3. Justification and Alternatives

3.1 Justification Issues

3.1.1 Boat Maintenance Area

It is acknowledged that there is a slipway within Boathaven Bay, located within Campbell's Creek that can only be accessed at high tide. Boat repairs are undertaken in an area of cleared mangrove adjacent to the creek. It is also noted that a number of boatowners currently perform hull scraping and painting in Boathaven Bay and nearby locations by beaching boats on the mudflats at low tide.

An assessment of the direct and indirect environmental impacts associated with these sorts of operations has not been undertaken but is likely to be greater than that of boat repair works undertaken in a hardstand facility with controls over runoff and waste management.

3.1.2 Justification for Land Creation

A range of alternative footprint scenarios are evaluated in **Section 3.2.2** of this Addendum. These are "marina only" options, that is, with creation of only enough land to provide the minimum marina support facilities required by DNRM and none of the public/community areas sought by Whitsunday Shire Council.

This analysis highlighted some key issues in regard to the justification for land creation in the proposal:

- The proposal depends on creation of saleable land to make it financially viable. The costs of disposal of dredge spoil to land or sea are prohibitive. This is also the case for marina developments at other sites identified in the WRMDA.
- Disposal of spoil off-site rather than use for land creation is not without environmental impacts at any chosen disposal site. Boathaven Bay has been identified as a non-pristine location compared to other locations within the Whitsunday Region (which includes terrestrial and marine conservation parks) (see **Section 9.4**). There is likely to be little environmental benefit in transferring spoil from Boathaven Bay to another location.
- If the land is not created, a number of the social benefits of the project are lost. These include the provision of a number of public facilities such as the maritime training academy site, parkland an all tide beach, a boat launching ramp and public transport terminal. Social benefits associated with job creation are also largely lost.
- Economic benefits to the local and regional economy are greatly enhanced by the creation of land for further development. These benefits are in the form of direct and indirect employment, purchase of goods and services from within the local and regional economy and revenue to local and State government.

Financial assistance from the government in the development of the marina is not available. In any case, such assistance would be inappropriate in the context of this development, which has been demonstrated to be economically viable as a stand alone development and to provide significant benefit to the local and regional economies and communities.

3.1.3 Demand for Marina Berths

The Marina Demand Analysis (Department of State Development 2001) identifies that, even taking into consideration the Abel Point Marina expansion, there is still significant demand for marina berths in the Airlie Beach vicinity. This is borne out by over 800 registrations received by Whitsunday Sailing Club for marina berths. This exceeds the number of berths that will be available from both Abel Point Marina and the proposed Port of Airlie combined by over 100%.

It is noted that there are a large number of vacant moorings in the Pioneer Bay area (the Marina Demand Analysis identified a theoretical vacancy of 225 moorings in this area in 2000). However, many boat owners prefer to keep their boats in a marina as this reduces the risk of damage to the boat from collision or during storm events and increases the convenience of access to the boat. Berthing in a marina also provides ready access to the range of facilities at the marina.

A large proportion of the inquiries for berths in the marina are from locally based boat owners.

3.2 Alternatives

3.2.1 Alternative Sites

The development planning process considered a number of crucial parameters, in addition to demand for the marina including:

- Impacts on the environment including coastal processes, water quality, flora and fauna, air quality, transportation, visual amenity,
- Social and economic impacts and benefits
- Compliance with the Whitsunday Shire Council's Strategic Plan which identifies the site as suitable for a marina and tourism development (see also **Section 4.2** of this Addendum)
- Integration of the development into the existing commercial area of Airlie Beach and enhancement of the area
- Development of a project that provides greater benefits to the community than just marina berths
- Improvement of land based and maritime transportation interchange and links
- Demands for commercial property and tourist accommodation
- Limiting physical and financial risks
- Development costs and financial capacity of the developer
- Minimising the development footprint through the efficient layout and design of the floating marina system, ferry terminals, boat ramp, marine academy, and marina maintenance area (see also **Section 1.1** of this Addendum)
- Minimising the importation of fill and armour rock
- Maximising use of materials to be found on site.
- Balancing excavation and fill quantities.

The current site performs well against all of these criterion.

As discussed in Section 3.3.1 of the Supplementary Environmental Impact Statement, the only alternative site that ranked closely to Boathaven Bay in the WRMDA was Shute Harbour. Shute Harbour does not offer the same commercial benefits as Port of Airlie due to the distance from Airlie Beach and other mainland population centres.

Environmental impacts associated with various other alternative sites are further discussed in **Section 3.3** of this Addendum.

An alternative location for the residential and commercial component would sacrifice many of the social and economic benefits of the project. Considerations supporting the integration of commercial and residential components with the marina development include:

- The proposed development must be seen as an integrated whole, and should not be seen as a combination of stand alone parts. The overall development relies on the inclusion of the residential and retail/commercial components, and would not be financially viable if these elements were excluded. Similarly, the intent of the residential and retail/commercial components is wholly reliant on their association with the other elements, and the proposed marina in particular. Accordingly, it is not appropriate to consider alternative locations for these elements, other than as part of the integrated development as proposed.
- Notwithstanding the above comment, the basic intent of the residential component is to provide a variety of dwelling units that have direct waterfront access and views, are part of a vibrant mix of uses, including a marina, restaurants/cafés and speciality shopping, and are within walking distance of the amenities of Airlie Beach, including the lagoon, shopping, commercial services, community facilities, beaches, open spaces and so on. The only suitable location for this component would be as part of the proposed development.
- The commercial component is intended to accommodate businesses directly associated with the marina and other elements of the proposed development. This will naturally also include tour operators, transport operators, car hire businesses and the like, all of which would be necessary to complement the tourism function of the overall development. Again, it is not appropriate to consider alternative locations for this particular element.
- Aside from the importance of the retail component as a contributor to the viability of the overall development, it is equally important as a contributor to the potential success of the development as a tourist attraction. This is primarily because the retail space will target operators such as restaurants, cafés, bars, entertainment venues, speciality tourist shopping and the like, all of which will enhance and enrich the holiday experience of its guests and visitors.

