Application Form

Section 220ZW Licence

under the *Fisheries Management Act 1994* authorising an action that is likely to result in one or more of the following [please tick]:

Harm to a threatened species, population or ecological community (s220ZW(1)(a))	✓
Damage to a critical habitat (s220ZW(1)(b))	
Damage to a habitat of a threatened species, population or ecological community (s220ZW(1)(c))	
This application includes a Species Impact Statement	N

1. Applicant's Name : *(if additional persons require authorisation by this licence, please attach details of names and addresses)*	Mr Andrew Walsh	
2. Australian Business Number (ABN):	33 280 968 043	
3. Organisation or company name and position of applicant : *(if applicable)*	Lord Howe Island Board Project Manager – Rodent Eradication Project	
4. Postal address : Email address:	PO Box 5 Lord Howe Island NSW 2898 Andrew.Walsh@lhib.nsw.gov.au	Telephone: 026563 2066
Location of the action *(including decimal Latitude and Longitude references, Lot and DP and local government area and delineated on a suitably scaled map).*	Lord Howe Island (LHI) is located 780 kilometres north-east of Sydney. LHI and its associated islands and rocky islets (excluding Balls Pyramid), are hereafter referred to as the Lord Howe Island Group (LHIG). The LHIG is located within the Lord Howe Island Marine Park (NSW) out to 3 nautical miles under NSW jurisdiction (See Attachment 1) and the new Lord Howe Commonwealth Marine Reserve (under Commonwealth authority), a further area of 110 000 km^2). Coordinates for the project area boundary are provided below in Table 1. Further details, maps and figures are found in Section 1.5 of the attached Public Environment Report (PER).	

Table 1: Project Area Coordinates

Location point	Latitude			Longitude		
	degrees	minutes	seconds	degrees	minutes	seconds
1	-31	28	53	159	4	23
2	-31	31	31	159	0	38
3	-31	36	18	159	4	8
4	-31	33	47	159	8	3

The Proposed REP will occur over the entire LHIG, excluding Balls Pyramid.
The LHIG consists of the following lease types:

- The Permanent Park Preserve
- Crown Land
- Permissive Occupancy
- Perpetual Leases
- Special Leases

Lease Boundaries are shown on Figure 5 of the attached PER.

The LHIG is part of the State of New South Wales and, for legal purposes, is regarded as an unincorporated area administered by the Lord Howe Island Board (Board), a statutory authority established under the provisions of the *Lord Howe Island Act, 1953* (the Act). The Board is directly responsible to the NSW Minister for the Environment and comprises four Islanders elected by the local community and three members appointed by the Minister. It is charged with the care, control and management of the Island's natural values and the affairs and trade of the Island. It is also responsible for the care, improvement and welfare of the Island and residents.

The LHIB carries out all local government functions on behalf of approximately 350 Island residents. It controls all land tenure on the island and administers all residential and other leases in accordance with the Act. The LHIB manages the Island PPP and the protection and conservation of the Island's fauna and flora.

The LHIB also undertakes the role of the relevant Local Government Authority and Consent Authority under the NSW *Environment Planning and Assessment Act, 1979.*

6. Full description of the action and its purpose including construction, operational and decommissioning footprint *(e.g. describe proposed development, or provide copies of relevant documents etc.)*

The Lord Howe Island Board (LHIB) is proposing to undertake the Lord Howe Island Rodent Eradication Project (LHI REP). The LHI REP aims to eradicate introduced rodents: the Ship Rat *(Rattus rattus*) and the House Mouse (*Mus musculus*) from the LHIG. Rodents are currently having significant impacts on World Heritage values including impacts to a range of federal and NSW listed threatened species. The eradication of rodents will also present an opportunity to simultaneously eradicate the introduced Masked Owl.

	The one-off eradication proposes to distribute a cereal-based bait pellet (Pestoff 20R) containing 0.02g/kg (20 parts per million) of the toxin, Brodifacoum across the LHIG (excluding Balls Pyramid). Methods of distribution will be dispersal from helicopters using an under-slung bait spreader bucket in the uninhabited parts of the island (most of the LHIG) and by a combination of hand broadcasting and the placement of bait in trays and bait stations in the settlement area. In the outdoor areas of the settlement, baits will be dispersed by hand and/or placed into bait stations. In dwellings (e.g. in ceiling spaces or floor spaces) bait trays and bait stations will be used. Given the size and rugged terrain of the LHIG, the exclusive use of baits stations is not feasible for the eradication. The operation is targeted for winter of 2017 (June to August) however to allow operational flexibility and to account for unforeseen delays, approval is sought for at least a three year period, June 2017 to December 2019. The LHI REP has received significant funding ($9M) in 2012 for planning and implementation from the Federal Government's former Caring for Our Country Program (now National Landcare program) $4,500,000 and the NSW Environment Trust $4,542,442. Further detail on operational activities is provided in Section 2 of the attached PER. The PER also provides detail on: • The project background (Section 1.6) • Consequences of not undertaking the REP (Section 1.9) • Alternatives considered and justification for the chosen methodology (Section 3).
7. Details of the area to be affected by the action and provide photos of the site *(e.g. site description, area to be impacted in hectares etc.)*	The overarching goal of successfully eradicating rodents is dependent upon ensuring the delivery of a lethal dose of toxicant to every rodent on the island in a manner that minimizes harm to the ecosystem while still maintaining a high probability of success. Rats and mice occur throughout LHI, including the settlement. LHI is the only island in the LHIG that is known to contain rodents. However, ship rats are able to swim over 500 m and both rats and mice are difficult to detect at low densities. It is therefore possible that either species may occur on offshore islands and islets close to the main island or may invade those islands prior to the implementation of the operation. To minimise the risks of operational failure, the main island and all nearby islands and islets, other than Balls Pyramid and its associated islets, will be baited. The 23 km distance between Balls Pyramid and the main island renders the chances of invasion by rodents very low. The 2 dimensional area of LHI is 1,455 ha. The 3 dimensional area when considering the rugged topography is approximately 2,100 ha. Indicative areas for treatment by aerial broadcast, hand broadcast and bait stations are shown in Figure 5 of the attached PER. Bait will not be intentionally applied to the marine environment however when Brodifacoum pellets are applied aerially to islands in attempts to eradicate rodents, all terrestrial habitats which may harbour rodents must receive bait. In achieving this it is often the case that a small

