Environmental Risk Assessment for Matters of National Environmental Significance (MNES) for Finfish Aquaculture at Okehampton Bay

This document is intended as background information to support Tassal's online referral for the Okehampton marine farm development. We have adopted a 'Risk and Consequence' approach to assess the impacts of the Okehampton marine farm on Matters of National Environmental Significance (MNES). This document provides a step by step account of this approach (see Figure 1) which is subsequently summarised in the online referral. We draw on EPBC tools, policy statements and impact criteria as a starting point for each step and supplement them with evidence from the literature, environmental databases, consultation with experts, relevant environmental impact statements and Aquaculture industry documents. Conventional risk assessment methodologies have been adapted to determine the likely risks to MNES from marine farming operations undertaken at Okehampton Bay.

Figure 1: Step by step process for the Environmental Risk Assessment for Matters of National Environmental Significance (MNES) for finfish aquaculture at Okehampton Bay, Tasmania.



Impact Assessment Document follows 6 steps indicated by (1),(2)....(6)

1. List of Matters of National Environmental Significance

List of Matters of National Environmental Significance from the EPBC Protected Matters Search Tool.

Tassal used the Protected Matters Search Tool (PMST: http://www.environment.gov.au/epbc/protected-matterssearch-tool) to compile a preliminary list of Matters of National Environmental Significance for Okehampton Bay. Our search area comprised a five-kilometer buffer surrounding the 203.5 ha Okehampton Bay marine farming zone. This area includes both marine environments (Okehampton Bay) and part of the Tasmanian mainland terrestrial/coastal environment between Point Home and Cape Bougainville. The PMST identified the potential for two threatened ecological communities, fifty-two threatened species and thirty-four migratory species (Table 1) within the search area. Other matters protected by the EPBC Act on Commonwealth land included 57 marine species and 10 whales and other cetaceans.

	Group	PMST
Threatened Ecological	Giant Kelp	1
Communities	Coastal Saltmarsh	1
Threatened Species	Birds	27
	Fish	3
	Frogs	1
	Mammals	7
	Other (Land snail)	1
	Plants	12
	Sharks	1
Migratory Species	Birds	19
	Marine	8
	Terrestrial	2
	Wetlands	5

Table 1: Number of Matters of National Environmental Significance (MNES), by group, identified by the ProtectedMatters Search Tool (PMST)

Additions and Removal of Species and Communities from Protected Matters Search Tool list (birds only insofar).

Tassal used a range of desktop searches of environmental databases, review of the scientific literature and information provided in previous consultations with the Tasmanian Government, local environmental experts and consultants to:

(a) verify whether species and communities identified with the Protected Matters Search Tool were likely to occur in Okehampton Bay and surrounding areas, and

(b) to identify other Matters of National Environmental Significance (MNES) that may not have been identified through by the Protected Matters Search Tool (PMST). This resulted in the verification and removal of some species and communities from the PMST and the formulation of a final list of species and threatened communities for risk assessment.

The following databases were interrogated: (1) Tasmanian Natural Values Atlas (TNVA: https://www.naturalvaluesatlas.tas.gov.au/) and (2) The LIST (The List: http://www.thelist.tas.gov.au/). Search areas were calibrated to approximately match the search area used in the Protected Matters Search Tool.

Verification of Protected Matters Search Tool species and communities list

The PMST includes the type of presence for each of the species captured within the search area – including:

- Species or species habitat likely to occur within area
- Species or species habitat may occur within area
- Species or species habitat known to occur within area
- Breeding likely to occur within area
- Foraging, feeding or related behavior likely to occur within area

The TNVA, literature, known observations and knowledge of the preferred habitat and behavior of species was used to verify and confirm the type of presence within the search area. Consideration for further assessment was undertaken for those species where this information suggested that species were known to occur within the search area, or where possible interactions could occur by virtue of their known range.

Removals from the Protected Matters Search Tool species and communities list

A range of listed/migratory seabirds (Procellariiformes) were removed from the initial PMST list because they are unlikely to frequent, forage and feed, or interact with the proposed action, although their presence within coastal waters off Okehampton Bay is possible on an irregular basis. These seabirds prefer more wide-ranging oceanic marine waters for feeding and foraging, with breeding colonies located on offshore islands (including Macquarie Island). Hence the likelihood of interactions with marine farming activities at Okehampton Bay is low. One seabird species (Fairy Prion) was short-listed for further assessment on the basis that the PMST suggested that this species or its habitat <u>was known</u> to occur within the search area, although there are no known interactions with this species for any of Tassal's marine farming operations in south east Tasmania.

