Realty Realizations Pty Ltd

Estuarine Management Study: Proposed Mixed Use Subdivision – West Culburra, NSW

ENVIRONMENTAL

WATER

WASTEWATER

GEOTECHNICAL

CIVIL

P1203365JR02V02
October 2013

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All enquiries regarding this project are to be directed to the Project Manager.

Contents

1 Overview

1.1 Background

This document has been prepared by Martens and Associates on behalf of Realty Realizations to support a project Concept Application, with NSW Department of Planning and Infrastructure (DoPI), for a mixed use subdivision located at Lot 61 DP 755971, and parts of Lots 5, 6 and 7 DP 1065111, Culburra Road, West Culburra, NSW (MP 09_0088).

It provides an assessment of potential impacts of the proposed development on the local estuarine environment and processes, and outlines management of this zone to mitigate these impacts.

This report integrates comments and has been prepared to address concerns provided by:

- Local oyster farmers, government agencies, Shoalhaven Water and Shoalhaven CMA in stakeholder meeting held on August 13, 2013.
- Government agency Environmental Assessment (EA) submission responses provided by:
  - NSW Office of Environment and Heritage (OEH) dated June 21, 2013.
  - NSW Department of Primary Industries (DPI) (including NSW Office of Water (NOW) and NSW Fisheries) dated June 24, 2013.
  - Shoalhaven City Council (undated).
- Australia's Oyster Coast Inc. dated June 6, 2013.

1.2 Overview of Proposed Development

The proposed development includes the following landuses:

- Residential (including Torrens title lots, townhouses and 3-5 storey multiunit development)
- Commercial
- Industrial
- Tourist accommodation
- Retirement village
- Open space

A plan of the proposed development is provided in Attachment A. It is noted that the proposed development, excluding elements noted below in Section 1.3, are setback generally 100m from the Crookhaven River foreshore and in all cases outside the area zoned as '7a – Environmental Protection' (Attachment A).

1.3 Interface Development

1.3.1 Watercraft Launching

An 'active waterfront' component of the development is proposed from within the site's foreshore zone. At the western end of the development, in the vicinity of Cactus Point, a watercraft launching ramp is proposed to provide a controlled water access point. Given the shallow water depths in this area during low tide, it is intended that this access point be limited to use by canoes, kayaks and similar.

Design of the proposed ramp shall be provided at detailed design stage and incorporate the recommendations within this document.

1.3.2 Waterfront Walkway

A continuous cycleway/walkway is proposed to provide formalised access to foreshore areas and encourage low impact, passive recreational use of the area. It shall provide a means of pedestrian access to the town of Culburra. The following preliminary details for the walkway are provided:

- Approximately 3.75 km of cycle/walkway.
- The majority of the walkway shall be setback from the Crookhaven River within the terrestrial zone of the foreshore area. A preliminary alignment for the proposed path is provided in Attachment A.
- The walkway will provide occasional access to mangrove/foreshore areas for educational purposes and to provide the public with views of the estuary and Crookhaven River. In these areas, the path shall be constructed as an elevated boardwalk to reduce impact on foreshore environments. In terrestrial areas the path shall be on-grade.
- Light wells within boardwalk areas are to be provided where necessary to reduce any impacts of shading.

1.3.3 Proposed Clearing

An area known as 'Vista Park' is proposed in the site's east to provide views of Curleys Bay from Culburra Road (Attachment A). Creation of this vista shall involve vegetation clearing. The following preliminary details regarding these works are provided:

- The vista corridor is proposed to be approximately 440m long and 50m wide.
- Clearing will involve removal of the canopy (but not the understorey layers) of:
  - Hard Leaved Scribbly Gum Woodland
  - Swamp Oak-Eucalypt Open Forest
  - Potentially a thin fringe of Grey Mangrove Forest
- The proposed vegetation loss in the protected 7(a) zone for the development (including for the 'Vista Park') is less than 1 ha.