	quantity of bait enters the marine environment within 5-10m of the shore, particualrly on rugged coastal areas. On LHI it will be impossible to collect these baits. Baiting around the coast line will occur above the mean high water mark to minimise bait entry into the marine environment. A deflector arm can be attached to the spreader bucket to restrict the arc of the swathe to 180^{o} and will be used particularly when baiting the edge of buffer zones and to minimise bait entry into the marine environment when baiting coastal areas. The Lagoon foreshore and some other beaches will be hand baited to furhter mimise the possibility of bait entering the water. The fate of bait pellets that enter the Marine environment is dicsussed in detail in section 5.2.1 of the attached PER.
8. Duration and timing of the action *(including staging, if any).*	The one off operation is programmed to take place in winter 2017 (June-August), when the availability of natural food for rodents is low, rodent breeding is greatly reduced or absent and the rodent populations are likely to be at their seasonal lowest. This is also a period when most non-target seabirds are absent from the LHIG and is the tourist low season. The proposal is for aerial and hand baiting to be carried out twice only, the applications separated by about 14-21 days (depending on the weather) although the number of applications in and around dwellings may be more as it is dependent on the rate of removal by rodents of distributed baits. This will maximise the exposure of rodents to the bait. The proposed application rate for the first bait drop is 12 kg of bait per hectare, and 8 kg per hectare for the second drop. These application rates relate to the actual surface area of the islands. Most rodents will be killed by bait from the first bait drop. However, it is beneficial to carry out a second bait drop to eliminate the likelihood of any gaps in the distribution of baits, ensure bait is available long enough to ensure that all individuals receive a lethal dose and to target: • individuals that may have been denied access to bait distributed in the first application (by more dominant individuals that will now be dead), and • any surviving young that have recently emerged from the nest. Bait drops will be timed to avoid periods of predicted heavy rainfall (as this may prematurely dissolve the bait) and cannot take place in more than light winds or in the presence of low cloud. Therefore weather will influence the actual timing of the two bait drops. Weather forecasts of rainfall and wind speeds will be obtained from the Bureau of Meteorology station on LHI from June onwards. A forecast of less than 15 knots and four fine days (three fine nights) without significant rainfall (less than 6 mm daily) is preferred for each drop but the decision to apply bait will be taken by the operations manager at the time when all relevant factors are known. Given the possibly limited operational window, approval is sought for at least a three year period to account for unforeseen delays beyond winter 2017, however the operation would only occur once during that period.
9. Is the action to occur	

on land (or waters) declared as critical habitat*? *(tick appropriate box)*	☐ Yes ☒ No If Yes, critical habitat for which species? ……..			
10. Threatened species, populations or ecological communities to be harmed.	Scientific name	Common name *(if known)*	Conservation status *(i.e. critically endangered, endangered or vulnerable)*	Details of no. of individual animals and plants, or proportion and type of plant material *(e.g. whole plants or plant parts)*
	Epinephelus daemelii	Black Rockcod	Vulnerable	Unknown numbers present around LHI. Expected to be very low numbers within areas near shore.
	Carcharodon carcharias	Great White Shark	Vulnerable	Transitory around LHI waters. Unlikely that any individuals would be harmed
	Sphyrna lewini	Scalloped Hammerhead Sharks	Endangered	Transitory around LHI waters. Unlikely that any individuals would be harmed
	Sphyrna mokarran	Great Hammerhead Sharks	Vulnerable	Transitory around LHI waters. Unlikely that any individuals would be harmed
	Thunnus maccoyii	Southern Bluefin Tuna	Endangered	Transitory around LHI waters. Unlikely that any individuals would be

* Critical habitat means habitat declared as critical habitat under Part 7A of the *Fisheries Management Act 1994*.

				harmed

11. Species impact: *(please tick appropriate box)* a) For action proposed on land (or waters) declared as critical habitat; or b) For action proposed on land (or waters) <u>not</u> declared as critical habitat.	a Species Impact Statement (SIS) is attached	☐ Yes	☒ No
	Items 12 to 24 have been addressed	☒ Yes	☐ No

N.B: Provision of a Species Impact Statement (SIS) is a statutory requirement of a licence application if the action is proposed on critical habitat.
The provision of information addressing items 12 to 17 is a statutory requirement of a licence application if the action proposed is <u>not</u> on land (or waters) that is declared critical habitat. Information addressing all of the questions below must be attached to the application.

12. Describe the type and condition of habitats in and adjacent to the land (or waters) to be affected by the action.	Ocean waters from the high water mark to three nautical miles offshore from Lord Howe Island (including the Admiralty Islands and Balls Pyramid) form part of the state of NSW and are protected under the approximately 47,000 hectare NSW Lord Howe Island Marine Park, declared in 1999 (see attachment 1). The recently declared 110,000km^2 Lord Howe Commonwealth Marine Reserve (replacing the former 3,000km^2 Lord Howe Island Marine Park (Commonwealth Waters)) commences three nautical miles from the high water mark of the LHIG. Transitional management arrangements were in place however no operational changes were yet in effect. No impact is expected to the Commonwealth Marine Reserve. It is difficult to distinguish the values of the NSW Lord Howe Island Marine Park from the Lord Howe Commonwealth Marine Reserve. A summary of values is presented below. Further detail is provided in section 4.4.1 of the attached PER. The waters of Lord Howe Island are renowned for their clarity, relatively high coral and algae cover. The island supports the southernmost barrier coral reef and associated lagoon in the world, differing considerably from more northerly warm water reefs (Environment Australia, 2002). The fringing coral reef and associated sheltered lagoon, open coast, near shore rocky reefs, sandy beaches, mid-shelf reefs, intertidal reefs, seagrass beds, mangroves, unconsolidated shelf habitats, rugged seamount shelves and slopes, pelagic waters, shallow inshore lagoons, and the steep drop offs to deep ocean create a diverse topography that maximises exposure to ocean currents from all directions and thus the potential for high biodiversity (Environment Australia, 2002). Tropical species tend to dominate in terms of total species counts,