Other birds removed from the initial search included those species, such as the Masked Owl, and other woodland species where their preferred range is limited to terrestrial ecosystems, and their range would not generally overlap with the proposed action at Okehampton Bay. However, one woodland species (Swift Parrot) was included for further assessment because its range is common within the Wielangta Forest (Eastern Tasmania) and Maria Island, so there is the potential for this species to fly across open waters for foraging, feeding or breeding, although potential interactions are considered to be low.

Migratory shorebirds and waders captured by the PMST (i.e. Little Tern and Cattle Egret) were not short-listed for further assessment because the shores around Okehampton Bay do not provide important habitat for these species. However, the Hooded Plover, a known resident shorebird, has been included for further assessment because its presence has been recorded in previous shorebird surveys at Okehampton Bay.

Three fishes (Red Handfish, Ziebell's Handfish and the Australian Grayling) included within the PMST were not shortlisted for further assessment because the waters off Okehampton Bay do not represent areas within their preferred range, and interactions with the proposed action are unlikely. Advice provided by the Tasmanian Inland Fisheries Service indicates that the proposed action is unlikely to significantly impact upon Australian Grayling populations.

A selection of marine mammal species (such as the Humpback Whale, Blue Whale and Pygmy Right Whale) were not short-listed for further assessment. However, the Southern Right Whale was shortlisted because the PMST suggested that breeding was likely to occur within the known area. Any potential threats from interactions with the proposed action for this species (as well as mitigation measures), would similarly apply to any potential interactions with the Humpback, Blue and Pygmy Right Whales.

Terrestrial mammals, plants and invertebrates were not short-listed for further assessment because interactions or impacts (direct or indirect) with the proposed action are highly unlikely.

Additions to the MNES list

There were no additions to MNES list derived from the PMST.

Table 2: Number of Matters of National Environmental Significance (MNES), by group, identified the Protected Matters Search Tool (PMST) and the final MNES list (FINAL) following verification (observed or deemed possible), deletions, literature and consultation.

	Group	PMST	Deletions	Additions	FINAL
Threatened Ecological	Giant Kelp	1	0	0	1
Communities	Coastal Saltmarsh	1	1	0	0
Threatened Species	Birds	27	23	0	4
	Fish	3	3	0	0
	Frogs	1	1	0	0
	Mammals	7	6	0	1
	Other (Land Snail)	1	1	0	0
	Plants	12	12	0	0
	Sharks	1	0	0	1
Migratory Species	Migratory Marine	19	19	0	0
	Birds				
	Migratory Marine	8	6	0	2
	Species				
	Migratory Terrestrial	7	7	0	0
	Species				
	Migratory Wetland	5	5	0	0
	Species				

2. Grouping of species by morphology and potential threats

For the purpose of risk assessment, and analysing any residual impacts following the implementation of mitigation measures to MNES, short-listed species were grouped according to similar morphology and behavior. This allows for a more targeted approach to developing appropriate mitigation strategies for individual species, as well as similar species that may not be formally protected by law or other conventions, or where interactions with some species may occur beyond their known range. For instance, the mitigation measures proposed for the Fairy Prion would also apply to other seabirds that may venture into coastal waters during rough seas or storm events.

The final list of species, grouped according to similar morphology and behavior, is shown below in Table 3. This list is based on the potential for these species to feed, forage, breed or migrate within the vicinity of the proposed action, regardless of whether there is any likelihood of potential interaction with the proposed action at Okehampton Bay. Two of these species (Southern Right Whale and Great White Shark) qualify as both listed endangered/vulnerable species and listed migratory marine species.

Species	Common Name	Species Grouping		
Macrosuctic purifora	Giant Kelp Marine Forests of	Endangered		
wacrocystis pyrijera	South East Australia	Community		
Aquila audax fleayi	Wedge-tailed Eagle (Tasmanian)	Raptor		
Lathamus discolor	Swift Parrot	Woodland Bird		
Pachyptila turtur subantarctica	Fairy Prion (southern)	Seabird		

Table 3: Short-list of species extracted from the PMST and assessed for likelihood of occurrence within project area.