There do not appear to be any alternative locations which would achieve the basic intent of the proposed development as a whole and, given the integrated nature of the overall concept; there are similarly no alternatives for any of its elements.

3.2.2 Alternative Footprints and Layouts

The WRMDS estimated that demand for marina berths in the Whitsunday area to the year 2015 will be 573 of which Able Point Marina is currently developing 250. The Whitsunday Sailing Club and Windward AB P/L, the developers, of the proposed Port of Airlie Project have received over 800 applications for leases or purchase of marina berths in the project and a decision was made to develop a marina with a 250 berth capacity. The proposed marina would contribute to meeting the projected demands estimated in the WRMDS and on the basis of the level of inquiry for berths, have excellent investment potential.

The development planning process considered a number of crucial parameters, in addition to demand for marina berths, including:

- Minimising impacts on the environment including coastal processes, water quality, flora and fauna, air quality, transportation, visual amenity,
- Providing positive social and economic impacts and benefits
- Conforming with the Whitsunday Shire Council's Strategic Plan which identifies the site as suitable for a marina and tourism development
- Integration of the development into the existing commercial area of Airlie Beach and enhancement of the commercial area
- Providing benefits to the community including a transportation interchange, ferry terminal, public car parks, public beach, recreation areas
- Improving land based and maritime transportation facilities for the Whitsunday coast
- Meeting demands for commercial property and tourist accommodation
- Limiting physical and financial risks
- Providing an equitable return to the developer given the risks associated with the type of development
- Minimising the development footprint through the efficient layout and design of the floating marina system, ferry terminals, boat ramp, marine academy, and marina maintenance area
- Maximising use of materials to be found on site and minimising the importation of fill and armour rock through balancing excavation and fill quantities

The proposed development concept shown in **Figure 1-1** is the result of consideration and analysis of the above parameters.

As requested by EPA and DPI, alternative layouts for a development comprising only a marina and associated marina facilities have been considered and analysed. The footprints of the proposed Port of Airlie proposal and three possible alternative "marina only" layouts are shown in **Figure 3-2**, **Figure 3-3**, **Figure 3-4** and **Figure 3-5**. The alternative layouts are based on the following:

- A minimum water area of 8ha is required for a marina basin to accommodate 250 berths plus boat ramp and access to a boat repair/maintenance area
- An area of approximately 3ha is required for land based development including car parks, marina maintenance area, boat ramp, marina administration and services buildings
- Marina protection provided by conventional rock armoured breakwaters to limit the area of the seabed disturbed
- Vertical walls around the marina basin used to minimise the area of the marina basin
- For estimating costs of construction, excess material from dredging and excavation, not used for reclamation of land based marina facilities, will be dumped at sea or disposed off-site.

The three alternatives are as follows:

- Alternative 1 is a marina only option in the same location as the proposed Port of Airlie
- Alternative 2 is a marina only option placed largely in subtidal waters adjoining the headland

- Alternative 3 is a marina only option located near the sports park in Boathaven Bay

A comparison of the alternative layouts is presented in **Table 3-1**.

Table 3-1 Analysis of Alternative Layouts

	Port of Airlie	Alternative 1	Alternative 2	Alternative 3
Development Footprint (Ha)				
Marina Basin	9.9	8.0	8.0	8.0
Entrance Channel	7.4	7.4	5.8	10.7
Marina Facilities Area	2.2	3	3	3
Commercial and Tourist Facilities	6.8	0.00	0.00	0.00
Community Facilities	6.6	0.00	0.00	0.00
Breakwater (1)	NA	2.6	5.2	1.3
Total Footprint (ha)	33	21	22	23
Total Intertidal zone impacted (Ha)	21.2	15.9	2.5	19.0
Area of Mangroves Impacted (Ha)	3.06	1.36	1.09	2.28
Potential impact on Seagrass (Ha) (2)				
Above low water	5.38	6.48	-	1.67
Below low water	5.58	1.17	6.44	1.19
Volume of excavation (m^3)	650,000	510,000	290,000	660,000
Spoil requiring disposal (m^3)	0	435,000	190,000	595,000
Construction Costs ($million)	26.6	35.4	26.8	40.8
Cost per Berth ($)	106,000 (3)	142,000 (4)	107,000 (4)	163,000 (4)

(1) The Port of Airlie breakwater area is included in the community facilities and tourist facilities area.

(2) Seagrass areas are based on maximum distribution from all survey data collected over the past 20 years and therefore differ from areas estimated in the Supplementary EIS.

(3) The high cost per berth will be offset by the value of the freehold land created.

(4) The high construction costs of the "marina only' alternatives are the result of the need to dispose of large quantities of excess dredged material to an offshore dumping ground and for the need to import large quantities of core and armour rock for the breakwaters

Alternative 1, which is in the same location as the proposed development has a smaller development footprint, however it will have similar impacts as the proposed Port of Airlie proposal on seagrasses in the intertidal zone and less impact on the fringing mangroves along Shute Harbour Road.

Alternative 2 is located seaward of the intertidal area of the bay in permanent water and has minimal impact on the seagrasses in the intertidal zone. The breakwater needed to protect the marina is in deeper water and will have a higher crest level because of the greater height of the storm generated waves. The breakwater is also founded on soft mud up to 8 m in depth, which will significantly increase the volume of materials required for construction and greatly increase the costs of the protection works. A low level breakwater would also be required on the landward perimeter of the marina basin for protection of the floating berths from waves generated by the prevailing south east winds.