	although temperate animals and plants dominate in terms of abundance and biomass (Marine Parks Authority 2010). The only habitats potentially affected by the REP will be near shore habitats (open coast, rock pools and rocky and intertidal reefs within 5-10m of the shore) surrounding rugged or steep areas of the coast line that are aerially baited (see Figure 5 of the attached PER). A small amount of bait may enter the marine environment in these areas. Estuaries that form part of the Marine Park (Soldiers Creek, Cobbys Creek and Old Settlement Creek) may also recieve small amounts from the areial application. Baits are unlikely to enter the water in aerially baited sandy beaches as bait will be applied only above the high water mark. This is also true for areas that are baited by hand. Therefore baits could potentially enter the water in rugged areas of the following zones of the LHI Marine Park. • Neds Beach and Admiralty Islands Sanctuary Zone (although Neds Beach will be baited by hand broadcast and or bait stations) • North Bay Sanctuary Zone • East Coast and Shelf Sanctuary Zone • The remaining Habitat Protection Zone around LHI (excluding parts of the Lagoon that will be baited by hand or bait station) The Lagoon Sanctuary Zone will not be impacted due to the 50m offset from the shore.
13. Provide details of any known records or potential of a threatened species in the same or similar known habitats in the locality *(include reference sources).*	<u>Black Rockcod</u> The Black Rock Cod is recorded from warm temperate and subtropical waters of the south western Pacific, including off south eastern Australia, Lord Howe Island, Norfolk Island, the Kermadec Islands and northern New Zealand. It is a large reef-dwelling grouper. Adult Black Rockcod are known to occur in caves, gutters and on rocky reefs from near shore environments to depths of at least 50 m (Heemstra and Randall 1993). Recently settled small juveniles are occasionally found in intertidal rock pools along the NSW coastline and larger juveniles are generally captured by anglers on rocky reefs in estuary systems. It is likely that they are epibenthic predators feeding on macroinvertebrates (mainly crustaceans) and fishes on or near the bottom (DPI, 2012). Within NSW, and along the mainland coast of eastern Australia the most important sites for *E. daemelii* abundance in NSW were considered to Fish Rock at Smoky Cape, the Solitary Islands Marine Park, and the Port Stephens–Great Lakes Marine Park (Harasti and Malcom, 2013 and DPI, 2012). The Lord Howe population was not considered overly important. Black Rockcod are considered to be common around Elizabeth and Middleton reef systems, two offshore reefs in Commonwealth waters in the northern Tasman Sea. It is not known whether the Black Rockcod populations from coastal NSW, Lord Howe and Norfolk Islands, Elizabeth and Middleton reefs and the Kermadec Islands (NZ) represent separate genetic stocks, however genetic evidence

	from one study undertaken by van Herwerden *et al* (cited in DPI, 2012) suggests that the Elizabeth and Middleton Reef populations are not distinct from each other and not distinct from the coastal population on the Australian east coast and rather are part of a larger single stock . In a targeted NSW wide study of the species conducted by Harasti & Malcolm (2013), a total of 12 individual Black Rock cod were recorded from 8 sites (of 18 sites studied) on LHI. 42% of the 12 fish observed around LHI were considered to be cryptic as they were only found in overhanging shelves or caves with a torch required to find them. Apart from two juvenile fish observed in the lagoon most fish were recorded in water from 10 to 30 m in depth. The predominant habitats that *E. daemelii* were observed utilizing in this study were rocky reefs, especially with caves or overhangs. Comprehensive baseline sub tidal fish surveys (Aquenal, 2006) across 31 sites in various habitat around LHI and the Admiralty Islands found only one Black Rock Cod (Sugar Loaf Island). Therefore whilst there is potential for Black Rock Cod to be found within near shore habitat potentially affected by the REP it is likely that this would be restricted to very low numbers of juveniles. <u>Great White Shark</u> Occasionally recorded in waters around the LHIG. Local information from local fisherman and surfers from the island say the species is probably seen in the LHI area once or twice a year from personal observations. Unlikely to be within near shore habitats affected by the REP. <u>Scalloped Hammerhead Sharks</u> The Scalloped Hammerhead Shark is a coastal pelagic species with a circumglobal distribution between 45^{o}N and 34^{o}S, but occurs more frequently during the warmer months at higher latitudes (Last & Stevens 2009). The species occurs in NSW between at least November and June (and perhaps longer) (Reid & Krogh 1992; Macbeth et al. 2009). It occurs inshore and over the continental shelf and in adjacent deep water from the surface to at least 275 m depth (Last & Stevens 2009). However, there is sexual niche separation, with mature females occupying offshore waters and only moving onto the continental shelf to mate and give birth (Klimley 1987; Stevens & Lyle 1989, Hazin et al. 2001). Further, Harry et al. (2011a) suggest two life strategies for males; pelagic strategists and inshore strategists. Stevens (1984) and Macbeth et al. (2009) suggest that few mature females occur in NSW. During the day, adults aggregate around sea-mounts and pups aggregate in shallow inshore waters. The diet of adults is dominated by teleost fishes (61.9%), crustaceans (22%) and cephalopods (15.5%) (Cortés 1999) and suggests pelagic foraging (Stevens and Lyle 1989). Pups feed on fish and nocturnally active crustaceans (Clarke 1971). Unlikely to be within near shore habitats affected by the REP in significant numbers <u>Great Hammerhead Sharks</u>