Thinornis rubricollis rubricollis	Hooded Plover	Shorebird		
Eubalaena australis	Southern Right Whale	Cetacean		
Carcharodon carcharias	Great White Shark	Shark		

3. Review of Environmental Impacts of Finfish aquaculture

This section reviews the potential impacts of finfish aquaculture on Matters of National Environmental Significance (MNES) with particular reference to matters identified and short-listed above. This provides useful background information for the risk assessment.

There are a range of potential environmental impacts posed by finfish Aquaculture. The Department of Environment and Energy has produced an EPBC Act Policy Statement for Offshore Aquaculture (2006) which identifies these impacts. These are supplemented by a review of the literature, management documents and consultation with local experts.

Table 4 lists the potential environmental impacts from finfish farming, and the relevance of these potential impacts from the proposed action at Okehampton Bay.

Table 4. Potential environmental impacts from offshore aquaculture – finfish, and relevance to the proposed action at Okehampton Bay.

Activity	Potential Impact	Relevance to Proposed Action at Okehampton Bay
Structures located adjacent to protected area or	Interference with survival or movement of listed	• The proposed action is located within a current,
species, within pathway of migratory species	 migratory species Reduction in social or visual amenity values of World Heritage and National Heritage properties 	 operational and working marine farm lease area at Okehampton Bay. Although Southern Right Whales are common visitors to Tasmanian waters on a seasonal basis – there are no recorded interactions with any of Tassal's marine farms in Tasmania. No World Heritage areas identified within 5 km of proposed action (PMST). Nearest Wold Heritage Property – Maria Island Convict Site will not be impacted by proposed action
Nets and mooring systems	Entanglement and entrapment of listed threatened species or listed migratory species	 Marine farming equipment, ropes and nets present potential interactions to seals, cetaceans, raptors and seabirds. Tassal meets the Aquaculture Stewardship Council's (ASC's) requirement addressing potential impacts from salmon farms on natural habitat, local biodiversity and ecosystem function (ASC Principle 2). See Tassal Sustainability Report
Supplemental feeding (nutrients from feed, faeces, uneaten food)	Algal blooms, localised eutrophication in a World Heritage Area or Ramsar Wetland	 The proposed action is not located in close proximity to either World Heritage Areas or Ramsar Sites. Tassal will monitor biological and physical water quality characteristics as part of EPA broadscale monitoring program.
	Introduction of pathogens into a World Heritage Area or the Commonwealth marine environment	 Proposed action is located in Tasmanian State waters – Commonwealth waters commence

	 or an important habitat for a listed threatened marine species where non-local sources of feed are used Increase in numbers of nuisance birds leading to impacts on listed migratory birds through egg predation and competition for nesting sites 	 approximately 23 km to the east of the proposed action. Tassal employs strategies to mitigate against the threat of disease in farmed fish at all stages of production – Tassal has documented procedures contained in its Fish Health Management Plan. The proposed action may attract gulls, terns and cormorants, but is unlikely to displace threatened birds.
Use of chemicals to prevent disease (therapeutics) and biofouling (antifoulants)	 Toxic effects (lethal and non-lethal) on non-target organisms in a World Heritage Area or the Commonwealth marine environment or an important habitat for a listed migratory species and/or a threatened marine species 	 As part of Tassal's Fish Health Management Plan, all smolt are vaccinated against bacterial diseases prior to growout. This practice has dramatically reduced Tassal's use of antibiotics. The use of antifoulant on cage netting for all Tassal's farms ceased in 2013.
Generation of waste materials including from processing (blood water, nutrients)	 Pollution of a World Heritage Area or Ramsar Wetland or the Commonwealth marine environment Altering breeding/colonising of listed threatened or migratory birds or birds in a World Heritage Area or Ramsar Wetland as a result of changed feeding patterns such as attracting nuisance birds, or alteration of seal foraging behaviour 	 Harvesting activities retain all waste materials for processing and treatment on land. The proposed action is likely to attract some birds. Tassal's approach to dealing with these interactions is through exclusion control (through sea cage aerial and submarine netting. Tassal maintains on-site, enclosed feed storage management systems and meets the ASC Standards in relation to minimisation of fines from feeding activities.
	• Introductions of pathogens into a World Heritage Area or Ramsar Wetland or an important habitat for listed threatened marine species where non- local sources of feed are used	• Tassal undertakes strict routine hygiene measures, disease reduction controls and water quality/sediment monitoring to mitigate the risk of pathogens.

