



DEPARTMENT *of*
PRIMARY INDUSTRIES,
WATER *and* ENVIRONMENT

Tasmania

Marine Farming Development Plan

FURNEAUX ISLANDS
January 1999

Prepared by the Food, Agriculture and Fisheries Division, Department of Primary Industries,
Water and Environment, Tasmania.

Some comments expressed in this document have arisen out of discussions with marine farmers in the plan area and an examination of departmental files. To the best knowledge of the

DPIWE, the views of marine farmers have been correctly incorporated. However, the words describing the operation of each farm in the document are the views of the DPIWE and do not necessarily reflect the views of the operators.

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Introduction

The State Government has recognised the need for long term policy that will manage the State's coastal resources on a more sustainable basis. The coastal zone in Australia is an important and valuable area and there has been a range of Government initiatives to ensure that there is a long term strategy for the management of this zone.

One important economic use of the coastal zone, around Australia, is for marine farming. This industry has been experiencing rapid growth in Tasmania since the establishment of shellfish culture in the 1960s and finfish farming in the 1980s. This growth has not followed any specific planning process, individual applications having been processed and developed in an *ad hoc* fashion. The resulting levels of conflict with other users of the coastal zone have led to the need for a zoning scheme plan to develop marine farming in the State.

The Furneaux Islands Marine Farming Development Plan is one of a series of development plans which are being prepared for the major aquaculture regions of Tasmania. The plan identifies areas of coastal water which may be suitable for marine farming, after consideration of the needs of other users of the coastal zone. This plan has been developed by an extensive public consultation process in which factors such as the physical suitability of the water, the current legal situation and the desire to minimise impacts on other users of the coastal zone were given consideration.

This plan identifies eighteen areas suitable for zoning for the purpose of marine farming. All marine farming activities will be confined to marine farming zones unless otherwise authorised under the *Marine Farming Planning Act 1995* or the *Living Marine Resources Management Act 1995*.

Some of the zones include existing farms and others are recognised as being suitable for the expansion of the industry, providing new sites for both finfish and shellfish. Sixteen new zones have been identified as suitable for marine farming. Existing marine farming areas account for the remaining expansion. With the adoption of this plan the potential area for marine farming will increase from approximately 92 ha to 738 ha, representing an increase of 702%.

The Furneaux Islands is an area with great potential for marine farming, allowing the development of a range of new and experimental species. High value species are most suitable for the area, particularly those requiring higher water temperatures. This may encourage the farming of a new range of finfish species presently under evaluation.

An important component of these plans will be an extensive environmental monitoring program to ensure that the industry operates in an environmentally sustainable way. This undertaking by the Government should ensure that the plans fit within the broad definition of "sustainable development", a key component of the State's Coastal Policy.

Environmental Impact Statement

The Environmental Impact Statement describes the area covered by the marine farming development plan, including an outline of existing marine uses and existing industry operations. The impacts of marine farming on other users and values in the coastal zone have been considered in the placement of zones. Impacts on land under the control of local councils and relevant marine authorities have also been considered with those authorities to ensure a coordinated approach to developments in the coastal zone. The general impacts of marine farming are outlined, including ecological as well as other impacts. To reduce these, controls on activities within the zones have been developed. These are outlined as management controls and accompany the marine farming development plan. In some zones there may be impacts specific to that zone; these are included in the zone description.

The impact statement also includes a detailed description of the zone area available for marine farming.

1. General Introduction

The Furneaux Islands lie to the north east of mainland Tasmania and consist of a group of over fifty islands of varying sizes. The plan area covers the coastal waters surrounding the larger islands of Flinders Island, Cape Barren, Clarke and Prime Seal, as well as the many smaller islands that are located close by. Many of these small islands are conservation areas, State Reserves or Nature Reserves under the management control of the State Government.

The coastline of Flinders Island and Cape Barren Island extends for 447.04 km.

2. Characteristics of the Furneaux Islands

a) Geographic Description

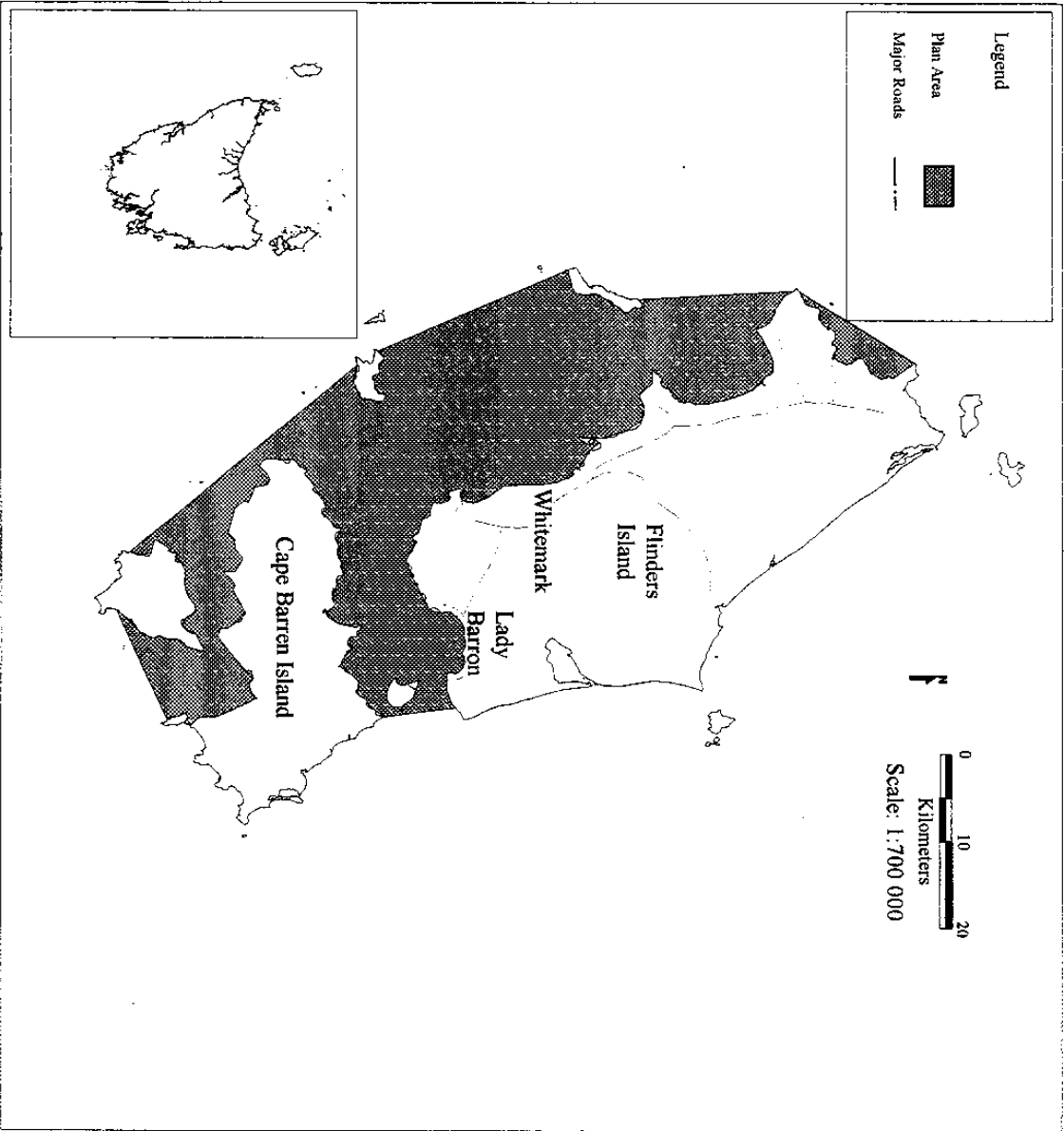
Information about the characteristics of the Furneaux Islands has largely been drawn from the Land Systems (Region 2) report prepared by the Department of Agriculture. The area included within the plan area is shown in Map 1.

Flinders Island (1376 km²), Cape Barren Island (445 km²) and Clarke Island (114 km²) are the largest islands within the Furneaux region.

The climate of the Furneaux Islands is maritime. The annual rainfall ranges from about 600 mm in the south west to over 800 mm in the central hills on Flinders Island. Precipitation is greatest during the cooler months from May to October. The climate is generally mild, the mean maximum temperature in February is 22.5°C and the mean minimum in July is 6.1°C. Extremes in temperature are less on the islands than other parts of the State because of their maritime locations. There are fewer winter frosts and fewer hotter days than inland areas on mainland Tasmania.

Winds are predominantly westerlies which can blow unabated for several days at a time. The weather pattern is variable in late winter and spring and also subject to blustery cold southerly winds. Sea breezes occur during the summer months. Consequently, coastal waters can be exposed to strong and variable winds, and high seas at all times during the year.

Map 1 - General Map of Tasmania and the Plan Area



The geology of the islands is dominated by ridges of granite which occupy about a third of the islands, including the striking features of the southern part of Strzelecki Range, Darling Range, The Patriarchs and the higher parts of Cape Barren Island. About half of the islands area is coastal sand dunes and related soil deposits. These form a broad plain on the eastern side of Flinders Island and a narrow strip on the western coast, as is so on Cape Barren Island. Estuarine beds of sands, clays and gravels can be found in many low lying areas on the islands. The highest peaks are Strzelecki Peak on Flinders Island which rises to 756 m, Mt. Munro on Cape Barren Island to 687 m and many other peaks exceed 400 m.

The many small streams flowing directly to the coast form the dominant drainage pattern. Flinders Island has its largest drainage system towards the east coast from the agricultural lands that drain into Foochow Inlet, Middle Inlet and Patriarch Inlet. Because of the steepness and short distance of the catchments, many of the smaller streams only flow after good rainfalls. Many coastal lagoons exist along the eastern coastline of Flinders Island and Cape Barren Island due to sand dunes blocking drainage to the coast. Only a small number of streams flow permanently. On Cape Barren Island, most of the streams flow to the north and south into coastal bays.

The variation in rainfall, altitude, geology and landform has led to considerable variety in the soil and vegetation types found on the islands. Deep calcareous sandy soils occur along the coastal dunes and narrow flats and mostly support scrub vegetation with some shrub land, woodland and low forest. The undulating plains such as those found on the western side of Flinders Island and Cape Barren Island have deep, mostly uniform sand and duplex soils. These soils mostly carry eucalypt woodland and scrub vegetation with some forest. On the higher granite based slopes, the soil types are mostly mottled duplex soils carrying peppermint eucalypt forest and woodland vegetation. On many of the smaller islands there is tussock grassland and coastal heathland similar to the larger islands. However these islands can provide a refuge for species and plant communities which have been destroyed by fire, grazing and recreational activities in the past. Between 800 to 900 species of plants have been recorded in the Furneaux Islands, once again reflecting the diversity of physical conditions found throughout the islands. The islands have scientific significance in that they represent a boundary for some species - being the southernmost location for some species yet being the northernmost for others.

On land, strong winds may cause serious degradation of exposed or bare soil surfaces, much of which is included in the sandy soils found on the islands. Poor site drainage causes waterlogging in some locations, thus requiring extensive drainage schemes to alleviate the problems. Some severe sheet erosion in the hilly areas has occurred along with gully erosion along drainage trenches.

The Furneaux Islands are renowned for the diversity of wildlife and in particular bird habitats - cliffs, dunes, mountains, heaths, woodlands, forest and islands. Some 150 species of birds have been recorded from the Furneaux Islands including eight of the eleven Tasmanian endemic species including the rare Forty-spotted Pardalote, Green Rosella and the Black Currawong. The Cape Barren Goose is regarded as one of the world's rarest goose species, but an estimated 12,000 birds move between the outer islands and the pastures on Flinders Island. The other notable species is the Short-tailed Shearwater, known as "mutton-birds". This species returns from its migratory travel to the northern hemisphere every September in millions. The new chicks have traditionally been hunted by Aboriginal people each April. Many of the small islands that have been reserved for nature have been done so to protect

known mutton-bird rookeries, bird habitat, nesting sites for Cape Barren Geese and other sea bird species, seal colonies and areas for scientific research.

The islands provide suitable habitat for a range of native animals including echidnas, wombats, bennetts wallabies, pademelons, brushtailed possums, ring-tailed possums, pigmy possums, potoroos, native rats, various skinks, snakes and bats. There are no rabbits or foxes on the islands.

b) Water Quality

Water quality objectives in the coastal marine environment are covered by the State Policy on Water Quality Management 1997 which has become an important guide for establishing the desired water quality for given areas. These water quality guidelines reflect the protected environmental values of a body of water.

The protected environmental values are values or uses of the environment for which it has been determined that the environment should be protected. Water quality objectives set for the surface waters should apply to each body of water covered by planning instruments.

The proposed protected environmental values (PEV) for all marine farming zones covered by the Furneaux Islands Marine Farming Development Plan has been set under Part 3-Water Quality Objectives 7.1A of the State Policy on Water Quality Management 1997. This protected environmental value provides for the protection of aquatic ecosystems, modified (not pristine) ecosystems from which edible fish, crustacea and shellfish are harvested. Other protected environmental values covering recreational water quality and aesthetics are to be established by other management authorities, for areas not covered by zones.

c) Social and Economic Description

The population trends for Flinders Island Municipality since 1976 are shown in Table 1. Over the 20 year period 1976-1996, the population of the Furneaux Islands has fallen by 33 people (3.4%), whereas the Tasmanian population as a whole has risen by 11.5%. The population grew during 1976-81, but has declined since. Despite a perception of continuing decline, the 1996 census appears to indicate at least a stabilisation of the population in recent years.

Year (Census Year)	Population of Flinders Municipality (Number)	Growth Rate (%)
1976	957	
1981	1039	+8.5
1986	1010	-2.8
1991	905	-10.4
1996	924	+2.1

*Table 1: Population Trends in settlements of the Furneaux Islands, 1976-91
Source : ABS Urban Centre and Localities : Tasmania Cat No 2794.6 and Cat No 2015.6 (1996)*

The population of the Islands increases dramatically during the summer holidays, school holiday periods and Easter when children return home from outside schools and the tourism market peaks.

Unemployment levels were higher than the State average in January 1997, being 12.5%; the State's average as of January 1997 was 10.4%.

The Flinders Municipality has the highest proportion of Aboriginal people of any council area in Tasmania, reflecting the history discussed below. According to the census, there were 146 Aboriginal people in the Municipality (16% of the total population) in 1996.

The primary employment has been agriculture and fishing which accounted for about a third of the employment in 1991, as compared with about 6% for the State. In 1986 agriculture and farming accounted for 43% of the total employment and there was a loss of 76 people (35%) from these industries between 1986-91. Tourism has grown in importance on the islands, often providing a supplementary source of income for many people. During 1986-91 there was an increase in numbers employed in recreation, personal and other services from 22 to 33 despite the loss of about 100 people from the work-force.

d) Cultural Values

The history of the Furneaux Islands includes a significant component of the continuing story of the Tasmanian Aboriginals, as well as aspects of early white settlement that are of local, and in some cases national importance. Examples of this rich history include the occupation of sites in Kent Bay on the southern side of Cape Barren Island as bases for the early sealing industry.

The sealers lived with Aboriginal women on the islands and these families became the ancestors of continuing Aboriginal communities, particularly on Cape Barren Island. That history was reinforced by the later forced settlement of Aborigines from the mainland, at Wybalenna. As a result, the islands have provided the background of a high proportion of the present Tasmanian Aboriginal population, and in Wybalenna the community has a site of very special historical and cultural significance. The strong traditions of mutton birding in the Flinders Group have been another important factor since birding has been the basis for a largely Aboriginal industry as well as an important focus for community culture.

The islands therefore have a special place in the eyes of most Tasmanian Aboriginals many of whom visit periodically. This was recognised in the provisions of the *Aboriginal Lands Act 1995*. Of the twelve parcels of land transferred back to the Aboriginal people, five are in the Flinders Group, and they constitute a substantial proportion of all the land administered by the Aboriginal Land Council of Tasmania.

Further examples of this rich history include the wreck of the Sydney Cove in 1797 near Preservation Island and the many other wrecks that occurred around the coastline.

The Emita Museum at Settlement Point provides an insight into the early history of the islands and its inhabitants. There are many other sites, events, buildings and happenings that add to the cultural value of the islands, and it has benefited from the recent success of the three peaks race involving endurance running and sailing events. Any visitor cannot help but notice the unique lifestyle of island residents and how strongly their attitudes and values are related to the quality of the natural and cultural setting.

e) Infrastructure and Services

Access to the islands is by air, some 360 km from Melbourne or 160 km from Launceston. The main airport is located to the north of Whitemark and there are a number of landing strips around the islands to service small planes. Ferry services to the islands connect Whitemark, Lady Barron and Cape Barren from Welshpool and Bridport. Connection between the islands can be undertaken by small chartered plane services or chartered boat services.

The principal settlements are Whitemark and Lady Barron. The facilities and services at Whitemark include the Council Chambers, school, hospital, Sports Club (golf course), bank, supermarket, food outlets, hardware and rural supplies, shops, craft, fuel, garage, library, post office, vehicle hire, Government offices, hotel, accommodation and port facilities. Lady Barron has port facilities, supermarket, post office, bank, fish processing, hotel, fuel, accommodation and the Flinders Island Aboriginal Association centre. A local store/shop is found at Killiecrankie and a store for the Cape Barren Island community exists at the settlement.

The HEC maintains a power plant for the island near Whitemark which is supplemented by wind generators. Whitemark and Lady Barron have reticulated water systems.

3. Existing Marine Uses

There is a range of existing and potential uses of the marine environment in the Furneaux Islands area. These include shipping, commercial fishing, abalone diving, recreational, tourism, marine farming and conservation uses. The Aboriginal community of the islands has strong traditions of coastal activities. These have been both in terms of taking seafood for personal and communal consumption, and in terms of gathering shells and kelp as materials for craft goods such as necklaces and baskets.

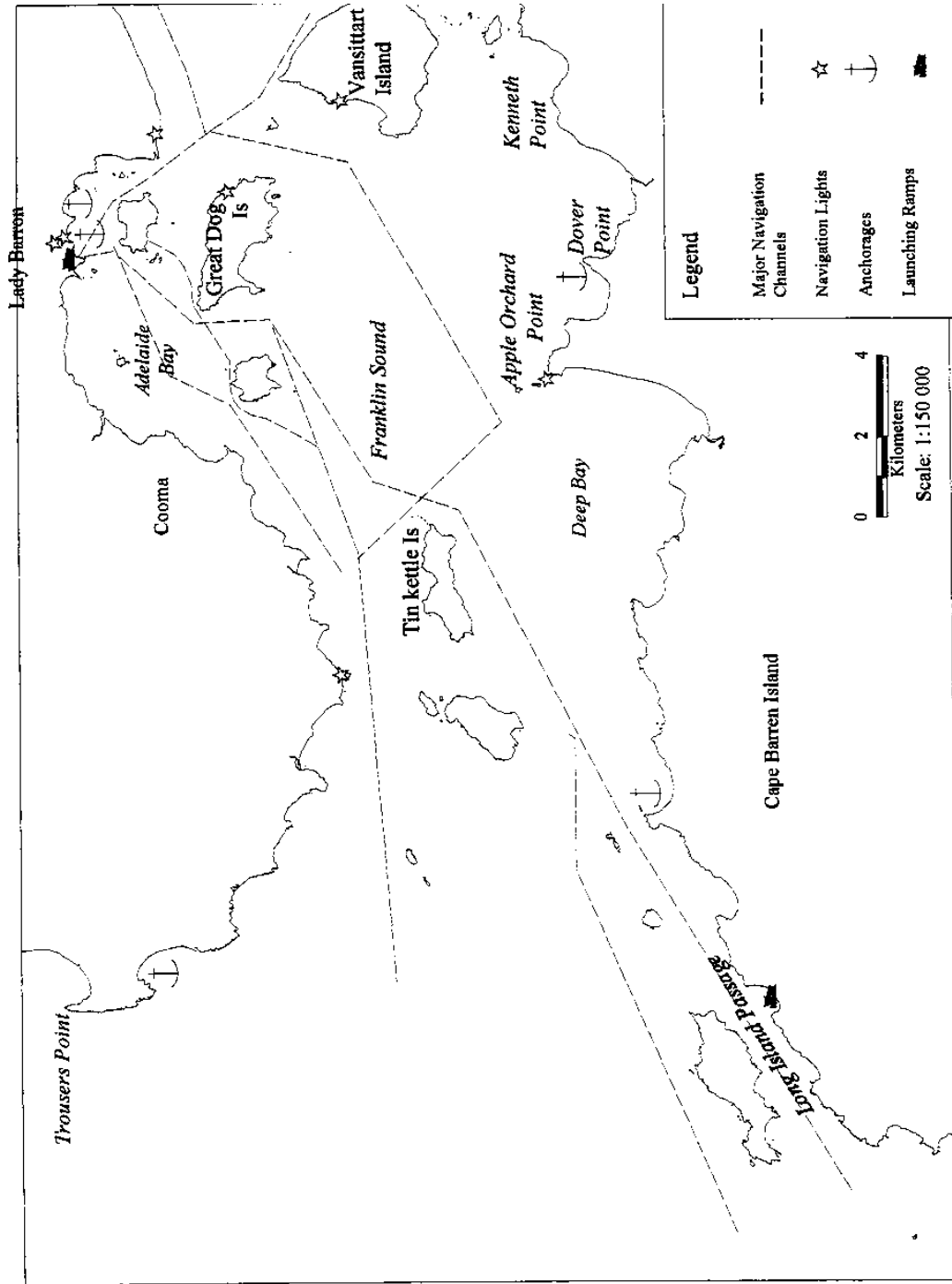
The main navigational channels identified by the Marine Board of Flinders Island, and other coastal users, are shown in Map 2. The principal navigation channels provide access to:

1. Whitemark Wharf;
2. Lady Barron through Franklin Sound and Adelaide Bay;
3. Franklin Sound through the Pot Boil;
4. Killiecrankie Bay;
5. Palana Bay;
6. North East River;
7. Cape Barren Island by Sandford Bay.

The smaller islands in the Furneaux Islands region, especially those used for grazing, also have known access points for loading and unloading vessels. There are also numerous "local" navigational routes used by professional fishermen, recreational fishers, the Aboriginal community and cruising yachts. Access to recognised safe anchorages by these users has been considered in the zoning process. These "local navigational" routes and access to anchorages are not marked in Map 2 but have been considered prior to the location of zones for marine farming.

Marine and Safety Tasmania has 23 day leads/night beacons under its direct control which relate to the different types of navigational systems required for the different channels. Navigational aids are located on Flinders Island (including Holloway Point Navigational Light at the mouth of North East River), Little Green Island, Big Dog Island, Vansittart Island, Apple Orchard Point and Kangaroo Island.

Map 2 - Major Navigation Channels in the Furmeaux Islands



The Furneaux Islands are a superb cruising area for yachts and pleasure vessels with many sheltered and secluded anchorages providing for most weather conditions. Map 2 indicates the recognised anchorages identified in Franklin Sound with the assistance of the Marine Board, fishermen, charter boat tour operators and existing publications (Brettingham-Moore 1988). Anchorages in other areas are detailed in the zone descriptions. Whilst these are the most recognised anchorages a number of alternative anchorage sites are used to suit the changing weather conditions. The review of the preliminary zoning plans with the Flinders Island Marine Board and coastal users allowed for any necessary changes to zones to accommodate lesser known or occasionally used anchorage sites.

The existence of fast-running tidal streams, extensive shoal areas and both above water and underwater rock outcrops in the Furneaux Islands requires careful piloting and navigation (Brettingham-Moore 1988). Inshore passages are not recommended for skippers without good local knowledge of the islands and water conditions.

Consultation occurred with professional fishermen during the project and general maps were prepared to indicate coastal areas that are fished for a variety of species. Extensive use is made of reefs along the western coastline from the Outer Sister Island to the Pasco Islands, around Settlement Point, Prime Seal Island, Badger Island, some isolated locations around the islands within Franklin Sound, and significant parts of Cape Barren Island, Clarke Island and the smaller islands. Fishing for wrasses occurs principally along the eastern coastline in selected reef locations and around the offshore islands. Garfishing takes place in shallow sandy bottom areas, particularly within Franklin Sound. Shark and flathead are caught in many locations around Cape Barren Island and the western side of Flinders Island and the outer islands.

Abalone diving is a major fishery for the Furneaux Islands and extensive consultation was undertaken with the local divers to determine the status of the coastline for habitat, growth and recovery rates of the species. This information was used as part of the selection of suitable zones for future abalone marine farming and allowed these zones to avoid areas of high commercial productivity. A closed area for the taking of abalone in the water between Little Green Island and Great Dog Island was established with the support of the Flinders Island abalone divers to allow for protection of a good nursery site.

Recreational fishing occurs in many locations around the islands. Discussions with recreational fishers indicated areas that were more regularly used around Flinders, including:

1. North East River for flounder, salmon, trevally, prawning and flathead;
2. netting around Palana Bay;
3. flathead and shark fishing in the northern corner of Marshall Bay;
4. snapper, flathead and pike fishing around Prime Seal Island;
5. flathead, shark, barracouta, pike, snapper generally through the coastal area out of Whitemark from Settlement Point to Franklin Sound;
6. general fishing and squid fishing off both Whitemark and Lady Barron wharfs;
7. floundering off accessible shallow beach areas;
8. rock fishing along the coast;
9. surf rod fishing off the eastern beaches.

Consultations are underway to clarify the nature and extent of the fishing done by the Aboriginal community in the islands, as part of a state wide program under the National Aboriginal and Torres Strait Islanders Fisheries Strategy. It is hoped that this will feed into the

development of a management plan that will allow easier interpretation of the “Aboriginal cultural activities” provided for in the *Living Marine Resources Management Act 1995*.

There are no identified coastal areas where the use of nets is prohibited other than for respecting identified navigational channels and anchorage sites. Recreational diving for abalone, crayfish and other fish can occur at many locations around the islands. A number of wrecks can be readily reached by diving. The northern and western waters are considered to be very suitable for diving due to good access, reefs and protection from the many islands.

There are no marine reserves in the Furneaux Islands however potential interest was expressed during the public consultation for having such a reserve near Settlement Point. Any such proposal will require the support of the State Government and Flinders Island Council.

Flinders Island has many superb beaches that are available to local residents and tourists. The recommended swimming locations for visitors are Trousers Point, Allports Beach, Emita Beach, Yellow Beach, Lillies Bay, Killiecrankie and Palana but there are many other beaches which can also be "discovered". Camping sites have been developed by Parks and Wildlife at Trousers Point and Allports Beach. Simple bush camping with no facilities is permitted on Crown Land foreshore areas and one of the popular locations is at North East River. The beaches provide good coastal bushwalking opportunities.

Tour operations on Flinders Island catering for potential use of the coastline include boats for hire or charter, cottage accommodation in coastal areas, coastal walking tours, hire of fishing tackle, diving tours, wildlife tours, four wheel drive tours, surf fishing tours and searching for gem stones (Killiecrankie diamonds).

4. Marine Farming in the Furneaux Islands

a) Suitability For Marine Farming

The area covered by the Furneaux Islands Marine Farming Development Plan is considered highly suited for marine farming activities. The advantages of this region include:

- absence of major sources of pollution that could threaten the industry;
- potential areas for the production of new finfish species such as yellowtail kingfish;
- deepwater and inter-tidal areas suitable for the growing of oysters and abalone;
- no history of marine farm closures due to toxic dinoflagellate blooms;
- this region has already established trials and limited production of shellfish with some experience having been gained into farming in the local environment.

Limitations to the future growth of the marine farming industry in the area covered by the Furneaux Islands Marine Farming Development Plan include:

- the need to accommodate expectations of other users of the area;
- the need to minimise conflict with the existing land use activities including tourism, private land use activities, rural and residential living areas;
- weather conditions in exposed sites;
- freighting equipment and food to the island and product from the island.

a) Existing Marine Farms

The current marine farming activities within the Furneaux Islands are limited to the production of abalone, however the area has the potential for farming other species of shellfish and new species of finfish.

Four marine farms covering an area of approximately 92 ha are in the area covered by the Furneaux Islands Marine Farming Development Plan. These farms are shown in Maps 3 and 4. Information outlining the location, holder, business name, size of leases, and the granting and expiry date of the leases are shown in Table 2. The species licensed for each farm are shown in Table 3.