	The Great Hammerhead has a circumglobal distribution between the latitudes of 40°N and 35°S. They are a nomadic, generally solitary and highly migratory species that ranges in tropical and warm temperate seas. They are found throughout the seas around northern Australia and have been recorded occurring as far south as Sydney. The Great Hammerhead is a coastal-pelagic and semi-oceanic species, occurring along coastlines, continental shelves and adjacent drop-offs to about 80 m depth. In NSW waters Great Hammerheads are most likely to occur north of Sydney and mainly during the warmer months. The diet of the Great Hammerhead Shark consists of fish, other sharks, rays, crustaceans, and cephalopods (squid, octopus and cuttlefish). Unlikely to be within near shore habitats affected by the REP <u>Southern Bluefin Tuna</u> Southern Bluefin Tuna are found in oceanic waters normally on the seaward side of the continental shelf. Worldwide the species is considered a single population. Southern Bluefin Tuna are carnivorous, feeding mainly on fish, squid, krill and salps. In offshore waters, they also eat small crustaceans and larger fish. Unlikely to be within near shore habitats affected by the REP
14. Provide details of any known or potential habitat for a threatened species on the land (or waters) to be affected by the action *(include reference sources).*	Potential habitat for the Black Rock Cod that could be affected by the REP is restricted to be near shore rock pools and rocky and intertidal reefs particularly with caves or overhangs (Harasti and Malcom 2013) within 5-10 m of the shore surrounding rugged or steep areas of the coast line that are aerially baited. Habitat for other listed species is unlikely to be affected.
15. Provide details of the amount of such habitat to be affected by the action proposed in relation to the known distribution of the species and its habitat in the locality.	Whilst it is difficult to calculate the amount of Black Rock Cod habitat that would potentially be affected by the REP, it is considered that potential habitat within 5-10m of the shore would be a small fraction of the total available habitat for the species on LHI. Whilst the habitat frequented by the species is very common around the cliffs and mountainous regions of LHI, most of the individuals recorded on LHI were found in water 10 -30m deep (likely to be further than 10m from shore in most areas). They were also observed on coral reefs at LHI, although they are not generally known to be associated with coral habitat. Adult *E. daemelii* were found to occur at several sites deeper than 30m on the Lord Howe shelf and have been reported from deeper reefs around LHI (Harasti and Malcom,2013). Habitat for other listed species is unlikely to be affected.
16. Provide an assessment of the likely nature and intensity of the effect of the action on the lifecycle and habitat of the species.	Potential impacts to listed threatened species in the marine environment are limited to: • accidental bait entry into the water (either through aerial distribution or a spill) leading to: o Pollution of water. Pollution of marine water resulting in impacts to threatened marine species is considered extremely unlikely considering the minimal amount of bait likely to enter the water, the

insolubility of Brodifacoum and the huge dilution factor. The fate of the Pestoff bait pellet and the toxin Brodifacoum in the marine environment is described in detail in section 5.2.1 of the attached PER.

- Primary or secondary poisoning of fish, marine mammals, marine reptiles, marine invertebrates that inhabit or transit through the Lord Howe Island Marine Park. Threatened species are unlikely to have sufficient exposure to the bait to have a significant impact at a population level. Potential for bioaccumulation in the marine environment is described in section 5.2.2 the attached PER.

Any potential impacts are likely to be very localised and temporary in nature.

Pollution of water

The application rate of Pestoff 20R over the LHIG group will be two applications (14- 21 days apart); 12/kg/ha and 8kg/ha giving a total application rate of 20kg/ha of Pestoff 20R pellets. For simplicity this can be considered a single application. At 20mg/kg Brodifacoum concentration this will result in application of 0.4g/ha of Brodifacoum. In the marine and aquatic environment, the dosage rate of 0.4 g/ha Brodifacoum equates to 0.4 g /1.5ML (1 ha of water 15cm deep) or 0.2ug/L in the worst case scenario. This worst case scenario assumes that the entire 20kg/ha (i.e. all of the bait from coastal swaths in both bait drops) ends up in the water. This is considered highly unlikely considering Howald *et al*. (2005) showed that when baits were applied aerially to steep cliffs, (application rate of 15kg/ha) a mean of only 72 baits over 500 m stretch of coast (~2ha) ended up in the water. This would equate to less than 0.5% out of the approximate 15,000 baits applied over that area ended up in the sea. Using a similar percentage of bait that could bounce off the cliffs and ended up in the sea in the LHI REP situation, a more likely predicted environmental concentration in the marine environment would be in the order of 0.01ug/L.

It is possible for marine organisms to absorb Brodifacoum through their gills or skin (Empson and Miskelly 1999), and Brodifacoum is considered to be toxic to aquatic organisms, but at concentrations in their environment many orders of magnitude greater than those that could be associated with the small amount of bait that may be deposited in the sea as the result of rodent baiting operations conducted on nearby land. Even the 0.2ug/L in the worst case scenario described above is still orders of magnitude below the known Lethal Concentrations (LC) for the most sensitive marine species. LC, referring to the concentration of a chemical in a medium such as air or water, is the measure of the toxicity of that chemical to a particular test subject. Typically it is defined as LC_{50} for exposure for a certain amount of time; the 50 indicating the concentration likely to kill 50% of those organisms exposed to it.