Predator control/Wildlife deterrents (e.g. bird nets)	 Disturbance and/or entanglement of listed threatened or migratory species or species in the Commonwealth marine environment 	 Tassal maintains a dedicated Wildlife Management Team to manage interactions with seals, and improve wildlife management practices
	 Potential exclusion of species from preferred habitat(s) 	• The proposed action is located within a current, operational and working marine farm lease area.
Escapees	 In relation to aquatic fauna in the Commonwealth marine area, a World Heritage Area, a Ramsar Wetland or important populations of listed threatened marine species: Alteration of the genetic profile Spread of disease Competition for habitat and food Predation 	 Tassal has implemented protocols to prevent the escape of farmed salmon – through installation of K-grid netting systems, routine inspections of equipment by divers. Tassal's has not had a significant escape event in the last 10 years. See Tassal Sustainability Report. No evidence that feral populations of Atlantic salmon have established in Tasmanian waters, or are able to successfully feed and forage.

4. Risk Assessment with regard to EPBC Criteria

To assess any potential impacts on MNES from the proposed action at Okehampton Bay, the species (groups) identified in the initial screening exercise have been subjected to an evaluation of all possible impacts/interactions based on the likelihood and consequence of these occurring. This risk assessment used the framework shown in Table 5 below.

Table 5: Categories of risk for a qualitative assessment (refer AS/NZA 2006 Environmental Risk Management: Principles and Practice). Likelihood and consequence of each scored subjectively on a scale of 1 to 5. Risk ratings, as the product of likelihood and consequence, are shown in the body of the table. In this particular scheme, risk ratings have been categorised as follows: High 15-25 (dark shading); 5-12 Moderate (light shading); and 1-4 Low (unshaded). Key to EPBC Significant Impact criteria listed below.

		Insignificant	Minor	Moderate	Major	Catastrophic
		[1]	[2]	[3]	[4]	[5]
Almost Certain	[5]	5	10	15	20	25
Likely	[4]	4	8	12	16	20
Moderately Likely	[3]	3	6	9	12	15
Unlikely	[2]	2	4	6	8	10
Rare	[1]	1	2	3	4	5

Key to EPBC Significant Impact Criteria for Endangered/Vulnerable Species

- (PD) (PD) Population decrease in the size of an important population of a species
- (AR) (AR) Reduce the area of occupancy of an important population
- (FP) (FP) Fragment an existing important population into two or more populations
- (AH) (AH) Adversely affect habitat critical to the survival of a species
- (DB) (DB) Disrupt the breeding cycle of an important population
- (HQ) Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the (HQ) species is likely to decline
- (IS) Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable (ISV) species' habitat
- (ID) (ID) Introduce disease that may cause the species to decline
- (IR) (IR) Interfere substantially with the recovery of a species

Key to EPBC Significant Impact Criteria for Migratory Species

- (MH) Substantially modify, destroy or isolate an area of important habitat for a migratory species Result in an invasive species that is harmful to the migratory species becoming established in an area of
- (ISM) important habitat for the migratory species
 Seriously disrupt the lifecycle (breeding, feeding migration, resting) of an ecologically significant proportion of
- (DL) the population of a migratory species.

Key to EPBC Significant Impact Criteria for Endangered Ecological Communities

- (RE) Reduce the extent of an ecological community
- (IFE) Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines

- (AH) Adversely affect habitat critical to the survival of an ecological community
 Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological
- (MA) community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

Cause a substantial change in the species composition of an occurrence of an ecological community, including

(CSC) causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

(RIE) -- assisting invasive species, that are harmful to the listed ecological community, to become established, or

-- causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community

(IRC) Interfere with the recovery of an ecological community

Table 6. Risk assessment for Giant Kelp Forests (Endangered Community) using consequence-likelihood framework (Table 5) against each of the relevant EPBC

 Significant Impact Criteria (N = criteria not met, Y = criteria met). Assessment of impacts addressed before and after mitigation measures adopted.