- Vegetation within the 7(a) zoned land will be retained on either side of the vista corridor to minimise edge effects.

- Vegetation within the vista will be native grasses and understorey species, and will incorporate a water quality treatment basin – the latter to be outside of the 7(a) zone.

- Clearing within the 7(a) zone shall be dealt with as part of the wider offset program for the development.

2 Site Description

2.1 Location and Existing Landuse

The site is located on the northern side of Culburra Road, West Culburra, within the Shoalhaven City Council local government area (LGA). The study area consists of the following lots:

- Lot 61 DP 755971
- Part Lot 5 DP 1065111
- Part Lot 6 DP 1065111
- Part Lot 7 DP 1065111

It covers an area of approximately 109 ha and consists of undeveloped vegetated land and some agricultural areas in Lot 5 DP 1065111 and Lot 61 DP 755971 (Figure 1).

2.2 Water Quality

Water quality monitoring within the Crookhaven River and Curleys Bay is regularly undertaken by Shoalhaven City Council. According to 2009/2010 Council monitoring results, water quality within this area is rated as 'excellent' with nutrients and faecal coliforms below guidelines levels.

Generally speaking, water quality in the Shoalhaven/Crookhaven River system is affected by catchment runoff, acid sulfate soils, and point and diffuse sources of pollution (urban and rural runoff, sewage treatment plant and pump station discharges, industrial waste disposal) (Shoalhaven River Estuary Data Compilation Study, 2005).

2.3 Tides

Table 1 summarises the tidal analysis conducted in the Shoalhaven River Data Compilation Study (2005) report for Greenwell Point, approximately 1200m north of the site, when the entrance bar was scoured out in 1992 (as is currently the case).

Table 1: Tidal Information (mAHD) for Greenwell Point, Crookhaven River.

Mean High Water(m) (Spring)	Mean High Water (m)	Mean Sea Level (m)	Mean Low Water (m) (Spring)	Mean Low Water (m)
0.483	0.386	-0.032	-0.547	-0.450

Tides at the site are expected to differ slightly from these values.

2.4 Riparian Vegetation

2.4.1 Overview

The Ecological and Riparian Issues and Assessment Report (SLR, 2013) notes that only a single bank occurs along this part of the Crookhaven River, being 0.5 – 1.0m high and separating the estuarine ecosystems and Swamp Oak Forest located above the tidal zone. Along most of the subject site there is also a 2 – 5m steep embankment containing a mixture of either Swamp Oak Forest or dry forest communities. The area including the estuarine and mesic (Swamp Oak Forest) communities can be described as the 'riparian zone'. This riparian zone is located entirely within the 7(a) zone.

2.4.2 Estuarine Communities

Estuarine communities present immediately adjacent to the site primarily consist of:

- Coastal Saltmarsh – sporadic patches along the foreshore between mangroves and Swamp Oak forests. It is listed as an Endangered Ecological Community (EEC).
- Grey Mangrove Forest - which lines much of the Crookhaven River, including Billys Island and Curleys Bay. It is protected under the Fisheries Management Act.

The extent of estuarine communities has been mapped by SLR (2013) (Attachment B).

2.4.3 Mesic Communities

There are three mesic forest communities that have been identified by SLR (2013):

- the Moist Forest (Swamp Oak – Eucalypt Forest) and the Swamp Forest communities – which floristically reflect the Swamp Sclerophyll Forest on Coastal Floodplains (SSFCF) EEC.

- The Swamp Oak Closed Forest – which floristically reflects the Swamp Oak Floodplain Forest (SOFF) EEC.

Despite the floristic characteristics, the EEC's are not considered strictly 'present' at the site by SLR (2013) due to the lack of a coastal floodplain at the site.

The extent of mesic forest communities is provided in Attachment B.