Table2 2: Lethal Concentrations (Lc50 Mg/L) of Brodifacoum for a Range of Fish and Aquatic Invertebrates (from Broome *et al*,

2016)

SPECIES	LC50 mg/L	REFERENCES
Fish	Range: 0.02 - >10.0 mg/L	
Bluegill sunfish (*Lepomis macrochirus*)	0.12 (96-hour LC50)	USEPA (2005)
	0.165 (96-hour LC50)	Eason & Wickstrom (2001)
Crucian Carp (*Carassius carassius*)	>10.0 (24 hour LC50)	USEPA (2005)
	>10.0 (48 hour LC50)	USEPA (2005)
	1.0 (72 hour LC50)	USEPA (2005)
	1.0 (96 hour LC50)	USEPA (2005)
	1.0 (7 day LC50)	USEPA (2005)
	1.0 (14 day LC50)	USEPA (2005)
	0.1 (21 day LC50)	USEPA (2005)
Common carp (*Cyprina carpio*)	>10.0 (24 hour LC50)	USEPA (2005)
	>10.0 (48 hour LC50)	USEPA (2005)
	1 (72 hour LC50)	USEPA (2005)
	1 (96 hour LC50)	USEPA (2005)
Cyprinid (*Leucaspius delineatus*)	>10.0 (24 hour LC50)	USEPA (2005)
	>10.0 (48 hour LC50)	USEPA (2005)
	1.0 (72 hour LC50)	USEPA (2005)
	1.0 (96 hour LC50)	USEPA (2005)
	1.0 (7 day LC50)	USEPA (2005)
	0.1 (14 day LC50)	USEPA (2005)
	0.1 (21 day LC50)	USEPA (2005)
Rainbow trout (*Oncorhynchus mykiss*)	0.155 (24-hour LC50)	Eason & Wickstrom (2001)
	0.051 (96 hour LC50)	Eason & Wickstrom

		(2001)
	0.02 (96 hour LC50)	USEPA (2005)
	0.025 (96 hour LC50)	USEPA (2005)
	0.04 (96 hour LC50)	(Anonymous 2009)
Tench (*Tinca tinca*)	>10.0 (24 hour LC50)	USEPA (2005)
	>10.0 (48 hour LC50)	USEPA (2005)
	1.0 (72 hour LC50)	USEPA (2005)
	1.0 (96 hour LC50)	USEPA (2005)
	1.0 (7 day LC50)	USEPA (2005)
	0.1 (14 day LC50)	USEPA (2005)
	0.1 (21 day LC50)	USEPA (2005)
Aquatic Invertebrates	Range: 0.34 - >10.0 mg/L	
Daphnia (*Daphnia magna*)	1.0 (24 hour LC50)	Eason & Wickstrom (2001)
	0.34 (48 hour LC50)	Eason & Wickstrom (2001)
	0.98 (48 hour LC50)	USEPA (2005)
Tubificid worm (*Tubifex tubifex*)	>10.0 (24 hr LC50)	USEPA (2005)
	>10.0 (48 hr LC50)	USEPA (2005)
	>10.0 (72 hr LC50)	USEPA (2005)
	1.0 (96 hr LC50)	USEPA (2005)
Mosquito larvae (*Aedes aegypti*)	8.23 (24hr LC50)	Jung & Moon (2011)

The accidental spillage of 360g of Brodifacoum into the sea in New Zealand from a single-point discharge of 18 tonnes of bait was not associated with any long-term adverse effects on the marine environment (see Section 7-2.3.3). This incident represents an extreme example of Brodifacoum contamination. Although 18 tonnes of bait, almost half the total proposed to be applied to the whole of the LHIG, was deposited into the sea at one point, the overall effect was small and localised (Primus *et al.* 2005). There were no report of damage to the surrounding reefs (Primus *et al*. 2005), and what effect there was on the local marine life was limited in extent and transient (*ibid*). Although it is possible that, as a

consequence of the aerial baiting of the LHG, some pellets will land in the ocean, the number of such pellets will be small. In an aerial baiting programme conducted on a U.S. island where baits were dispersed at a higher application rate then that proposed for the LHG, the average number of pellets landing per 500 metres of coastline was only 72 (Howald *et al*. 2005). If nine million pellets deposited at one point resulted in a limited and transient effect on the marine environment within a 100 metres of the spill-site (Primus *et al.* 2005) then, intuitively, 14 pellets in 100 metres (Howald *et al.* 2005) would have negligible effect on the marine environment of LHI.

Other baiting operations using similar methods to the one proposed for LHI have not caused harm to marine organisms (Howald *et al.* 2005; Samaniego-Herrera *et al.* 2009), even though the bait application rates in those operations were up to double that proposed for LHI, and the bait more concentrated (i.e. 50ppm compared to 25 ppm on LHI).

Pollution of water within the marine environment is therefore considered extremely unlikely considering:

- The use of specialised equipment on the bait hopper will ensure minimal bait entry to the water.
- The amount of bait that may bounce off the cliffs to fall into the sea will be minimal (Howald *et al.* 2005; Samaniego-Herrera *et al.* 2009);
- Brodifacoum is practically insoluble, particularly in cold seawater (Primus *et al.* 2005) such as will be found off LHI in August, therefore extremely little Brodifacoum will dissolve out from the baits and remain suspended in the water. This, coupled with the significant dilution factor, will mean that the amount of Brodifacoum assimilated into the marine environment will be many orders of magnitude lower than the concentrations known to be toxic to fish (Empson 1996); and
- Baiting other islands using similar methods, although sometimes using significantly more bait, has not resulted in adverse effects on the marine environment a s a whole.
- Any potential impacts are likely to be very localised and temporary in nature.