Alternative 3 is located adjacent to the Sports Park in Jubilee Pocket. This alternative has less impacts than the proposed Port of Airlie proposal on both the seagrasses in the intertidal zone but similar impacts on the fringing mangroves along the foreshore. However the marina is located further inshore than the other proposals and will require significantly larger excavation for the marina basin and a longer entrance channel.

The proposed Port of Airlie and Alternative 1 both intrude slightly into the World Heritage Area boundary. The majority of the footprint for Alternative 2 is located almost entirely within the World Heritage Area, while Alternative 3 is located outside the World Heritage Area.

Although all of the "marina only" alternatives would have lesser impacts on the intertidal zone than the Port of Airlie Proposal, they are not financially feasible. The costs of construction of the development could not be covered by the combined income generated from the sale or lease of marina berths and income generated from operation of the marina and marina facilities. All three "marina only" alternatives would require a mix of commercial, residential and tourism outlets to be developed in conjunction with the marina for their viability.

The high construction costs estimated for the "marina only" alternatives compared to the Port of Airlie proposal are the result of the high costs of disposal of excess dredged material and the costs of importing large quantities of material for breakwater cores, filter material and armour rock. The proposed development and the three "marina only" alternatives all require dredging of large volumes of material for construction of the marina basin and entrance channel. The estimated quantities of excavation are:

- Port of Airlie proposal 650,000 cu m
- Alternative 1 510,000 cu m
- Alternative 2 290,000 cu m
- Alternative 3 660,000 cu m

excavated materials from the site in reclaiming useful land for commercial, tourist developments and public and recreation areas, in addition to a marina facilities area, therefore minimising the costs of disposal of marine mud and the importation of materials for breakwater construction. For the other alternatives, only a small percentage of the excavated material could be used for reclamation of the 3ha marina facilities area; 75,000 m^3 for Alternatives 1 and 3 and 120,000 m^3 for Alternative 2. Excess material from excavation would then have to be disposed of to an onshore landfill, or by dumping at sea. Disposal of large volumes of marine mud to a landfill site or by dumping at sea would not be practical or economically feasible. We have not been able to identify suitable dump sites within the Airlie Beach–Shute Harbour area and Whitsunday Shire Council would not agree to the transportation of large volumes of spoil through Airlie Beach. Even if a suitable disposal site was available, the costs of on shore disposal of the mud would require:

- Storage and de-watering of the dredged material at the development site
- Re-excavation, haulage and placement of the material at the disposal site
- Preparation of containment bunds at the disposal site
- Construction of a leachate collection and treatment facility for the control of saline leachate
- Purchase of a large parcel of agricultural land for the landfill

The costs of this method of disposal would be equal to or greater than disposal at sea, which as explained in the section on earthworks strategy, has been estimated to cost between $40 and $60 per cu m.

The Port of Airlie proposal will utilise material excavated from the site to form a beach breakwater, minimising importation of core and filter material and armour rock (14,000 cu m) and lowering costs of construction. The construction of rock armour

breakwaters for the "marina only" alternatives would require much larger quantities of imported core, filter and armour rock as follows:

- Alternative 1 82,000 m^3
- Alternative 2 212,000 m^3
- Alternative 3 37,000 m^3

Whitsunday Shire Council will not support the transportation of these large quantities of material through Airlie Beach and there are no feasible sites for a quarry to supply this material on the Shute Harbour side of the town.

3.2.3 Public Benefits of Preferred Option

Compared to the "no project" and "marina only" options presented in Section 3.3 of the Supplementary EIS, the following public benefits are gained from the proposal:

- Transport Interchange capable of accommodating at any one time:
  - 6 interstate coaches
  - 2 local "bendy" buses
  - mini buses
  - taxi rank
  - 180 carparks
- Town Square / central meeting place
- Public access to most of the waterfront including extension of the existing very popular coast walking tracks in Airlie Beach
- All tides public beach
- All tides public boat ramp together with 45 adjoining boat/trailer parks.
- Public lookout and picnic area with associated carpark on the point of the breakwater
- Site for a maritime training academy
- Over 1000 car parking spaces.

These Community Benefits, which will cost about $8 million to create, would not be financially viable with a "marina only" option and there is no possibility of their creation with a "no marina'" option.

3.2.4 Breakwater Instead of Beach

The possibility of including a rock breakwater rather than a beach breakwater has been examined.

The breakwater has been designed as a beach breakwater as described in Section 5.3 of the Supplementary EIS. This design was chosen for a number of reasons, including:

- Use of materials largely excavated from the site reduces the need for importation of breakwater core material and armour rock. An armour rock breakwater would require the importation of 54,000 m^3 of core material and 28,000 m^3 of filter and armour rock. The proposed design only requires the importation of 12,000 m^3 of filter and armour rock.
- The proposed breakwater crest level is lower than the conventional rock armour breakwater, providing improved aesthetics when viewed from both landward and seaward viewpoints
- The beach breakwater provides a valuable community asset

- The creation of useful land behind the beach for residential development helps to offset the high costs of providing the breakwater that is needed for protection of the marina.

As can be seen from **Figure 3-2**, the area of sparse seagrass that would be lost as a result of the beach breakwater compared to a rock breakwater is small, and lies in the subtidal zone.