2.5 Estuarine Flora

2.5.1 Seagrass and Seaweed

There are extensive seagrass beds within the Crookhaven River and Shoalhaven River estuary, as illustrated in aerial photography and in the mapping of seagrass by Fisheries NSW (Figures 16A, 16B and 16C) in the SLR Ecology (2013) report. Seagrass beds in particular are of very high significance for fisheries and for the maintenance of healthy estuarine ecosystems, and are strongly protected in the *Fisheries Management Act 1994*.

There are notable areas of seagrasses within Curleys Bay and within the Crookhaven River, adjacent to or near the development site. However, there is no proposal to impose any adverse impacts on these areas.

Similarly, there are extensive mangrove forests in and around the Crookhaven River and Shoalhaven River estuary (Figure 16B of SLR, 2013). Mangroves are also a critically important estuarine ecosystem, and are also well protected in the *Fisheries Management Act 1994*. The overwhelming majority of mangroves adjacent to the site will be retained, and the proposed water quality controls identified for the project are shall protect that ecosystem. There is some limited potential for very small areas of mangroves being 'trimmed' for vistas – subject to future development consents.

Seaweed occurs sporadically around the estuary, with extent dependent on seasonal fluctuation and flooding regimes. There are no

significant areas of seaweed associated with the development site.

2.5.2 SEPP 14 Wetlands

According to SLR (2013), SEPP 14 Wetland No. 350 is located immediately adjacent to the site. It largely consists of estuarine Mangrove Forest and Coastal Saltmarsh communities.

None of the vegetation present within the proposed development footprint consists of vegetation which could constitute a SEPP 14 Wetland. Further, all areas of swamp forest, estuarine ecosystems or any other ecosystems that could potentially constitute a wetland are located within the areas to be protected within the existing 7(a) zoned lands or within the 100m foreshore buffer, along the Crookhaven River foreshore.

SEPP 14 Wetland extents have been mapped by SLR and are provided in Figure 3 (Attachment B).

2.6 Oyster Leases

As shown in Attachment C a number of current and former oyster leases are in close proximity to the site. According to mapping within the Oyster Industry Sustainable Aquaculture Strategy (OISAS) (NSW DPI, 2006) these leases are categorised as '*priority oyster aquaculture areas*'. The NSW Food Authority website currently classifies the oyster harvest areas adjacent to the site as 'conditionally restricted' meaning harvest areas have some pollution but at low enough levels to be removed from the shellfish. At the time of reporting, harvest areas in the Crookhaven River and Curley Bay were closed due to 'positive biotoxin result'.

2.7 Boating

As the site is undeveloped, there is very little boating activity to the site. Boating within the estuary is generally restricted to recreational fishing boats and local oyster farmers.

2.8 Wave Climate

Although the site is largely protected from ocean generated waves, wave conditions at the site may also originate from a number of other sources. These are locally generated wind waves and waves generated by boating activity.

3 Impact Assessment and Management

3.1 Overview

An impact assessment of proposed development has been completed and management measures identified to mitigate impacts on the estuarine environment.

3.2 Boating

3.2.1 Impact Assessment

The proposed development does not include provision of site/estuary access to boats. A single boat ramp is proposed in the vicinity of Cactus Point, however water depths restrict use of this to canoes, kayaks and the like. Although development of the site may encourage the use of the local estuary for activities such as recreational fishing, the impact on boating activities is expected to be negligible. Therefore, no significant impact on local wave climate is envisaged.

3.2.2 Management

To mitigate any potential impacts arising from increased boating as a result of the proposed development, the following management measures are recommended:

- Signage in the vicinity of the ramp to educate the community on the location of oyster leases and sensitive environments, and relevant rules and regulations regarding vessel navigation in the area (e.g. speed limits, buffer distances).

3.3 Water Quality

3.3.1 Impact Assessment

The proposed development has potential to reduce water quality in the Crookhaven River. This may arise from an accidental spill event or from stormwater discharge from urban development.