Primary or Secondary Poisoning of Marine Organisms

Marine invertebrates
Because many marine invertebrates scavenge or graze on items on the sea bottom or in intertidal areas, it is possible that a few may pick up bait pellets or pellet fragments prior to the pellets breaking down in the water. Breakdown of a pellet would likely take only a few minutes, especially if the water is rough (Empson and Miskelly 1999). However, evidence against the existence of a significant dietary-exposure pathway for invertebrates comes from field sampling of marine invertebrates following an actual rodenticide application (Howald *et al*. 2005) where no Brodifacoum was

	detected in invertebrate species. Sampling undertaken after a spill of 18 tonnes of 0.002% (20 ppm) Brodifacoum bait in New Zealand in 2001 (Primus *et al*. 2005,) also demonstrated that even when extremely large amounts of Brodifacoum enter the sea, the effect on the marine environment is transient and localised. Therefore baiting of the Lord Howe Island Group poses negligible risk to local marine invertebrates. *Corals* The rodent eradication will not pose a risk to coral because: 1) the pellets and most pellet fragments are too big for the filter-feeding coral polyps to eat; 2) the solubility of Brodifacoum in water is poor and the amount of rodenticide in pellets (20 ppm) is low to begin with, thus the risk of corals absorbing dissolved Brodifacoum is negligible; and 3) there is no known physiological mechanism by which vertebrate anticoagulants can affect invertebrates. *Fish* If in sufficient quantity, it is possible for fish to absorb Brodifacoum through their gills or skin (Empson and Miskelly 1999). However, the proposed baiting of the LHIG is likely to result in only a small number of baits landing in the sea. Because i) Brodifacoum is practically insoluble in water, ii) the total amount of Brodifacoum is minute, and iii) the dilution factor is great, the risk of fish absorbing Brodifacoum is negligible. Whilst there is a possibility that individual fish will ingest sufficient pellets to consume a lethal dose, impacts to the values of the LHI Park Marine Environment are very unlikely. Similarly the likelihood of secondary poisoning is also considered unlikely. In summary, the proposed baiting of LHI does not pose a threat to the marine life (Cetaceans, seals, turtles, fish or invertebrates, including coral) or the conservation values of the Lord Howe Island Marine Park because: • The use of specialised equipment on the bait hopper will ensure minimal bait entry to the water. The amount of bait that may bounce off the cliffs to fall into the sea will be minimal (Howald *et al.* 2005; Samaniego-Herrera *et al.* 2009); • The breakdown of baits that do land in the sea will be rapid (Empson and Miskelly 1999), therefore the opportunity for fish to take baits will be limited; • Fish have shown a lack of interest in baits (Samaniego-Herrera *et al.* 2009, U.S. Fish and Wildlife Service and Hawai'i Department of Land and Natural Resources 2008), so it is unlikely that many fish will take baits; • The possible death of those few fish that find and eat enough baits to prove fatal does not pose a threat at the population level; • Baiting other islands using similar methods, although sometimes using significantly more bait, has not resulted in adverse effects on the marine environment • Any potential impacts are likely to be very localised and

	temporary in nature. Appendix I of the PER contains a number of hypothetical examples where the contamination levels resulting from that bait spill have been assumed to exist off the LHIG, and involve representatives of some of the fauna that may be found in the area. This analysis demonstrates that the risks to marine species around the Lord Howe Island Group are negligible, and, accordingly, marine species are not affected species. It also contains a summary of attraction of fish to bait pellets from testing undertaken on Lehua Island, Hawai'i, in 2004 (U.S. Fish and Wildlife Service, 2008).
17. Provide details of proposed measures to avoid or ameliorate the effect of the action.	Measures used to mitigate potential environmental harm are summarised below: **Bait selection** The lower concentration of Brodifacoum in the bait, namely 20 parts per million, also reduces the possibility of non-target kills while still being highly lethal to rodents. Baiting on LHI currently involves the use of bait containing 50 parts per million of Brodifacoum which is 250% as toxic as that proposed for the eradication. Pestoff® Rodent Bait 20R pellet product breaks down more quickly than most commercial rodenticides which tend to contain waxes and other compounds aimed at extending bait life in the field. This would extend unacceptably, the period of non-target risk. The more rapid physical bait breakdown rate for Pestoff® Rodent Bait 20R and its lower toxicity provide an effective compromise between maintaining target animal efficacy and reducing non-target risk. **Minimising Bait Entry in the Water** Baiting around the coast line will occur above the mean high water mark to minimise bait entry into the marine environment. A deflector arm can be attached to the spreader bucket to restrict the arc of the swathe to 180^{o} and will be used particularly when baiting the edge of buffer zones and to minimise bait entry into the marine environment when baiting coastal areas. The Lagoon foreshore and some other beaches will be hand baited above the high water mark to significantly reduce the amount of bait entering the water.. **Monitoring** An extensive monitoring program will be conducted during and after the REP. This includes • Monitoring of weather in the lead up to and during the REP. • Monitoring breakdown of baits after distribution. Bait breakdown will be monitored at random sites using the Craddock Condition Index described above at approximately 30 day intervals until complete disintegration. • Soil Monitoring after distribution. Post operational soil samples will be collected to monitor residues of Brodifacoum in the soil. Representative samples will be collected from directly below some toxic bait and at control sites away from bait pellets. Soil samples will be collected approximately 30 days after bait disintegration and approximately every two

	months (if required, dependant on results). All tests will be conducted at a NATA accredited analytical laboratory. • Random sampling will be conducted on water bodies on the island to monitor Brodifacoum levels after the bait drop. Water samples will be collected within 2 days of each bait drop and approximately weekly 30 (if required, dependant on results). All tests will be conducted at a NATA accredited analytical laboratory. Rain water tanks will be sampled if requested by residents. • Monitoring for ill and dead non target species. Ill individuals will be treated with Vitamin K where possible. Carcasses of rodents and non target species will be collected if found.

N.B: The Director-General must determine whether the action proposed is likely to significantly affect threatened species, populations or ecological communities, or their habitats. To enable this assessment, the Applicant is required to address items 18 to 24. Any additional information referred to in addressing these items must be provided with the application.