3.2.5 Comparison with Abel Point Expansion

Criteria	Port of Airlie	Abel Point [1]
Less traffic congestion	Traffic assessment identifies that unacceptable traffic congestion will not occur (Section 13 of Supplementary EIS)	Traffic congestion not assessed for this site
Source of Rock and Fill	Most material available on-site from dredging and excavations. Up to 55,000 tonnes to be brought onto the site from existing quarries (Section 2.7.5 of Supplementary EIS)	Final source of rock and fill not specified, believed that most rock and fill is being obtained from quarry adjacent to the site.
Social Dislocation	Project expected to create benefits for local residents in terms of employment, education and recreation opportunities (Section 15 of Supplementary EIS)	Not assessed in detail. No significant issues identified.
Need for dredging	Approximately 600,000 m^3 of material to be dredged/excavated from site.	250,000m^3 of material to be dredged from site, 270,000m^3 of material to be excavated from quarry.
Central location	Located immediately adjacent to Airlie Beach town centre and 3 km from Cannonvale.	Located approximately 2 km from Cannonvale and 1 km from Airlie Beach town centre.
Existing infrastructure	Water, power, sewage and road infrastructure available at the site.	Water, power, sewage and road infrastructure available at the site.
Maintenance Dredge Spoil Disposal	To specified area within development with possible reuse on land once dewatering is complete.	To an unspecified land location.

1 From *Proposed Expansion of Abel Point Marina: Draft Impact Assessment Study*, PPK, undated

3.2.6 Alternative Dredge Spoil Disposal

Section 3.3.4 of the Supplementary EIS discussed alternatives for dredge spoil disposal. The section concluded that disposal in the intertidal zone was the most appropriate location in this instance due to the lack of suitable, low impact on-shore disposal options.

Further investigation of the sea dumping option has been carried out for disposal of both capital and maintenance dredge spoil. While it is acknowledged that it may be possible to identify a location where sea dumping could take place without causing significant environmental impacts, the cost of transporting spoil to such a location is prohibitive.

A permit is required from Great Barrier Reef Marine Park Authority, and while such permits are issued from time to time, discussions with GBRMPA indicate that off shore dumping of dredged spoil is not favoured by the Authority except for designated port areas. However the Authority would consider an application that is supported by a full EIS covering dredging methods, transportation, and impacts on the selected dumping ground. The proponent would also need a permit from the Commonwealth

Government for dumping at sea. GBRMPA estimated that the EIS and permitting process will take at least 2 years. This is an unacceptable delay for the proposed Port of Airlie.

In developing the earthworks strategy for marina construction the possibility of offshore disposal of excess dredged spoil from excavation of the entrance channel and marina basin was investigated. Marine engineers and dredging experts were then consulted on alternative methods for dredging and disposal of material offshore. They considered that the most methods would be excavation by barge mounted clamshell excavators, discharging into split hopper barges which would transport the material to a designated spoil dumping ground. The barges would dump the material behind a silt curtain to reduce the silt plume, however control of the silt plumes both during excavation and dumping would be extremely problematical. The barges would have a capacity of between 500 and 1000 cu m. The clamshell excavators would have a capacity of approximately 60 cu m per hour which would mean that, assuming 2 clamshells in operation, excavation of the marina channel and marina basin would take at least 11 working months. If it is assumed that the dredging cannot take place during storms and high seas, a total time from excavation of 14 months should be allowed. The cost of this method of dredging and disposal, based on a similar operation recently undertaken in NSW, is estimated to be $40 and $60 per cubic metre. The cost of using this method of dredging and disposal would result in the project becoming not financially viable. The estimated costs of dredging and use of the dredged material for reclamation is estimated at $15 per cubic metre, which includes the costs of construction of the containment structures around the reclamation areas.

Additionally, the dredging method required to transfer dredge spoil into a barge for transport to an offshore location for sea dumping does not allow for management of tailwater to remove sediment from the tailwater. There is insufficient space on the barge for the sort of retention systems intended for the intertidal dredge spoil disposal area. Sediment laden tailwater would drain from the barge into Boathaven Bay and is likely to have a significant effect on water quality in the area. By contrast, the proposed method of cutter suction dredging and pumping of spoil and tailwater to an enclosed area in the intertidal zone allows tight control over tailwater releases (see also Section 2.7.1 of the Supplementary EIS and **Section 2.1.2** of this Addendum).

Some modifications to the layout and construction sequence of the proposed Port of Airlie have been made to maximise the use of dredge spoil and soft surface muds within the development itself rather than by creating a "future development area". This is described in more detail in **Section 2.15** of this Addendum.

Discussions have been undertaken with Whitsunday Shire Council regarding the use of maintenance dredge spoil. Council has a number of uses for this spoil once it has dried out and it is likely that the maintenance dredge spoil disposal area will be operated as a "dewatering" facility rather than a permanent storage.

3.3 Environmental Impacts of Alternative Sites

3.3.1 WRMDA Environmental Assessment

The WRMDA included environmental sensitivities in the assessment matrix as follows:

- Impact/loss of terrestrial flora and fauna
- Impact/loss of aquatic flora and fauna
- Proximity to high value natural areas

The results of the assessment for these three criteria is presented in **Table 3-2.** Note that only the "raw score" has been reproduced in **Table 3-2**. The WRMDA also used weightings for each criteria, these are not reproduced here. Weightings assigned to environmental criteria in the assessment were higher than any other criteria, with 417 points out of 1000 assigned to these three criteria (the total number of assessment criteria was 13).

Table 3-2 WRMDA – Environmental Rankings

Site	terrestrial flora and fauna	aquatic flora and fauna	Proximity to high value natural areas
Gloucester Island/Dingo Beach	4	2	3
Earlando/Clarks Cove	3	3	4
Woodwark South	3	4	6
Airlie/Muddy Bay	**8**	**8**	**8**
Shute Harbour	6	6	7
Mackay North	7	6	7
Keswick Island	2	2	4

1 = most impact, 10 = least impact

From **Table 3-2**, it is clear that the proposed Port of Airlie scored better on every environmental criteria, compared to the other sites assessed. The only other site that was close to Boathaven Bay in score was Shute Harbour.

3.3.2 Assessment of Embayments

A desktop assessment was undertaken of embayments along the Whitsunday mainland coast to identify any other sites that might compare favourably to Boathaven Bay from an environmental viewpoint. Seagrass data was taken from DPI 2002 and other information from interpretation of aerial photography and mapping of national park boundaries.