Location	Farm No	Lease Holder	Zone No	Business Name	Size (ha)	Lease Granted	Lease Exp.
Bun Beetons Pt Sth	137	Butler Aviation Pty Ltd	3	Furneaux Shellfish	18.07	1990	2010
Tanners Bay	148	Butler Aviation Pty Ltd	4	Furneaux Shellfish	13.48	1993	2113
Lady Barron	121	Furneaux Aquaculture Pty Ltd		Furneaux Aquaculture	0.4802	1988	2008
Sth Vansittart Is	138	JR, SA & D Fuglsang	16	JR, SA & D Fuglsang	59.97	1991	2011

Table 2 - Details of Existing Marine Farm Leases in the Plan Area

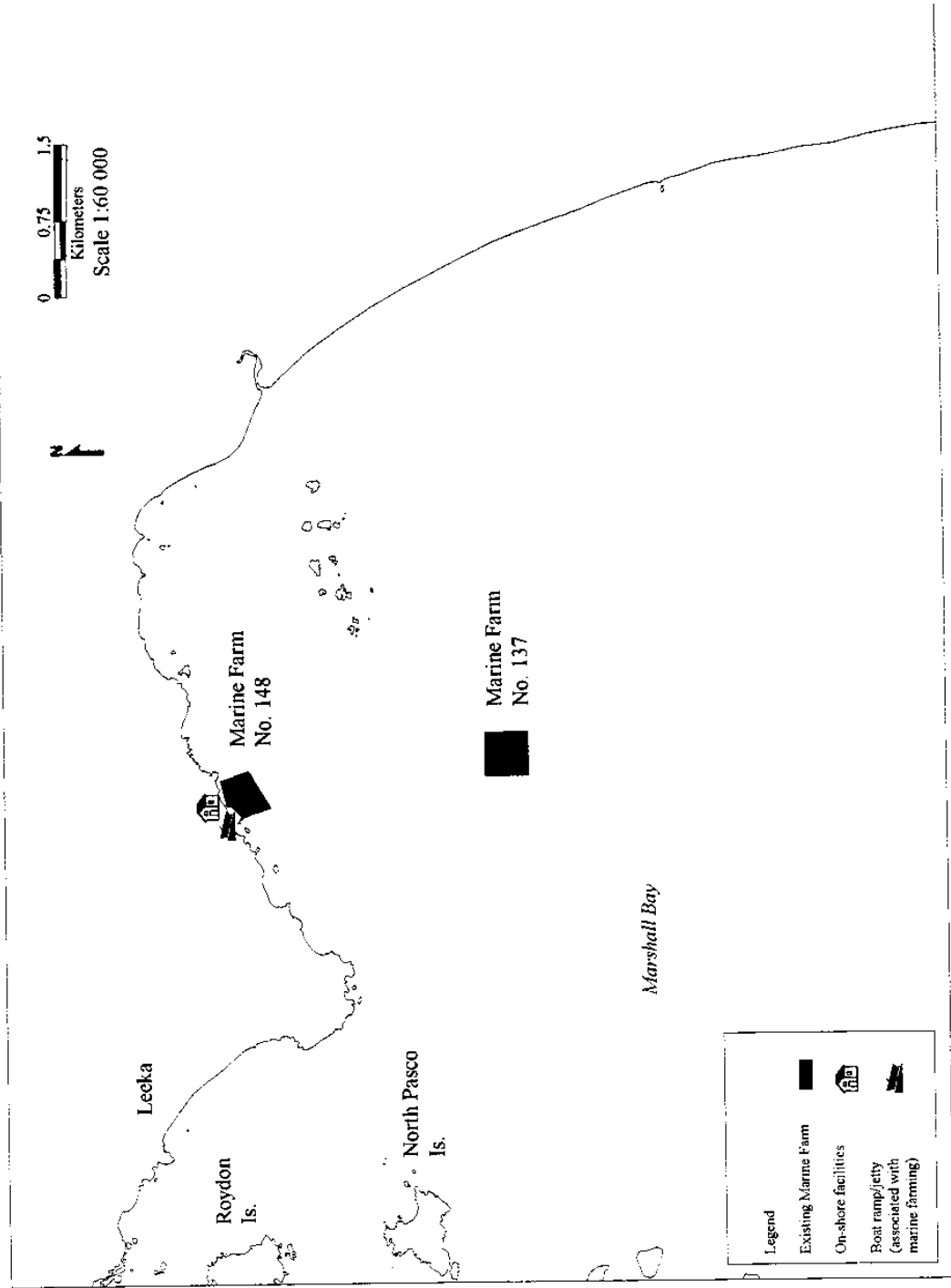
Lease Holder	Location	Zone No	AB	SW
Butler Aviation Pty Ltd	Bun Beetons Pt	3		X
Butler Aviation Pty Ltd	Tanners Bay	4	O	
Furneaux Aquaculture Pty Ltd	Lady Barron		O	
JR, SA & D Fuglsang	Sth Vansittart Is	16	O	

Holders of marine farm lease or permit in the Furneaux Islands, location description, species licensed to grow (x = Licensed to grow but not growing at present) and indication of the species actually grown on the marine farm (o = Licensed to grow and growing at present). List of species name abbreviations:

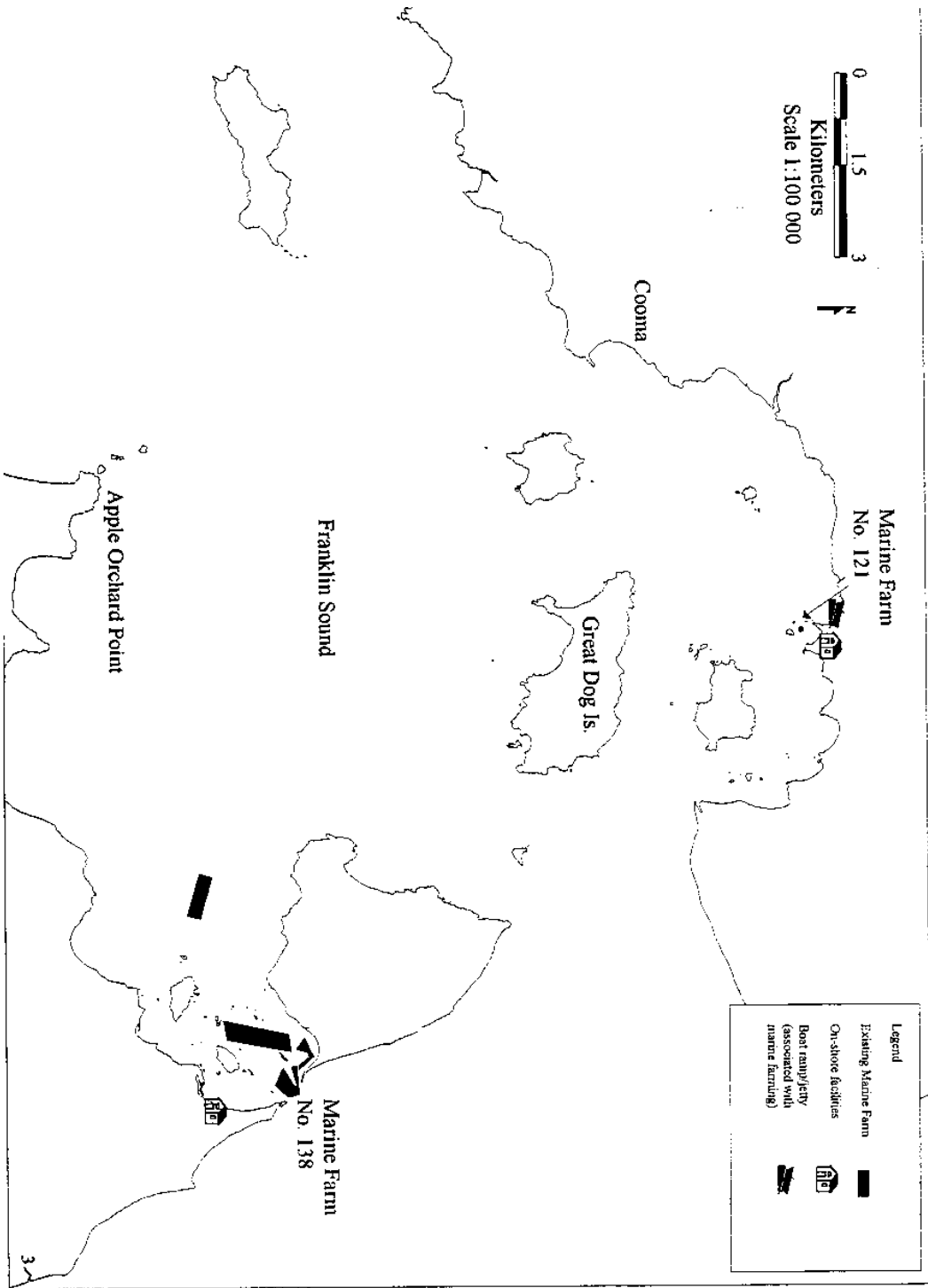
AB Abalone, g = Green Lip, b = Black Lip, e = Emmae
 SW Seaweed

Table 3 - Species Licensed at Existing Marine Farms in the Plan Area

Map 3 - Marine Farms in the Furneaux Islands, Existing Farms and Farm Facilities



Map 4 - Marine Farms in the Furneaux Islands, Existing Farms and Farm Facilities



c) Existing Infrastructure and Service Facilities

The marine farming industry in the area covered by the Furneaux Islands Marine Farming Development Plan is generally limited to experimental abalone and seaweed culture, and limited production of abalone. There are limited onshore facilities associated with marine farming. There is an existing abalone processing facility at Lady Barron. There are three locations used for onshore facilities, they are:

1. Tanners Bay, shed
2. Lady Barron, abalone hatchery, holding and processing facilities
3. Cape Barren Island, shed

5. General Impacts of Marine Farming

The impacts vary in their nature and intensity. The obvious visual and noise impacts arise from the operation of a marine farm. They include farm infrastructure, such as cages or racks in the water, and more people and boat traffic in the area. These impacts are relatively easily controlled.

Impacts on the water quality and seabed in the vicinity of marine farms are not so obvious, and coastal communities are concerned that long-term ecological damage may occur. They are also concerned that farming an introduced species of fish in unnaturally high densities could result in disease outbreaks affecting native fish stocks, or that an introduced species could become established in the wild as a pest.

In general terms the main impacts of marine farming have been well documented overseas, and there has been some limited research on the local environment (Gowen & Rosenthal 1993, Ritz *et al.* 1989). These impacts are divided into 'ecological' and 'other'.

a) Ecological Impacts

Fish and Fish Food

a) Finfish

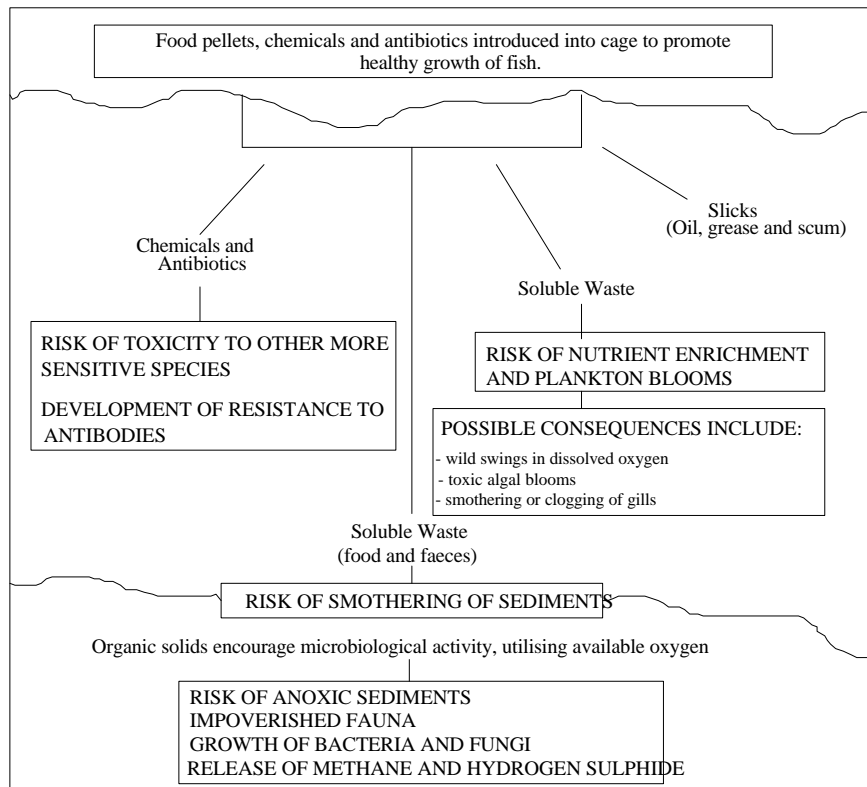
At present finfish farming has a greater impact on the environment than shellfish farming because of the addition of organic material - fish feed - which results in nutrients in the form of surplus food and excretory products being released to the sediments and waters. The impacts and possible detrimental effects of finfish farms on the environment are illustrated in Figure 1 (Smith and Haig, 1991). Solid wastes may accumulate on the sea bed, especially in areas of poor current flow, causing a change in the benthic community structure, while soluble nutrients released to the water column can increase the risk of toxic algal blooms.

In Tasmania the salmonid farming industry has a continuing investment in research on methods to improve its efficiency, which has also reduced the ecological impact of the farms. Less food but of better quality, is now given. The food conversion ratio (ratio of weight of dried food fed to the gain in wet fish weight) dropped from 1.8-2.0 to 1.4-1.5 in ten years. The constant improvement in feed quality and form means that the amount of food being deposited on the bottom has been substantially reduced and this reduction continues.

Changes to the substrate ecosystem under a finfish farm have been documented in several studies, including some in Tasmania (Ritz *et al.* 1989). The changes are similar to, and consistent with, those caused by other forms of organic enrichment, such as wood pulp and domestic sewage. The increase in organic matter in the sediment leads to an increase in chemical oxygen demand and microbial activity, which can deplete the oxygen in the water overlying the sediment. There may also be a reduction of the oxygen in the sediment, which can be measured by the redox potential, the relative balance between oxidation and reduction in the sediments. Large reductions can result in sulfate reduction, producing hydrogen sulfide bubbles; methanogenic bacteria can cause these bubbles to also contain methane. This is commonly known as "outgassing".

Outgassing has not been a major problem in Tasmanian finfish farms, as it is controlled by feeding regimes and fallowing of the areas under cages. Experience with local conditions has enabled operators to establish the best feeding regimes for different localities and stock densities. However, the relationship between organic enrichment of the sediments and fish health is unclear (Gowen and Rosenthal 1993). Improved management strategies in Tasmania seek to ensure that organic loading in the sediment does not reach the level that can result in lower oxygen levels in the sediments and water column (T Dix, pers. comm.).

Figure 1 - Potential Routes to Environmental Impacts Associated With Cage Fish Farming (Smith and Haig, 1991)



The organic loading in and around finfish farms has been studied extensively overseas and locally. The Tasmanian studies concentrated on the salmon producing areas of the

Huon estuary and at Nubeena on the Tasman Peninsula. The local studies (Woodward *et al.* 1992, Ritz *et al.* 1989, Ye *et al.* 1991) confirmed overseas experience indicating that changes in organic loading are confined to an area less than 40 to 50 m from the centre of the cage. Local changes in the physical characteristics of the sediments are reflected in changes in the macrobenthic communities.

The macrobenthic fauna of the sediment changes in relation to the increased organic enrichment; this has been well documented in overseas and local studies (Pearson & Stanley 1979, Horwitz and Blake 1992, Johannessen *et al.* 1994, Ritz *et al.* 1989). A study has been undertaken through SALTAS to relate the redox potential and the macrofauna of the sediments under several finfish farms in Tasmania. This study clearly indicated the importance of the relationship between sediment structure, redox levels and changes in community structure. "Sediment redox readings were observed to respond rapidly to changing levels of feed input" (MacLeod 1996).

The health of the macrobenthic community under finfish cages can be monitored by a method developed by Ritz *et al.* (1989), based on Warwick (1986). The "ABC" (abundance, biomass comparison) method relies on the relationship between changes in species diversity and population numbers, and the degree of disturbance of the environment. As the degree of disturbance increases, species diversity begins to decrease, while the numbers and biomass of opportunistic species increase. The biomass and abundance are plotted on a *k*-dominance curve for the communities under the finfish cages and the position and shape of the curve can be related directly to the degree of disturbance (Ritz *et al.* 1989).

This method enables the collection of a single sample to be used to judge whether a site is considered undisturbed, moderately disturbed or grossly disturbed and does not rely upon a baseline or control value. This method is particularly useful in estimating the health of the sediments at sites where there is no existing background data collected prior to the establishment of the marine farm. It can also be used to establish the degree of disturbance of a site prior to the establishment of a new marine farm.

Changes to the water column will result from the increases in soluble nutrients released from sediments, deposited faecal matter, uneaten food particles and excretory products from the fish. The changes in nutrient levels in waters can in turn cause changes in phytoplankton populations, not only in density but also in species composition.

However, the overseas experience is that, at the current level of farming in coastal waters in most countries, large-scale hypereutrophication is unlikely (Gowen and Rosenthal 1993), although there may be local increases in ammonia concentrations in some embayments. Generally, it was concluded that in coastal areas where phytoplankton growth is limited by light, or biomass is reduced by dilution, eutrophication is unlikely (Gowen and Rosenthal 1993).

Research conducted both overseas and in Tasmania on the effects of salmonid farming on the seabed has generally shown that organic build-up is greatest directly underneath a stocked cage and rapidly decreases with distance from the cage. In most studies, the seabed remained at normal conditions at a distance of 30 m from the edge of the cage. Studies have also shown that most previously farmed areas will approach normal conditions if left fallow for 3 to 6 months (Ritz *et al.* 1989; Gowan 1991).

b) Shellfish

Filter feeding shellfish feed on microscopic algae obtained from the waters they are growing in. They do not require feeding. Even so, shellfish farming results in the build-up of some excretions below the holding containers on racks or longlines. Much of this is dispersed by currents, and it has not been found to be a significant problem in the history of the industry in Tasmania.

The ecological impacts of shellfish culture have been outlined in Hecht and Britz (1992), who state that organic sediment can build-up under mussel longlines and rafts. This build-up would be negligible compared to finfish culture, primarily because the shellfish make use of the existing plankton and particulate organic matter. Also, the marine farming management controls introduced in this Plan restrict the density of shellfish held on farms by limiting the amount of racking or longlines per ha, and thus the sediment deposits are much less than for high density shellfish farms overseas.

Because shellfish are totally reliant on the food available in the water, the production of algal food in the growing area is important in determining how many shellfish can be grown. If there are too many shellfish in a particular growing area, there may not be sufficient microscopic algae to feed all the farmed shellfish and the other planktivorous invertebrates. This is naturally also of concern to shellfish farmers since, if the food supply is limited, the shellfish will grow more slowly. Management may be adjusted by marine farmers in relation to food availability, for instance by altering stocking density or row spacing. The Furneaux Islands Marine Farming Development Plan contains management controls limiting the amount of farming equipment per ha and hence the density of shellfish.

The establishment of new oyster farms around the State could lead to an increase in the spread of oyster spat, given the right temperature, salinity, currents and sediments. It is acknowledged that such settlement can be a detriment to the amenity and aesthetic values of some persons, whilst others consider these oysters a delicacy and a recreational resource to be harvested.

Pacific Oysters

Anecdotal reports suggest that Pacific oysters have been introduced to the Furneaux region on a number of occasions for the purpose of trial culture. The reports indicated that these trials were unsuccessful due to a lack of knowledge in relation to tidal variation and the species requirements. It would appear that all the introduced oysters died and to the best of the DPIWE's knowledge Pacific oysters are not found in the Furneaux region. Therefore an introduction of Pacific oysters to the Furneaux Islands would effectively be an introduction of an exotic species.

The Victorian Government conducted an investigation into the farming of Pacific oysters in Victorian Coastal Waters in October 1996. This report discusses the implications of additional introductions of Pacific oysters to Victorian waters and proposes a number of findings and recommendations after reviewing a range of literature, including papers by:

- Coleman, N. 1996. Potential for the establishment of wild populations and biological risk assessment of the introduction of Pacific oysters into Victoria. Marine and Freshwater Resources Institute;

- Greilach, P. 1996. Water movement in the Corner Inlet-Nooramunga Region. Marine and Freshwater Resources Institute; and
- Unitas Consulting Ltd and O'sullivan, 1996. Assessment of the Economic Potential of Farming Pacific Oysters in Victoria.

The findings and recommendations of this report suggested that it is impossible to determine the likelihood of wild Pacific oyster overcatch on surrounding substrata. Because of the inability to provide any absolute guarantee that there would be no overcatch the report recommended against the introduction of Pacific oysters.

The DPIWE appreciates that there are a number of uncertainties involved with an introduction of Pacific oysters to the Furneaux region. These uncertainties range from the environmental impacts such as extent of wild settlement, ecological impacts and impacts on amenity, to the economic and employment benefits.

There have not been any studies undertaken in Tasmania regarding the impacts of established wild populations of Pacific oysters on native marine invertebrate fauna. However, research undertaken by the South Australian Research and Development Institute indicated that, providing stocking rates were controlled, there was no significant effect to competing filter feeding shellfish within marine farms. In an attempt to address some of these uncertainties in the Tasmanian marine environment, the DPIWE will seek to have research undertaken to assess the ecological impacts of Pacific oysters on intertidal communities, in areas similar to those in the Furneaux region. The results of this research would then be available for consideration in any future review of the Plan.

Once sexually mature, Pacific oysters in Tasmania spawn during the warmer summer months when temperatures rise above approximately 18°C for several consecutive days. Each female releases millions of eggs into the water, and those that are successfully fertilised by sperm from male oysters hatch into larvae after about 24 hours. The oyster larvae float in the water column for around 3 weeks before they metamorphose and settle on suitable substrata as juvenile oysters. During this 3 week period the oyster larvae can move long distances if strong currents are present, and their survival is dependent on the right environmental conditions being present and currents moving the larvae to areas suitable for settlement.

Salinity is also important for oyster larvae release, survival and later settlement. Pacific oysters thrive in estuarine conditions in which there is a fresh water influence. In some Tasmanian estuaries, such as the lower Tamar River and Port Esperance in the D'Entrecasteaux Channel, there has been substantial spread of feral oysters along the shoreline. However, in fully marine areas with no freshwater, settlement of wild oysters generally has been at a lower density and an irregular occurrence. For example at Pipeclay Lagoon, a marine inlet near Hobart containing several oyster farms, wild oyster settlement has only been observed to occur sporadically.

Coleman (1986) reviewed the introductions of Pacific oysters around the world and concluded that although it is impossible to predict their spread along shorelines, it may be possible to prevent extensive wild populations becoming established by growing Pacific oysters in areas of high summer salinities.

Pacific oyster culture has occurred in Great Oyster Bay since 1988, opposite the Coles Bay area on the Freycinet Peninsula. The marine environment within Great Oyster Bay is of relatively oceanic salinity with relatively high exposure, similar to the Furneaux region. The adjacent coastline of the Freycinet Peninsula consists of granite boulders, platforms and sand beaches, again not dissimilar to sections of coastline in the Furneaux region. Pacific oysters cultured on the farms in Great Oyster Bay are known to spawn when environmental conditions are suitable however anecdotal evidence suggests (and to the best of the DPIWE's knowledge) there are no known wild Pacific oysters on the coastline or beaches of the Freycinet Peninsula.

It must however be acknowledged that the reasons for the limited wild Pacific oyster settlement within the areas mentioned above are not fully understood and whilst much of the Furneaux region is generally open coastline some of the areas proposed within the Plan may be less exposed than others and while the optimum salinity for larval settlement is considered to be between 23 and 24 ppt (Hone 1993), it is not the only factor that influences larval survival, and settlement has been shown to occur out side of this range.

Notwithstanding the above the marine farming zones proposed for the Furneaux Islands all have marine conditions with little or no freshwater influence, other than immediate rainfall run-off during storms. If Pacific oysters were introduced to the region in a manner that allowed them to spawn regularly, it is predicted that some settlement along the shoreline would occur but would not be as extensive as in brackish water estuaries and would only occur sporadically when the environmental conditions are favourable.

The culture of triploid or sterile Pacific oysters in the area covered by this Plan would reduce the numbers of larvae available for potential settlement in the region. However the production of triploid Pacific oysters is currently limited to 70 to 80% per batch. The remaining 20 to 30% are normal diploid Pacific oysters. Discussions with industry have indicated that these 20 to 30% diploid Pacific oysters behave differently to normal diploids, in that they spawn at a different time, or not at all.

Nevertheless even if Pacific oyster culture were limited to the use of triploids in the Furneaux region it is considered that the numbers of larvae available for potential settlement would be considerable given the reproductive capacity of the species. Industry have also expressed concerns about the commercial cultivation of triploid Pacific oysters as, in some areas of the State, there have been problems with fattening and meat discolouration. Consequently to limit the culture of Pacific oysters to triploids in the Furneaux region would neither provide any certainty for producers or persons concerned about wild settlement in the region.

The Flinders Island MFDP therefore does not allow for the culture of fertile Pacific oysters. It will however allow for the culture of 100% sterile Pacific oysters approved by the Secretary of the DPIWE.

Sydney Rock Oysters

Sydney rock oysters already occur at several locations around the Furneaux Group. Bass Strait is influenced by two major water bodies. To the east, the East Australian Current passes down the New South Wales coast from north to south. This current is characterised by a series of counterclockwise warm core eddies, which bring upwelling to the continental shelf by their interaction with the continental slope. The current and associated eddies move

south eastwards into the Tasman Sea at about the latitude of Bass Strait, but because of their warm cores, filaments of water from the eddies often advect the larvae of more northerly species to southern shores. This has most probably enabled the establishment of the Sydney rock oysters around the Furneaux Islands.

Given that Sydney rock oysters already occur in the Furneaux region and that their larvae are most probably periodically carried to the region, it is the intention of this Plan that the culture of this species be permitted, unrestricted by the size and time limitations imposed on the culture of Pacific oysters. It is considered that this proposal is entirely consistent with community concerns that only native species should be farmed.

Planostrea pestigris

During the environmental assessment of marine farming zones in the region it was brought to the attention that a species of oyster had been settling on abalone farm equipment located off the north eastern coastline of Cape Barren Island. Samples of the oysters were taken which were later identified as *Planostrea pestigris*.

The distribution of this species is Darwin, Townsville, Gladstone and Morton Island. The oysters have only been found in the Furneaux region for the last 18 to 24 months and appear to be restricted to the mid water region of the water column. It is not known if the species is suitable for cultivation, however the DPIWE intends to investigate the issue further.

Seagrass

In the Furneaux Island region there are extensive seagrass beds, many of which are dominated by *Posidonia australis*. Other species that occur include *Amphibolis antarctica*, *Heterozostera tasmanica*, *Zostera muelleri*, *Halophila australia*.

Seagrass beds have been identified as major contributors to the marine ecosystem providing sediment stability and habitats for a range of species, particularly juveniles. The continued loss of large areas of seagrass is a major concern for coastal and marine managers with strong evidence that there is little if any return of *Posidonia australis* beds if destroyed beyond a certain level.

The impacts of marine farming on *Posidonia australis* seagrass beds could include disturbances such as shading, detrital accumulation, increased nutrient loading increasing epiphytic algal growth and mechanical disturbances. Some of the mechanical disturbances will include the placement of structures, anchoring systems, the continued movement of vessels and vehicles and trampling of the seagrass beds by operators. The experience in South Australia however suggests that the impacts are not significant and can be managed. Increased shading on seagrass beds may occur in two ways as a result of marine farming activities. There is the shading caused by physical structures such as fish cages and containers for holding shellfish. Shading of areas of *Posidonia australis* to less than 10% of incident light for 3 months in Jervis Bay significantly lowered the leaf growth rate, shoot density and weight and changed the epiphytic community associated with the leaves. (Fitzpatrick, J & Kirkman, H. 1995). Shaded areas of *Posidonia* did not show any significant recovery 17 months after the shading was removed. Movement of starch reserves from rhizomes not shaded may prevent the death of those under less severe shading or with shorter periods of shading. The time of shading was also found to be

relevant with shading in early summer having a more severe impact than shading in later summer (Fitzpatrick, J and Kirkman, H. 1995).

Shading may also occur as a result of eutrophication of the surrounding waters. This may be the result of high nutrient loads entering the marine environment from waste water discharged from land based activities including sewage treatment works, heavily fertilised agricultural lands and stormwater outlets. The high nutrient loads can result in the development of opportunistic epiphytic growth on the leaves of the seagrass. High sediment loads in the water column, usually the result of human land based activities, also produce shading with the result that the plant uses stored food faster than it produces it and therefore dies.

Mechanical disturbances from marine farming activities over *Posidonia australis* may be immediate or occur over a longer time-frame. The immediate disturbances will occur when structures are placed in the seagrass meadows creating breaks in the stabilising rhizome systems. A long term result of this mechanical disturbance may be the destabilisation of the surrounding mats of roots, exacerbated by loss of leaves and shoots, which can result in “blowouts” in the seagrass beds. These “blowouts” may not be severe but have the potential to rapidly denude areas given storm events or very strong water movement. Such “blowouts” have been recorded in areas with little return of seagrass in these meadows.

The use of tractors or continual use of pathways through seagrass meadows may result in erosion paths with results similar to that described earlier.

The predicted impacts on seagrass beds may be minimised by the development of a range of management strategies focused particularly on the degree of shading in the lease areas and the reduction of mechanical disturbance. Strong tidal movements in the waters surrounding the island group will provide a degree of flushing which should sufficiently reduce the level of detrital material from farming to prevent shading from the source.

Minimising mechanical disturbances may include the use of tensioned wire instead of the more usual rack and rail method of farming, reducing the level of racking for intertidal shellfish farming, a reduced number of mooring blocks for finfish farms and rotation of farming areas within a lease to reduce access impacts.

Phytoplankton levels have been recorded at various sites around Flinders Island by the CSIRO as part of a scallop spat location program. Chlorophyll levels at a site in Banks Strait east of Cape Barren Island ranged from 0.2 to 3.3 µgm/L with water temperatures varying between 9 to 16.7°C. These values are within the range expected in waters off the east coast of Tasmania (McLoughlin *et al* 1990).

Chemicals

Chemicals used in farming finfish (for example, to treat diseases and net fouling) may have a substantial impact on the environment. Intertidal shellfish farms generally use wooden racks treated with preservatives, although these preservatives have not been found to accumulate in shellfish.

The use of chemicals has declined on Tasmanian salmonid farms. Copper-based net antifoulants were not cost-effective and have been replaced by regular manual changing and washing of nets. Very few chemicals or therapeutic substances are used because virtually none of the major salmonid diseases occur in Tasmania. In recent years

antibiotics have been used irregularly in very small quantities and not at all on some farms. Shellfish farms do not use any chemicals.

Operational Wastes

Some aspects of the farming operations may affect water quality, such as fouling organisms from nets and other in-water equipment being disposed of, and decomposing, in the water. Similarly, wastes from harvesting and processing operations could result in substantial organic build-up if they are thrown back into the water.

Diseases

The likelihood of disease outbreak increases when marine organisms are cultured at densities higher than normal in the wild. Often these diseases are naturally occurring and only manifest themselves when the fish are stressed and contained at high densities, but there is also the possibility of spreading exotic diseases to native fish stocks. Also, the transfer of farmed stock to various growing areas around the coast has the potential to spread diseases further afield.