18. In the case of a threatened species, is the action proposed likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction?	Pollution of marine water resulting in adverse effects on the life cycle of threatened species is considered extremely unlikely considering the minimal amount of bait likely to enter the water, the insolubility of Brodifacoum and the huge dilution factor. Threatened species are unlikely to have sufficient exposure to the bait to have a significant impact at a population level. <u>Black Rockcod</u> No. Unlikely to have sufficient exposure to bait. <u>Great White Shark</u> No. Species unlikely to be present or present in small numbers. Unlikely to have sufficient exposure to bait. <u>Scalloped Hammerhead Sharks</u> No. Species unlikely to be present or present in small numbers. Unlikely to have sufficient exposure to bait. <u>Great Hammerhead Sharks</u> No. Species unlikely to be present or present in small numbers. Unlikely to have sufficient exposure to bait. <u>Southern Bluefin Tuna</u> No. Species unlikely to be present or present in small numbers. Unlikely to have sufficient exposure to bait.
19. In the case of an endangered population, is the action proposed likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be	N/A. No endangered populations are listed for the LHIG under the *Fisheries Management Act 1994*.

placed at risk of extinction?	
20. In the case of an endangered ecological community or critically endangered ecological community, is the action proposed: (i) likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction? or (ii) likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction?	N/A. No endangered ecological communities are listed for the LHIG under the *Fisheries Management Act 1994*.
21. In relation to the habitat of a threatened species, population or ecological community describe: (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and (ii) whether an area of habitat is likely to	Pollution of marine water resulting in adverse effects on the life cycle of threatened species is considered extremely unlikely considering the one off nature of the project, the minimal amount of bait likely to enter the water, the insolubility of Brodifacoum and the huge dilution factor. No other impacts or modification to habitat of threatened species is expected to occur as a result of the projects implementation.

become fragmented or isolated from other areas of habitat as a result of the proposed action, and (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	
22. Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).	Pollution of marine water resulting in adverse effects on the life cycle of threatened species is considered extremely unlikely considering the one off nature of the project, the minimal amount of bait likely to enter the water, the insolubility of Brodifacoum and the huge dilution factor. No other impacts to habitat of threatened species are expected.
23. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.	Whilst not directly related to threatened marine species, the proposed REP is supported by a range of international, national and state laws, policies and strategic planning documents that effectively provides strong evidence to support the eradication of exotic rodents from LHI. The eradication of rodents from LHI is recommended or supported by the following documents: • Strategic Plan for the Lord Howe Island Group World Heritage Property (LHIB, 2010b). • Biodiversity Management Plan for Lord Howe Island (DECC, 2007). This document serves as the Recovery Plan for many terrestrial species. • Lord Howe Island Permanent Park Preserve Plan of Management (LHIB, 2010a). • Commonwealth Listing Advice on Predation by exotic rats on Australian offshore islands of less than 1000 km2 (100,000 ha) Threatened Species Scientific Committee (TSSC) (2006a) • Threat Abatement plan to reduce the impacts of exotic rodents on biodiversity on Australian offshore islands of less than 100 000 hectares (DEWHA, 2009) • Predation by the Ship Rat (*Rattus rattus*) on Lord Howe Island (2000): a key threatening process listed under the NSW Threatened Species Conservation Act 1995. • Recovery Plan for the Lord Howe Woodhen (*Gallirallus sylvestris*) (NSW NPWS, 2002) • Recovery Plan for the Lord Howe Placostylus (NSW NPWS, 2001). The eradication of rodents from LHI is consistent with the: • Australian Pest Animal Strategy – A national strategy for the management of vertebrate pest animals in Australia. Natural Resource Management Ministerial Council (DEWR, 2007).

	• Australia's Biodiversity Conservation Strategy 2010-2030 (NRMMC, 2010).
24. Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process	See 23. Above.

Important information for the applicant

Processing times and fees

The *Fisheries Management Act 1994* provides that the Director-General (or delegate) must make a decision on the licence application within 120 days where a species impact statement (SIS) has been received. No timeframes have been set for those applications which do not require a SIS. The Department of Primary Industries (DPI) will assess your application as soon as possible. Applications that do not require a SIS will generally be determined and a response sent within 28 days. These applications will receive a certificate under s220ZZ(4). You can assist the assessment process by providing clear, concise and accurate information in your application.
Applicants will be charged a licence processing fee. The Director-General is required to advise prospective applicants of the maximum fee payable before the licence application is lodged. Therefore, prospective applicants should contact DPI prior to submitting a licence application.

The total licence fee consists of an Application Fee plus an Assessment Fee and is based on the following schedule:

Application fee (for all applications)	$168.00
Plus:	
Applications determined to **have no significant impact** and only requiring the issuance of a certificate will be considered either:	
Minor assessments – takes up to 3 hours to complete	$168.00
Moderate assessments – takes between 3 to 7 hours to complete	$392.00
Major assessments – takes between 7 to 21 hours to complete	$1,402.00

Applications determined to **have a significant impact** and that require a 220ZW licence will be considered complex assessments as the assessment involves more than 21 hours to complete. The cost of a complex assessment is $3,644.00.

In accordance with s221 of the FM Act, applications seeking a 220ZW licence will also be charged the cost of advertising the licence application and species impact statement in a newspaper circulating throughout the State.
Do <u>not</u> send payment with this application form. A Departmental Officer will contact you to advise the total amount of the licence processing fee and you will be sent an invoice for the total fee once the application has been lodged.

Request for additional information

The Director-General may, after receiving the application, request additional information necessary for the determination of the licence application. The 120 day determination period is suspended until the additional information is provided.

Species Impact Statement (SIS)

Where the application is not accompanied by a SIS, the Director-General may decide, following an initial assessment of your application, that the action proposed is likely to have a significant effect on threatened species, populations or ecological communities, or their habitats. In such cases, the *Fisheries Management Act 1994* requires that the applicant submit a SIS. Following initial review of the application, the Director-General will advise the applicant of the need to prepare a SIS.