<u>Accidental Spill Event</u>

Although unlikely, there is a potential for pollution of the estuarine environment from events such as spills or leaks. The main source of this risk is from the proposed sewer main and proposed sewage pump

stations (SPS) (Attachment A).

Stormwater

If not properly controlled, runoff from within the development footprint could carry nutrients and/or pollutants into the estuary and contaminate the surrounding environment.

3.3.2 Management

The following management measures are recommended to mitigate identified impacts:

- The SPS Management Plan (Allen Price & Associates, 2013) has been prepared to outline management of proposed sewage infrastructure and procedures/measures to minimise impacts on the estuarine environment in the event of a spill/leak.
- A stormwater 'treatment train' has been developed (Martens and Associates, 2013a) in accordance with the principles of WSUD and best practice engineering standards. Modelling demonstrates that measures achieve a discharge water quality that is better than or the same as that currently coming from the site.
- A Water Quality Monitoring Plan (Martens and Associates, 2013b) has been prepared in accordance with OISAS, SEPP 62 and best practice engineering standards; and in consultation with NSW Food Authority, NSW OEH and local oyster farmers. Adherence with the plan will ensure the impacts of the proposed development are monitored and enable any issues to be identified and rectified prior to long-term environmental damage occurring.

3.4 Estuarine Flora

3.4.1 Impact Assessment

The following potential impacts on estuarine flora and habitats have been identified:

- There is limited potential for small areas of seagrass to be affected by use of a canoe/kayak boat ramp at Cactus Point.
- Installation of that the proposed boat ramp is not likely to affect seagrasses.

- Some (very limited) 'trimming' of a few mangroves for vistas.

- Although boardwalk areas are proposed in the foreshore area of the site, it is not proposed to encroach on existing seagrass, coastal saltmarsh or SEPP 14 wetland areas. No impact is therefore expected.

- Proposed clearing to create 'vistas' will partially remove the existing buffer area that would otherwise protect SEPP 14 wetlands from impacts arising from the proposed development (such as water quality impacts, weed invasion, edge effects *etc*). No clearing of SEPP 14 Wetlands is proposed, other than possibly some limited trimming of mangroves for the Vista Park.

- Long term reduced water quality as a result of the development may impact on the health of marine flora.

- Short term reduced water quality as a result of disturbance during construction phase.

- Change in local hydrology as a result of the proposed development, particularly arising from an increase in impervious surfaces. This may impact on the health and extent of estuarine flora.

- Disturbance and/or physical removal of marine flora by the public.

3.4.2 Management

In order to minimise impacts on estuarine flora and habitats, the following management techniques are recommended:

- Detailed assessment of any works which have any potential to impact on seagrasses (*eg* the boat ramp at Cactus Point) prior to any works been undertaken.

- Supervision of works in such areas by a Project Ecologist – to ensure that construction activities avoid seagrasses.

- Disturbance/removal of marine flora during works for the proposed ramp shall be minimal. It is expected that these communities will recover from this disturbance by recolonising over disturbed seafloor areas.

- Signage shall be placed along proposed coastal boardwalks and in the vicinity of proposed canoe/kayak ramp informing the

community of the importance of marine flora in the estuarine environment and that removal or collection of species is prohibited by law.

- The proposed stormwater 'treatment train' (Martens and Associates, 2013a) and water quality monitoring regime (Martens and Associates, 2013b) shall ensure existing water quality is maintained as part of the proposed development.

- According to SLR (2013), no adverse impacts on seagrasses from stormwater discharges from the site are anticipated with the implementation of the proposed stormwater management regime (noting that the seagrasses within Curleys Bay do not appear to be adversely affected by the currently unmanaged stormwater discharges from Culburra and Orient Point.

- The hydrological assessment (Martens and Associates, 2013a) proposes that catchment areas outside the area that would otherwise discharge into the wetlands shall be diverted, after treatment, and discharged to open water in the Crookhaven River in order to maintain SEPP 14 hydrology.