Because of the number of debilitating diseases in salmonid-producing areas overseas, and the research on the spread of diseases and salmonid parasites, most farmers have accepted that salmonid farms must be separated by at least 1 km, but preferably more.

Fortunately, most of the major diseases and parasites of salmonids do not occur in Tasmania, possibly as a result of the relatively low stocking densities in the State. It has also been established that good management practices tend to limit the risk of diseases on marine farms. Due to the potentially large losses industry could sustain from disease, the industry is very conscious of the need for disease prevention. The Government through quarantine controls assists in this regard.

Species Escapes

Little is known about the impact of marine farms on the commercial and recreational fish populations in Tasmania. Anecdotal evidence suggests that marine farms possibly increase habitat sites for recreational fish species, with excess food from finfish farms another attraction. Mussel longlines provide shelter for smaller fish and flounder are reported in intertidal oyster farms.

Recreational fishers surveyed in 1994 (G Double, pers. comm.) expressed the opinion that fewer recreational fish were being caught. However, this was happening not only in areas where there are marine farms. There is likely to be a number of causes, including overfishing and destruction or alteration of breeding habitat.

The impact of finfish that escape from marine farms has attracted little research. A study by the DPIF on salmon caught after an escape found the escaped salmon either had empty guts or soft material, such as pellets, and many of the fish were in poor condition (H Williams pers. comm.). An article in a sport fishing magazine described the excitement of catching salmon in the Huon River; the fish had empty guts but some were in breeding condition (Abbot, 1994).

Overseas evidence suggests that most escapees have few skills for survival in the wild: escaped fish in Canada have ignored schools of pile perch, anchovies and herrings, and just cruised around waiting for pellets (Anon. 1989).

b) Visual Impacts

Farming Equipment

Marine farming equipment in coastal waters, as with any structures on the water, will have some visual impact on residents and other users of an area. This equipment will generally consist of fish cages, buoys, feeding equipment, seal nets and so on. The siting, layout, colour and general appearance will affect their visibility and acceptability.

On-land developments associated with marine farming will also have a visual impact; these developments are under the control of DPIWE or the local government authority.

On-water Sheds

The mooring of floating structures such as storage facilities, shelters and grading facilities will not be allowed within a lease area except in accordance with licence conditions. However, these structures can also reduce environmental impact; for example, if used to store feed, they reduce marine traffic. If floating structures are approved in a lease area, the visual impact may be similar to a permanently moored vessel, provided activities on the structure produce minimal noise.

Lighting

The impact of lighting used on a marine farm will vary with the type of farm and the marking requirements of the relevant Marine Authority. There may be navigation lights on the corners of the lease or spotlights for security.

Poor placement of high-intensity lights can have a considerable impact on the amenity of nearby residents, or even on residents a considerable distance away. Flashing navigation lights are required to be visible from considerable distances under maritime laws, and may be intrusive to some people. The reflective surface of calm waters could exacerbate light problems.

General Appearance

The general appearance of marine farms will vary with the species farmed and the management strategies of the operator. Intertidal shellfish farms will typically not be highly visible, except at low to medium tides when racks emerge. Deep-water shellfish leases will usually consist of parallel rows of buoys within a marked lease area. Finfish farms will generally be visible from the shoreline. They will include fish cages of different sizes and placement patterns. The development of off-shore finfish farming may change the appearance of areas of coastline previously dominated by such a farm.

c) Access Restrictions

Navigation

Marine farming equipment on the water, as with any floating structures, will have some impact on the navigation of vessels (mainly fishing and recreational) in an area.

Other Restrictions

Marine farmers are granted exclusive rights to the lease area, which prohibits the public from passing through or using that area. This could restrict the rights of recreational fishers, divers and swimmers who may have previously used the area.

d) Other Impacts

Noise

Several uses of our coastal waters create noise; marine farming is one. The impact of that noise will depend on weather conditions and background noise. Noise impacts from marine farming operations will usually be caused by such things as movement of boats, feeding equipment, generators, processing, human activity and telephones/PA systems.

Debris

There is a possibility, usually during extreme weather conditions, of structures breaking away from marine farms and littering the surrounding foreshore.

Predator Control

The control of predators on oyster farms is usually limited to netting of baskets or relocating native starfish. The main potential predators of finfish farms are seals. However, currently they rarely cause problems because heavy nets are used to exclude them from the cages. In some areas, seals are trapped and released to other waters. Fish cages are usually netted to exclude birds.

e) Predicted Impacts of Increased Marine Farming in the Plan Area

Preliminary surveys of proposed zones, undertaken by DPIF, provide basic environmental data, as outlined in the zone descriptions. Some basic environmental data was presented with original applications; these are also included in the zone descriptions. Management Controls require baseline surveys and a benthic fauna analysis prior to the establishment of new farms or for significant expansion of existing farms.

The impacts for finfish farming in the area can be divided into several categories. The impact on sediments and the impact on the water column are the most obvious ecological impacts. Shellfish farming has less direct ecological impacts than finfish farming, as outlined in Section 5(b) (Shellfish).

Knowledge of the environmental impacts of marine farms in Tasmania is limited for most farms and a similar situation applies to the few farms in the Furneaux Island group. However baseline environmental information on the zone areas for marine farming in this plan area has been collected. This information is presented in the zone descriptions, supplemented by information obtained from existing marine farmers, from files and from local communities.

Other impacts from marine farming in the area include visual impact, changes to the general amenity of the areas, impact on other water users and the social and economic impacts. Generally the social and economic impacts to an area are considered positive, with increases to employment having important flow on benefits. However it is

recognised that there may be changes to excepted uses of some areas of water as a result of marine farming, including access to areas of coastal waters.

Ecological changes that may take place as a result of increased marine farming are difficult to predict; however, the physical characteristics of these water areas are likely to exchange water sufficiently to minimise the impacts.

Changes to the physical characteristics of sediments due to increased marine farming should remain localised. The time for sediments to return to un-farmed conditions is expected to be similar to local and overseas experience and to vary, depending on the site, between 6 and 12 months. The monitoring program to be initiated by the DPIWE should give a clearer indication of the impact of the existing industry and of changes that can be expected after an increase in production.

Monitoring food input into the system will give some indication of the increase of organic loading to the area and will encourage the already efficient feeding strategies to continue. It may be possible to increase the productivity of the area (without necessarily increasing the organic loading on the system) by improving feeding regimes and husbandry practices and rotating the stock in the area.

An increase in the number of shellfish in the area may reduce the impact of finfish farming, since the shellfish will feed on the phytoplankton. Available phytoplankton is controlled by the availability of nutrients in the water column. The importance of this interaction has not been fully investigated, but a current study is examining the value of polyculture (growing more than one species in an area at one time).

Specific impacts on the environment as a result of increased marine farming in the Furneaux Islands may include changes brought about by the presence of Pacific oysters and the impacts on the seagrass meadows. There may be oyster spat settlement in certain areas, given environmental conditions suitable for settlement. This may change the intertidal area in some rocky locations if spat find suitable substrata on which to settle.

A further impact specific to the Furneaux Islands will be the changes to the seagrass meadows as a result of increased shading and mechanical disturbances from marine farming activities.

As with the prediction of any impact on the environment, there are limited guarantees. To mitigate or ameliorate the predicted impacts there is a range of management controls for marine farming. Marine farmers in the development plan area will be required to comply with these controls. Included in the management controls are provisions for collecting baseline environmental data and implementing on-going monitoring programs. These controls should make it possible to detect changes to the marine environment as a result of marine farming in sufficient time for management to be effective.

Development Proposals

1. Marine Farming Zones

The planning process has identified marine farming zones in the Furneaux Islands area. Maps 5A, 5B & 5C show the zones designated for marine farming with individual zones shown in Maps 6 to 17.

Currently, the four existing marine farm leases cover a total area of approximately 92 ha. Three leases are trialing and producing small quantities of abalone with one lease presently trialing seaweed culture in the area.

The plan has identified 18 areas suitable for zoning for the purpose of marine farming. Some of these areas have existing farms and others are recognised as being suitable for the expansion of the industry, providing new sites for both finfish and shellfish.

Maximum leasable areas have been set for each zone. These will indicate the maximum area that will be available for marine farming within the zone. For some zones the maximum leasable area will closely reflect the total areas of the zones, with allowance made for securing of longlines and fish pens, as all marine farming equipment is to be included within the zone boundaries. In some zones the maximum leasable area has been restricted by physical parameters and recognition of the interests of other marine activities.

A marine farmer may apply for increases in the existing lease up to the maximum leasable area, in accordance with environmental and operational controls as outlined in management controls and licence conditions. A marine farmer may also apply for another farm within the zone provided the total farmed area in the zone does not exceed the maximum leasable area.

In areas where there are new zones created, experience to date has allowed a maximum leasable area to be set. For new lease areas a baseline environmental survey will be conducted before marine farming operations commence. Existing lease holders will be required to undertake an initial monitoring survey.

It is the planning intention to provide for all marine farms to conform with the plan. Some situations may have arisen where a marine farm is outside the lease area for a range of reasons and this may be rectified by a change to the lease area or boundaries, provided it is within the marine farming zone and does not increase the farmed area above the maximum leasable area.

One marine farm has not been zoned due to its proximity to the Lady Barron wharf facilities. This farm will maintain its current right of tenure, however the Plan has identified a potential relocation site within another zone should the lessee choose to relocate.

Zone areas are sufficient to allow all marine farming equipment to be within the boundaries of the zone. There will be a percentage of a zone which is primarily occupied by mooring ropes and this will vary according to water depth, currents, tidal flows and the mooring systems employed by the marine farmer. This generally means that the zones may appear much larger than the maximum leasable area. The areas outside the marine farm lease but within the zone boundary act as a "buffer" area within which there is public access.

Several new zones have been allocated for the expansion of the shellfish industry. Identifying the species that may be farmed in any area has not been limited to those presently being farmed but the plan has allowed for possible new species to be included. Specific species to be farmed have not been identified but have been included in the broad categories of finfish, shellfish and seaweed. In some zones the water temperatures and depth will limit the production of existing farmed finfish species but these areas may have the potential to farm other finfish species such as flounder or rock lobster. Seaweed has been included as a species to be farmed as there is the potential to grow seaweeds to enhance the production of abalone and eliminate the need for wild harvesting of the required seaweeds.

The establishment of a new zone, outside those presently outlined in this plan will require the collection of suitable environmental data. This information will be used to support a submission to include a new zone within the area covered by the plan which will be subject to the statutory process. This will allow new zones to be established in the future to accommodate changes that have not been foreseen in the lifetime of this plan.

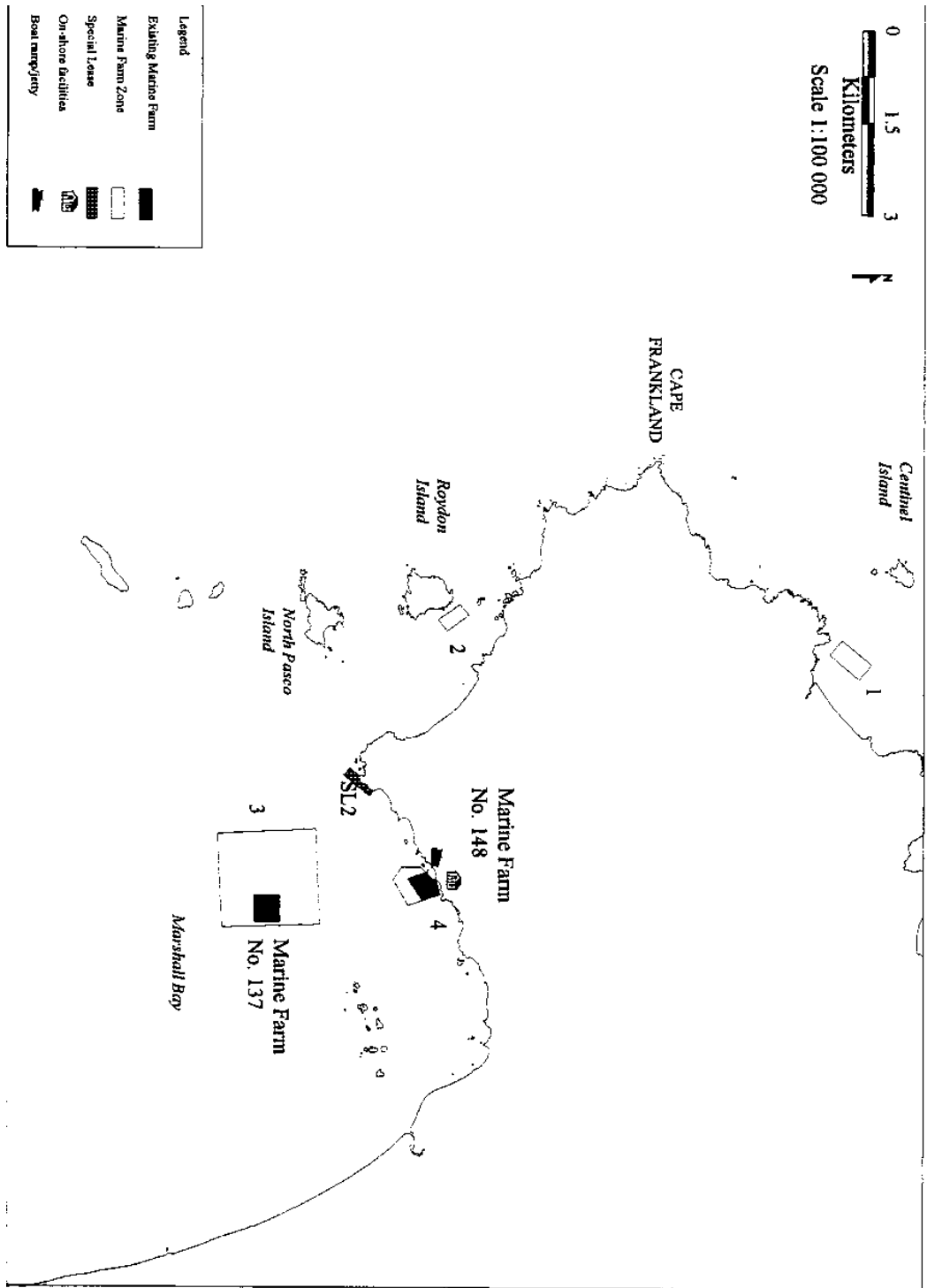
2. Zone Plans

The zone plans for the Furneaux Islands Marine Farming Development Plan are summarised in Table 4.

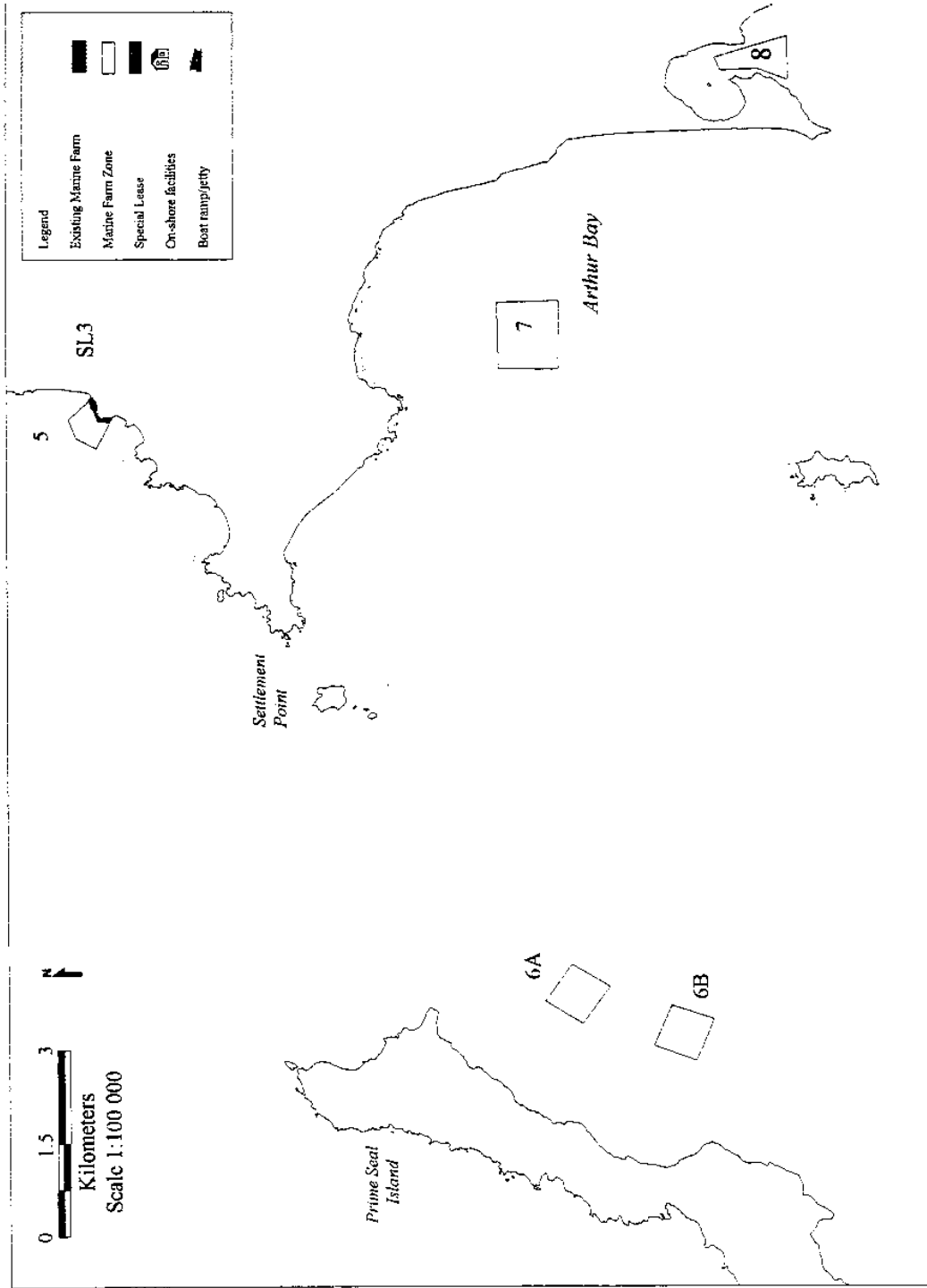
Zone	Area	Species to be farmed	Zone area (ha)	Maximum leasable area (ha)	Existing lease area (ha)
1	Boat Harbour	Shellfish, seaweed	18.13	10.00	0
2	Roydon Island	Shellfish, finfish, seaweed	10.00	5.00	0
3	Bun Beetons Point	Shellfish, finfish, seaweed	246.60	40.00	18.07
4	Tanners Bay	Shellfish, finfish, seaweed	30.00	18.00	13.48
5	South Castle Rock Pt.	Shellfish, seaweed	25.09	15.00	0
6A	Prime Seal Island	Shellfish, finfish, seaweed	50.63	30.00	0
6B	Prime Seal Island	Shellfish, finfish, seaweed	50.23	30.00	0
7	South Arthur Bay	Shellfish, finfish, seaweed	102.90	40.00	0
8	Long Point	Shellfish, seaweed	45.00	30.00	0
9	East Little Chalky Is.	Shellfish, finfish, seaweed	94.11	60.00	0
10	Badger Corner	Shellfish, seaweed	45.08	30.00	0
11	Little Dog Is. North	Shellfish, seaweed	49.35	20.00	0
12	Little Dog Is. East	Shellfish, seaweed	47.78	30.00	0
13	South Vansittart Is.	Shellfish, seaweed	164.10	60.00	59.97
14	Vansittart Is. West	Shellfish, finfish	50.60	30.00	0
15	Dover Point	Shellfish, finfish, seaweed	37.15	21.00	0
16	Deep Bay	Shellfish, seaweed	401.10	140.00	0
17	Deep Bay West	Shellfish, finfish	53.17	20.00	0
18A	Kent Bay	Shellfish, seaweed	59.77	59.77	0
18B	Kent Bay	Shellfish, seaweed	50.62	50.00	0
			1631.41	738.77	91.52

Table 4 - Summary of Zone Plans

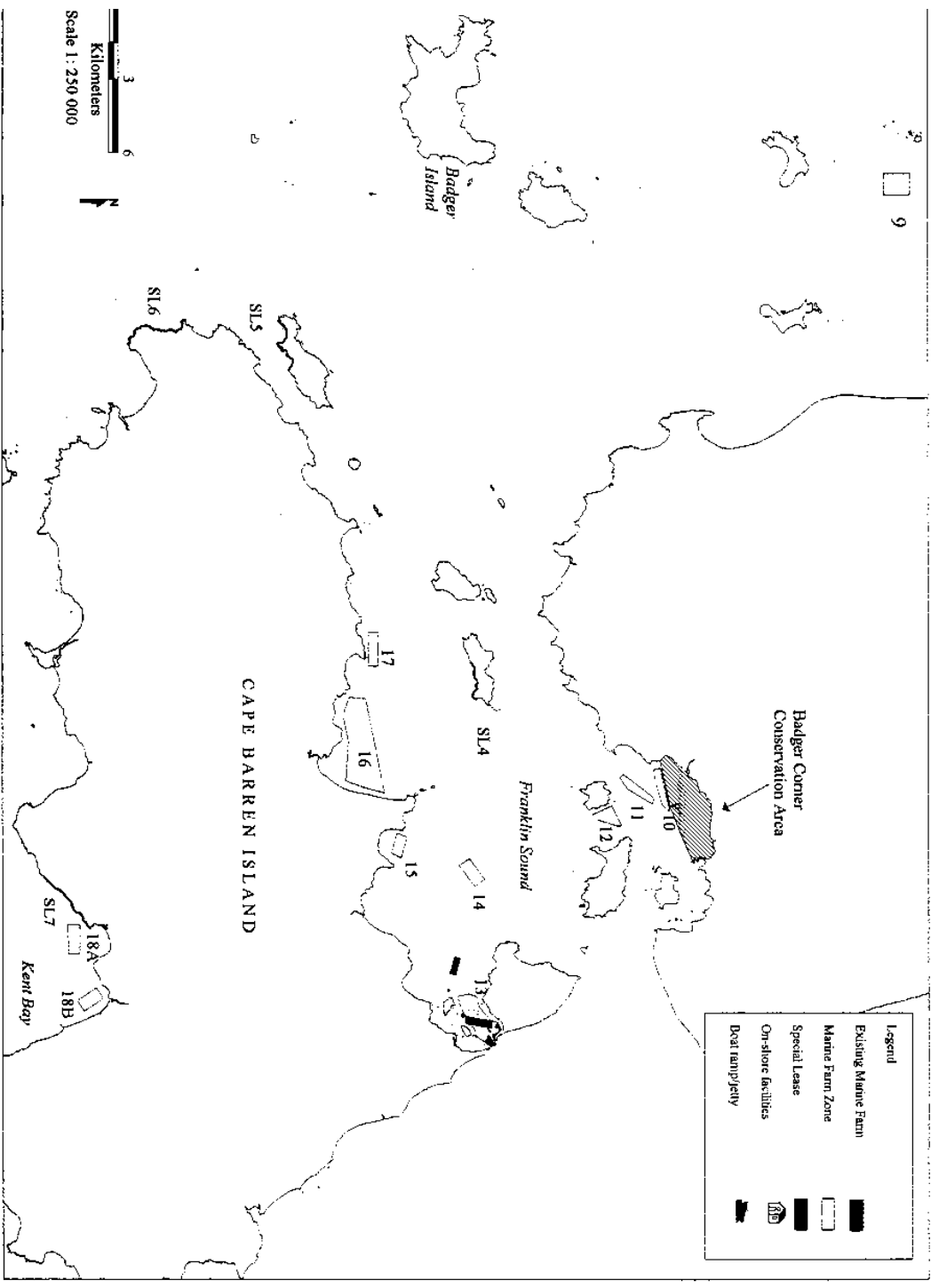
Map 5A - Furreaux Islands Marine Farming Development Plan & Existing Farms (Map 1 of 3)



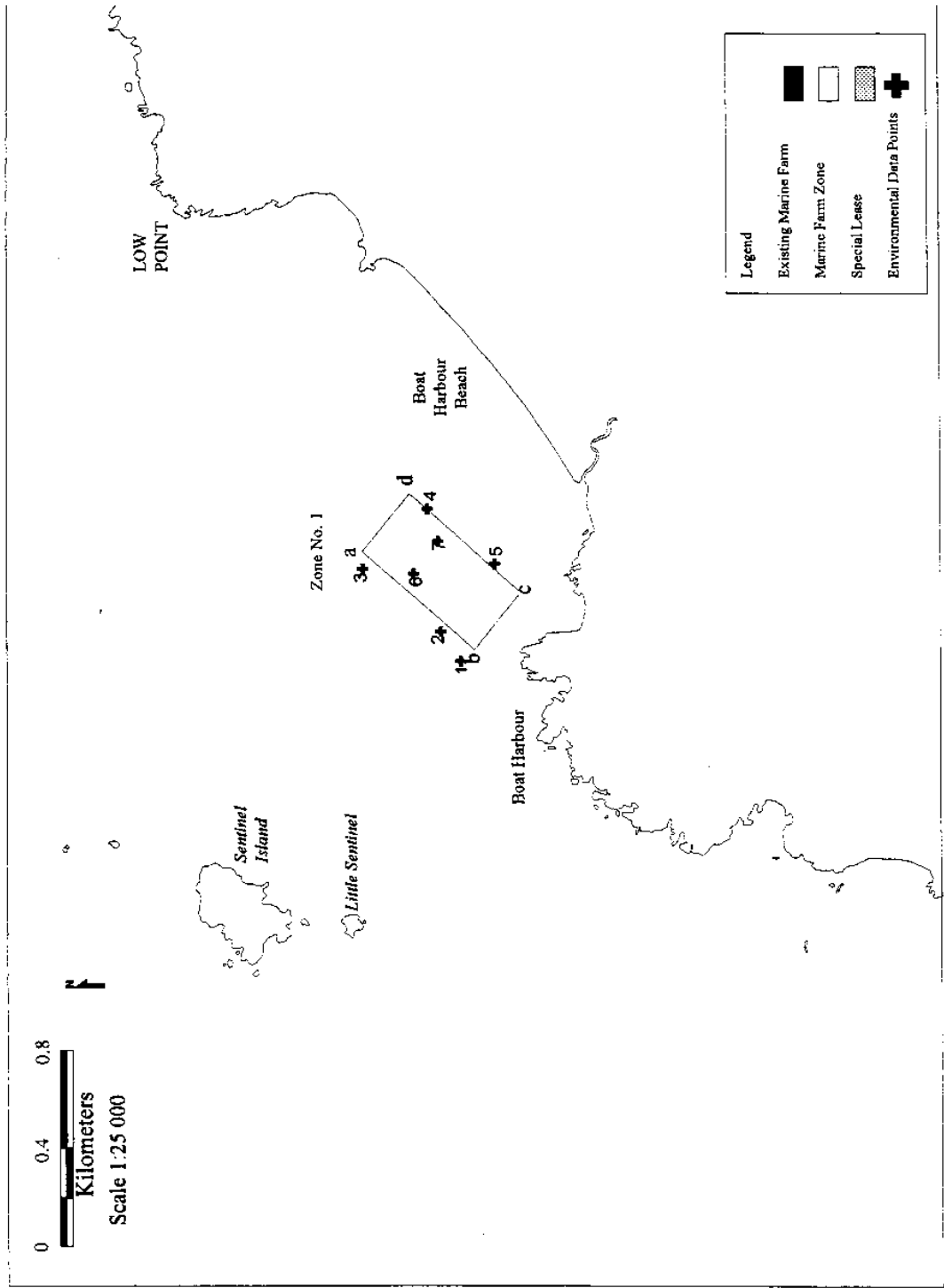
Map 5B - Furneaux Islands Marine Farming Development Plan & Existing Farms (Map 2 of 3)



Map 5C - Furneaux Islands Marine Farming Development Plan & Existing Farms (Map 3 of 3)



Map 6 - Zone 1 (Boat Harbour)



Zone 1 (Boat Harbour)

Location

Boat Harbour is situated off the north eastern coastline of Flinders Island approximately 4 km south of Killiecrankie Bay. The Boat Harbour marine farming zone is located at the southern end of Boat Harbour Beach approximately 150 m from the coastline at its closest point and 530 m from Boat Harbour Beach. Sentinel Island is located over 1.2 km north west of the zone.

Environmental conditions

The zone was surveyed on the 3 September 1997 at 1530 hours. Depth soundings, sediment samples and underwater video footage were taken adjacent to and throughout the zone. The survey indicated water depths ranging from approximately 6 to 14 m. The substrate is predominantly sand with some regions of patchy weed cover consisting of *Caulerpa sp* or *Heterozostera tasmanica*. Reasonable current flow is expected in the area as evidenced by observation of seagrass blades parallel to the substrate surface in the video footage. Water depths, a description of sediment samples and video footage are described below.

Sediment Grab Samples

Site	Depth (m)	Sediment type & Texture
1	14.5	Sand with small to medium fragments of shell debris, 1 small amphipod.
3	8.4	Fine grey sand with very little fine shell grit/debris. A few of <i>Heterozostera tasmanica</i> blades in sample.
4	8.0	Fine grey sand with little shell grit, few blades of <i>Heterozostera tasmanica</i> .
5	6.4	Sand with shell grit/debris, large fragment of <i>Caulerpa longifolia</i> .

Video Record

Site	Description
1	Drift, drop from patchy reef with reasonable vegetation cover (<i>Cystophora sp.</i> , <i>Sargassum sp.</i> , <i>Caulerpa flexilis</i>).
2	Bare sand, slightly ridged, occasional burrow holes visible.
3	Sparse <i>Heterozostera tasmanica</i> over sand, slightly ridged. Reasonable current flow as evidenced by sea grass blades almost parallel to substrate surface.
4	Sparse <i>Heterozostera tasmanica</i> over slightly ridged sand. Occasional burrow holes visible.
5	Patchy weed, predominantly <i>Caulerpa longifolia</i> over slightly ridged sand.
6	Slightly undulating/ridged grey coloured sand with some shell debris, burrow holes visible, very sparse <i>tasmanica</i> .
7	Sparse to moderate <i>Heterozostera tasmanica</i> cover over slightly ridged sand.