The availability of infrastructure and road access are included in the assessment to take into account the impacts on the terrestrial environment associated with providing these services to the site. Social issues have not been included. With the exception of Pioneer Bay/Airlie Beach sites, all locations are remote from population centres. On this basis, it is likely that social benefits from development at these sites will be minimal.

The assessment presented in **Table 3-3** is not intended to be quantitative or definitive, but rather to broadly demonstrate the level of constraints that exist for alternative sites in the region, compared to Boathaven Bay. It is recognised that the assessment is a desktop survey and that it is limited to very broad comparisons only. Indicative locations are shown on **Figure 3-1**.

Further discussion regarding the conservation and habitat significance of Boathaven Bay compared to other embayments on the Whitsunday mainland coast is provided in **Section 9.4** of this Addendum.

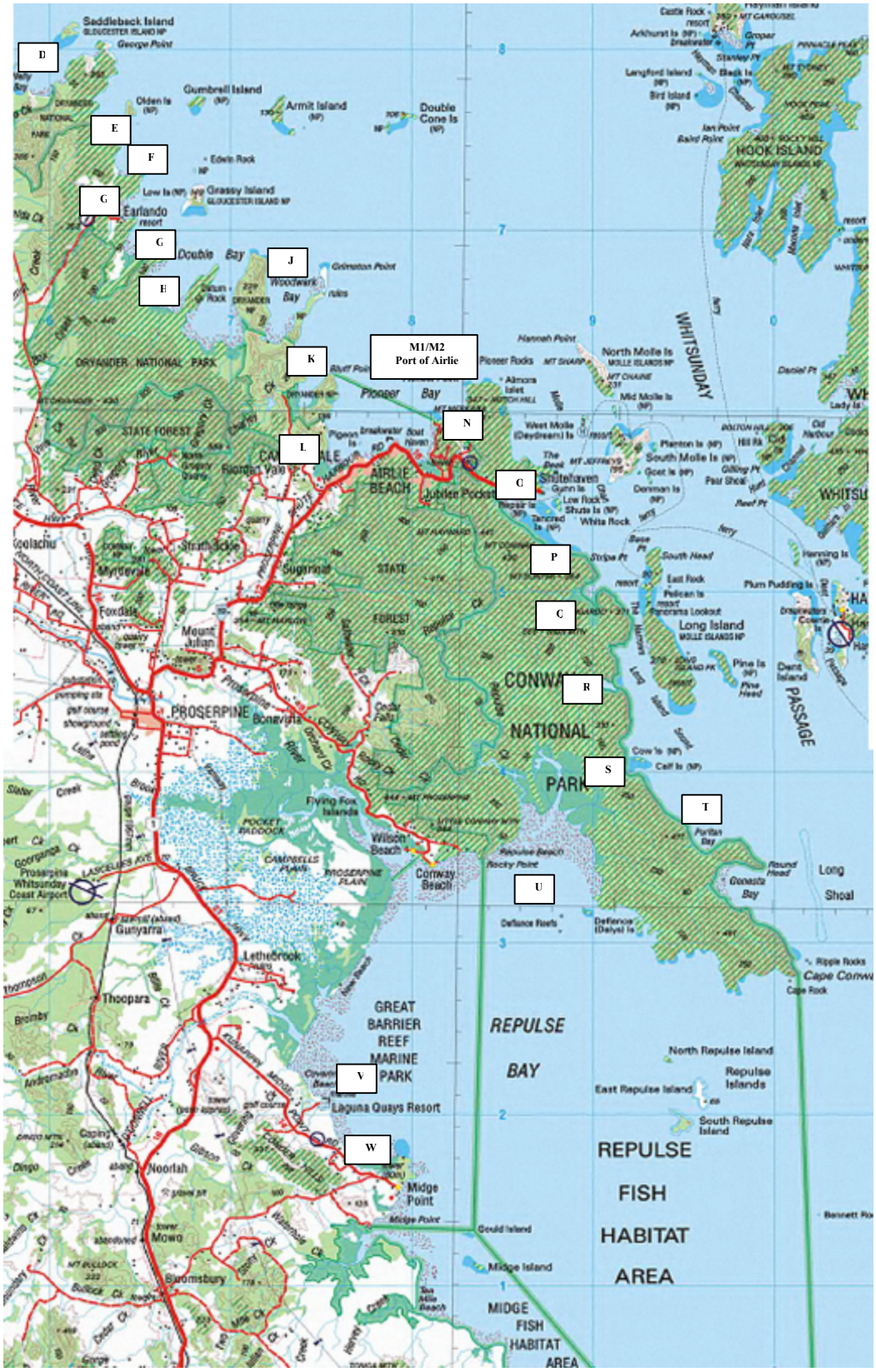
■ **Table 3-3 Desktop Assessment of Alternative Locations**