- Proposed water quality structures shall include outlet structures appropriately designed to achieve dispersed flow into the SEPP 14 wetland and mitigate impacts such as localised scour.

- The proposed 100m buffer, including the protected 7(a) zone, shall provide additional water quality treatment and 'buffer' impacts arising from the proposed development.

- Sediment and erosion control (Martens and Associates, 2013b) shall be installed and maintained throughout all stages of the proposed development to mitigate impacts on marine flora arising from sedimentation.

3.5 Riparian Vegetation

3.5.1 Impact Assessment

The following potential impacts of the proposed development on riparian vegetation have been identified:

1. According to SLR (2013) 0.92 ha of mesic forest and estuarine ecosystems are to be modified for proposed vistas.

2. Change in local hydrology as a result of the proposed development, particularly arising from an increase in impervious

surfaces.

3. Long term reduced water quality as a result of the development may impact on the health of riparian vegetation.

4. Short term reduced water quality as a result of disturbance and edge effects during construction phase.

5. Weed introduction due to increased disturbance. The introduction of weed species could place vulnerable riparian communities at risk, displace native vegetation species and interrupt local estuarine processes.

6. Public access to foreshore areas may increase the risk for riparian zones to be trampled or degraded. Access to these sensitive areas could result in a diminished ability of seedling regeneration and propagation, and cause a 'thinning' of vegetation.

3.5.2 Management

In order to ensure the riparian zone at the site is protected the following management and maintenance techniques are recommended during the construction and also as an on-going requirement:

- Provision of coastal walkway and boardwalks to minimise trampling and informal accessways by encouraging use of designated formed paths. Boardwalks shall incorporate the use of light wells to reduce shading impacts.

- Signage shall be placed along proposed coastal walkways and in the vicinity of proposed canoe/kayak ramp informing the public on:

  - The importance of riparian vegetation in the estuarine environment.

  - Appropriate disposal of litter.

  - That the area is zoned by Shoalhaven Council as 7 (a) and it is important to conserve the biological diversity of the area.

  - The removal of parts of this environment should not occur.

- The foreshore zone shall be dedicated to Council. This will allow it to be appropriately maintained under Council's current system.

- A weed eradication program is to be implemented as part of the maintenance of the Crookhaven River foreshore buffer zone and Foreshore Park.

- Removal of the 0.92 ha of riparian species shall be offset by the rehabilitation and management of other areas similarly vegetated elsewhere within the applicants land holdings. Details of this are to be provided at detailed design stage.

- As discussed within the Sediment and Erosion Control Plan (Martens and Associates, 2013b) sediment control such as the use of filter fences, hay bales and basins should be implemented during the construction phase of development.

3.6 Exotic Species

3.6.1 Impact Assessment

The proposed development has the potential to increase the risk of exotic/pest introduction and establishment through:

- Physical disturbance of terrestrial and riparian areas.
- A reduction in competition by native species.
- Use of equipment and machinery on site from areas where pests occur.
- Increased nutrient and sediment load from the proposed development.

3.6.2 Management

In order to minimise impacts on estuarine flora and habitats, the following management techniques are recommended:

- Provision of coastal walkway and board walks to minimise trampling and disturbance by encouraging use of designated paths.

- Increase in boat traffic is expected to be negligible.

- Signage shall be placed along proposed coastal boardwalks and in the vicinity of proposed canoe/kayak ramp informing the community on correct disposal of rubbish and use of the protected 7(a) area.

- The proposed stormwater 'treatment train' (Martens and Associates, 2013a) and water quality monitoring regime (Martens and Associates, 2013b) shall ensure existing water quality is

maintained as part of the proposed development.

- As discussed within the Sediment and Erosion Control Plan (Martens and Associates, 2013b) sediment control such as the use of filter fences, hay bales and basins should be implemented during the construction phase of development.

- Machinery/equipment used onsite for the development shall be appropriately cleaned and decontaminated before entering the site.