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farming operations within the zone.

History of Marine Farming Activities

There is no history of marine farming within the zone.

Future Potential

The area has been identified as a site with the potential for the cultivation of shellfish. The Sentinel Islands and associated reef region located to the west of the zone provide some protection and abatement of seas from the west to the south west.

Navigation Channels and Safe Anchorages

The zone lies clear of any recognised navigation channel or safe anchorages

Surrounding Land Use

The adjacent land consists of a coastal strip of Crown Reserve giving way to private Freehold Land, zoned Rural. There are three holiday dwellings located in the area.

Sewage and Stormwater Outlets

The three dwellings located on the adjacent land have approved septic tank sewage treatment.

Summary of Zone

The zone is considered an appropriate site for marine farming with potential for the culture of a number of species, in particular for deepwater shellfish culture. Any marine farming activities will be required to conform to the management controls contained within this Plan.

Zone 1 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

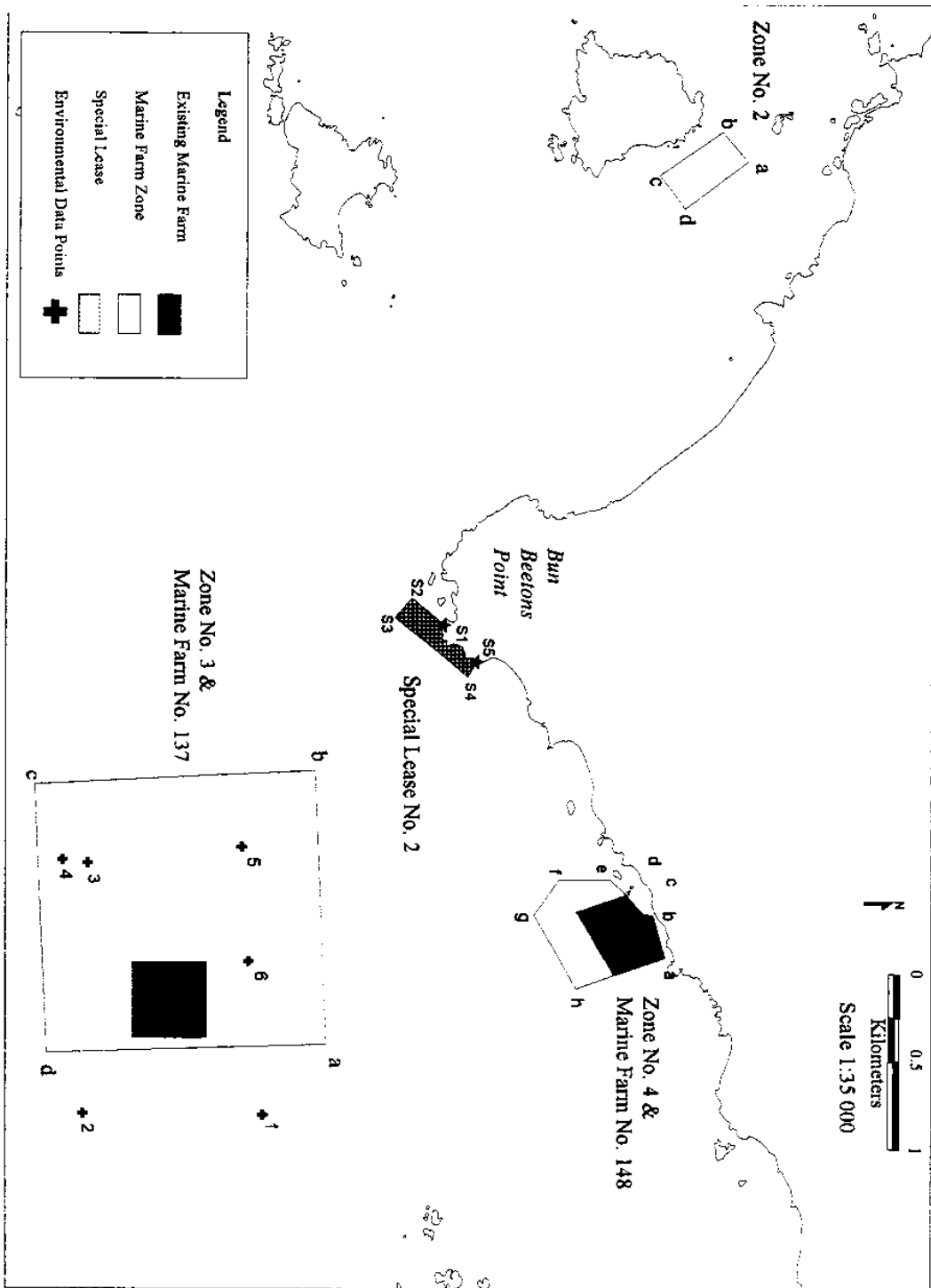
- a (E567158 N5589172) thence straight to
- b (E567394 N5588983) thence straight to
- c (E566994 N5588531) thence straight to
- d (E566760 N5588721) thence straight to
- a (E567158 N5589172).

Australian Mapping Grid (AMG)

Zone 55 Co-ordinates

The size of the zone is approximately 18.13 ha with a maximum leasable area of 10 ha. Species to be farmed will include shellfish and seaweeds. Map 6 shows the zone.

Map 7- Zone 2 (Roydon Island), Zone 3 (Bunbeetons Point), Zone 4 (Tanners Bay)



Zone 2 (Roydon Island)

Location

Roydon Island is situated to the north of the Pasco Group of islands on the west coast of Flinders Island and to the south of Cape Frankland. The Roydon Island marine farming zone lies between a reef on the north eastern tip of Roydon Island and a sand spit on the eastern side of the Island. The zone is situated approximately 90 m from the rocky foreshore of Roydon Island and over 500 m from the mainland.

Environmental Conditions

Water depth within the zone varies between 2 and 11 m. The substrate is sand containing isolated areas of seagrass and granite boulders. Tidal movements in the area are estimated to be strong.

The southern part of the zone is approximately 5 to 6 m deep with a substrate of coarse sand. There is a 50% cover of seagrass on this area, predominantly *Posidonia australis*. *Posidonia* cover varies between 20% and 50%. In some areas it is the only abundant species, while in others it is interspersed with *Caulerpa* of up to 33% ground cover.

In the north the zone is up to 11 m deep, and the sandy substrate is broken by limestone rock outcrops covering up to 50% of the seabed. *Posidonia* cover declines to approximately 10% and *Zostera* is 10% to 20% of the cover.

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone.

History of Marine Farming Activities

There is no history of marine farming within the zone.

Future Potential

The zone has been identified as an area with potential for the culture of shellfish, but may also be suitable for a number of other species.

Navigation Channels and Safe Anchorages

The zone lies clear of any recognised navigational channel, but there are locally recognised anchorages to the south across a sand bar and to the east of the area. The zone will not interfere with these anchorages.

Developments within the zone must conform to the relevant marine authority's navigational requirements.

Marinas, Public Jetties and Other Public Facilities

There is a public launching ramp situated at West End. There are no marinas, public jetties adjacent to the area.

Surrounding Land Use

Roydon Island consists of uncommitted Crown Land and is zoned Rural.

Sewage and Stormwater Outlets

There are no known sewage or stormwater outlets adjacent to the zone.

Summary of Zone

The zone is considered an appropriate site for marine farming with potential for the culture of a number of species, but in particular for deepwater shellfish farming. Any marine farming activities will be required to conform to the management controls contained within this plan.

Zone 2 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E566373 N5582726) thence straight to
- b (E566201 N5582583) thence straight to
- c (E566449 N5582232) thence straight to
- d (E566639 N5582374) thence straight to
- a (E566373 N5582726).

Australian Mapping Grid (AMG) Zone 55 Co-ordinates

The zone size will be approximately 10 ha with a maximum leasable area of 5 ha. Species to be farmed will include shellfish, finfish and seaweeds. Map 7 shows the zone.

Zone 3 (Bun Beetons Point South)

Location

The Bun Beetons Point marine farming zone is sited approximately 1 km south east of Bun Beetons Point, within Marshall Bay on the north western side of Flinders Island. The area is an offshore site and may require the development of new farming methods to allow farming in exposed areas. There is one existing marine farm of 18.07 ha within the zone.

Environmental Conditions

Water depth in the zone varies between 13 and 15 m. Tidal flow is estimated at up to 2 knots with a temperature range of 11°C to 21°C. The site is exposed to south and south westerly winds.

The zone was surveyed on 5th February 1996 at 1820 hours. Depth soundings were recorded at the boundaries and two additional transects within the zone. The survey indicated a light greenish grey sediment of fine sand and shell grit. Ridged sand reflected the strong currents in the area. Extensive *Posidonia* beds dominated the vegetation cover over most of the zone. The detailed results of sediment grab samples are shown below. A video transect through the eastern section of the zone is also described below.

Sediment Grab Samples

Site	Depth (m)	GPS co-ords	Sediment type & texture	Colour	Smell	Other
1 (d)	13.7	S 39° 55 618' E 147° 50 405'	Relatively fine sand/shell grit	light greenish/grey	none	<i>Posidonia</i> with <i>Colpomenia sinuosa</i> attached.
2 (c)	14.0	S 39° 56 176' E 147° 50 408'	as above	light greenish/grey	none	<i>Posidonia</i> blades (many) with <i>Colpomenia sinuosa</i> attached. Not much sediment obtained, dense patch of <i>Posidonia</i> .
3	14.1	S 39° 56 168' E 147° 49 890'	none collected in grab			<i>Posidonia</i> blades (many), 2 dead clam shells, 1 live turban-like shell. No sediment in grab, suggest dense patch of <i>Posidonia</i> .
4 (b)	15.8	S 39° 56 248' E 147° 49 398'	as above			Blades of <i>Posidonia</i> with <i>Colpomenia sinuosa</i> attached, <i>Mychodea carnosa</i> , 1 dead clam shell.
5 (a)	15.6	S 39° 55 687' E 147° 49 339'	Quartz/sand with small shell & rock fragments	Sand - greenish grey		<i>Posidonia</i> blades, some <i>Halophila</i> , brown filamentous algae, 3 <i>Pyura pachydermatina</i> , 1 large clam.
6	13.6	S 39° 55 664' E 147° 49 794'	Relatively fine sand/shell grit.	light greenish/grey	none	<i>Posidonia</i> blades + roots, only a small amount of sediment in grab.

Video Record

- clear sand - ridged, shell debris, odd patch of seaweed;
- fringe of *Posidonia*, patchy then moving into *Posidonia* (approx. 40% cover), other seaweed species also present;
- denser *Posidonia*, approx. 90-95% cover, epiphytes on blades, occasional sea tulip;
- sponges, approx. 80% cover of *Posidonia*, sand patches in troughs, bottom quite markedly ridged (deep furrows), *Posidonia* predominantly on crests;
- clearer patches of sand with some *Halophila*, variable cover 30-70%;
- rocky reef patches with sponges and weed cover (eg. *Caulerpa cactoides*, brown weeds);
- clear sand, furrowed;
- clear sand, furrowed, occasional seaweed, shell debris in troughs;
- patchy weed cover (approx. 60-70%) with loose rocks on coarse quartz/sand;
- patchy weed cover over ridged coarser sand & shell debris, odd *Posidonia* patch, variable cover from 20-40%;

- denser *Posidonia*, variable cover from 50-100%, occasional sea tulip;
- dense *Posidonia*, approx. 95% cover;
- bottom quite furrowed with dense *Posidonia* cover on crests, variable cover 60-95%;
- dense *Posidonia*, approx. 95-100% cover;
- clear finer sand, furrowed;
- patchy *Posidonia* with clear sand patches;
- fringe of *Posidonia* bed, patchy cover varying between patches of sand & approx. 50-90% (variable) *Posidonia*, some other seaweed species present at times;
- furrowed bottom, generally 90% *Posidonia* cover;
- clear sand;
- approx. 95% *Posidonia* cover, patchy cover at times with occasional clear sand patch.

Prior to the commencement of new marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

Butler Aviation Pty Ltd is the current holder of the one existing marine farm within the zone.

<i>Marine Farm No. 137</i>	Area	18.07 ha
	Granted	1990
	Duration	20 years
	Species	One species of red seaweed

History of Marine Farming Activities

The application for the current marine farm was received in December 1989 for an area of 18 ha in Marshall Bay, sited approximately 2.75 km from the mainland of Flinders Island, in the lee of Pasco Island. The application was for scallop culture using longline techniques.

The application was advertised on 28 April 1990 and received two objections on the grounds of loss of recreational and professional fishing area, navigation hazard, seal interference and surface pollution. After consideration of these objections the permit was granted to take effect from 1 July 1990 for a term of 20 years for an area of 18 ha.

Butler Aviation Pty Ltd applied for a variation to relocate the site to a more sheltered area as there were problems with weather conditions, strong tidal movement and fouling in the approved area. This variation was advertised on 8 December 1990 with no objections being received.

The variation was approved and the site was relocated to an area measuring 425 m x 425 m located 2.3 km from the closest shore high water mark in Marshall Bay.

The lease holder is currently farming red seaweeds that are used to feed abalone on the lease holder's other existing farm, Marine Farm No. 148. The lease holder has also experimented with scallop culture on the farm and results indicated good spat collection and growth rates.

Future Potential

The zone is considered a suitable site for marine farming. The existing farm has potential for a number of deepwater farming techniques, in particular scallop culture, given the experimental growth rates and the amount of natural spat settlement.

The size of the zone has been set to allow for a second marine farm with potential for the farming of finfish, given the water depth and current movements in the area. The zone will be exposed to south and south westerly winds and is an offshore exposed site requiring the development of appropriate farming techniques to suit the conditions.

Navigation Channels and Safe Anchorages

The marine farming zone lies clear of any recognised major navigation channel. There is a recognised safe anchorage situated north east of the zone within Tanners Bay and north of Marriott Reef. The marine farming zone will not interfere with this anchorage. Any lease within the area will be required to meet the relevant marine authority's navigational requirements.

Marinas, Public Jetties and Other Public Facilities

There are no marinas, public jetties or other public facilities adjacent to the zone.

Surrounding Land Use

The marine farming zone is situated offshore, the closest landfall is Bun Beetons Point, 1 km to the north west. This area is subdivided private freehold land. The area is zoned Rural and has a strip of Crown reserve zoned Open Space around the foreshore.

Sewage and Stormwater Outlets

There are no known sewage or storm water outlets adjacent to the zone.

Summary of Zone

The marine farming zone is an appropriate site for the continued operation of the existing marine farm and for some expansion of the industry, given the potential that the zone may hold for the marine farming of a number of species. The zone is an offshore exposed site.

Zone 3 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E571386 N5580349)thence straight to
- b (E569831 N5580286)thence straight to
- c (E569914 N5578681)thence straight to
- d (E571435 N5578753)thence straight to
- a (E571386 N5580349).

Australian Mapping Grid (AMG) Zone 55 Co-ordinates

The zone has an area of approximately 246.6 ha with a maximum leasable area of 40 ha. The species to be farmed will include finfish, shellfish and seaweeds. Map 7 shows the zone.

Zone 4 (Tanners Bay)

Location

The Tanners Bay marine farming zone is located within Tanners Bay, at the northern end of Marshall Bay, on the north western side of Flinders Island. The zone is situated approximately 15 m from a coastline of granite platforms and boulders with areas of coarse granite beaches. The surrounding land is covered in coastal forest.

Environmental Conditions

Water depth within the zone ranges from 1 to 7 m and the substrate is approximately 75% sand with 25% broken granite and limestone rock. Tidal flow within the area is estimated at up to 1 knot and water temperatures between 11°C and 20°C.

A scuba dive assessment of seagrass undertaken by the applicants covered approximately 33% of the application area and indicated that 10 - 15% of the sea bed appeared to be covered by seagrass. Samples of seagrass were collected and identified as *Amphibolis spp* most likely *Amphibolis antarctica*. (Ref. used Womersley, H. B. S. 1984. The marine benthic flora of southern Australia. Part 1. Government Printer, South Australia. pp. 329). There will be an ongoing monitoring program for the area.

Existing Farming Activities

There is one existing marine farm within the zone, operated by Butler Aviation Pty Ltd.

<i>Marine Farm No. 148</i>	Area	13.48 ha
	Granted	1993
	Duration	20 years
	Species	Abalone

History of Marine Farming Activities

The application for this farm was received in July 1992 for an area of 13 ha in Tanners Bay for the purposes of farming scallops, abalone, seaweed and sea urchins.

The application was advertised 10 October 1992 and did not receive any objections. A lease was issued on 22 December 1992 to take effect from 1 January 1993.

Future Potential

The site is currently being developed for the purposes of abalone culture. The current lease holders are undertaking a number of trials into abalone production and believe the site has the potential to become a viable commercial operation.

Navigation Channels and Safe Anchorages

The zone does not interfere with a recognised safe anchorage located to the north east of the area, or any recognised navigation channel within the area.

Marinas, Public Jetties and Other Public Facilities

There are no marinas, public jetties or other public facilities adjacent to the zone. There is a private licensed launching ramp adjacent to the zone that is used by the current lessee of the existing marine farm.

Surrounding Land Use

The land adjacent to the area consists of private freehold land zoned Rural. There is one dwelling and depot opposite the marine farming zone belonging to the lease holder. To the east there is an portion of uncommitted Crown Land which is commonly used for camping.

Sewage and Stormwater Outlets

There is one dwelling immediately opposite the marine farming zone. It belongs to the lease holder and uses a septic tank system.

Summary of Zone

Zone 4 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

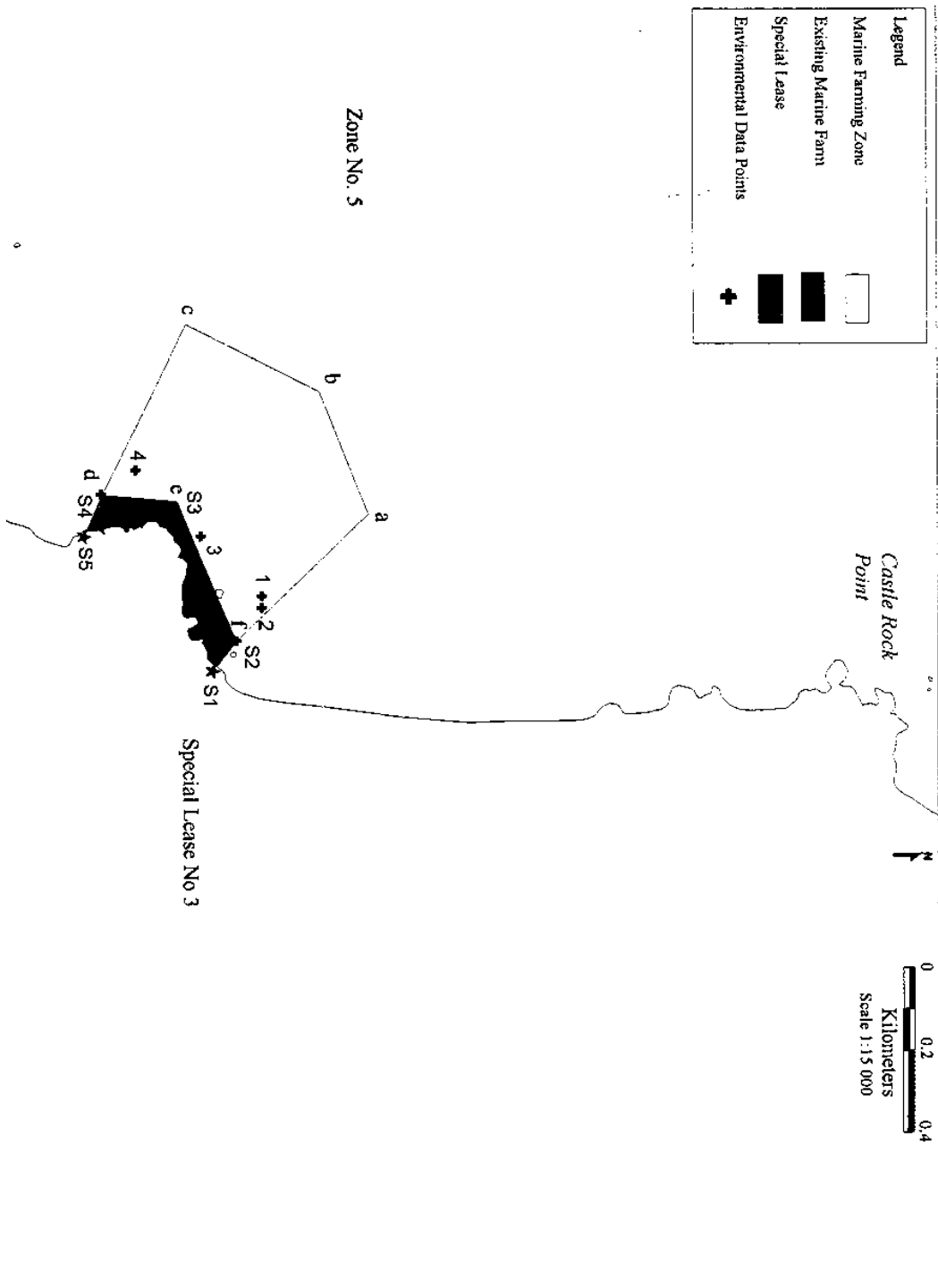
- a (E570895 N5582266) thence straight to
- b (E570653 N5582201) thence straight to
- c (E570641 N5582143) thence straight to
- d (E570536 N5582050) thence straight to
- e (E570452 N5581966) thence straight to
- f (E570452 N5581666) thence straight to
- g (E570650 N5581528) thence straight to
- h (E571069 N5581762) thence straight to
- a (E570895 N5582266).

Australian Mapping Grid (AMG)

Zone 55 Co-ordinates

The area is considered appropriate for the continued operation of the existing marine farm with the possibility of some expansion in the future. The zone size will be approximately 30.00 ha with a maximum leasable area of 18 ha. Species to be farmed will include finfish, shellfish and seaweeds. Map 7 shows the zone.

Map 8 - Zone 5 (South Castle Rock Point)



Zone 5 (South Castle Rock Point)

Location

The marine farming zone is approximately 50 m off the coastline of Marshall Bay approximately 1.2 km south from Castle Rock, on the north western side of Flinders Island. The adjacent foreshore consists of a granite headland to the south and a sandy beach running north bounded by sand dunes. The adjacent land is mostly cleared and consists of improved pasture for grazing purposes.

Environmental Conditions

Water depth within the zone varies between 5 and 8 m. The zone was surveyed on the 5 February 1996 at 1100 hours. Some sites were inspected by snorkel diving to determine and confirm the area of reef. Many free floating *Posidonia* blades and seed pods were present. The clear water enabled the reef and sandy bottom to be discriminated. A video transect conducted between corners b and f showed very thick *Amphibolis* meadows. No grab samples were collected, but it could be determined that the sediment type was quartz/sand. It is a relatively exposed site as indicated by the amount of seaweed washed up on the northern beach region of the zone.

A region of reef on the inner boundary of the zone was mapped and its location is described below.

Site	Depth	GPS co-ords	Sediment type & texture
corner E	5.6 m	S 39° 59 643 E 147° 54 017	Large exposed granite boulders within this region, no seagrass visible, sand patches.
1		S 39° 59 61 E 147° 53 94	Approx. location of reef boundary.
2		S 39° 59 61 E 147° 53 96	Approx. location of reef boundary.
3	8.0 m	S 39° 59 69 E 147° 53 84	Patchy reef bottom, reef fringe, relatively flat, no seagrass observed.
4	8.4 m	N/R	Reef.
corner C	7.2 m	S 39° 59 82 E 147° 53 77	Sandy bottom.

A video transect was conducted between corner b to f.

Video Record

- dense *Amphibolis* approx. 95-100% cover, some epiphytic growth on blades as well as sparse fine filamentous algae, cover virtually all *Amphibolis*. Occasional patch of sand with *Caulerpa sp.* Present;
- sand patches visible, clear sand ridged.

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone.

History of Marine Farming Activities

There is no history of marine farming within the zone.

Future Potential

The area has been identified as a potential site for deepwater culture of shellfish, in particular abalone. A special lease is proposed on the inshore boundary of the zone, which has potential to be used in conjunction with any area allocated within the zone.

Navigation Channels and Safe Anchorages

The zone lies clear of recognised navigational channels. There are four recognised safe anchorages in bays south of the zone to Port Davies. These are illustrated in Map 2.

Marinas, Public Jetties and Other Public Facilities

There is a public launching ramp and a number of moorings situated at Port Davies, 2.5 km south. There are no public or private jetties on the foreshore adjacent to the zone.

Surrounding Land Use

The surrounding land is zoned Rural with a strip of Crown reserve zoned Open Space running around the foreshore. The principal use of the adjacent land is mixed grazing.

Sewage and Stormwater Outlets

There are no sewage or stormwater outlets adjacent to the zone.

Summary of Zone

The zone is considered to have potential for farming abalone and possibly a number of other species. Marine farming activities are required to conform to the management controls contained within this Plan.

Zone 5 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

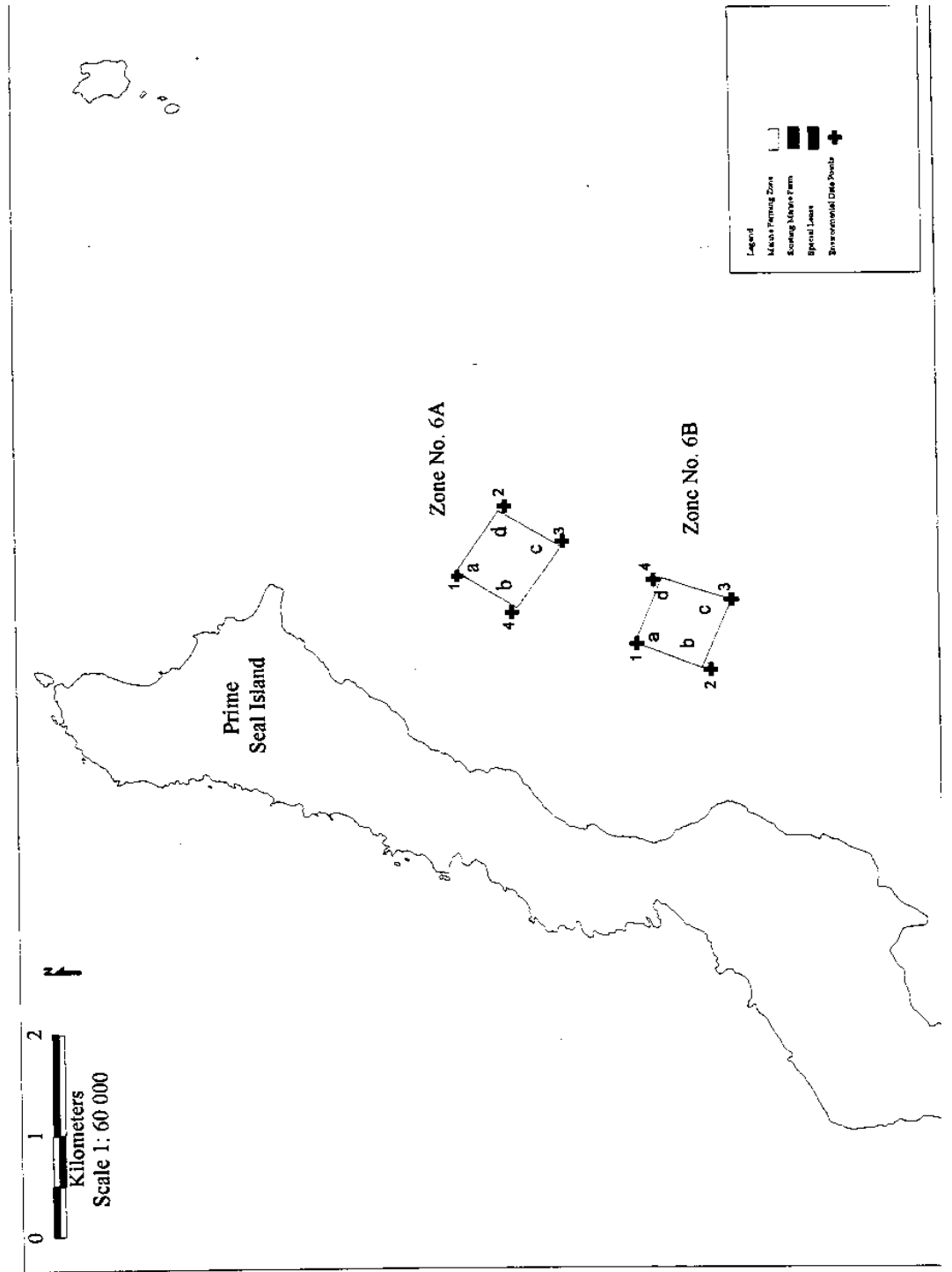
- a (E576549 N5572820) thence straight to
- b (E576253 N5572702) thence straight to
- c (E576089 N5572381) thence straight to
- d (E576504 N5572180) thence straight to
- e (E576519 N5572359) thence straight to
- f (E576856 N5572500) thence straight to
- a (E576549 N5572820).

Australian Mapping Grid (AMG)

Zone 55 Co-ordinates

A zone size of approximately 25.09 ha is proposed with a maximum leasable area of 15 ha. The species to be farmed include shellfish and seaweeds. Map 8 shows the zone.