Species	Potential Impact	Management	Like.	Cons.	Haz.	RE	IFE	AH	MA	SCS	RIE	IRC	Comment
Giant Kelp	Nutrient	Before (inherent)	2	2	4	N	N	N	Ν	Ν	N	N	Closest potential stands of Giant Kelp that may meet the criteria of a threatened ecological community are approximately 70 km away - Munroe Bight (Tas). Ongoing nutrient monitoring and modelling will
Forests Potential for	enrichment	After (Residual)	2	2	4	N	Ν	N	Ν	Ν	N	N	provide determinations of soluble emissions. Impacts from soluble emissions restricted to approx. 500m from proposed action. Tassal supports monthly water quality monitoring at 29 sites in south east
significant impact criteria to be met =	Smothering from	Before (inherent)	2	2	4	N	Ν	N	Ν	Ν	N	N	Tasmania (including Okehampton Bay) Particulate emissions restricted to localized areas around lease. No
LOW	fish faeces /particulates	After (Residual)	2	2	4	N	Ν	N	N	N	N	N	adverse impacts allowed beyond 35 m from lease boundary Potential for significant impact criteria to be met = LOW

Table 7. Risk assessment for Cetaceans (i.e. Southern Right Whale) using consequence-likelihood framework (Table 5) against each of the relevant EPBC Significant Impact Criteria (N = criteria not met, Y = criteria met). Assessment of impacts addressed before and after mitigation measures adopted.

Species	Potential Impact	Management	Like.	Cons.	Haz.	PD	AR	FP	AH	DB	HQ	ISV	ID	IR	MH	ISM	DL	Comment
			2	3	6	N	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	N	N	Cetaceans such as the Southern
		Before (inherent)																Right Whale are common seasonal
	Entanglement in		2	2	1	N	N	N	N	N	N	N	N	N	N	N	N	visitors to Tasmanian coastal
	netting, ropes or		2	2	7	IN IN		IN IN							IN I			waters – usually in the months
	mooring lines	After (Residual)																July-November. Observations from
																		the current leaseholder of the
																		Okehampton Bay marine farming
			2	3	6	N	N	N	N	N	N	N	N	N	N	N	N	lease suggests that 1-2 sightings
		Before (inherent)																occur most years (but not every
	F																	year).
	from marine																	-
	debris		2	2	4	N	N	N	N	N	N	N	N	N	N	N	N	No interactions with cetaceans at
		After (Residual)																the current, working lease have
		Arter (Nesidudi)																occurred in the past 10 years.
			2	2	4	N	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	N	N	Tassal employs a dedicated
Cetaceans		Before (inherent)																Wildlife Management Team to
	Noise				_													manage interactions with wildlife,
Potential for	interierence	Aftor (Posidual)	2	1	2	N	N	N	N	N	N	N	N	N	N	N	N	and train other staff with best
significant		Arter (Nesidual)																practice wildlife management skills
to be met =			2	2	4	N	Ν	Ν	N	Ν	Ν	Ν	Ν	Ν	Ν	N	N	- a dedicated team ensures that an
LOW		Before (inherent)																effective approach to managing
	Habitat																	wildlife interactions, and
	modification		2	2	4	N	Ν	Ν	N	Ν	Ν	Ν	Ν	Ν	Ν	N	N	communicating on best practice
		After (Residual)																procedures is applied consistently
			-		_													across the company.
		Defere (inherent)	3	1	3	N	N	N	N	N	N	N	N	N	N	Ν	N	
		Belore (initerent)																Controls placed on the movement
			2	1	2	N	N	N	N	N	N	N	N	N	N	N	N	of vessels (i.e. reductions in speed
																		and noise) will reduce the potential
																		threat of collisions with Southern
	Vessel																	Right Whales.
	Disturbance																	
		After (Residual)																Early warnings to staff of the
																		presence of Southern Right Whales
																		in waters adjacent to marine farms
																		will provide a more heightened
																		awareness of the need to monitor
																		for potential threats – including

									removing the threat of vessel
									collisions with Southern Right
									Whales. No work activites when
									whales are sighted within 500m of
									a marine farm.
									Potential for significant impact criteria to be met = LOW

Table 8. Risk assessment for Shorebirds (i.e. Hooded Plover) using consequence-likelihood framework (Table 5) against each of the relevant EPBC Significant Impact Criteria (N = criteria not met, Y = criteria met). Assessment of impacts addressed before and after mitigation measures adopted.