Location	Comments	Reference
Edgecombe Bay including Bowen	❑ Declared as a Dugong Protection Area (DPA).	
Hydeaway Bay	❑ Large amount of seagrass (Thalassia and Halodule) in light abundance. ❑ Minimal or no infrastructure	
Dingo Beach	❑ Large amount of seagrass (Halophilia and Halodule) in light – medium – dense abundance. ❑ Minimal or no infrastructure	
Nellie Bay and Jonah Bay	❑ Large continuous seagrass communities (Halodule) in moderate to light abundance ❑ Limited road access ❑ Minimal or no infrastructure	
West of Olden Island	❑ Continuous communities of seagrass (Halodule, Halophilia and small amount of Syringodium/Halodule) in light to moderate abundance ❑ Minimal or no infrastructure	E
Unnamed embayment	❑ Seagrass meadows ❑ Limited access ❑ Minimal or no infrastructure	F
Earlando	❑ many contiguous seagrass communities (Halodule, Halophilia majority) of light to mostly moderate abundance ❑ mangrove communities on coast. ❑ Minimal or no infrastructure	G
Western Double Bay	❑ seagrass communities on the western edge of bay. ❑ Mangroves fringing the coastline. ❑ The site is also adjacent to Dryander National Park, and there is no existing road access. ❑ Minimal or no infrastructure	H
Eastern Double Bay	❑ No seagrass recorded ❑ Mangrove fringed coastline ❑ The site is also adjacent to Dryander National Park, and there is no existing road access. ❑ Minimal or no infrastructure	I
Woodcutters Bay	❑ Limited access through the Dryander National Park ❑ Isolated seagrass communities on western bay coast ❑ Minimal or no infrastructure	J
West of Bluff Point	❑ No seagrass information available ❑ Mangrove fringed coastline ❑ The site is also adjacent to Dryander	K

Location	Comments	Reference
	National Park, and there is no existing road access. ❑ Minimal or no infrastructure	
Pioneer Bay west	❑ Moderate seagrass abundance along mainland coast, south of Pigeon Island, and stretches of seagrass communities along western side of bay along coastline. ❑ Mangrove fringed coastline. ❑ No road access to most of the coastline ❑ Infrastructure in the vicinity	L
Airlie Beach	❑ Appears highly developed already ❑ Very small isolated seagrass communities ❑ Infrastructure at site	M1
Boathaven (Muddy) Bay	❑ isolated seagrass community (Halodule) of sparse to moderate abundance. ❑ Some mangrove fringed coastline ❑ Infrastructure at site	M2
Funnel Bay	❑ isolated seagrass community (Halodule) of moderate abundance ❑ Considerable mangrove fringed coastline ❑ Minimal infrastructure	N
Shute Harbour	❑ Large contiguous seagrass communities (Halodule and Halophilia primarily – high diversity) of light – moderate abundance. ❑ Adjacent to Conway National Park ❑ Road access ❑ Some infrastructure available	O
Between Shute Harbour and Stripe Point	❑ Light abundance of seagrasses. ❑ Mangrove fringed coastline ❑ No existing access. ❑ No existing infrastructure ❑ Adjacent to Conway National Park ❑ Within GBRMP	P
Trammel Bay	❑ Extensive seagrass communities of moderate abundance ❑ Mangrove fringed coastline. ❑ No existing access. ❑ No existing infrastructure ❑ Adjacent to Conway National Park ❑ Within GBRMP.	Q
Woodcutters Bay	❑ Extensive seagrass communities of light-moderate abundance ❑ Mangrove fringed coastline. ❑ No existing access.	R

Location	Comments	Reference
	❑ No existing infrastructure ❑ Adjacent to Conway National Park ❑ Within GBRMP.	
Near Cow & Calf Islands	❑ Considerable extent of seagrass communities. ❑ Mangrove fringed coastline. ❑ No existing access. ❑ No existing infrastructure ❑ Adjacent to Conway National Park ❑ Within GBRMP.	S
Puriton Bay	❑ Continuous presence of seagrass communities along coastline ❑ No existing access. ❑ No existing infrastructure ❑ Adjacent to Conway National Park ❑ Within GBRMP	T
Northern Repulse Bay	❑ Continuous seagrass, moderate to light abundance ❑ Coastline fringed by mangroves ❑ Fish Habitat Area. ❑ Dugong Protected Area ❑ No existing access. ❑ No existing infrastructure ❑ Adjacent to Conway National Park ❑ Within GBRMP	U
Laguna Quays	❑ small meadow of seagrass commonly used as a dugong feeding ground. ❑ Site of existing Marina. ❑ Within GBRMP	V
Southern Repulse Bay	❑ Large seagrass communities and mangrove populations ❑ Within/adjacent Midge and Repulse FHA ❑ Within GBRMP	W

In summary, most of the sites identified along the coastline are relatively undisturbed compared to Boathaven Bay. Most of these sites are also remote from population centres thus minimising any social benefits associated with marina development.