- The foreshore zone shall be dedicated to Council. This will allow it to be appropriately maintained under Council's current system.

3.7 Acid Sulfate Soils

3.7.1 Impact Assessment

Previously undertaken site investigations (*Geotechnical Assessment*, Martens and Associates, 2012) and laboratory testing concluded:

- No actual or potential acid sulfate soils (ASS) occur onsite within the main development footprint.

- The perimeter of the site, adjacent to the Crookhaven River, may contain Class 2 soils. These soils may present an ASS risk and would therefore require appropriate management.

3.7.2 Management

No management of soils within the main development footprint is required as soils are not potential or actual ASS.

Should development be proposed within areas identified in the *Geotechnical Assessment* (Martens and Associates, 2012) as Class 2 soils, further intrusive sampling and laboratory testing should be completed. Should potential or actual ASS be identified, an appropriate management plan should be prepared to ensure impacts on the surrounding estuarine environment are mitigated.

3.8 Oyster Leases

3.8.1 Impact Assessment

The following potential impacts of the proposed development on

existing oyster leases have been identified:

- According to the NSW Oyster Industry Sustainable Aquaculture Strategy (OISAS) 2006, oyster growth and production can be affected by reduced water quality caused or exacerbated by human activity. Given the close proximity of the site to a number of priority oyster leases, the proposed development has potential to result in a change in water quality within the estuary and hence impact on the local aquaculture industry.

- The increased population living and visiting the site increases the potential for oyster theft.

- Increased boating activity may have indirect impacts on oyster leases (increased boatwash, boating activities in prohibited areas) as well as direct impacts on water quality.

3.8.2 Management

In order to minimise impacts on oyster leases, the following management techniques are recommended:

- The proposed development shall comply with various policy and regulation regarding aquaculture, in particular SEPP 62 and OISAS (Section 4), the NSW Shellfish Program and NSW Shellfish Program Operations Manual.

- A stormwater 'treatment train' has been developed (Martens and Associates, 2013a) in accordance with the principles of WSUD and best practice engineering standards. Modelling demonstrates that measures achieve a discharge water quality that is better than or the same as that currently coming off the site.

- A Water Quality Monitoring Plan (Martens and Associates, 2013b) has been prepared in accordance with OISAS, SEPP 62 and best practice engineering standards; and in consultation with NSW Food Authority, NSW OEH, local oyster farmers and other stakeholders. Adherence with the plan will ensure the impacts of the proposed development are monitored and enable any issues to be quickly identified and rectified.

- Signage in the vicinity of canoe/kayak ramp shall educate the public on the location of oyster leases and relevant rules and regulations regarding vessel navigation in the area (e.g. speed limits, buffer distances).

- The proposed development is expected to have a negligible impact on existing boating activities within the estuary. This will subsequently have a negligible impact on local wave climate.

- A SPS Management Plan (Allen Price & Associates, 2013) has been prepared to outline management of proposed sewage infrastructure and procedures/measures to minimise impacts on oyster leases in the event of a spill/leak. In the event of an accidental spill or incident the NSW Shellfish Program Operation Manual requires appropriate action be taken which may include:
  - Alerting relevant authorities, including NSW Food Authority that an accidental spill has occurred that may affect the health of surrounding oyster leases.
  - Containment booms *etc* shall be deployed to prevent the spread of the potential contaminant. This is more effective for chemical spills rather than sewage spills which are more easily dispersed.
  - All vessel activity to and from the site shall temporarily cease.
  - The oyster leases may be temporarily closed and harvesting suspended until such time that NSW Food Authority deems the oysters safe for human consumption.

3.9 'People' Pressure

3.9.1 Impact Assessment

The proposed development would result in the currently unoccupied site to have a permanent population as well as an increased number of visitors. This would result in a greater 'people' pressure on the local estuarine environment and could lead to a greater chance of disturbance of fauna and flora, and their habitat, breeding grounds and nesting sites. Further, increased 'people' pressure increases the chance of any of the identified risks in Section 3 from occurring.