Species	Potential Impact	Management	Like.	Cons.	Haz.	PD	AR	FP	AH	DB	н	ISV	ID	IR	Comment
											Q				
	Entanglement	Before (inherent)	2	3	6	N	N	N	N	N	N	N	N	N	Possible interactions with shorebirds (such as the Hooded Plover) from the proposed action at Okehampton Bay may include a
	and Entrapment	After (Residual)	2	2	4	N	N	N	N	N	N	N	N	N	range of known impacts. Tassal's main focus on interactions with all bird species is to maintain exclusion from farming activities
		Before (inherent)	2	3	6	N	N	N	N	N	N	N	N	N	(feeding fish) through aerial bird netting, and reducing the potential onshore impacts of marine debris by using K-grid nets and
	Entanglement with Marine Debris	After (Residual)	2	2	4	Ν	N	N	Ν	N	N	Ν	N	N	minimizing the use of packaged materials. Tassal undertakes routine shoreline clean- ups (outside of shorebird breeding seasons) to ensure the potential for entanglement/habitat modification is minimized wherever possible.
Shorebirds	Collision with structures/	Before (inherent)	2	3	6	N	N	N	N	N	N	N	N	N	Tassal has not recorded or observed any collisions of birds with infrastructure (sea pens or barges) used at any of its farm sites
Potential for significant impact criteria	marine infrastructure	After (Residual)	2	2	4	N	N	N	N	N	N	N	N	N	in south east Tasmania.
to be met = LOW	Habitat Modification	Before (inherent)	3	2	6	N	N	N	N	N	N	N	N	N	The proposed action is located within a current, operational and working marine farm lease area at Okehampton Bay. The
		After (Residual)	3	1	3	N	N	N	N	N	N	N	N	N	proposed action will not displace shorebird species from this area.
		Before (inherent)	3	2	6	N	N	N	N	N	N	N	N	N	Artificial lighting (used for manning platforms and security) may disorient birds at night. Light intensity at nights is
	Artificial Lighting	After (Residual)	3	1	3	N	N	N	N	N	N	N	N	N	maintained at lowest legal level and in line with marine farming regulations – there are no farming activities undertaken at night.
		Before (inherent)	2	3	6	N	N	N	N	N	N	N	N	N	Use of chemicals on site is controlled and kept to a minimum through appropriate farm practice protocols.
	Chemical Pollution	After (Residual)	2	2	4	N	N	N	N	N	N	N	N	N	Tassal has developed its own internal Oil spill/chemical response protocols in the event of any spills. All waste is collected, stored and disposed of at land-based facilities. Measures are

							taken to minimize generation of scent trails and scavenging opportunities for birds.
							Potential for significant impact criteria to be met = LOW

Table 9. Risk assessment for Raptors (i.e. Wedge-tailed Eagles) using consequence-likelihood framework (Table 5) against each of the relevant EPBC Significant Impact Criteria (N = criteria not met, Y = criteria met). Assessment of impacts addressed before and after mitigation measures adopted.