■ **Figure 3-1 Whitsunday Mainland Coast Embayments**

SINCLAIR KNIGHT MERZ

FIGURE 3-2
PORT OF AIRLIE
PORT OF AIRLIE MARINA
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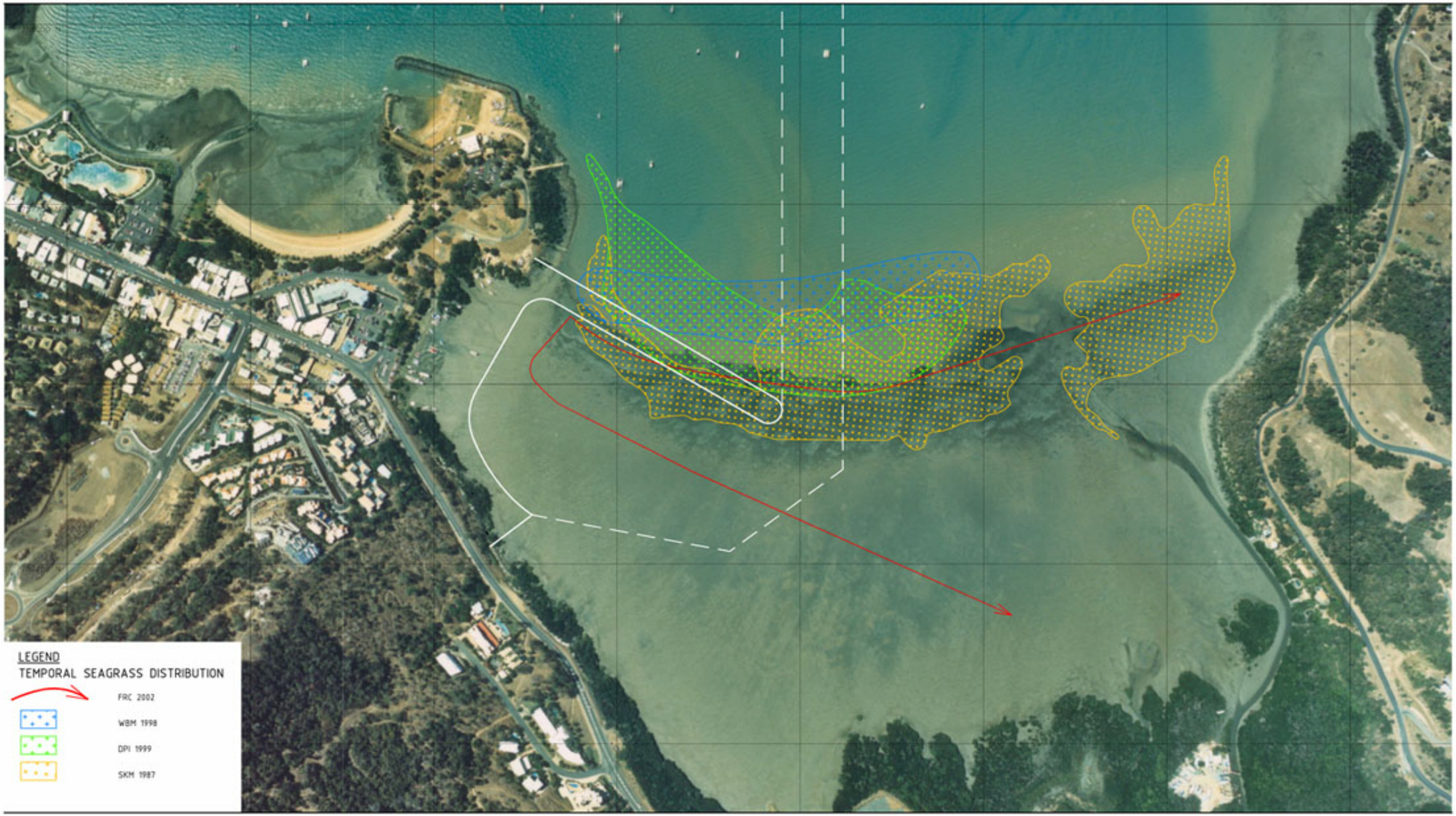
DATE: 17/04/03 - 4.21 pm

LOCATION: L:\REED\RE09038\CAD\DWG\
XREF: X-09038-SHORELINE

0 100 200 300m

SINCLAIR KNIGHT MERZ

FIGURE 3-3
ALTERNATIVE 1
PORT OF AIRLIE MARINA
RE09038



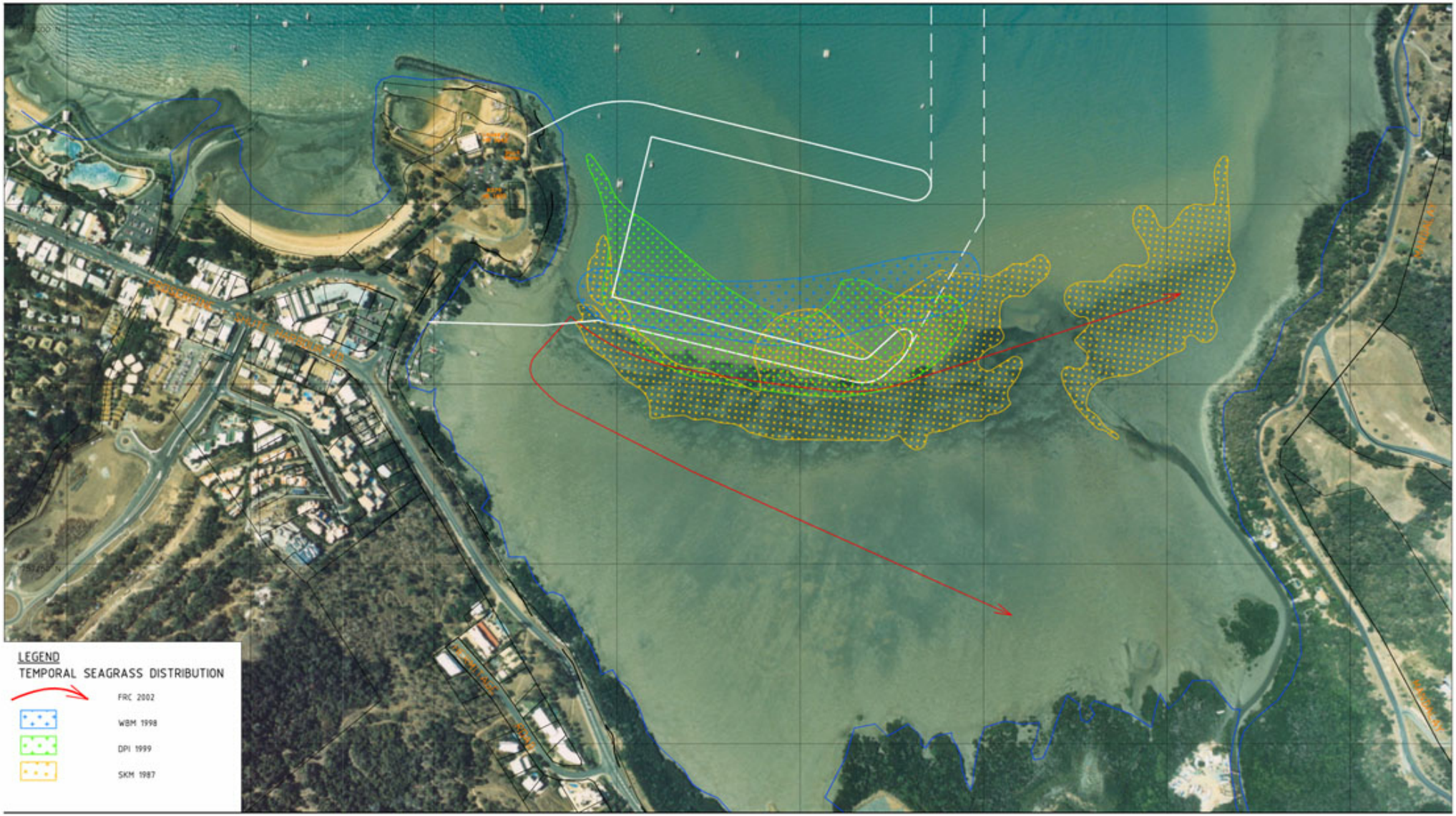
FILENAME: FIGURE 3-3.DWG
DATE: 17/04/03 - 4.31 pm