Map 9 - Zone 6A & 6B (Prime Seal Island)



Zone 6 (Prime Seal Island A & B)

Location

Prime Seal Island is situated approximately 6 km to the west of Flinders Island. The Prime Seal Island marine farming zone is located on the eastern side of the island. The zone is divided into two sub-zones, A and B. Prime Seal Island is Crown Land leased for grazing purposes. Sub-zone A has an area of 50.63 ha and is situated approximately 1.7 km south of Spit Point. Sub-zone B consists of an area of 50.23 ha and is located over 1 km to the south of sub-zone A and approximately 1.8 km from the coastline of Peacock Bay.

Environmental Conditions

Sub-zone A

The zone was surveyed on 5 February 1996 at 0620 hours. Depth soundings were taken along boundaries and along a diagonal transect between corner a and corner c indicating water depths between 12 to 15 m. The survey indicated a sediment of fine sand with some quartz, shell grit and light greenish grey in colour. Dense patches of *Posidonia* covered the zones, the clear waters allow its growth at depths greater than normally found. A video transect across the middle of the zone is described below, with data from sediment grab samples.

Sediment Grab Samples

Site	Depth (m)	GPS co-ords	Sediment type & texture	Colour	Smell	Other
1 (a)	13.5	S 40° 03 611' E 147° 47 227'	Fine sand with coarser quartz & shell grit, black flecks	light greenish/grey	none	Small clump of <i>Posidonia</i> , 1 live clam, 4 clam valves.
2 (d)	12.5	S 40° 03 860' E 147° 47 713'	Mostly fine shell grit with some fine sand	light greenish/grey	none	Small amount of brown weed (fine bladed) .
3 (c)	15.6	S 40° 04 164' E 147° 47 467'	Fine sand with coarser quartz & shell grit, black flecks	light greenish/grey	none	Small amount of <i>Halophila</i> blades & root mass, few clam shell valves, 1 small scallop shell valve.
4 (b)	13.2	S 40° 04 164' E 147° 47 467'	Fine sand with much fine-coarse shell grit	light greenish/grey	none	12 clam shell valves, varied small shells, 1 mussel shell valve, 2 dead scallop shells, small amount of <i>Halophila</i> (blades & roots), few <i>Posidonia</i> blades.

Video Record

- sparse cover, occas. *Halophila* some *Posidonia* blade debris visible, veg'tn. cover approx 10%, occasional. clump of *Posidonia*;
- *Posidonia*, approx. 50% cover;
- sparse cover (10-15%) *Halophila*, *Posidonia* debris, occasional sponge, some other seaweed species present;
- patchy clumps of *Posidonia* then changing back to above cover;
- relatively dense *Posidonia* cover (90-95%), moving to patchy cover with sand (approx. 50%);
- sparse cover, occasional patches of *Caulerpa cactoides* and clumps of *Posidonia*, variable cover from 5-20%;
- relatively dense *Posidonia*, 95-100% cover;
- moderately dense *Posidonia*, varying from 60-95% cover;
- sand with sparse cover, occasional *Posidonia* (5-10% cover);
- virtually clear sand with drift weed debris,

Sub-zone B

The sub-zone was surveyed on 5 February 1996 at 0730 hours. Depth soundings were taken along the boundaries and a transect sampled mid zone from south to north. These soundings showed water depths between 16 and 18 m. A video transect was done mid zone and is described below. Results of the sediment grab samples are given below. Relatively dense *Posidonia* patches were observed with the video transect, though not observed in grab samples.

Sediment Grab Samples

Site	Depth (m)	GPS co-ords	Sediment type & texture	Colour	Smell	Other
1 (a)	15.6	S 40° 04 555' E 147° 46 761'	Fine sand with fine quartz much fine-coarse shell grit/shell fragments	light greenish/grey	none	Small amount of <i>Halophila</i> , 3-4 brown <i>Posidonia</i> blades (1 green), small amount of <i>Caulerpa scalpelliformis</i> , 3 tapering tube burrows (cemented quartz) - 1 inhabited.
2 (b)	16.4	S 40° 04 948' E 147° 46 585'	as above but less coarser shell fragments	light greenish/grey	none	Clump of <i>Posidonia</i> root mass + blades.
3 (c)	18.3	S 40° 05 660' E 147° 47 080'	Fine sand with fine to medium shell grit	light grey greenish	none	Small section of (green) <i>Posidonia</i> blade, 1 dead scallop shell, 3 dead clam shells.
4 (d)	17.6	S 40° 04 642' E 147° 47 206'	Fine sand with medium shell grit + some quartz	light greenish/grey	none	6-8 clam shells, small amount of fine filamentous red weed.

Video Record

- relatively dense *Posidonia*, approx 100% cover, some epiphytic growth on blades as well as some filamentous algae;
- change to patchy *Posidonia* and sand, approx. 50% vegetation cover;
- nearly clear sand with *Posidonia* blade debris, occasional small patch of *Halophila*;
- sparse patchy cover of *Halophila* with *Posidonia* blade debris, approx. 20% vegetation cover;
- very sparse clumps of *Posidonia* with *Halophila* and *Caulerpa sp.* over sand, approx. 10% vegetation cover;
- dense patch of *Posidonia* then sand, moving to *Caulerpa cactoides* (sparse cover);
- dense *Posidonia* cover, approx. 95% cover;
- clear sand with sparse weed cover (10-20%), *Halophila* plus other species, fringes of *Posidonia* bed visible at times;
- relatively clear sand with odd patches of *Halophila* and *Caulerpa cactoides*, *Posidonia* blade debris, about 10-15% veg'tn cover;
- relatively dense *Posidonia*, approx. 90-95% vegetation cover.

In 1993/94 preliminary survey work done under the Ocean Rescue 2000 - Marine Protected Area Program (Project No. D705) by DELM indicated high species diversity on the western side of Prime Seal Island.

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone.

History of Marine Farming Activities

There is no history of marine farming within the zone.

Future Potential

The zone has been identified as an area that may have future potential for the production of finfish given the water depth, tidal movements and protection from prevailing westerlies. The zone may also be suitable for the deepwater cultivation of shellfish.

Navigation Channels and Safe Anchorages

The marine farming zone will not interfere with any recognised navigational channel. There is a recognised safe anchorage on the southern side of Spit Point; sub-zone A is located approximately 1.7 km south of Spit Point and will not interfere with this anchorage. There is also a recognised anchorage within Peacock Bay; sub-zone B is located approximately 1.8 km from the coastline and will not impact on this anchorage.

Marinas, Public Jetties and Other Public Facilities

There are no public or private jetties on the foreshore immediately adjacent to the zone. There is an area within Peacock Bay where the loading and unloading of livestock occurs. Sub-zone B is located over 1.8 km from this area and will not impact on this activity.

Surrounding Land Use

Prime Seal Island is an area of Crown Land with a Rural zoning. The area is leased from the Crown for the purposes of grazing and is also used for harvesting muttonbirds. The marine farming zone will not impact on these activities.

Sewage and Stormwater Outlets

There are no sewage or storm water outlets on the island.

Summary of Zone

The zone is considered a suitable site for marine farming operations to occur. The zone has the potential for a range of species, in particular finfish, given the water depth and tidal movements within the area. Prime Seal Island will afford some degree of shelter from westerly winds. The zone has been divided into two sections to allow for the possibility of two finfish farms, one in each zone, with a separation distance of over 1 km.

Further baseline environmental data will be collected before the zone is developed and any marine farming activities will be required to conform to the management controls contained within the Furneaux Islands Marine Farming Development Plan.

Zone 6A consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E567175 N5565259) thence straight to
- b (E566813 N5564677) thence straight to
- c (E567413 N5564237) thence straight to
- d (E567765 N5564846) thence straight to
- a (E567175 N5565259).

Australian Mapping Grid (AMG)
Zone 55 Co-ordinates

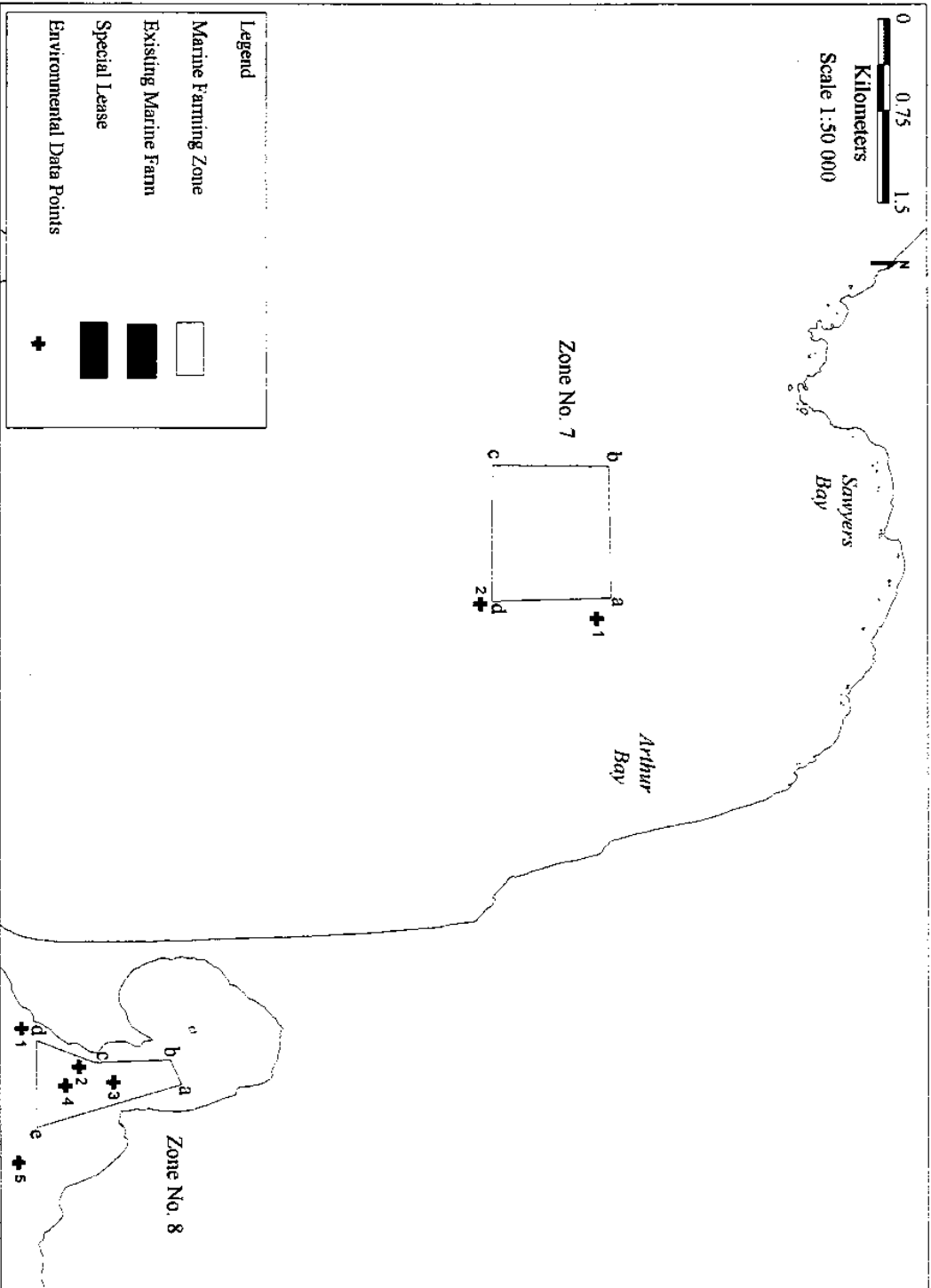
Zone 6B consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E566464 N5563531) thence straight to
- b (E566214 N5562866) thence straight to
- c (E566885 N5562583) thence straight to
- d (E567101 N5563258) thence straight to
- a (E566464 N5563531).

Australian Mapping Grid (AMG)
Zone 55 Co-ordinates

Sub-zone A is an area of approximately 50.63 ha with a maximum leasable area of 30 ha. Sub-zone B is an area of approximately 50.23 ha with a maximum leasable area of 30 ha. The species to be farmed within both sub-zones include finfish, shellfish and seaweeds. Map 9 shows the zones.

Map 10 - Zone 7 (South Arthur Bay), Zone 8 (Long Point)



Zone 7 (South Arthur Bay)

Location

Arthur Bay is located on the western side of Flinders Island. The South Arthur Bay marine farming zone is located approximately 1.6 km from the closest landfall, a headland to the west of Sawyers Bay and 2.25 km west of Blue Rocks. The zone is an off-shore exposed site.

Environmental Conditions

Water depth within the zone is approximately 7 to 8 m deep. Tidal movement in the area is 1 to 2 knots. The area may benefit from some shelter offered by Prime Seal Island with regards to wave energy.

The zone was surveyed on 6 February 1996 at 0730 hours and depth soundings were taken along the boundaries. The survey results indicated a coarse quartz sand sediment covered by intensive beds of *Posidonia* and *Amphibolis*. A video transect was made south to north mid-zone and is described below. Seagrass cover of 95-100% was observed along the length of this transect - mixed *Amphibolis* & *Posidonia*. Results of sediment grab samples are also shown.

Sediment Grab Samples

Site	Depth (m)	GPS co-ords	Sediment type & texture	Colour	Smell	Other
1 (d)	7.2	S 40° 03 250' E 147° 55 254'	Coarse quartz/sand	quartz	none	<i>Posidonia</i> (root mass & blades), 1 small shrimp, small piece of coralline algae.
2 (c)	7.6	S 40° 03 743' E 147° 55 207'	Coarse quartz + fine gravel		none	<i>Amphibolis</i> , 1 blade with <i>Tethya corticata</i> attached (approx. 4 cm diam).

Video Record

- relatively dense *Amphibolis*, approx. 95% vegetation cover, some *Posidonia* observed;
- 95-100% vegetation cover, approx. 50/50 mix *Amphibolis/Posidonia*;
- 80-100% veg. cover, approx. 60/40 *Amphibolis/Posidonia* mix, some patches where *Posidonia* has died off;
- 90-100% veg. cover, 10/90 *Amphibolis/Posidonia* mix;
- 90-100% veg. cover, generally *Posidonia*, occasional other seaweed species, epiphytes on *Posidonia*; seed pods of *Posidonia* visible at times;
- *Posidonia*, 95-100% cover;
- *Amphibolis* with some *Posidonia*, 100% veg. cover, variable mix of these species from 5-50% *Posidonia*;
- 95-100% cover, *Posidonia*;
- *Amphibolis/Posidonia*, 95-100% cover;
- *Posidonia*, 95-100% cover, some patches where *Posidonia* has died off, occasional small patch of *Amphibolis*;
- *Posidonia*, 95-100% cover - seed pods visible at times;
- *Posidonia* with *Amphibolis*, 95-100% cover and approx. 50/50 mix.

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone.

History of Marine Farming Activities

There is no history of marine farming within the zone.

Future Potential

The area has been identified as a site that may hold future potential for the cultivation of shellfish . There has been some previous interest expressed in farming shellfish in the area.

Navigation Channels and Safe Anchorages

The zone lies clear of any recognised navigation channel or safe anchorages.

Marinas, Public Jetties and Other Public Facilities

There are no marinas, public jetties or other public facilities adjacent to the zone.

Surrounding Land Use

The closest landfall is located 1.6 km north west of the zone.

Sewage and Stormwater Outlets

There are no licensed sewage or stormwater outlets adjacent to the zone.

Summary of Zone

The marine farming zone has potential for the farming of a number of species, in particular shellfish. Marine farming activities will be required to conform to the management controls contained within this plan.

Zone 7 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E578427 N5565956) thence straight to
- b (E577360 N5565939) thence straight to
- c (E577350 N5564999) thence straight to
- d (E578449 N5564994) thence straight to
- a (E578427 N5565956).

Australian Mapping Grid (AMG)

Zone 55 Co-ordinates

The zone area will be set at approximately 102.9 ha with a maximum leasable area of 40 ha. Species to be farmed will include shellfish, finfish and seaweeds. Map 10 shows the zone.

Zone 8 (Long Point)

Location

The zone is located to the east of Long Point at the northern end of Parrys Bay and is mostly shallow and intertidal. The surrounding foreshore is rock with intermittent areas of sandy beaches. The adjacent coastline is covered in coastal forest giving way to areas of cleared pasture land. The area is fed by a small creek and a drain to the north of the zone and the larger Pats River to the south of the zone.

Environmental Conditions

The area is situated in a shallow tidal bay. Marine flora in the area includes *Enteromorpha intestinalis*, *Hormosira banksii*, *Heterozostera tasmanica* and *Posidonia australis*. Tidal variation is approximately 2.6 m, giving good water flow throughout the zone.

The zone was surveyed on 6 February 1996 at 0945 hours. A visual inspection of bottom cover was made. Results of the observations are below, with location of site numbers indicated on the zone map.

Visual Observations

Site 1	Sandy bottom with patches of <i>Posidonia</i> , approx. 5% vegetation cover (2 m depth).
Site 2	Substrate coarse gravel/sand with clusters of mussels growing on bottom (<1m depth), patchy weed cover (5-
	10%) with small amount of <i>Posidonia</i> . Site 3 A narrow channel (1-2 m deep) with reasonably dense, but at times
	patchy, cover of <i>Posidonia</i> (85-95%), sparse <i>Zostera muelleri</i> . A sediment sample collected from the shallow edge of the channel showed a moderately gritty mud/sand substrate.
d to e	Sand with <i>Posidonia</i> near d, less <i>Posidonia</i> , with a more firm gritty sediment type and reducing water depth with
	progression towards e.
Site 4	Patchy <i>Posidonia</i> with sand, approx. 40-50% cover, increasing to 80-90% <i>Posidonia</i> cover with progression into
	deeper water towards the direction of corner g.

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone

History of Marine Farming Activities

There is no history of marine farming within the zone.

Future Potential

The site has been identified as having potential for the culture of intertidal shellfish.

Navigation Channels and Safe Anchorages

The zone lies clear of any recognised navigation channel or safe anchorage.

Marinas, Public Jetties and Other Public Facilities

There are no marinas, public jetties or other public facilities on the foreshore adjacent to the zone.

Surrounding Land Use

The land adjacent to the area is zoned Rural and is used for grazing purposes with a strip of Crown Reserve zoned Open Space running around the foreshore. The Flinders Island Aerodrome is located to the east of the area and has a buffer zone around it prohibiting dwellings. The location of the Flinders Island Airport has been considered in the siting of the zone.

DELM has indicated that during times of drought when the coastal lagoons on the eastern side of the Flinders Island are dry, the Long Point area is a significant site for wading birds, including migratory species covered by the International Convention of Migratory Bird species.

Further environmental baseline assessment for any future marine farming operations within the zone will consider the impact on wading birds in the Long Point area. The results of this assessment will be considered in the drafting of licence conditions for any future marine farming activities within this zone.

Sewage and Stormwater Outlets

There are no sewage or stormwater outlets adjacent the area. There is one licensed discharge point originating from the Flinders Island Hospital over 5 km to the south east of the zone at the Whitemark jetty. This sewage system takes effluent from the Multi Purpose Centre using a dissolved air flotation system. The effluent is primary and secondary treated prior to discharge.

Summary of Zone

The zone has potential for farming intertidal shellfish. Marine farming activities are required to conform to the management controls contained in this plan.

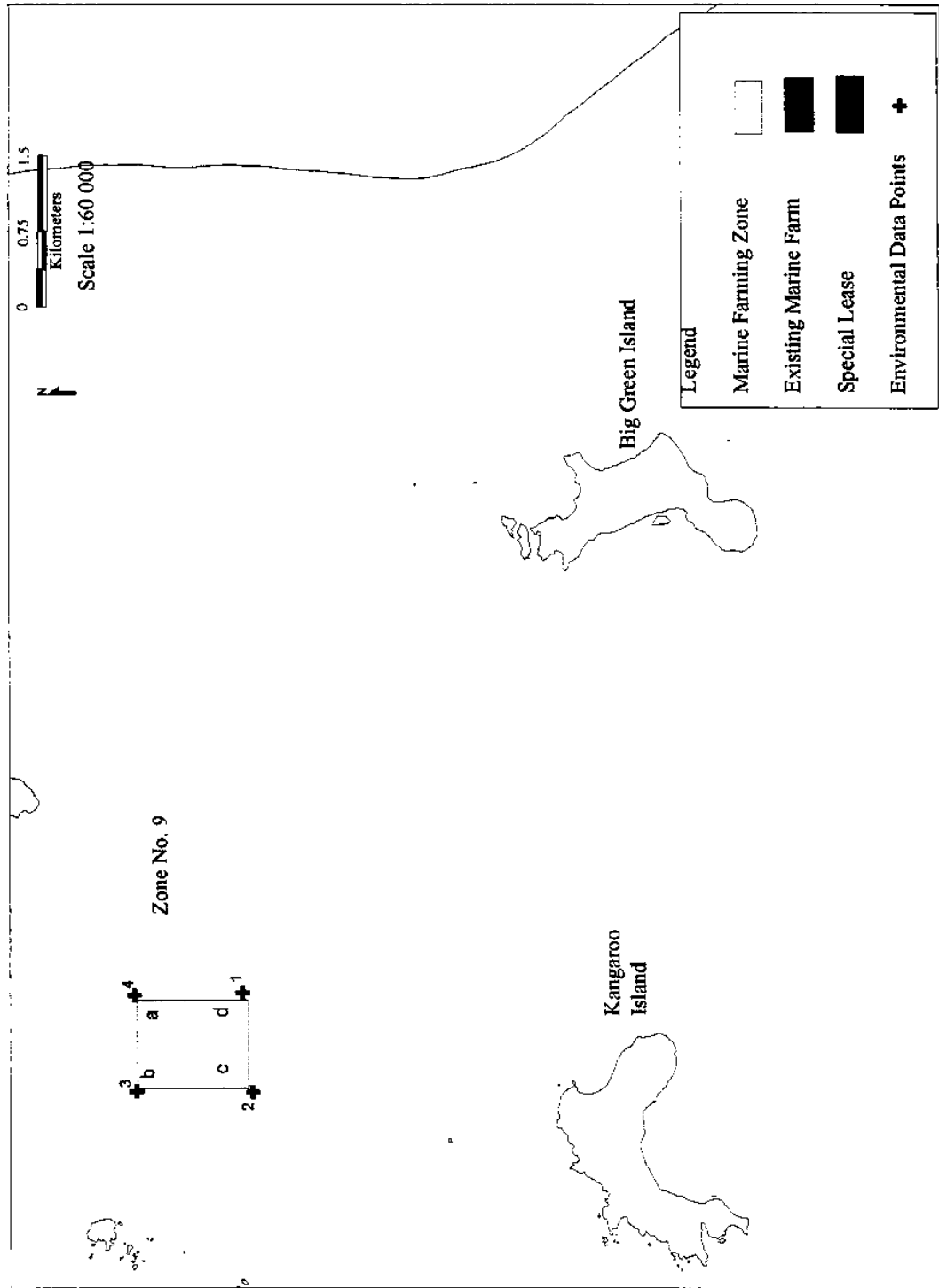
Zone 8 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E582370 N5562479) thence straight to
- b (E582170 N5562388) thence straight to
- c (E582194 N5561781) thence straight to
- d (E582016 N5561314) thence straight to
- e (E582720 N5561317) thence straight to
- a (E582370 N5562479).

Australian Mapping Grid (AMG) Zone 55 Co-ordinates

The zone size is approximately 45 ha with a maximum leasable area of 30 ha. The species to be farmed are shellfish and seaweeds. Map 10 shows the zone.

Map 11 - Zone 9 (East Little Chalky Island)



Zone 9 (East Little Chalky Island)

Location

The zone is located 1.3 km to the east of Little Chalky Island and sited inside a reef and island system running north from Kangaroo Island then sweeping round to the east finishing at Isabella Island. The coastline consists of granite giving way to coastal heath on the more substantial islands.

Environmental Conditions

This zone was surveyed on 4 February 1996 at 1645 hours with depth soundings taken along the boundaries as well as a mid-zone transect running south to north. Water depth ranged from 14 to 20 m. The survey indicated a fine to medium quartz sand sediment, light greenish grey in colour with fine shell fragments. *Posidonia* was the dominant seagrass with some beds of mixed *Posidonia Amphibolis*. The clear waters allowed the development of *Posidonia* at 20 m, below the normal depth range. A video transect was conducted mid-zone north to south and is described below with the results of sediment grab samples. It is expected that the area will gain some shelter from westerly weather conditions from a reef system located to the west.

Sediment Grab Samples

Site	Depth (m)	GPS co-ords	Sediment type & texture	Colour	Smell	Other
1 (c)	19.4	S 40° 09 067' E 147° 55 200'	Rel. fine sand with fine shell fragments	light greenish grey	none	<i>Amphibolis</i> with red epiphytic algae, 1 large orange-red starfish (live), fragments of sponge.
2 (b)	20.7	S 40° 09 127' E 147° 54 511'	Med. quartz sand with fine shell fragments	light quartz	none	2 small live clams, scallop shell valve, no weed in grab, relatively deep cover, judging by amount of sediment collected in grab.
3 (a)	13.5	S 40° 08 512' E 147° 54 512'	Rel. fine sand with fine shell fragments	light greenish grey	none	<i>Amphibolis</i> with red epiphytic algae, few pieces of <i>Posidonia</i> sp. (blades + roots), 1 live small cone shell.
4 (d)#	13.7	S 40° 08 502' E 147° 55 177'	i. Fine quartz sand with shell grit	light greenish grey	none	<i>Posidonia</i> blades & some root mass, small amount of sediment in grab, dense patch of <i>Posidonia</i> .
			ii. Rel. fine sand with fine shell fragments	light greenish grey	none	<i>Amphibolis</i> , many varied small shells.
# 2 grabs taken at this corner of the zone						

Video Record

- relatively dense *Posidonia*, approx. 85% vegetation cover, epiphytes on *Posidonia*, other sea weed species observed, some *Caulerpa cactoides* and various types of sponges (eg. fan sponges), some *Amphibolis*;
- mixed *Amphibolis* and *Posidonia*, lots of sponges, moderately dense but at times patchy cover, approx. 60-90%. Epiphytes on *Amphibolis*;
- mixed *Amphibolis* and *Posidonia* with sponges, some *C. cactoides*, changing to *Posidonia*, sea tulips and various sponges, approx. 80% vegetation cover to 60% (sand patches), other seaweed species in patches where no *Posidonia*;
- mostly *Posidonia*, no *Amphibolis* observed, some other seaweed species and various types of sponges;
- relatively dense *Posidonia*, approx. 80% cover, epiphytes on blades;
- relatively dense *Posidonia*, approx. 80% cover, sea tulips frequently observed within *Posidonia* (this type of cover continued to end of video transect, which finished in approx. 20 m of water).

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone.

History of Marine Farming Activities

There is no history of marine farming within the zone.

Future Potential

The zone has been identified as a site which holds potential for the culture of a number of species, in particular finfish, given the water depth, tidal movements and shelter offered by the reef system located to the west. The zone is an offshore site which may require the development of new technology for farming in exposed conditions.

Navigation Channels and Safe Anchorages

The zone lies clear of any recognised navigation channel and will not impact on a recognised safe anchorage located 4 km away on the north eastern side of Kangaroo Island.

Marinas, Public Jetties and Other Public Facilities

The zone is located in an offshore location and therefore will not impact on any marinas, public jetties or other public facilities.

Surrounding Land Use

There are four small islands adjacent to the zone. Two of these are classified as Wildlife Sanctuaries, Reef Island and Mile Island, with the third, Isabella Island classified as a Nature Reserve. The closest of these islands is approximately 1.6 km from the zone.

a) Isabella Island Nature Reserve

The island was proclaimed a Nature Reserve in 1979 and its boundary extends to low water mark. The island is a significant breeding island for the Cape Barren goose and also the white-faced storm-petrel.

b) Reef Island and Mile Island Wildlife Sanctuaries

These island wildlife sanctuaries were proclaimed in 1951. They are important as roosting and feeding areas for water birds and Mile Island also supports populations of the little grassbird.

c) Little Chalky Island

Significantly for the Furneaux region this island is largely undisturbed. It is the subject of a nature reserve proposal presently under consideration by the Parks & Wildlife Service. It is one of the two major Tasmanian locations for the creeping saltbush (*Atriplex suberecta*).

The island supports breeding colonies of black faced cormorant (one of the major colonies in the Furneaux Islands), fairy tern (vulnerable species), white fronted tern, caspian tern, crested tern, pied oystercatcher, sooty oystercatcher, silver gull, white-faced heron, Cape Barren goose, Richards pipit, hooded dotterel, Pacific gull (one of the largest colonies in eastern Bass Strait), short-tailed shearwater and white-faced storm-petrel.

Any proposed marine farming operations will need to consider the values of these reserves and sanctuaries in the collection of further environmental baseline data for the area. The results of this assessment will be considered in the drafting of licence conditions for any future marine farming activities within the zone.

Sewage and Stormwater Outlets

There are no sewage or stormwater outlets adjacent to the zone.

Summary of Zone

The site has been selected because of the future potential that it may hold for finfish culture given the water depth in the area, tidal movements and some degree of shelter offered by a reef system situated to the west and north of the zone. Marine farming activities will be required to conform to the management controls contained within this plan.