Species	Potential Impact	Management	Like.	Cons.	Haz.	PD	AR	FP	AH	DB	H Q	ISV	ID	IR	Comment
	Entanglement	Before (inherent)	2	3	6	N	N	N	N	N	N	N	N	N	Possible interactions with raptors (such as the Wedge-tailed Eagle) from the proposed action at Okehampton Bay may include a range of known
	and Entrapment	After (Residual)	2	2	4	N	N	N	N	N	N	N	N	N	impacts. Tassal's main focus on interactions with all bird species is to maintain exclusion from farming activities (feeding fish) through aerial
	Entanglement with Marine Debris	Before (inherent)	2	3	6	N	N	N	N	N	N	N	N	N	bird netting, and reducing the potential onshore impacts of marine debris by using K-grid nets and minimizing the use of packaged materials.
		After (Residual)	2	2	4	N	N	N	N	N	N	N	N	N	Tassal undertakes routine shoreline clean-ups (outside of shorebird breeding seasons) to ensure the potential for entanglement/habitat modification is minimized wherever possible.
	Collision with structures/	Before (inherent)	2	3	6	N	Ν	N	N	N	N	N	N	N	Tassal has not recorded or observed any collisions of raptors with infrastructure (sea pens or barges) used at any of its farm sites in south
Raptors	marine infrastructure	After (Residual)	2	2	4	N	N	N	N	N	N	N	N	N	east Tasmania.
Potential for significant impact criteria	Habitat Modification	Before (inherent)	3	2	6	N	N	Ν	N	N	N	N	N	N	The proposed action is located within a current, operational and working marine farm lease area at Okehampton Bay. The proposed action will
to be met = LOW		After (Residual)	3	1	3	N	N	N	N	N	N	N	N	N	not displace raptors from this area.
		Before (inherent)	3	2	6	N	N	N	N	N	N	N	N	N	Artificial lighting (used for manning platforms and security) may disorient birds at night. Light intensity at night is maintained at lowest legal
	Artificial Lighting	After (Residual)	3	1	3	N	N	N	N	N	N	N	N	N	level and in line with marine farming regulations – there are no farming activities undertaken at night.
		Before (inherent)	2	3	6	N	N	N	N	N	N	N	N	N	Use of chemicals on site is controlled and kept to a minimum through appropriate farm practice protocols.
	Chemical Pollution		2	2	4	N	N	N	N	N	N	N	N	N	Tassal has developed its own internal Oil spill/chemical response protocols in the event of any spills.
		After (Residual)													All waste is collected, stored and disposed of at land-based facilities. Measures are taken to minimise generation of scent trails and scavenging opportunities for birds.
			2	3	6	N	Ν	Ν	Ν	N	Ν	Ν	Ν	N	

	Before (inherent)													The proposed action is located within a current, operational and working marine farm lease area
Nest Disturbance	After (Residual)	2	2	4	N	N	N	N	N	N	N	N	Ν	at Okehampton Bay. The proposed action will not impact upon the breeding success of raptors or disrupt nesting activities. Potential for significant impact criteria to be met = LOW

Table 10. Risk assessment for Woodland Birds (i.e. Swift Parrots) using consequence-likelihood framework (Table 5) against each of the relevant EPBC Significant Impact Criteria (N = criteria not met, Y = criteria met). Assessment of impacts addressed before and after mitigation measures adopted.

Species	Potential Impact	Management	Like.	Cons.	Haz.	PD	AR	FP	AH	DB	н	ISV	ID	IR	Comment
			2	2	4	N	N	N	N	N	Q	N	NI	N	Descible interactions with woodland hird
	Entanglement	Before (inherent)	2	2	4	N	N	N	IN	N	N	IN	N	N	species (such as the Swift Parrot) from the proposed action at Okehampton Bay are
	and Entrapment	After (Residual)	2	1	2	N	N	N	N	N	N	N	N	N	highly unlikely. Tassal's main focus on interactions with all bird species is to maintain output form forming activities (fooding fich)
	Entanglement with Marine Debris	Before (inherent)	2	3	6	N	N	N	N	N	N	N	N	N	through aerial bird netting, and reducing the potential onshore impacts of marine debris by using K-grid nets and minimising the use of
		After (Residual)	2	2	4	N	N	N	Ν	N	N	N	N	N	packaged materials. Tassal undertakes routine shoreline clean-ups (outside of shorebird breeding seasons) to ensure the potential for entanglement/habitat modification is minimised wherever possible.
Marcelland.	Collision with structures/ marine infrastructure	Before (inherent)	2	3	6	N	N	N	N	N	N	Ν	N	N	Tassal has not recorded or observed any collisions of raptors with infrastructure (sea pens or barges) used at any of its farm sites in
Birds/Parrots		After (Residual)	2	2	4	N	N	N	N	N	N	N	N	N	south east Tasmania.
Potential for significant impact criteria	Habitat Modification	Before (inherent)	2	2	4	N	N	N	N	N	N	N	N	N	The proposed action is located within a current, operational and working marine farm lease area at Okehampton Bay. The proposed
to be met = LOW		After (Residual)	2	1	2	N	N	N	N	N	N	N	N	N	action will not displace raptors from this area.
		Before (inherent)	3	2	6	N	N	N	N	N	N	N	N	N	Artificial lighting (used for manning platforms and security) may disorient birds at night. Light intensity at nights is maintained at
	Artificial Lighting	After (Residual)	3	1	3	N	N	N	N	N	N	N	N	N	lowest legal level and in line with marine farming regulations– there are no farming activities undertaken at night.
	Chemical Pollution	Before (inherent)	2	3	6	N	N	N	N	N	N	N	N	N	Use of chemicals on site is controlled and kept to a minimum through appropriate farm practice protocols.
		After (Residual)	2	2	4	N	N	N	N	N	N	N	N	N	All waste is collected, stored and disposed of at land-based facilities. Measures are taken to minimise generation of scent trails and scavenging opportunities for birds