LOCATION: L:\REED\RE09038\CAD\DWG\
XREF: X-09038-SHORELINE

0 100 200 300m

SINCLAIR KNIGHT MERZ

FIGURE 3–4
ALTERNATIVE 2
PORT OF AIRLIE MARINA
RE09038



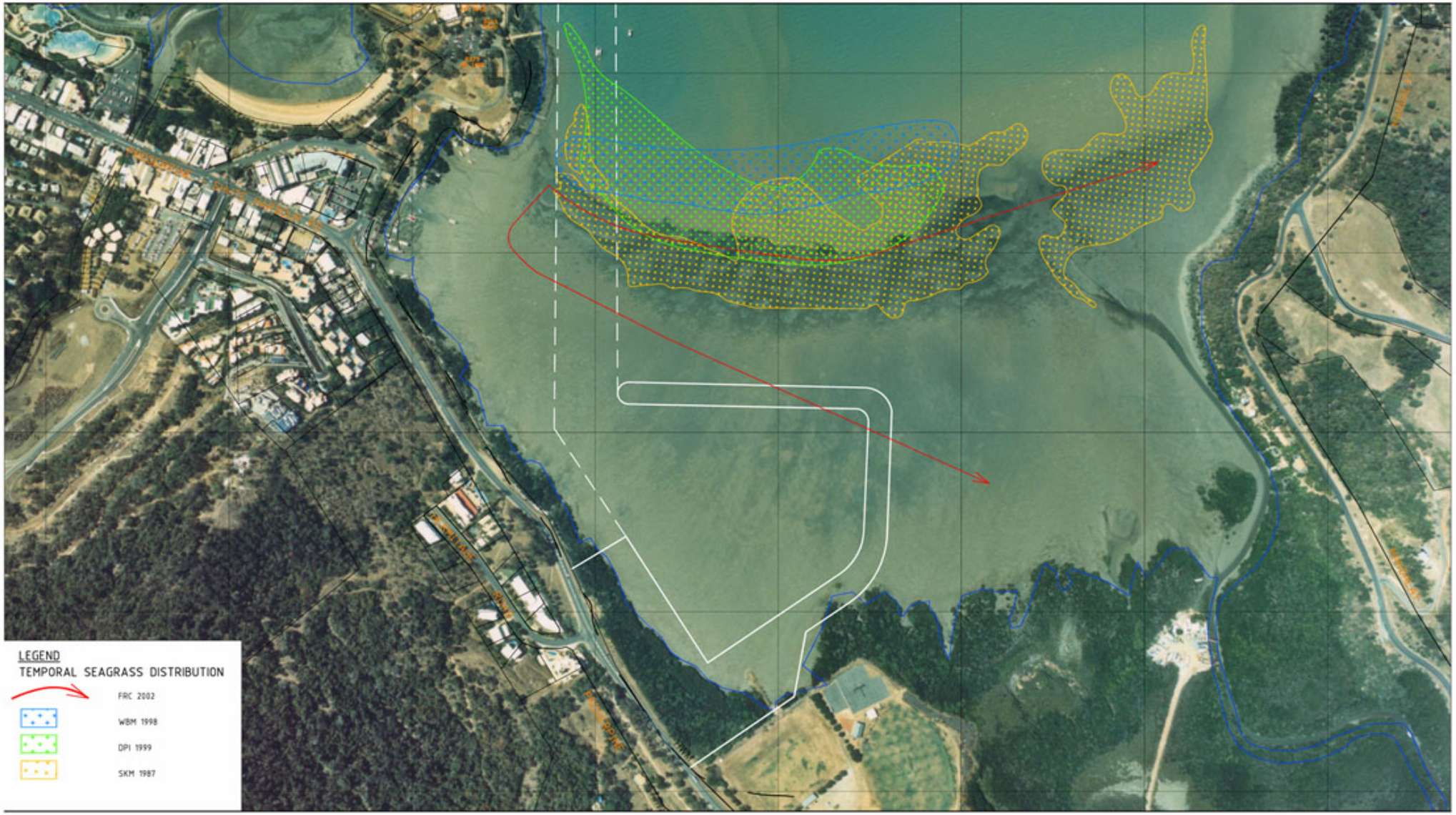
FILENAME: FIGURE 3-4.DWG
DATE: 17/04/03 - 4.25 pm

LOCATION: L:\REED\RE09038\CAD\DWG\
XREF: X-09038-SHORELINE

0 100 200 300m

SINCLAIR KNIGHT MERZ

FIGURE 3-5
ALTERNATIVE 3
PORT OF AIRLIE MARINA
RE09038



FILENAME: FIGURE 3-5.DWG
DATE: 17/04/03 - 4:53 pm

LOCATION: L:\REED\RE09038\CAD\DWG\
XREF: X-09038-SHORELINE

0 100 200 300m

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