Zone 9 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

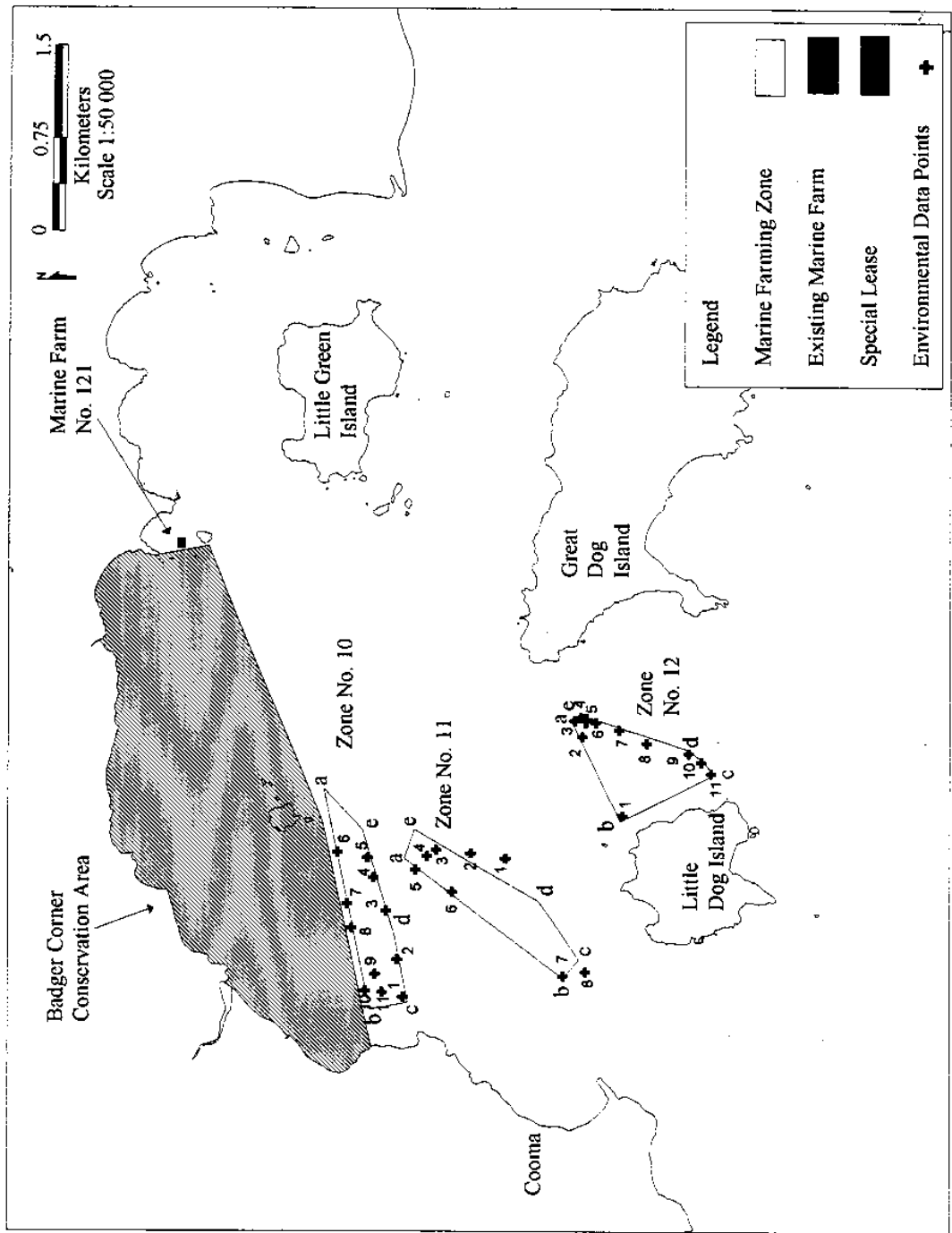
- a (E578290 N5556079) thence straight to
- b (E577421 N5556079) thence straight to
- c (E577421 N5554994) thence straight to
- d (E578290 N5554997) thence straight to
- a (E578290 N5556079).

Australian Mapping Grid (AMG)

Zone 55 Co-ordinates

The zone size will be set at approximately 94.11 ha with a maximum leasable area of 60 ha. Species to be farmed include finfish, shellfish and seaweeds. Map 11 shows the zone.

Map 12 - Zone 10 (Badger Corner), Zone 11 (Little Dog Island North), Zone 12 (Little Dog Island East) and Marine Farm No. 121 (Lady Barron)



Zone 10 (Badger Corner)

Location

This zone is located within Adelaide Bay off the southern shores of Flinders Island to the south west of Lady Barron township. The zone is over 50 m outside the southern boundary of the Badger Corner conservation area and about 1.2 km from the northern foreshore of Petrification Bay. The closest land on mainland Flinders is over 250 m to the west of the zone. The area is fed by Samphire river at the western side of the bay and a smaller creek to the east.

Environmental Conditions

The area within the zone is a shallow intertidal/subtidal area with a depth of 1.5 to 5 m and a substrate consisting of sand with outcrops of sandstone rubble. Tidal variation in the area is approximately 2.6 m indicating an adequate water flow for marine farming.

The zone was surveyed on 2 February 1996 at 1100 hours and 3 February 1996 at 1600 hours using a portable GPS unit, but 15 to 25 knot west-north west winds made conditions difficult for conducting the survey. Vegetation type and cover were assessed by either snorkelling or using a viewfinder. Depths were relatively shallow for most of the zone. The survey showed patches with dense *Posidonia* beds and mixed *Posidonia/ Heterozostera* beds in other areas depending on the degree of exposure to air. Results of visual inspection of bottom are below.

Visual Observations

Site	Depth (m)	Sediment type & texture
1 (b)	2.2 m	70% cover, patches of <i>Posidonia</i> and <i>Scaberia sp.</i> with sparse <i>Heterozostera.</i> , sand.
2	2.8 m	90% cover; 80% <i>Posidonia</i> , 20% <i>Heterozostera</i> , sand patches.
3	1.4 m	as above.
4	3.5 m	80% cover; 50% <i>Posidonia</i> , 50% <i>Heterozostera</i> , coarse quartz sand.
5	5.1 m	depth drops off at this corner.
6 (d)	1.2 m	70% cover; <i>Posidonia</i> and <i>Scaberia sp.</i>
7	0.5 m	70% <i>Posidonia</i> , 10% <i>Heterozostera</i> , small amount of brown algae.
8	3.0 m	10% <i>Posidonia</i> .
9	1.0 m	50% <i>Heterozostera</i> , 40% <i>Posidonia</i> .
10	1.7 m	100% <i>Posidonia</i> .
11	1.5 m	100% mixed <i>Posidonia</i> and <i>Scaberia sp.</i>

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone

History of Marine Farming Activities

There is no history of marine farming within the zone.

Future Potential

The site has been identified as an area with potential for the cultivation of intertidal shellfish.

Navigation Channels and Safe Anchorages

The port of Lady Barron lies to the east of the marine farming zone and has some recognised navigation channels leading into the port. The zone is situated over an intertidal area and will not interfere with these facilities.

Marinas, Public Jetties and other Public Facilities

Lady Barron port facilities lie to the west of the area. There is also a public launching ramp and jetty in this area. The zone will not interfere with the use of these facilities.

Surrounding Land Use

The land adjacent to the area is generally cleared and is zoned Rural with a strip of Crown foreshore reserve zoned Open Space.

Badger Comer conservation area lies on the northern boundary of the zone. The area has been proclaimed as a sanctuary under the *Animals and Birds Protection Act 1928*, as a significant area for foreshore wader birds, migratory waders, Cape Barren geese and tiger snakes. The zone is over 50 m outside this sanctuary. Further baseline environmental assessment of the zone will need to consider the values of this conservation area. The results of this assessment will be considered in the drafting of licence conditions for any future marine farming activities within the zone.

Sewage and Stormwater Outlets

There is a licensed discharge point originating from the Flinders Island Lodge 2.6 km to the east of the zone. Effluent from the Tavern is primary and secondary treated prior to discharge. There are no storm water outlets adjacent to the zone.

Summary of Zone

The zone has been identified as an area with potential for farming Pacific oysters. Further baseline data will be collected before the zone is developed and any marine farming activities will be required to conform to the management controls contained within this plan.

Zone 10 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E603312 N5546283) thence straight to
- b (E601540 N5545910) thence straight to
- c (E601592 N5545620) thence straight to
- d (E602109 N5545716) thence straight to
- e (E602981 N5545968) thence straight to
- a (E603312 N5546283).

*Australian Mapping Grid (AMG)
Zone 55 Co-ordinates*

The zone is approximately 45.08 ha with a maximum leasable area of 30 ha. The species to be farmed are shellfish and seaweeds. Map 12 shows the zone.

Zone 11 (Little Dog Island North)

Location

The zone is located approximately 600 m from the northern shores of Little Dog Island within Adelaide Bay and to the east of Tommy Rews Point. The adjacent foreshore on Little Dog Island consists of granite boulders and platforms. The adjacent foreshore on mainland Flinders is located at Badger Corner and consists of an intertidal bay and rocky foreshore.

Environmental Conditions

A survey was conducted on 3 February 1996 at 1845 hours using a portable GPS unit, but strong winds (25-30 knot) made conditions difficult. Estimates of vegetation type and cover were made by visual observation using a viewfinder. Within the zone there is a rapid drop off from shallow to deeper water. The depths recorded provide a guide only as accurate depths were difficult to measure given the rough sea conditions at the time. The results of the visual inspection of the bottom are as follows. Site numbers are indicated on the zone map.

Visual Observations

Site	Depth (m)	Sediment type & texture
1	2.1 m	sand, unvegetated.
2	3.4 m	10% cover, sparse <i>Posidonia</i> .
3	6.2 m	unvegetated, fine quartz sand; deep gutter between site 3 & 4 (~7.0 m).
4	1.0 m	100% cover, 80% <i>Posidonia</i> 20% <i>Heterozostera</i> .
5	1.5 m	80% cover, 90% <i>Posidonia</i> 10% <i>Heterozostera</i> .
6	8.0 m	sand.
7	3.5 m	sand, rapid drop-off 3.5-5.6 m.
8	11 m	gradual decrease in depth along this border steering towards d, sand.

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone.

History of Marine Farming Activities

There is no history of marine farming within the zone.

Future Potential

The area has been considered because of the potential that it may hold for the culture of abalone, given water flow in the area which carries drifting weed.

Subject to the provisions of the *Marine Farming Planning Act 1995*, Marine Farm No. 121 may be relocated to an area within Marine Farming Zone No. 11.

Navigation Channels and Safe Anchorages

There are a number of navigational channels leading to Lady Barron port, one of which runs along the northern side of Little Dog Island, south of the zone. The zone lies clear of this navigation channel and any allocation of area within the zone will not impact on this channel.

Any developments within the zone will be required to consider the navigational requirements of the relevant Marine Authority.

Marinas, Public Jetties and Other Public Facilities

The port of Lady Barron lies to the north east of the zone; there is also a public launching ramp and jetty in this area. The marine farming zone will not impact on the use of these facilities.

Surrounding Land Use

The closest land to the zone is Little Dog Island which consists of private freehold land with a section designated as game reserve on the eastern side of the island. Badger Corner located over 1 km to the west of the zone consists of Crown and private freehold land.

Sewage and Stormwater Outlets

There is a licensed discharge point originating from the Flinders Island Lodge over 3.5 km to the east of the zone. Effluent from the Tavern is primary and secondary treated prior to discharge.

There are no sewage or stormwater outlets adjacent to the zone.

Summary of Zone

The zone has been identified as an area with potential for the culture of shellfish in particular abalone. Subject to the provisions of the *Marine Farming Planning Act 1995* Marine Farm No. 121 may be relocated to within Marine Farming Zone No. 11.

Zone 11 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E602749 N5545645) thence straight to
- b (E601786 N5544385) thence straight to
- c (E601938 N5544250) thence straight to
- d (E602404 N5544571) thence straight to
- e (E602981 N5545564) thence straight to
- a (E602749 N5545645).

Australian Mapping Grid (AMG) Zone 55 Co-ordinates

The zone size is approximately 49.35 ha with a maximum leasable area of 20 ha. The species to be farmed include shellfish and seaweeds. Map 12 shows the zone.

Zone 12 (Little Dog Island East)

Location

Little Dog Island is located on the southern side of Flinders Island between Adelaide Bay and Franklin Sound. The marine farming zone is situated on the eastern side of the island within an intertidal area, over 100 m from the coastline of the island. The adjacent foreshore consists of a sand beach with surrounding land covered in coastal heath.

Environmental Conditions

A survey of the zone was conducted on 3 February 1996 at 1723 hours using a portable GPS unit, however strong winds (25-30 knots) made conditions difficult. Estimates of vegetation type and cover were made by visual observation using a viewfinder. This zone has a relatively large sandbar region (exposed at low water) within the mid western region. Near the north west corner (a) is an exposed rocky outcrop. Much of this region is undulating bottom with deeper gutters between vegetated banks.

Results of a visual inspection of the bottom are given below. Site numbers are indicated on the map of the zone.

Visual Observations

Site	Depth (m)	Sediment type & texture
1	0.5 m	100% cover, <i>Posidonia</i> - extends to location 2.
2	3.0 m	80% <i>Posidonia</i> , deeper drop-off (3.0-3.6 m).
3	2.2 m	90% cover, <i>Posidonia</i> only.
4	3.1 m	sand.
5	1.3 m	90% cover, <i>Posidonia</i> .
6	1.6 m	90% cover, <i>Posidonia</i> only.
7	4.5 m	100% cover, <i>Posidonia</i> only, drop-off.
8	1.6 m	decrease in depth between sites 7 & 8 (<i>ie.</i> 4.5- 1.6 m).
9	3.6 m	100% cover, <i>Posidonia</i> only.
10	2.6 m	sand.
11	1.0 m	60% cover; 90% <i>Posidonia</i> , 10% <i>Heterozostera</i> .

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone.

History of Marine Farming Activities

There is no history of marine farming within the zone.

Future Potential

The zone has been identified as an area suitable for the production of intertidal shellfish. The zone will have good water flow given tidal variation in the area.

Navigation Channels and Safe Anchorages

The zone will not interfere with a recognised navigation channel located to the east, used for navigation to and from the port of Lady Barron. There are no recognised safe anchorages adjacent to the zone.

Marinas, Public Jetties and Other Public Facilities

There are no marinas, public jetties or other public facilities adjacent to the zone.

Surrounding Land Use

The adjacent land to the zone on Little Dog Island consists of a national park and wildlife game reserve. Any proposed marine farming operations will need to consider the values of this reserve in baseline environmental assessments.

Sewage and Stormwater Outlets

There are no sewage or stormwater outlets adjacent to the zone.

Summary of Zone

The zone is considered to have potential for the farming of intertidal shellfish. Marine farming operations will be required to conform to the management controls contained within this plan.

Zone 12 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E603871 N5544318) thence straight to
- b (E603049 N5543917) thence straight to
- c (E603430 N5543154) thence straight to
- d (E603615 N5543348) thence straight to
- e (E603869 N5544129) thence straight to
- a (E603871 N5544318).

Australian Mapping Grid (AMG) Zone 55 Co-ordinates

The zone size is set at approximately 47.78 ha with a maximum leasable of 30 ha. The species to be farmed include shellfish and seaweeds. Map 12 shows the zone.

Marine Farm No. 121 (Lady Barron)

Location

Marine Farm No. 121 consists of an area of 0.4802 ha located on the eastern side of Fisher Reef, approximately 316 m to the west of Lady Barron Wharf, north west of Fisher Island.

Environmental Conditions

Water depth within the farm is between 5 and 13 m with a substrate consisting of sand and mud with some organic matter. Tidal movements in the area are considered suitable for the production of shellfish. Salinity levels in the area indicate a totally marine environment.

Existing Farming Activities

Furneaux Aquaculture Pty Ltd is the holder of the existing marine farm.

<i>Marine Farm No. 121</i>	Area	0.4802 ha
	Granted	1988
	Duration	20 years
	Species	Abalone

History of Marine Farming Activities

The application for this marine farm was received on 4 November 1986 for the farming of abalone using container culture methods on 0.5 ha at Fisher Reef situated south of Lady Barron. The application was advertised in March 1987 with one objection received from the Tasmanian Abalone Divers Association on the grounds that abalone were commercially harvested from the Fisher Reef area. There were also concerns expressed by the Department of National Parks that the application site was within the Badger Corner Wildlife Sanctuary, a breeding area for a number birds, in particular the rare white fronted tern.

These concerns were resolved when it was confirmed that the application site was not situated on Fisher Reef, but rather on sand bottom to one side of the reef and would not interfere with abalone harvesting within the area and that farm personnel would have no reason to frequent the reef site.

Marine Farm No. 121 was issued to Furneaux Aquaculture Pty Ltd for a term of 20 years from the first day of September 1988. Furneaux Aquaculture Pty Ltd also runs a land based abalone hatchery at Lady Barron and is currently undertaking trials into abalone pearl culture.

Future Potential

The site is considered by the current lease holders to be a suitable site for the culture of abalone in conjunction with their abalone hatchery which is in close proximity to the area. The lease holders would like to see some room for expansion of this area.

The Flinders Island Marine Board has modified the wharf area to accommodate a new shipping service to Lady Barron. There is a possibility that the berthing operations of this vessel may have a detrimental impact on marine farming activities of this farm.

Due to the close proximity of the Lady Barron Wharf facilities and the fact that the new shipping service will be operated from this facility, it is considered that there is a potential for detrimental impacts on the marine farm. Therefore the DPIWE does not intend to zone this farm. The existing marine farm will retain its current right of tenure.

Subject to the provisions of the *Marine Farming Planning Act 1995* it is the planning intention to provide for the relocation of Marine Farm No. 121 to an area within Marine Farming Zone No. 11 should the lease holder choose to relocate at some time in the future.

Navigation Channels and Safe Anchorages

There are a number of navigation channels leading into the Port of Lady Barron; there is also a locally recognised navigation channel into a small bay between Point Reid and Store Point. The marine farm does not interfere with the use of these navigation channels.

Marinas, Public Jetties and Other Public Facilities

Lady Barron port facilities lie to the west of the area; there is also a public launching ramp and jetty in this area. The farm does not interfere with the use of these facilities.

Surrounding Land Use

The land on the foreshore adjacent to the site consists of Crown foreshore reserve zoned Open Space. The port of Lady Barron lies to the west of the area and is zoned Commercial. The Badger Corner Conservation area is located to the east of the marine farm and is proclaimed under the *Animal and Birds Protection Act 1928* as a significant area for foreshore wader birds, migratory waders, Cape Barren geese and tiger snakes.

Sewage and Stormwater Outlets

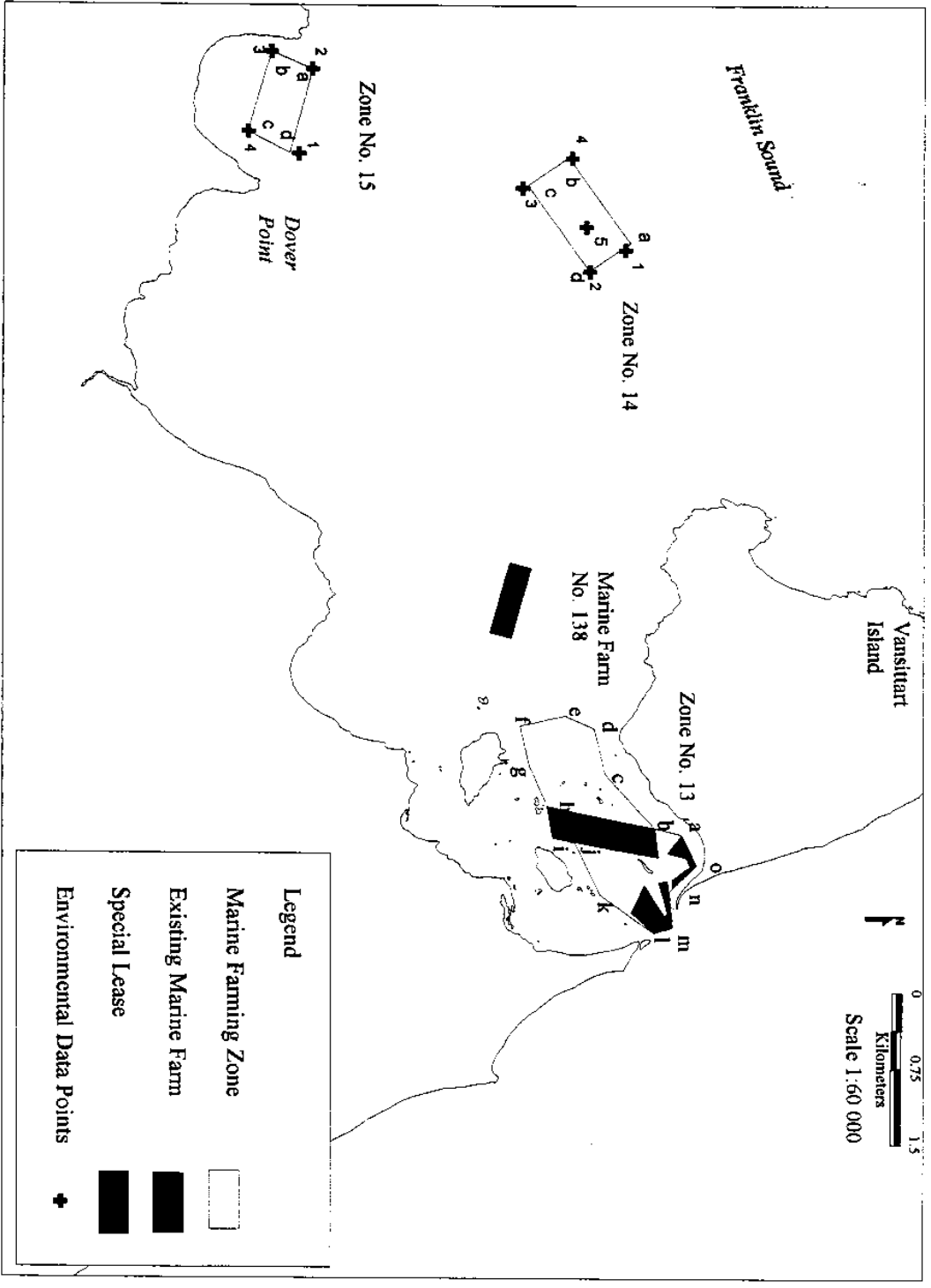
There is one licensed effluent discharge point originating from the Flinders Island Lodge located within the port area approximately 300 m to the west of the marine farm. This effluent is primary and secondary treated prior to discharge. There are no stormwater outlets in the area.

Summary of Existing Farm

It is proposed not to zone this existing marine farm due to its close proximity to the wharf facilities and the potential for these facilities to have an adverse impact on the farm. The existing farm will retain its current right of tenure. An alternative site has been identified for relocation of this lease should the holder wish to relocate. This has been discussed under future potential.

Map 12 shows the existing farm.

Map 13 - Zone 13 (South Vansittart Island), Zone 14 (Vansittart Island West), Zone 15 (Dover Point)



Zone 13 (South Vansittart Island)

Location

The zone is between the southern end of Vansittart Island and the north eastern tip of Cape Barren Island. There are two smaller islands adjacent to the zone, Pelican Island and Puncheon Island. There is an existing marine farm in the area, comprised of four sections.

Environmental Conditions

Water depth varies between 1 to 4 m with an estimated current flow of 0.75 to 1.5 knots. The substrate consists of sand areas interspersed between sections of reef. The zone is in a channel between Vansittart and Cape Barren Island with considerable water movement between the Tasman Sea to the east and Franklin Sound to the west, caused by strong tidal currents. *Zostera* is the predominant seagrass with a density of 50 to 70% coverage. *Posidonia* occurs in low densities of about 5% coverage in areas of the zone.

Existing Farming Activities

The existing marine farm is operated by SA and RD Fuglsang.

<i>Marine Farm No. 138</i>	Area	59.97 ha
	Granted	1991
	Duration	20 years
	Species	Abalone

History of Marine Farming Activities

An application was received on 17 August 1987 to farm abalone using longlines with drums and bottom sited cages in three areas of 15, 30 and 15 ha located at Puncheon Head, Cape Barren Island. Flinders Island Marine Board expressed concerns the area may cause a navigation hazard. These concerns were resolved with modifications to the application. The application was advertised on 24 September 1988 and received one objection from the Furneaux Abalone Divers Association.

A permit was issued on 16 January 1991 to take affect from 1 February 1991 for three areas of 15, 30 and 15 ha located 100, 70 and 500 m respectively from the closest high water mark, for the purpose of farming abalone only. A variation was made to the lease agreement to remove clause 2(o) to allow the farming of other species on 10 August 1992.

Future Potential

The lease holders consider the lease area an excellent site for the culture of abalone having achieved good growth rates to date. The area has considerable water flow carrying large amounts of various drifting weeds which are caught by the abalone cages and subsequently grazed by abalone.

Subject to the provisions of the *Marine Farming Planning Act 1995*, Marine Lease No. 138 may be relocated to an area within Marine Farming Zone No. 13. Such a relocation will provide a more suitable farming area whilst vacating an area that is used for shark fishing.

Navigation Channels and Safe Anchorages

There is a recognised navigation channel that runs between the Tasman Sea and Franklin Sound on the southern side of Vansittart Island. This navigation channel passes through the zone (Map 2). In the zoning of this area it is proposed that any future variation of the lease area within the zone will take into consideration this navigation channel. All marine farming activities within the zone will be required to conform to navigation requirements of the relevant Marine Authority with jurisdiction over the area.

Marinas, Public Jetties and Other Public Facilities

There are no marinas, public jetties or other public facilities adjacent to the zone.

Surrounding Land Use

Vansittart Island is located to the north of the zone and is zoned Rural with the principal use being grazing. The area to the south on Cape Barren Island is zoned Rural and principally used for grazing with a strip of foreshore Crown reserve zoned Open Space.

Sewage and Stormwater Outlets

There are no sewage or storm water outlets adjacent to the zone.

Summary of Zone

The zone covers sections of reef, however in zoning the area it is intended that, notwithstanding the existing lease area, any variation to lease boundaries will not cover commercially significant reef areas, rather farming areas will be situated over sand substrates, between the reef.

The zoning of a large area has been proposed to allow management of a single zone, rather than have a number of small zones.

Zone 13 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E611864 N5539347) thence straight to
- b (E611798 N5539087) thence straight to
- c (E611272 N5538603) thence straight to
- d (E610824 N5538499) thence straight to
- e (E610698 N5538207) thence straight to
- f (E610796 N5537760) thence straight to
- g (E611177 N5537848) thence straight to
- h (E611584 N5538031) thence straight to
- i (E611896 N5538088) thence straight to
- j (E611939 N5538303) thence straight to
- k (E612452 N5538551) thence straight to
- l (E612829 N5539078) thence straight to
- m (E612775 N5539261) thence straight to
- n (E612416 N5539228) thence straight to
- o (E612163 N5539490) thence straight to

a (E611864 N5539347).

Australian Mapping Grid (AMG)
Zone 55 Co-ordinates

The zone is considered to have future potential for the culture of abalone given the results of farming in the area to date. The zone size is set at approximately 164.1 ha with the maximum leasable area of 60 ha. Species to be farmed include shellfish and seaweeds. Map 13 shows the zone.

Zone 14 (Vansittart Island West)

Location

The zone is on the south eastern side of Franklin Sound over 2.5 km to the south west of Vansittart Island the closest land. Vansittart Island consists of uncommitted Crown Land with a section of private freehold land zoned Rural for grazing purposes.

Environmental Conditions

The survey of the zone was conducted on 4 February 1996 at 1215 hours, with strong north west winds and a relatively strong tide flowing at the time. Depth soundings were taken along boundaries and a mid-zone transect running south west to north east indicating a depth of 12 m. A video transect was conducted from the north east to the south west of the zone by drifting with the current flow. The survey indicated a coarse to fine sand sediment, greenish grey in colour with shell debris throughout. Patches of *Posidonia*, *Halophila* and *Heterozostera* were scattered throughout the zone. Detailed results of sediment grab samples and a description of video transect are shown below.

Sediment Grab Samples

Site	Depth (m)	GPS co-ords	Sediment type & texture	Colour	Smell	Other
1 (a)	14.1	S 40° 17 667' E 148° 14 913'	Rel. fine sand with fine shell grit	Greenish grey	none	Few fragments of <i>Halophila</i> , <i>Caulerpa trifaria</i> , & red weed, approx. 8 cm piece of black rock.
2 (d)	14.4	S 40° 17 856' E 148° 15 068'	Rel. fine sand with fine to coarse shell grit	Greenish grey	none	Few fragments of <i>Heterozostera</i> & fine filamentous brown algae, small piece of sponge (sand coloured), bit of abalone shell & odd fragments of scallop shell debris.
3 (c)	12.5	S 40° 18 223' E 148° 14 498'	Coarse sand quartz with shell debris			2 scallop shells, few clam shell valves, 1 live glass eel (20 cm long), few fragments of thin brown weed .
4 (b)	13.5	S 40° 17 961' E 148° 14 285'	Fine sand with fine shell grit, black flecks	Greenish grey	none	Small amount of <i>Heterozostera</i> & brown weed.
5	14.3	S 40° 17 879' E 148° 14 760'	Fine sand with fine shell grit, black flecks	Greenish grey	none	Fragments of brown & red weed.

Video Record

- Clear sand with patchy vegetation cover (approx. 50%), much drift weed - reasonable current flow at time of survey;
- Numerous various types of sponges, occasional clump of *Posidonia*, approx. 50% vegetation cover;
- Sponges, sparse patches of *Halophila* and *Heterozostera*;
- Much drift weed, including *Posidonia* blades;
- Sand patches covered with an encrusting layer of coralline algae, some clear patches of sand visible where has been scoured;
- Predominantly *Halophila/Heterozostera* mix, sparse cover, generally approx. 50%, numerous various sponges observed along transect.

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone.

History of Marine Farming Activities

There is no history of marine farming within the zone.

Future Potential

The zone has been identified as an area with potential for the farming of a number of species, in particular finfish given the water depth and expected current flow.

Navigation Channels and Safe Anchorages

The zone lies clear of a recognised navigation channel which lies 500 m to the north of the zone. There are no recognised anchorages adjacent to the zone.

Marinas, Public Jetties and Other Public Facilities

There are no marinas, public jetties or other public facilities adjacent to the zone.

Surrounding Land Use

The closest landfall, Vansittart Island, is 2.5 km north east and consists of uncommitted Crown Land and a section of private freehold land primarily used for mixed grazing.

Sewage and Stormwater Outlets

There are no sewage or storm water outlets adjacent to the zone.