		2	2	4	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	The proposed action is located within a
	Before (inherent)													current, operational and working marine farm
														lease area at Okehampton Bay. The proposed
		2	1	2	Ν	Ν	Ν	Ν	Ν	Ν	N	Ν	Ν	action will not impact upon the breeding
Nest														success of woodland bird species or disrupt
Disturbance														nesting activities.
	After (Residual)													
														Potential for significant impact criteria to be
														met = LOW

Table 11. Risk assessment for the Great White Shark using consequence-likelihood framework (Table 5) against each of the relevant EPBC Significant Impact Criteria (N = criteria not met, Y = criteria met). Assessment of impacts addressed before and after mitigation measures adopted.

Species	Potential Impact	Management	Like.	Cons.	Haz.	PD	AR	FP	AH	DB	Н	IS	ID	IR	МН	ISM	DL	Comment
											Q	V						
		Before (inherent)	2	3	6	N	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	The Great White Shark is known to
	Entanglement																	frequent Tasmanian coastal waters.
	and Entrapment	After (Residual)	2	2	4	N	Ν	Ν	Ν	N	Ν	Ν	Ν	Ν	Ν	Ν	Ν	There is no evidence that finfish
																		farming in Tasmanian waters has
		Before (inherent)	2	3	6	N	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	affected the foraging behavior of the
Sharks																		Great White Shark, or increased the
Sharks			2	2	4	N	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	Ν	potential for this species to be attracted
Potential for																		to finfish farms. However, as Mercury
significant																		Passage is a known shark nursery area,
impact criteria																		there is the potential for the Great
to be met =	Modification of																	White Shark to frequent the waters of
LOW	foraging	After (Residual)																Okehampton Bay on occasions. There
	behaviour	, inconduction																are no recorded negative interactions
																		with this species and Tassal's marine
																		farming operations.
																		Potential for significant impact criteria
																		to be met = LOW
	1					1	1	1	1	I	1	1	1	1		I	I	

5. Summary of Impacts by Species (Groups)

Risk assessments undertaken for each of the short-listed species (groups) prior to the use of mitigation measures reached a likelihood-consequence rating of "Moderate" in some instances, however this rating was reduced to "Low" once the impacts were assessed against the mitigation measures adopted by Tassal. Significant Impact Criteria were used against each of the species and threatened communities identified as potentially interacting with the proposed action, or where their habitat may be impacted from the marine farming activities. <u>The proposed action is considered</u> <u>unlikely to significantly impact on any MNES identified in this process.</u>

Species	Common Name	Species Grouping	Likelihood of Significant Impact
Macrocystis pyrifera	Giant Kelp Marine Forests of South East Australia	Endangered Community	Low
Aquila audax fleayi	Wedge-tailed Eagle (Tasmanian)	Raptor	Low
Lathamus discolor	Swift Parrot	Woodland Bird	Low
Pachyptila turtur subantarctica	Fairy Prion (southern)	Seabird	Low
Thinornis rubricollis rubricollis	Hooded Plover	Shorebird	Low
Eubalaena australis	Southern Right Whale	Cetacean	Low
Carcharodon carcharias	Great White Shark	Shark	Low

Table 12. Summary of risk ratings (likelihood-consequence) for short-listed species groups.