 2) <p>22. Introduce a review condition and/or licence expiry date, such that reviews of security values and royalties are undertaken at least every two years and environmental assessments, management and monitoring programs are reviewed every five years.</p> <p>23. Apply updated security values and royalty rates based on current market prices.</p>	High	State gov. Industry
<p>24. Licence reviews and renewals over the short term. The review of licences outside of the framework detailed at Action 13, need to evaluate the environmental assessments, management and monitoring programs associated with the current licence. If key risks and threats to the marine estate are identified, then the licence may require new conditions to address risks. If licence conditions are unlikely to address key risks and threats, then the licence may not be renewed.</p>	High	State gov. Industry
D. FILE MANAGEMENT		
<p>25. Gaps in relevant documentation and licences need to be addressed. Legal advice shall be obtained on the best way to obtain this documentation.</p>	Low	State gov.

Recommended Standard Crown Licence Conditions for Consideration

1. Require the development of updated environmental management and monitoring plans, specifically tailored to the project context and licences
2. Require periodic testing of dredged material for contamination (including acid sulfate soils) except where operators can provide sufficient evidence or justification that testing is not required.
3. As a condition of the licence, require a risk assessment of impacts to estuary morphology and tidal and hydrological patterns, including a program of survey to monitor changes to the estuary associated with dredging. The following model conditions are suggested:
 - i. The holder shall forward to Crown Lands a copy of the initial bathymetric survey prepared by a registered surveyor of those parts of the riverbed from which the holder plans to remove 80% of its annual production. The survey is to be submitted prior to the commencement of extraction in the relevant operational area(s).
 - ii. The bathymetric survey is to extend 500 m upstream and downstream of the operational area(s) and be linked to cadastral boundaries.
 - iii. The holder shall provide updated surveys at 2 yearly intervals, together with a final survey at the conclusion of the term of the licence.
 - iv. The Minister reserves the right to review the above-described monitoring survey requirements at any time during the term of the licence.
4. Where not already covered under a Part 4 consent or EPL, require an updated water quality monitoring program. This program should be adapted to the risk of the site and conditioned within the renewal. Model elements required for a program are:
 - i. Specific monitoring requirements such as when, where and how water quality is to be measured by the operator.
 - ii. Indicating when and how water quality is reported, as well as, to which responsible agency.
 - iii. Specifying what action/s the operator must take if levels are exceeded.
 - iv. Dredging methodology – location, proximity to aquatic and riparian vegetation, timing with tides, fish migrations and spawning, bed and bank profile management.
 - v. Dredging equipment – heads, hoses, and maintenance of these.
 - vi. Plant and equipment servicing and refuelling – processes for maintenance and refuelling on/adjacent to waterways and requirement for pollution spill kits to be on hand and staff to be trained on their use.
 - vii. Improved maintenance of stockpile sites, erosion and sedimentation controls, no washing of stockpiled materials (deemed for use or not) into adjacent waterway.
5. For all land-based processing, storage and handling facilities, ensure the licence conditions explicitly reference the appropriate approval for these facilities or, if no approval exists, require the development of a specific environmental management plan

6. Where appropriate, require operators to consider opportunities for beneficial reuse of dredge spoil and alignment of their operations with navigational dredging. If there are opportunities, these should be included as conditions.

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