Summary of Zone

The zone has been identified as an area that holds potential for the culture of a number of species, in particular finfish.

Zone 14 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E606052 N5538841) thence straight to
- b (E605212 N5538235) thence straight to
- c (E605490 N5537827) thence straight to
- d (E606326 N5538443) thence straight to
- a (E606052 N5538841).

Australian Mapping Grid (AMG) Zone 55 Co-ordinates

The zone size is set at approximately 50.6 ha with a maximum leasable area of 30 ha. The species to be farmed include finfish, shellfish and seaweeds. Map 13 shows the zone.

Zone 15 (Dover Point)

Location

The Dover Point marine farming zone is located on the northern shores of Cape Barren Island over 300 m to the west of Dover Point and approximately 600 m from the foreshore of Riddles Bay. The foreshore area adjacent to the zone consists of granite boulders giving way to cleared land used for mixed grazing.

Environmental Conditions

The survey of the zone was conducted on 4 February 1996 at 1050 hours. Depth soundings were taken at the corners of the zone indicating a depth of 4 to 7 m. A video transect was conducted mid-zone from east to west. The survey indicated a fine sand to sand/clay sediment dark greyish green with a small amount of shell grit. Mixed *Posidonia*/*Caulerpa* beds covered a large percentage of the seabed.

The detailed results of sediment grab samples and a description of the video transect are shown below. A very small amount of *Posidonia* was collected in the grab samples, however, it was observed to be quite abundant when conducting the video transect. More *Heterozostera* was observed in deeper water at corner a.

Sediment Grab Samples

Site	Depth (m)	GPS co-ords	Sediment type & texture	Colour	Smell	Other
1	4.0	S 40° 19 405' E 148° 14 286'	Rel. fine sand with some clay, small amount of shell grit	Dark greenish grey	none	<i>Caulerpa cactoides</i> , <i>Heterozostera</i> , piece of red sponge, 1 small 'biscuit' starfish, small spiral type shells.
2	7.0	S 40° 19 338' E 148° 13 692'	Fine sand/clay	Darker greenish grey	none	Reasonable amount of <i>Caulerpa cactoides</i> , few fragments of <i>Heterozostera</i> .
3	4.0	S 40° 19 560' E 148° 13 578'	Fine sand/clay, slightly more clay than above, small amount of fine shell debris	Dark greenish grey	none	Large root mass of <i>Caulerpa cactoides</i> , 3 live small clams, small spiral shells, brown bubble weed (<i>Sargassum</i> sp.).
4	4.0	S 40° 19 674' E 148° 14 136'	as above	as above	none	<i>Caulerpa cactoides</i> (with white tips), small amount of <i>Heterozostera</i> , fine filamentous brown algae, few <i>Posidonia</i> blades.

Video Record

- Mixed *Posidonia* and *Caulerpa cactoides*, virtually 100% cover. Epiphytic growth on *Posidonia* (fine filamentous algae);
- Mixed *Posidonia*, *Caulerpa cactoides* and *Heterozostera*, relatively dense cover; some quite dense patches of *Heterozostera* with some *C. cactoides*;
- Mixed *Posidonia* and *C. cactoides*, virtually 95% cover;
- Reasonably dense patch of *C. cactoides*, occasional *Heterozostera* and filamentous algae;
- Moving back into mixed *Posidonia*/*C. cactoides*, (predominant vegetation cover), approx. 95%;
- Change from above mix to *Heterozostera*/*C. cactoides* with sand patches, approx. 70% vegetation cover, then back to *Posidonia*/*C. cactoides*, 100% cover;
- Patchy sand with *Heterozostera*, approx. 60-70% cover, moving to *Posidonia*/*C. cactoides* with occasional *Scaberia* sp., 100% veg cover.

Predominantly *Posidonia* /*C. cactoides* cover over the length of the transect with vegetation cover generally being 95-100% with the exception of patches of almost 100% *Heterozostera*, where vegetation cover was approximately 60-70%. Within the north west region (near corner a), *Heterozostera*/*C. cactoides* cover generally 60-70%, with a filamentous algae observed. At times there were quite dense patches of *C. cactoides* (90% cover).

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms currently within the zone, however, historically the area has been subject to a lease as described under brief history.

History of Marine Farming Activities

An application was received on 7 September 1987 to farm finfish using seacages and flat oysters using tray culture at Dover Point, Cape Barren Island. The application was advertised 5 December 1987 and received one objection from an adjacent land owner on the grounds of visual impact, impact on the amenity of the area, impact on scale fishing in the area and concerns about access to the site.

A permit document was issued on 21 July 1988 to take effect from 1 July 1988 for an area of 21 ha measuring 700 x 300 m situated near Dover Point, Cape Barren Island for a term of 20 years.

Finfish were removed from the licence in 1991 at the request of the holder.

Due to the non development and non payment of fees the Minister cancelled the lease agreement in November 1994.

Future Potential

The site is considered to have potential for marine farming, particularly abalone.

Navigation Channels and Safe Anchorages

The marine farming zone will not interfere with any recognised navigation channel. The zone is situated to the west and clear of a recognised safe anchorage situated north west of Dover Point.

Marinas, Public Jetties and Other Public Facilities

There are no marinas, public jetties or other public facilities adjacent to the zone.

Surrounding Land Use

The land adjacent to the zone is a mixture of private freehold with a strip of Crown foreshore reserve and leased Crown Land, zoned Rural. The area is principally cleared for grazing purposes.

Sewage and Stormwater Outlets

There are no sewage or stormwater outlets adjacent to the zone.

Summary of Zone

The zone site is considered a suitable area for marine farming operations in particular for the culture of abalone.

Zone 15 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

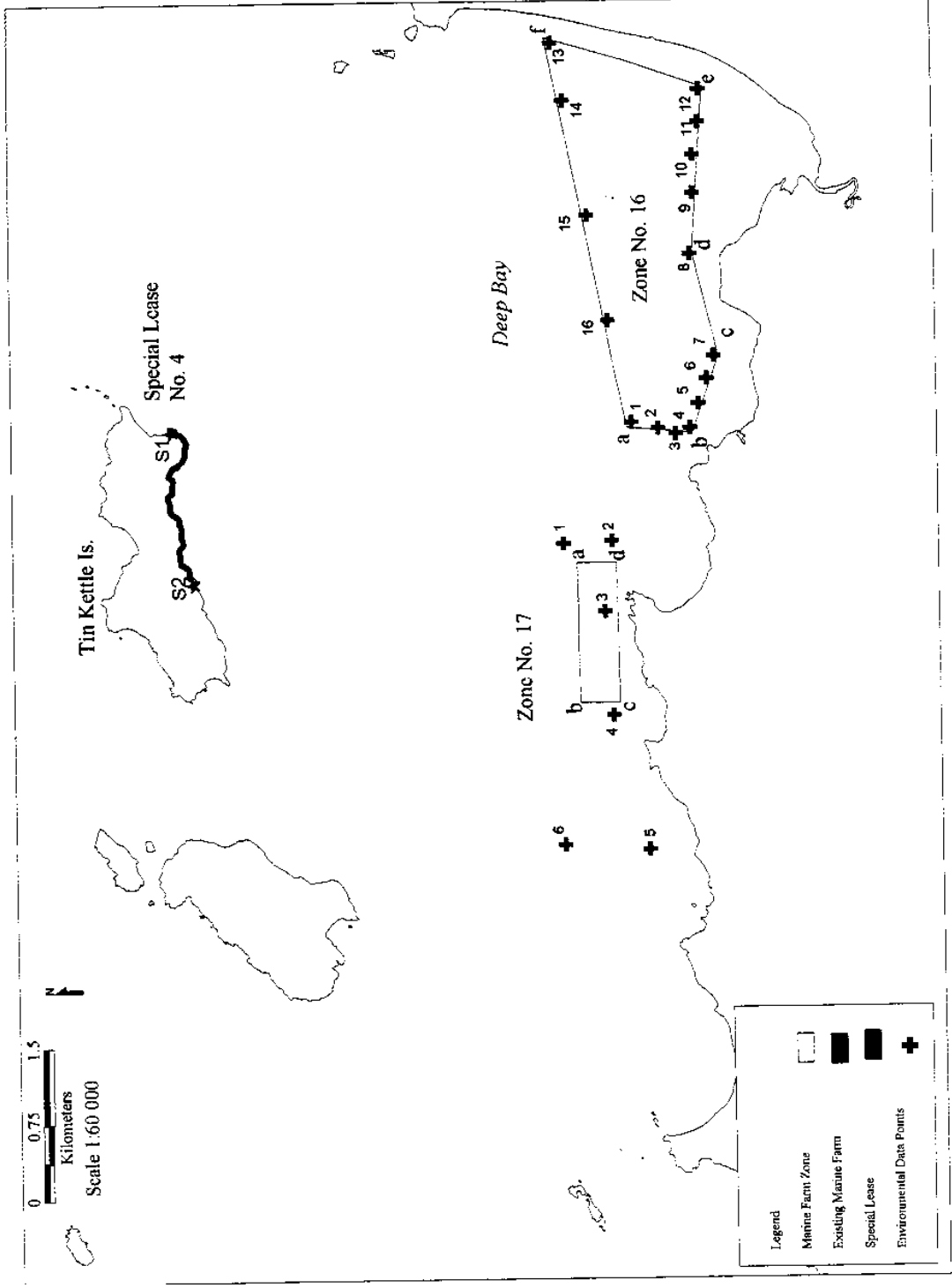
- a (E604350 N5535727) thence straight to
- b (E604180 N5535323) thence straight to
- c (E604967 N5535096) thence straight to
- d (E605178 N5535506) thence straight to
- a (E604350 N5535727).

Australian Mapping Grid (AMG)

Zone 55 Co-ordinates

The zone area is set at approximately 37.15 ha with a maximum leasable area of 21 ha. Species to be farmed include finfish, shellfish and seaweeds. Map 13 shows the zone.

Map 14 - Zone 16 (Deep Bay), Zone 17 (Deep Bay West), Special Lease No. 4



Zone 16 (Deep Bay)

Location

Deep Bay is located on the mid northern shores of Cape Barren Island to the west of Apple Orchard Point. The bay is fed by the Lea and Rooks rivers which drain into separate intertidal estuary areas at the head of Deep Bay.

Environmental Conditions

Deep Bay is generally a shallow bay with intertidal areas with a substrate consisting of a fine white sand with isolated loose rocks and small rock outcrops toward the western end. The zone is dominated by *Posidonia* with patches of sand. Details of the survey are outlined below.

A survey was conducted on 4 February 1996 at 1100 hours, with visual observation of vegetation type and cover using a viewfinder. A portable GPS unit was used to navigate within the zone area. Corners b, c & d are on bare sand on the edge of a *Posidonia* bed.

Visual Observations

The results of visual inspection of the bottom are as follows. Location of the site numbers is indicated on the map of the zone.

Site	Depth (m)	Sediment type & texture
1	1.6 m	100% cover, <i>Posidonia</i> .
2	1.6 m	sand patches.
3	2.2 m	50% cover; 100% <i>Posidonia</i> .
4 (b)	1.6 m	50% cover; 100% <i>Posidonia</i> .
5	1.0 m	sand, seagrass boundary runs along this section.
6	1.3 m	100% cover, <i>Posidonia</i> .
7 (c)	1.4 m	50% cover; 100% <i>Posidonia</i> .
8 (d)	1.3 m	50% cover; brown algae patches, boundary of seagrass from c to d.
9	1.2 m	50% cover; patchy <i>Posidonia</i> .
10	1.0 m	sand & coralline algae.
11	1.9 m	100% cover, <i>Posidonia</i> .
12 (e)	1.3 m	50% cover; 50% brown algae, 50% <i>Posidonia</i> .
13 (f)	1.8 m	90% cover; 100% <i>Posidonia</i> , sand.
14	5.0 m	
15	2.0 m	90% <i>Posidonia</i>
16	2.9 m	50% cover; 100% <i>Posidonia</i> , sand.

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone.

History of Marine Farming Activities

There is no history of marine farming within the zone.

Future Potential

The site has been identified as an area with the potential for the cultivation of intertidal shellfish.

Navigation Channels and Safe Anchorages

The area consists of a shallow intertidal area and will not interfere with any recognised navigation channel or safe anchorage.

Marinas, Public Jetties and Other Public Facilities

There are no marinas, public jetties or other public facilities on the foreshore adjacent to the zone.

Surrounding Land Use

The land adjacent to the zone consists of Crown Land zoned Rural.

Sewage and Stormwater Outlets

There are no sewage or stormwater outlets adjacent to the zone.

Summary of Zone

The Deep Bay zone is considered an appropriate and suitable site for growth of the marine farming industry, in particular for the cultivation of intertidal shellfish. Further baseline environmental data will be collected before the zone is developed and any marine farming activities will be required to conform to the management controls contained within this plan.

Zone 16 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E598717 N5534074) thence straight to
- b (E598662 N5533428) thence straight to
- c (E599413 N5533171) thence straight to
- d (E600431 N5533404) thence straight to
- e (E602058 N5533290) thence straight to
- f (E602551 N5534825) thence straight to
- a (E598717 N5534074).

Australian Mapping Grid (AMG) Zone 55 Co-ordinates

The zone area is approximately 401.10 ha with a maximum leasable area of 140 ha. The zone size has been set to allow a suitable location for marine farming to be identified within the bay. It is proposed that the species to be farmed include shellfish and seaweeds. Map 14 shows the zone.

Zone 17 (Deep Bay West)

Location

The zone is located within Franklin Sound on the northern shores of Cape Barren Island to the north of Whittling Office Bay, 70 m from the adjacent coastline. The surrounding coastline consists of rounded granite boulders and a sandy intertidal beach within Whittling Office Bay with the adjacent foreshore covered in coastal forest.

Environmental Conditions

Water depth within the zone varies between 10 and 18 m with a substrate of sand. Tidal flow in the area is estimated at 1 knot.

The zone was surveyed on 31 January 1996 (1045 hours) and 4 January 1996 (0900 hours). The survey indicated a sand/quartz sediment, light grey in colour with shell grit through the zone. Scattered clumps of *Posidonia* covered some patches with deep sided troughs and clear sand patches dominating. Abundant drift weed was visible. Depth transects and sediment sampling were conducted on the first day with strong wind conditions preventing a video transect. This was done on the second day, though a strong current was flowing at the time of towing the sledge. The transect was conducted drifting with the current from the north western corner of the zone to the central region of the zone. Lots of drift weed was visible while towing the camera and patches of *Posidonia* and *Amphibolis* observed, although the predominant bottom cover was quartz/sand.

Sediment Grab Samples

Site	Depth (m)	GPS co-ords	Sediment type & texture	Colour	Smell	Other
1 (d)	12.0	S 40° 19 937' E 148° 08 927'	Shell grit/sand/ quartz with clay underneath	Dark grey clay	none	Few shells.
2 (c)	11.0	S 40° 20 192' E 148° 08 952'	Coarse shell grit/sand/quartz		none	Few small scallop shells & clams, lots of varied small shells.
3	21.8	S 40° 20 158' E 148° 08 463'	as above			As above, though no scallop shells in grab.
4 (b)	20.4	S 40° 20 202' E 148° 07 745'	Shell grit/sand/quartz	Light grey with black flecks	none	Not so many shells as previous sample, scallop shell fragments, cockles, 1 large clam valve, no weed in grab.
5 (f)	13.0	S 40° 20 390' E 148° 06 818'	Shell grit/sand/quartz	Light grey with black flecks	none	Sediment matted in root mass of <i>Posidonia</i> , 3 dead scallop shells, grey shell debris.
6 (e)	16.3	S 40° 19 945' E 148° 06 848'	Quartz/sand some shell grit			Cockle shells, few pieces of quartz rock (approx. 5 cm), fragment of <i>Caulerpa sp.</i> , lots of varied small shells.

Video Record

- Video transect drifting with current which was quite strong. Very undulating bottom, stepping down in depth with quite steep sided steps. Clear sand with shells in troughs, some drift weed. Sparse vegetation cover, occasional clumps;
- Bottom more flat with patchy low weed cover; sponges, coral, very sparse *Posidonia*;
- Dense sponge cover of various types, occasional *Posidonia* clump moving to clear sand (ridged) with much drift weed.

Visibility during video tows was generally poor because of suspended sand in water column.

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone.

History of Marine Farming Activities

There is no history of marine farming operations within the zone.

Future Potential

The area is considered to have potential for the culture of a number of species including abalone and finfish given the water depth, water flow and the amount of seaweed drifting through the area.

Navigation Channels and Safe Anchorages

The zone will not impact on a recognised navigation channel situated to the north of the zone. There are no recognised anchorages adjacent to the zone.

Marinas, Public Jetties and Other Public Facilities

There are no marinas, public jetties or other public facilities adjacent to the zone.

Surrounding Land Use

The land adjacent to the zone consists of uncommitted Crown Land zoned Rural. There is an area of private freehold land situated over 2 km to the west of the zone.

Sewage and Stormwater Outlets

There are no sewage or stormwater outlets adjacent to the zone.

Summary of Zone

The zone has been proposed as it is considered to have potential for the culture of finfish or abalone and may also be suitable for the farming of a number of other species. The area has good water flow, adequate depth and also has the presence of drifting seaweed.

Further environmental baseline data will be collected before the zone is developed and any marine farming activities will be required to conform to the management controls contained in this Plan.

Zone 16 consists of all that area bounded by a line being from points defined by AMG co-ordinates:

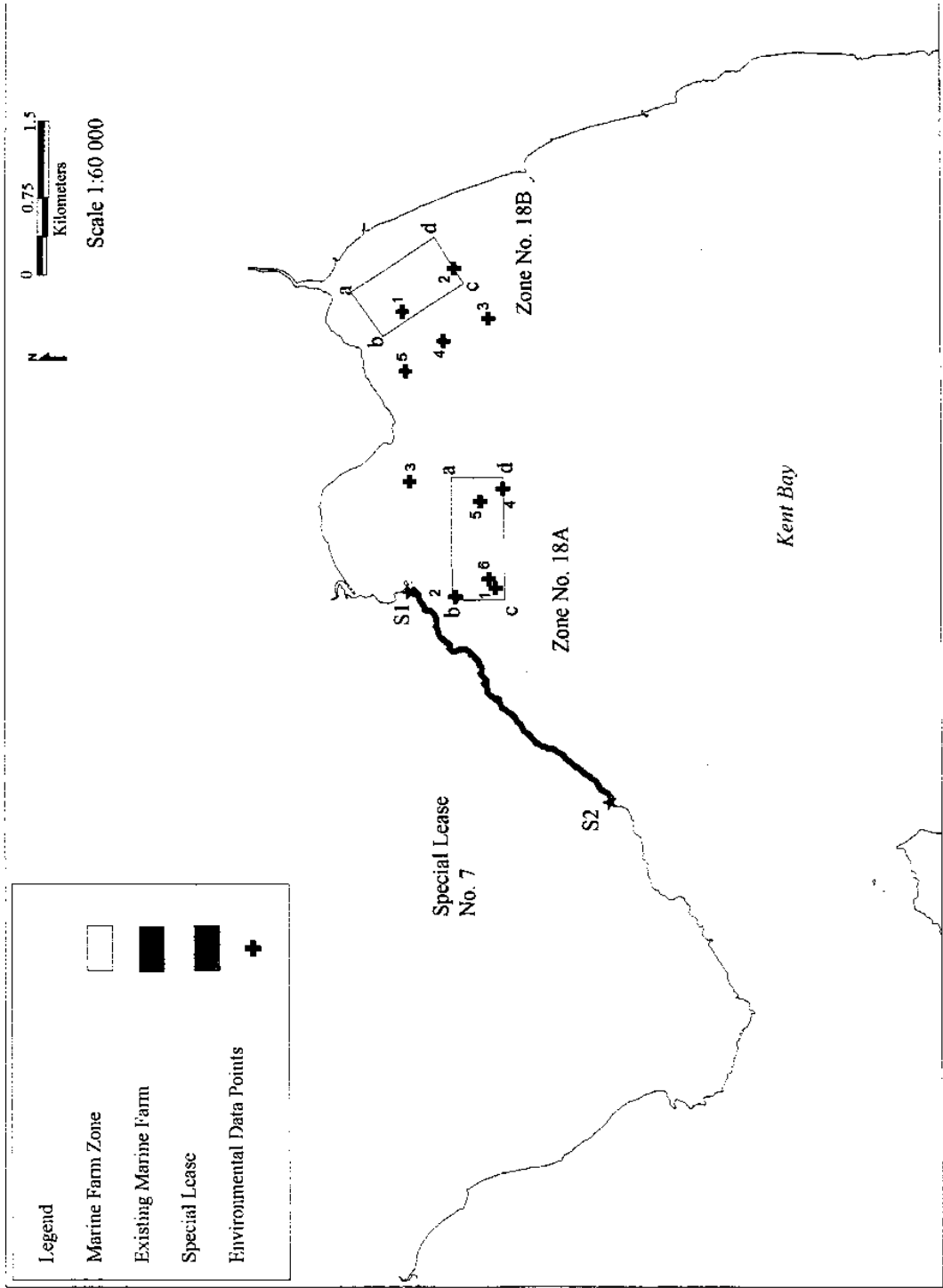
- a (E597396 N5534578) thence straight to
- b (E596028 N5534568) thence straight to

- c (E596025 N5534179) thence straight to
- d (E597399 N5534190) thence straight to
- a (E597396 N5534578).

Australian Mapping Grid (AMG)
Zone 55 Co-ordinates

The zone size is set at approximately 53.17 ha with a maximum leasable area of 20 ha. The species to be farmed include finfish, shellfish and seaweeds. Map 14 shows the zone.

Map 15 - Zone 18A & B (Kent Bay) and Special Lease No. 7



Zone 18 (Kent Bay A & B)

Location

The Kent Bay zone is located within Kent Bay on the south eastern side of Cape Barren Island. Kent Bay covers an area of approximately 110 ha and is fed by Bishops Creek running into Nautilus Cove, Rices River and a number of smaller unnamed creeks. The surrounding foreshore of the bay consists of intertidal sand-mudflats and sand beaches with the adjacent land generally covered in coastal shrubbery.

The marine farming zone is divided into two sub-zones A and B. Sub-zone A is over 900 m from the shores of Nautilus Cove on the western side of Kent Bay. Sub-zone B is situated on the eastern side of Kent Bay over 500 m from the mouth of Rices River.

Environmental Conditions

Water depth within the zones varies between 1.5 and 12 m.

Sub-zone A

The zone was surveyed on 30 January 1996 at 0830 hours with the area buoyed off. Depth soundings were taken along boundaries and a transect mid-zone from east to west. These soundings indicated a depth of 1.5 to 12 m. Video transects were conducted from corners c to b, b to a, a to d, then through the middle of the zone from east to west. *Posidonia* and *Heterozostera* were observed frequently along these transects. Results of sediment grab samples and a description of the video transects are described below.

Sediment Grab Samples

Site	Depth (m)	GPS co-ords	Sediment type & texture	Colour	Smell	Other
1	10.2	S 40° 26 687' E 148° 16 417'	Coarse quartz gravel/sand	Bluish grey	none	Decaying seaweed debris, <i>Caulerpa cactoides</i> , <i>Botryocladia obovata</i> .
2	6.0	NR	Rel. coarse shell grit/sand/ quartz over clay/ sand	Bluish grey	none	<i>Posidonia</i> .
3	5.5	S 40° 26 230' E 148° 17 140'	Quartz/sand	Bluish grey	none	<i>Posidonia</i> , <i>Botryocladia obovata</i> , 3 scallop shells.
4	5.2	S 40° 26 720' E 148° 17 100'	Quartz/sand with some shell grit	Light bluish grey	none	<i>Posidonia</i> , <i>Botryocladia obovata</i> (poor grab, dense patch of <i>Posidonia</i>).
5	7.2	S 40° 26 600' E 148° 17 010'	Rel. fine sand with some shell grit	Bluish grey	none	<i>Posidonia</i> with brown epiphytic algae on blades, lots of <i>Botryocladia obovata</i> .
6	9.0	S 40° 26 650' E 148° 16 480'	Sand with shell grit and quartz	Light bluish grey	none	Few <i>Posidonia</i> blades, <i>Halophila</i> , <i>Heterozostera</i> , 1 small live scallop.

Video Record

- relatively dense *Posidonia* with epiphytes (fine filamentous algae);
- sand patches visible within *Posidonia*, approx. 80% cover moving into dense cover of *Posidonia*;
- sand patches with *Caulerpa cactoides* and *Heterozostera* (sparse), some *Halophila* patches between, vegetation cover approx. 50% (epiphytic growth visible);
- mixed *Heterozostera*, *C. cactoides* and sparse *Halophila*, moderate - patchy cover (approach to corner b);
- approximately a third of the way towards corner a from b, dense cover of *Posidonia*;
- moving from corner a towards d, patches of *Botryocladia obovata* with dense epiphytic growth then *Posidonia*;

- clear patches of sand with sparse *Posidonia*, some *Halophila*;
- relatively dense *Posidonia* (100% cover) with much epiphytic covering;
- mixed *Posidonia* and *C. cactoides*, moving into patch of *Botryocladia obovata* and sand then back to *Posidonia* and *C. cactoides* (approach towards mid boundary of d to c, mixed *Posidonia*, *Heterozostera*, *C. cactoides* over sand);
- mid-zone transect from east to west, sparse *Heterozostera*, then dense patches of *C. cactoides*;
- patches of sand with areas where *Posidonia* has died off, moving into relatively dense *Posidonia* with epiphytes on blades;
- sparse *Heterozostera* mixed with brown seaweed and *C. cactoides* moving into relatively dense *Posidonia* with occasional patch where *Posidonia* has died off.

Sub-zone B

The survey was conducted on 30 January 1996 at 1330 hours using the portable GPS unit, viewfinder, Ekman grab and snorkelling. Some video footage was taken using a hand held underwater video camera. A considerable amount of coralline algae was observed under the seagrass canopy. Reasonably dense *Posidonia* with sand patches was observed over most of the zone area that was able to be surveyed (reasonably shallow towards the shoreline region north and east of the zone). Results of sediment samples and description of visual inspection with a viewfinder are shown below. Location of site numbers is shown on the map of the zone.

Sediment Grab Samples

Site	Depth (m)	GPS co-ords	Sediment type & texture	Smell	Other
1	2.0	S 40° 26 18' E 148° 18 09'	Coarse quartz gravel/sand	none	Dense <i>Posidonia</i> , grape-like coralline algae under <i>Posidonia</i> , brown filamentous algae, lots of urchins.
2	2.2	S 40° 26 45' E 148° 18 61'	Sand with shell grit	none	Dense <i>Posidonia</i> with patches of sand.
3	3.8	S 40° 26 63' E 148° 18 27'			Dense <i>Posidonia</i> .
4	3.2	S 40° 26 40' E 148° 18 11'	Sand with shell grit		Sand patches between <i>Posidonia</i> , grape-like coralline algae.
5	1.5	S 40° 26 20' E 148° 17 90'			<i>Posidonia</i> , <i>Caulerpa</i> sp., coralline algae, sponges.

Prior to the commencement of marine farming operations within the zone further environmental baseline assessment will be required. There will also be a requirement for an ongoing monitoring program of the area.

Existing Farming Activities

There are no existing marine farms within the zone.

History of Marine Farming Activities

There is no history of marine farming within the area, however research has been undertaken on the culture of native oysters.

Future Potential

The site is an area with potential for the cultivation of deepwater shellfish. Exploratory trials undertaken in the area indicated encouraging growth rates of native oysters.

Navigation Channels and Safe Anchorages

There is a navigation channel running between the south western shores of Cape Barren Island and Kent Rock leading to a recognised anchorage on the southern side of Cape Barren Island located inside Kent Rock. There is also a navigation channel running across the southern side of Kent Bay from Sloping Point through Sea Lion Narrows. The zone will not impact on the use of these areas.

Marinas, Public Jetties and Other Public Facilities

There are no marinas, public jetties or other public facilities adjacent to the zone.

Surrounding Land Use

The land adjacent to the zone consists of uncommitted Crown Land zoned Rural. The area is isolated and only accessible to off-road vehicles and walkers.

Nautilus Cove was the site of the first temporary settlement established south of the colony of Port Jackson (Sydney). The base was first established for the procurement of seal skins and oil by Captain Charles Bishop in 1798. Sealing products from the Kent Bay area were the first profitable exports sent from colonial New South Wales (M Nash, pers comm). Given the significance of the area, further baseline environmental assessment will need to consider the historical significance of the area.

Sewage and Stormwater Outlets

There are no sewage or stormwater outlets adjacent to the zone.

Summary of Zone

The zone is an appropriate area for marine farming having potential for deepwater shellfish farming. Exploratory trials indicated encouraging growth rates of native oysters. Further baseline environmental data will be collected before the zone is developed and any marine farming activities will be required to conform to the management controls within this plan.

Zone 18A consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E609086 N5522506) thence straight to
- b (E607896 N5522493) thence straight to
- c (E607896 N5521990) thence straight to
- d (E609086 N5522003) thence straight to
- a (E609086 N5522506).

Australian Mapping Grid (AMG) Zone 55 Co-ordinates

Zone 18B consists of all that area bounded by a line being from points defined by AMG co-ordinates:

- a (E610890 N5523475) thence straight to
- b (E610454 N5523176) thence straight to
- c (E610970 N5522383) thence straight to
- d (E611419 N5522661) thence straight to
- a (E610890 N5523475).

*Australian Mapping Grid (AMG)
Zone 55 Co-ordinates*

The size of sub-zone A is approximately 59.77 ha with a maximum leasable area of 59.77 ha. Sub-zone B is approximately 50.62 ha with a maximum leasable area of 50 ha. Map 15 shows the zone.