Director-General's requirements for a SIS

Prior to the preparation of a SIS, a request for Director-General's requirements must be forwarded to DPI. The SIS must be prepared in accordance with section 221J and 221K of the FM Act and must comply with any requirements as notified by the Director-General (or delegate).

Certificates

If the Director-General decides, following an assessment of your application, that the proposed action is not likely to significantly affect threatened species, populations or ecological communities, or their habitats, a Section 220ZW Licence is not required and the Director-General must, as soon as practicable after making the determination, issue the applicant with a certificate to that effect.

Public Register of s220ZW Licences

A Public Register provides a list of s220ZW licences granted. Copies of all licences issued under section 220ZW of the Act are available on the DPI website at:

http://www.dpi.nsw.gov.au/fisheries/species-protection

or in hardcopy can be requested from NSW DPI Threatened Species Unit by email to: fisheries.threatenedspecies@dpi.nsw.gov.au

I confirm that the information contained in this application is correct. I hereby apply for a licence under the provisions of Section 220ZW of the *Fisheries Management Act 1994.*

Applicant's name *(Please print)*	Andrew Walsh
Applicant's Position & Organisation/Company *(if relevant)* *(Please print)*	Project Manager – Rodent Eradication Project Lord Howe Island Board
Applicant's signature	
Date	3 November 2016

When completed, email your licence application (with all relevant attachments) to:

fisheries.threatenedspecies@dpi.nsw.gov.au

For more information, contact:

Threatened Species Unit
Department of Primary Industries – Fisheries NSW
Phone: (02) 4478 9103 or (02) 4916 3915
Email: fisheries.threatenedspecies@dpi.nsw.gov.au

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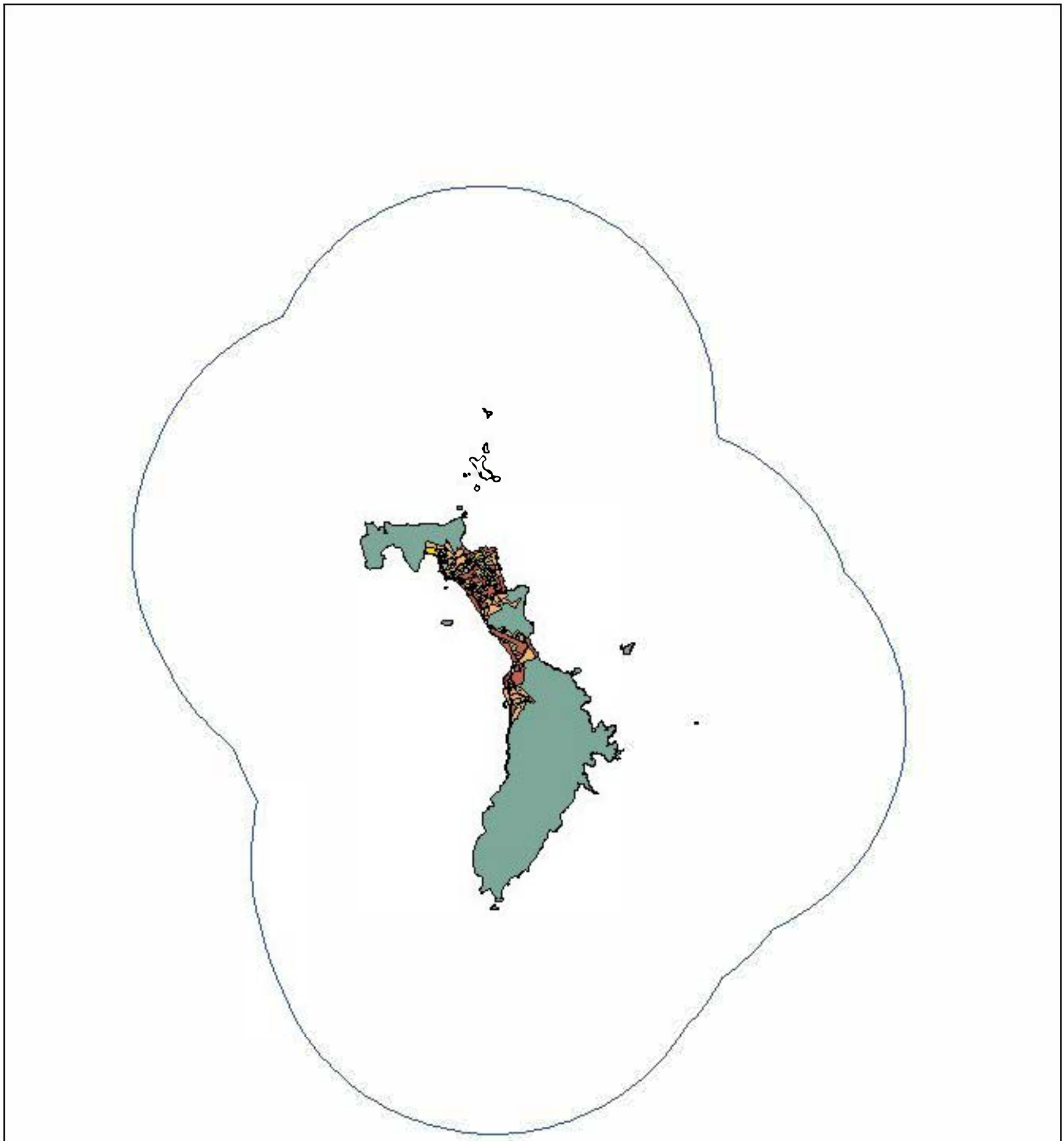

3nm LHI Marine Park Boundary
LHI Permanent Park Preserve
Tenure
Crown Reserve
Permissive Occupancy
Perpetual Lease
Special Lease

Attachment 1
NSW - LHI Marine Park Map

10 May 2016