3. Special Lease Zones

During the consultation process for the Furneaux Islands, interest was expressed in the possibilities of reseedling, ranching and on-growing of abalone and possibly other species. Discussions with local abalone divers on Flinders Island indicated that there may be areas of hard reef and foreshore (seaward of high water mark) that do not hold significant populations of wild abalone, but may provide suitable conditions for reseedling and ranching abalone.

Therefore the DPIWE has proposed seven zones along sections of coastline around the Furneaux Islands where special lease operations may occur in waters 50 m seaward of high water mark and between specified points with two exceptions being an areas of Bun Beetons Point and South Castle Rock Point which are defined by co-ordinates. A special lease within a zone will confer on a lessee any right specified in the lease but does not confer right of exclusive occupation to the area covered by a special lease.

It is proposed that a special lease will allow for trials into the reseedling, ranching and on-growing to harvest of specified species. These marine farming activities will not exclude other activities in the area such as:

- navigation over the special lease;
- commercial or recreational harvesting of abalone or crayfish over the legal size limit and un-tagged within a special lease zone;
- recreational fishing including netting within a special lease area.

As already discussed earlier the Planning Authority fully appreciates there would be a need to place adequate restrictions on such operations to protect the wild fishery and recommend that no such lease be issued until the policing of such an operation can be assured.

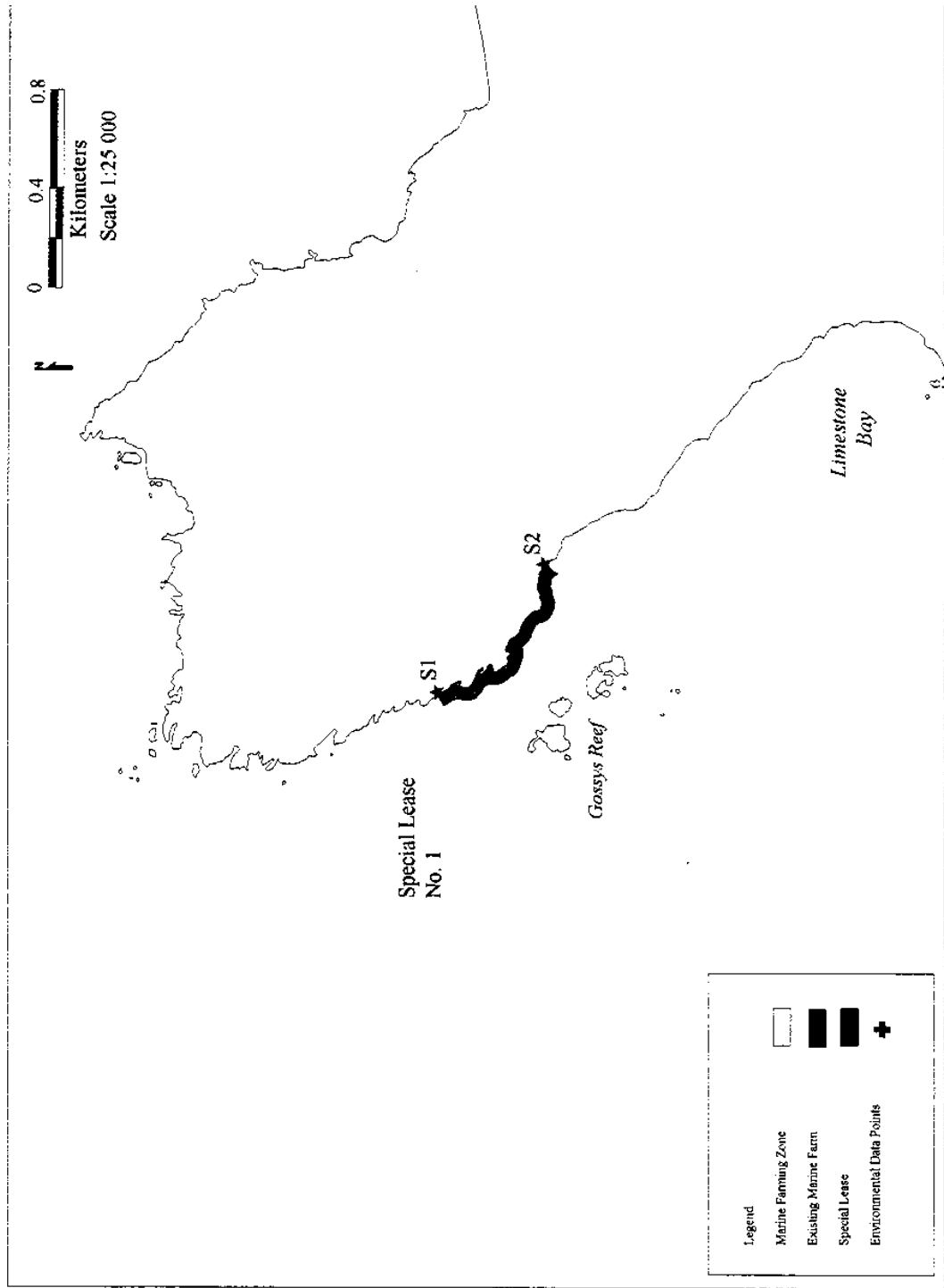
The Planning Authority also recommends that the use of special leases be limited to the Furneaux Islands within this plan in order to investigate the possibilities and problems that may arise in association with this particular method of marine farming, and that only a limited number of experimental operations be issued in the initial stages. These operations will be subject to environmental monitoring.

The Special Lease Zones identified in the Furneaux Islands Marine Farming Development Plan are summarised in Table 5.

Zone	Area	Approximate Zone Area (ha)	Approximate Maximum Leasable Area (ha)
1	Gossys Reef	4.33	4.33
2	Bun Beetons Point	5.92	5.92
3	South Castle Rock Point	3.60	3.60
4	Tin Kettle Island	9.24	9.24
5	Long Island	16.14	16.14
6	Cape Sir John	18.65	18.65
7	Kent Bay	15.59	15.59
		73.47	73.47

Table 5 - Summary of Zone Plans

Map 16 - Special Lease No. 1



Special Lease Zone 1 (Gossys Reef)

Location

The zone is located on the north western coastline of Flinders Island approximately 1.2 km south of Blyth Point. The zone consists of a rocky coastline located between Gossys Reef and mainland Flinders Island.

Future Potential

The area is seen as having the potential for the ranching of a number of species, in particular abalone.

Navigation Channels and Safe Anchorages

The zone is not located within any identified navigation channel or safe anchorage. As the area has been designated as a Special Lease Zone there will be no surface marking of the area and navigation or anchoring in the area will not be restricted

Surrounding Land Use

There is a strip of Crown Reserve adjacent to the zone which gives way to private freehold land zoned Rural.

Summary of zone

The zone consists of all that area bounded by the high water mark on the land side and extending 50 metres to seawards between two lines; one drawn from a point S1 (E572762, N5598332) to seawards following a bearing of 239°38'35" true, from where this line intersects the high water mark thence 50 metres to seawards and another drawn from point S2 (E573279, N5597901) seawards following a bearing of 212°00'52" true from where this line intersects the high water mark thence 50 metres to seaward. (*Australian Mapping Grid, Zone 55 Co-ordinates*).

The special lease zone area and maximum leasable area is approximately 4.33 ha. Map 16 shows the zone.

Special Lease Zone 2 (Bun Beetons Point)

Location

The zone is located off Bun Beetons Point on the western side of Flinders Island, adjacent to Marshall Bay and approximately 7.2 km to the south east of Cape Frankland. The zone consists of a rocky coastline and a reef area located off Bun Beetons Point.

Future Potential

The area is seen as having the potential for the ranching of a number of species, in particular abalone.

Navigation Channels and Safe Anchorages

The zone is not located within any identified navigation channel or safe anchorage. As the area has been designated as a Special Lease zone there will be no surface marking of the area and navigation or anchoring in the area will not be restricted.

Surrounding Land Use

There is a strip of Crown Reserve adjacent to the zone which gives way to private freehold land zoned Rural.

Summary of zone

The zone consists of all that area between defined co-ordinates and bounded by the high water mark generally between co-ordinates S1 and S5 from a point where a line drawn between S1 and S2 intersects the high water mark and at a point where a line drawn between S4 and S5 intersects the high water mark.

The zone co-ordinates are:

S1 (E569001 N5581016) thence straight to
S2 (E568850 N5580840) thence straight to
S3 (E568960 N5580743) thence straight to
S4 (E569297 N5581152) thence straight to
S5 (E569211 N5581211) thence straight to
S1 (E569001 N5581016).

Australian Mapping Grid (AMG) Zone 55 Co-ordinates

The special lease zone area and maximum leasable area is approximately 5.92 ha. Map 7 shows the zone.

Special Lease Zone 3 (South Castle Rock Point)

Location

The zone is approximately 1.2 km south from Castle Rock on the western side of Flinders Island and includes a section of rocky coastline.

Future Potential

The area is seen as having the potential for the ranching of a number of species, in particular abalone. There is a Marine Farming Zone located to the east of the Special Lease Zone. Potential may exist for the two zones to be used in conjunction.

Navigation Channels and Safe Anchorages

The zone is not located within any identified navigation channel or safe anchorage. As the area has been designated as a Special Lease Zone there will be no surface marking of the area and navigation or anchoring in the area will not be restricted

Surrounding Land Use

There is a strip of Crown Reserve adjacent to the zone which gives way to private freehold land zoned Rural.

Summary of zone

The zone consists of all that area between defined co-ordinates and bounded by the high water mark generally between co-ordinates S1 and S5 from a point where a line drawn between S1 and S2 intersects the high water mark and at a point where a line drawn between S4 and S5 intersects the high water mark.

The zone co-ordinates are:

S1 (E576929 N5572445) thence straight to
S2 (E576856 N5572500) thence straight to
S3 (E576519 N5572359) thence straight to
S4 (E576504 N5572180) thence straight to
S5 (E576603 N5572135) thence straight to
S1 (E576929 N5572445).

Australian Mapping Grid (AMG) Zone 55 Co-ordinates

The special lease zone area and maximum leasable area is approximately 3.60 ha. Map 8 shows the zone.

Special Lease Zone 4 (Tin Kettle Island)

Location

The zone is located within Franklin Sound on the southern side of Tin Kettle Island and includes a section of rocky coastline.

Future Potential

The area is seen as having the potential for the ranching of a number of species, in particular abalone.

Navigation Channels and Safe Anchorages

The zone is not located within any identified navigation channel or safe anchorage. As the area has been designated as a Special Lease Zone there will be no surface marking of the area and navigation or anchoring in the area will not be restricted

Surrounding Land Use

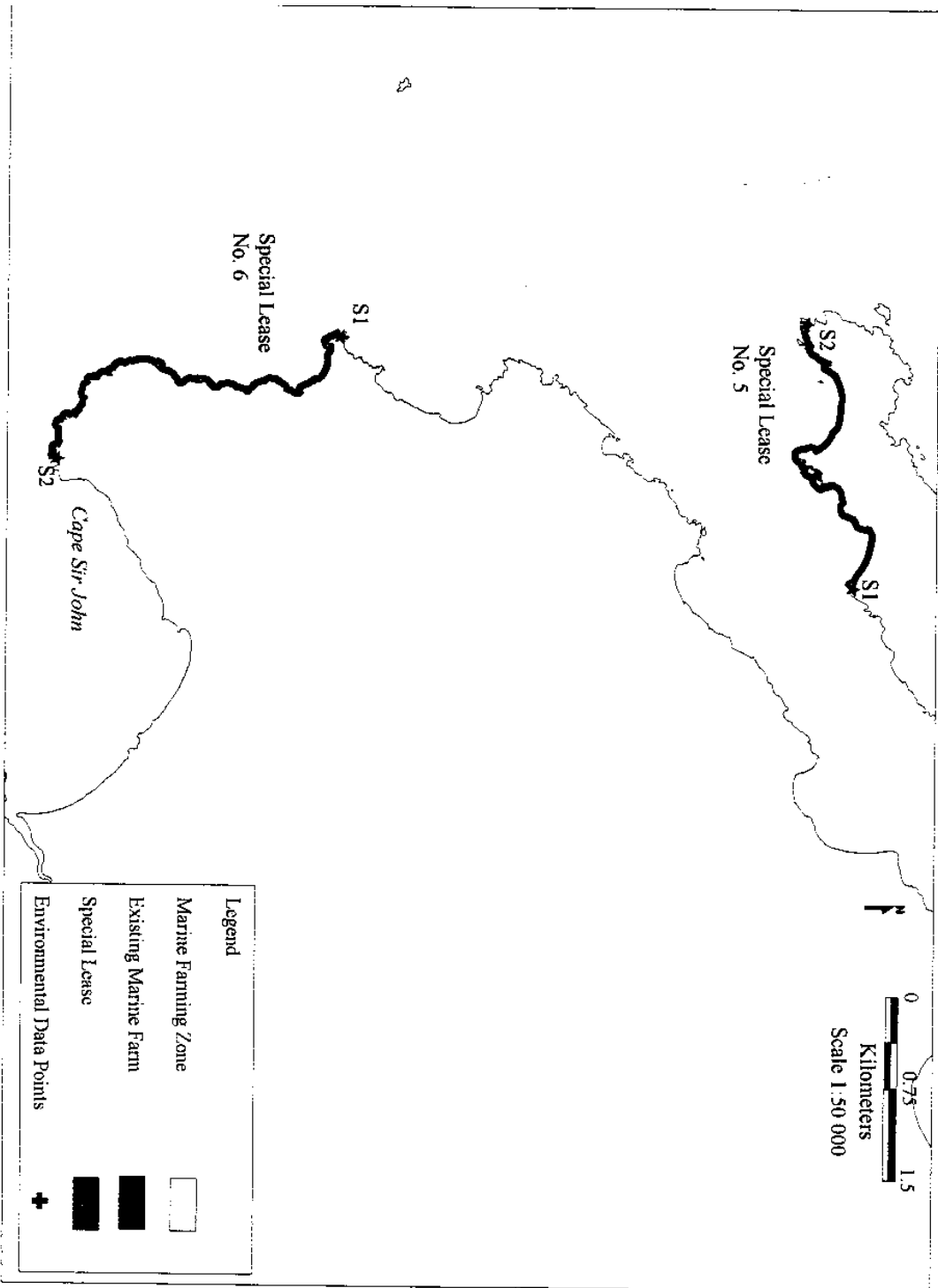
Tin Kettle Island consists of uncommitted Crown Land zoned Rural. The island is leased and is used for grazing.

Summary of Zone

The zone consists of all that area bounded by the high water mark on the land side and extending 50 metres to seawards between two lines; one drawn from a point S1 (E598707 N5538532) to seawards following a bearing of 99°04'34" true, from where this line intersects the high water mark thence 50 metres to seawards and another drawn from point S2 (E597218 N5538321) seawards following a bearing of 141°30'04" true from where this line intersects the high water mark thence 50 metres to seaward. (*Australian Mapping Grid, Zone 55 Coordinates*).

The special lease zone area and maximum leasable area is approximately 9.24 ha. Map 14 shows the zone.

Map 17 - Special Lease No. 5 and Special Lease No. 6



Special Lease Zone 5 (Long Island)

Location

Long Island is located adjacent to the north western section of Cape Barren Island. The zone is located on the southern coastline of Long Island.

Future Potential

The area is seen as having the potential for the ranching of a number of species, in particular abalone.

Navigation Channels and Safe Anchorages

The zone is not located within any identified navigation channel or safe anchorage. As the area has been designated as a Special Lease area there will be no surface marking of the area and navigation or anchoring in the area will not be restricted

Surrounding Land Use

The majority of Long Island consists of Uncommitted Crown Land with a small section of Private Freehold Land at its western end. The island is zoned Rural and is leased for grazing.

Summary of Zone

The zone consists of all that area bounded by the high water mark on the land side and extending 50 metres to seawards between two lines; one drawn from a point S1 (E585405, N5531044) to seawards following a bearing of 203°54'14" true, from where this line intersects the high water mark thence 50 metres to seawards and another drawn from point S2 (E583255, N5530655) seawards following a bearing of 172°51'36" true from where this line intersects the high water mark thence 50 metres to seaward. (*Australian Mapping Grid, Zone 55 Co-ordinates*).

The special lease zone area and maximum leasable area is approximately 16.14 ha. Map 17 shows the zone.

Special Lease Zone 6 (Cape Sir John)

Location

The zone is located on the western side of Cape Barren Island running north from Cape Sir John to G V H Point.

Future Potential

The area is seen as having the potential for the ranching of a number of species, in particular abalone.

Navigation Channels and Safe Anchorages

The zone is not located within any identified navigation channel or safe anchorage. As the area has been designated as a Special Lease Zone there will be no surface marking of the area and navigation or anchoring in the area will not be restricted

Surrounding Land Use

The adjacent land on Cape Barren Island consists of a coastal strip of Crown Reserve giving way to land owned by the Cape Barren Islanders Community Inc. which is zoned Rural.

Summary of Zone

The zone consists of all that area bounded by the high water mark on the land side and extending 50 metres to seawards between two lines; one drawn from a point S1 (E583390, N5526863) to seawards following a bearing of 240°23'21" true, from where this line intersects the high water mark thence 50 metres to seawards and another drawn from point S2 (E584402, N5524588) seawards following a bearing of 170°27'00" true from where this line intersects the high water mark thence 50 metres to seaward. (*Australian Mapping Grid, Zone 55 Co-ordinates*).

The special lease zone area and maximum leasable area is approximately 18.65 ha. Map 17 shows the zone.

Special Lease Zone 7 (Kent Bay)

Location

The zone is located on the western coastline of Kent Bay on the south coast of Cape Barren Island.

Future Potential

The area is seen as having the potential for the ranching of a number of species, in particular abalone.

Navigation Channels and Safe Anchorages

The zone is not located within any identified navigation channel or safe anchorage. As the area has been designated as a Special Lease Zone there will be no surface marking of the area and navigation or anchoring in the area will not be restricted

Surrounding Land Use

The adjacent land consists uncommitted Crown Land zoned Rural.

Summary of Zone

The zone consists of all that area bounded by the high water mark on the land side and extending 50 metres to seawards between two lines; one drawn from a point S1 (E607968, N5522923) to seawards following a bearing of 131°57'04" true, from where this line intersects the high water mark thence 50 metres to seawards and another drawn from point S2 (E605928, N5521011) seawards following a bearing of 126°17'04" true from where this line intersects the high water mark thence 50 metres to seaward. (*Australian Mapping Grid, Zone 55 Co-ordinates*).

The special lease zone area and maximum leasable area is approximately 15.59 ha. Map 15 shows the zone.

Management Controls

Prepared in accordance with section 24 of the *Marine Farming Planning Act 1995*. Management controls must contain any measures necessary to manage and mitigate negative effects which the Plan may have.

1. General Controls for all Marine Farming Zones

1.1 Finfish

- (i) There must be no unacceptable environmental impact, to the satisfaction of the Secretary, outside the boundary of the marine farming lease area. Relevant environmental parameters must be monitored in the lease area, and at any control site(s) in accordance with the requirements specified in the relevant marine farming licence.

1.2 Shellfish

- (i) There must be no unacceptable environmental impact, to the satisfaction of the Secretary, outside the boundary of the marine farming lease area. Environmental parameters must be monitored in accordance with the requirements specified in the relevant marine farming licence.

2. Environmental Controls Relating to Carrying Capacity

2.1 Finfish

- (i) The maximum permissible stocking density of salmonid fish is 25 kg/m³.
- (ii) Maximum permissible stocking densities for other finfish species may be specified in licence conditions.
- (iii) Lessees must ensure that farmed areas are fallowed as soon as practicable after bubbles of hydrogen sulphide and/or methane gases form in the sediment and rise to the surface.
- (iv) Finfish nets must be at least 1 metre clear of the seabed at low tide under normal growing conditions.

2.2 Shellfish

- (i) In all new lease areas used for the farming of shellfish there must not be more than the equivalent¹ of either:
 - (a) 1 km of stocked racking per hectare of lease area; or
 - (b) 3 km of stocked post and wire farming equipment (commonly known as the BST system) per hectare of lease area; or

¹ For the purposes of 2.2 (i) above each 100 metres of stocked racking shall be deemed equivalent to 300 metres of stocked post and wire farming equipment in circumstances where both systems are used in a lease area at the same time.

- (c) 1.1 km of effective backbone longline per hectare of lease area.
- (ii) In all existing lease areas used for the farming of shellfish there must not be more than the equivalent² of either:
 - (a) 1 km of stocked racking per hectare of lease area; or
 - (b) 3 km of stocked post and wire farming equipment (commonly known as the BST system) per hectare of lease area; or
 - (c) 1.1 km of effective backbone longline per hectare of lease area.
- (iii) Holders of an existing marine farming lease have 5 years from the date of approval of this Plan to comply with 2.2 (ii).
- (iv) Containers of oysters in intertidal lease areas must be clear of the seabed and there shall be no layering of containers on the racking.
- (v) All longlines and associated equipment for filter feeding shellfish must be maintained at least 1 metre clear of the seabed.

3. Environmental Controls Relating to Introduction of Bivalve Shellfish

- (i) Each lessee is to ensure that all bivalve shellfish introduced into the area covered by this Plan have been placed in fresh water for a period of 2 hours and then deperated in sterile sea water for a period of 24 hours prior to placement on a lease area.

4. Environmental Controls Relating to the Culture of Pacific Oysters

- (i) Only 100% sterile Pacific oysters may be introduced for culture in the area covered by this Plan
- (ii) The Secretary must be satisfied that any such Pacific oysters meet the sterility requirements of 4 (i).

5. Environmental Controls Relating to Seagrass

- (i) Wheeled vehicles/vessels must not touch the seabed within a lease area.
- (ii) There will be an annual assessment of the seagrass biomass. Those parts of the assessment required to be undertaken by the lessee will be specified in the relevant marine farming licence.

² For the purposes of 2.2 (ii) above each 100 metres of stocked racking shall be deemed equivalent to 300 metres of stocked post and wire farming equipment in circumstances where both systems are used in a lease area at the same time.

6. Environmental Controls Relating to Monitoring

6.1 Finfish

- (i) Lessees must comply with the environmental monitoring requirements for collection, analysis and reporting as specified in the relevant marine farming licence.
- (ii) Lessees are to provide to the Secretary, on an annual basis the following information:
 - (a) Usage of fish feed on each lease area for which they hold a marine farming licence as specified in the relevant marine farming licence.
 - (b) A list specifying the names and quantities of therapeutic treatments, pesticides, anaesthetics, antibiotics, hormones, pigments, antifoulants, disinfectants, cleansers and any other potentially harmful materials which may have been released into the marine environment in each lease area for which they hold a marine farming licence.
 - (c) Location, size and stocking rates of cages on each lease area for which they hold a marine farming licence and the areas being fallowed as specified in the relevant marine farming licence.
- (iii) Environmental data are to be collected at each finfish lease area and analysed to specified standards by persons approved and authorised by the Secretary. The monitoring requirements for collection, reporting and analysis are detailed in the relevant marine farming licence.
- (iv) Lessees are required to ensure that an annual underwater survey is conducted to assess the extent of marine farming-derived organic sedimentation and the degree of impact on the benthic community as specified in the relevant marine farming licence.
- (v) Lessees must provide a baseline environmental survey as specified by the Secretary where:
 - (a) a new lease area is being established; or
 - (b) for any expansion greater than 10% to an existing marine farm lease area.

The baseline environmental survey must be undertaken prior to the commencement of marine farming operations.

Data to be collected may include but is not limited to sediment particle size analysis, organic carbon content of the sediment, redox potentials, water flow rates, current flows and composition of the benthic community.

Note: The Secretary will use the information from the baseline environmental survey to assess whether the area to be farmed contains any rare and endangered species or any

unusual habitat and will determine future management and monitoring requirements for the area.

6.2 Shellfish

- (i) Lessees must comply with the environmental monitoring requirements specified in the relevant marine farming licence.
- (ii) Lessees are to provide to the Secretary an estimate of numbers or biomass of each species of shellfish being farmed in a lease area for which they hold a marine farming licence, on an annual basis or as otherwise specified in the relevant marine farming licence.
- (iii) Lessees must provide a baseline environmental survey as specified by the Secretary where:
 - (a) a new lease area is being established; or
 - (b) for any expansion greater than 10% to an existing marine farm lease area.

The baseline environmental survey must be undertaken prior to the commencement of marine farming operations.

Note: The Secretary will use the information from the baseline environmental survey to assess whether the area to be farmed contains any rare and endangered species or any unusual habitat and will determine future management and monitoring requirements for the area.

- (iv) Lessees farming or taking bivalve shellfish from the lease area for human consumption or for on-growing for human consumption must comply with the requirements of the Tasmanian Shellfish Quality Assurance Program and with any directions from the Minister for the Department of Health and Human Services.
- (v) Lessees must regularly measure the growth of samples of shellfish, as specified by the Secretary, in areas where the growth rates of shellfish have declined and questions arise over the carrying capacity of a growing area.

7. Abalone Farm Audit

- (i) All abalone marine farming is to be conducted in accordance with the DPIWE's Abalone Farm Audit requirements.

8. Chemical Controls

- (i) All chemical use must comply with the requirements of the *Agriculture and Veterinary Chemicals (Control of Use) Act 1995*.

9. Controls on Waste

- (i) Lessees must dispose of wastes from:
 - harvesting;
 - processing of produce; and

- removal of fouling organisms,
in a manner that the Secretary is satisfied will not cause an unacceptable effect on the ecology of the marine environment or nearby shorelines.

10. Disease Controls

- (i) Lessees must notify the Secretary of any suspected disease in accordance with the *Animal Health Act 1995*.
- (ii) Lessees must not intentionally release into State waters fish of species authorised in the relevant marine farming licence unless authorised to do so by that licence.

11. Visual Controls

Lessees must ensure that all marine farming structures and equipment on marine farming lease areas conform to the following controls:

- (i) All fish cages, buoys, netting and other floating marine farming structures and equipment on the sea, other than that specified for navigational requirements, must be grey to black in colour, or be any other colour that is specified in the relevant marine farming licence.

Holders of an existing marine farming lease have five years to conform from the date of approval of this Plan.

Lessees of new marine farming lease areas must comply immediately on commencement.

- (ii) Marine farming structures and equipment must be low in profile and be of a uniform size and shape to the satisfaction of the Secretary.

Holders of an existing marine farming lease have five years to conform from the date of approval of this Plan.

Lessees of new marine farming lease areas must comply immediately on commencement.

- (iii) Posts on each section of racking on intertidal lease areas are to be of consistent height above sea level.
- (iv) Row markers on intertidal lease areas are to be of consistent height above sea level.
- (v) The lease area must be kept neat and tidy to a standard acceptable to the Secretary.
- (vi) Floating storage huts, grading facilities and shelters must not be located within a lease area unless authorised under the relevant marine farming licence.
- (vii) Lessees must ensure that lighting of marine farming operations, other than that required for navigation purposes, complies with the *Environmental Management and Pollution Control Act 1994*.

- (viii) Anchors and mooring lines that extend outside the lease area must be at least 5 metres below the surface at the boundary of the lease area.

12. Access Controls

- (i) Lessees must mark the external boundaries of the lease area in whatever manner is required by the Secretary and by the relevant authority under the provisions of the *Marine and Safety Authority Act 1997*.
- (ii) Lessees must identify the lease area in a manner specified by the Secretary.

13. Other Controls

- (i) Lessees must comply with the *Marine Farming Planning Act 1995* and with any other Act or regulations that may affect the lease area or the marine farming operations in that lease area.
- (ii) Lessees must comply with guidelines on noise levels made pursuant to the *Environmental Management and Pollution Control Act 1994*.
- (iii) Lessees must maintain marine farming structures and equipment on lease areas held by them in a serviceable condition.
- (iv) Lessees must remove redundant, dilapidated or loose marine farming structures and equipment from the lease area at the request of the Secretary.
- (v) If any part or parts of marine farming structures or equipment break away from the lease area, lessees must take action as soon as reasonably possible to recover those structures and equipment and return them to the lease area or otherwise dispose of them in an appropriate manner.
- (vi) Lessees must ensure any predator control of protected species is conducted with the approval of the Parks and Wildlife Service of the Department Primary Industries, Water and Environment.
- (vii) Lessees must permit the Minister, or persons authorised by the Minister, to enter into and inspect the lease area at all reasonable times.
- (viii) Lessees must comply with all lawful written requirements of the Minister.

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Glossary

AMG	Australian Mapping Grid
anoxic	Limited supply of oxygen in the sediments
DELM	Department of Environment and Land Management
DPIF	Department of Primary Industry and Fisheries
DPIWE	Department Primary Industries, Water and Environment (NB. DPIF and DELM amalgamated in September 1998 to DPIWE)
GPS	Global Positioning Systems
MRLs	Maximum Residual Levels
oxic	Plentiful supply of oxygen in the sediments
photic depth	Depth of water to which light penetrates
ppt	Parts per thousand
SALTAS	Salmon Enterprises of Tasmania Pty Ltd
Secretary	Secretary of the Department of Primary Industry, Water and Environment
TSQAP	Tasmanian Shellfish Quality Assurance Program

Species Glossary

Abalone Blacklip	<i>Haliotis rubra</i>
Abalone Greenlip	<i>Haliotis laevigata</i>
Atlantic Salmon	<i>Salmo salar</i>
Blue Fin Tuna	<i>Thynnus Maccoyii</i>
Clams	<i>Katylesia spp.</i>
Mussels	<i>Mytilus edulis planulatus</i>
Oysters Flat	<i>Ostrea angasi</i>
Oysters Pacific	<i>Crassostrea gigas</i>
Periwinkles	<i>Turbo undulatus</i>
Rainbow Trout	<i>Oncorhynchus mykiss</i>
Scallops Commercial	<i>Pecten fumatus</i>
Scallops Doughboys	<i>Chlamys asperrimus</i>
Scallops Queen	<i>Equichlamys bifrons</i>
Stripey Trumpeter	<i>Latris lineata</i>
Sydney Rock Oyster	<i>Saccostrea glomerata</i>