3.9.2 Management

- Signage shall be placed along proposed coastal boardwalks and in the vicinity of proposed ramps informing the community of:
  - The importance of the estuarine environment including

riparian vegetation, marina flora, oyster leases *etc*.

- Appropriate disposal of litter.
- That the area is zoned by Shoalhaven Council as 7 (a) and it is important to conserve the biological diversity of the area.
- The removal of parts of this environment should not occur and is prohibited by law.
- Boating requirements.

- Provision of environmentally friendly coastal walkway/board walks to minimise trampling by encouraging use of designated paths.

3.10 Conclusion

Provided management measures identified in this document are appropriately integrated, the proposed development is considered to have a negligible impact on the local estuarine environment.

This management plan shall be refined at detailed design stage and integrated into the development's consent conditions to ensure its correct application.

4 Policy Compliance

4.1 NSW Coastal Policy 1997 and Ecologically Sustainable Development

The main objective of the NSW Coastal Policy is to protect and conserve the coast for future generations whilst still providing for population growth and economic development. Its central focus is the ecologically sustainable development (ESD) of the NSW coastline by following the four main principles of ESD contained in the Intergovernmental Agreement on the Environment (IGAE) signed in 1992. These are:

- *Conservation of Biological Diversity and ecological integrity:* the need to conserve all life forms and to ensure productivity, stability and resilience of ecosystems is maintained.
- *Inter-generational equity:* requires that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.
- *Improve valuation, pricing and incentive mechanisms:* requires that environmental factors, such as the valuation of ecosystems and polluter pays principles, are incorporated into the valuation of assets, services and considered in decision making processes.
- *The Precautionary Principle:* a risk adverse approach to decision making. Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty is not to be used as a reason for postponing measures to prevent environmental degradation.

According to the NSW Coastal Policy 1997, 9 goals have been set out which aim to fulfil the principles of ESD within the coastal zone. They are:

- Protecting, rehabilitating and improving the natural environment of the coastal zone.
- Recognising and accommodating the natural processes of the coastal zone.
- Protecting and enhancing the aesthetic qualities of the coastal zone.
- Protecting and conserving the cultural heritage of the coastal

zone.

- Providing for ecologically sustainable development and use of resources.
- Providing for ecologically sustainable human settlement in the coastal zone.
- Providing for appropriate public access and use.
- Providing information to enable effective management of the coastal zone.
- Providing for integrated planning and management of the coastal zone.

The proposed development complies with the NSW Coastal Policy 1997 and the principles of ESD. It has been demonstrated that the current ecological integrity of the site will be maintained and enhanced in the future provided potential environmental impacts are substantially mitigated. The following actions promote the proposed development as compliant with the NSW Coastal Policy:

- Water quality of the estuary environment is maintained and improved.
- Protection of marine flora will be undertaken.
- The SEPP 14 wetland protection will be enforced in the recognition that these valuable ecosystems need to be protected.
- The aesthetic qualities of the site will be identified, protected and promoted.
- Potential opportunities for the sustainable development and use of coastal resources at the site are identified and facilitated. This includes tourism, aquaculture and other potential commercial or industrial development at the site.

4.2 SEPP 62 (Sustainable Aquaculture) and Oyster Industry Sustainable Aquaculture Strategy (OISAS)

4.2.1 Policy Objectives

The aims of SEPP 62 (Sustainable Aquaculture) are as follows;

- Encourages sustainable aquaculture, namely aquaculture which uses, conserves and enhances the community's resources so that quality of life is preserved and enhanced.
- Makes aquaculture permissible in certain areas for which a comprehensive and integrated regional aquaculture strategy has been developed.
- Sets out minimum site location and operational requirements for permissible aquaculture developments.
- Establishes a graduated environmental assessment regime for aquaculture development based on the applicable level of environmental risk associated with the site and operational factors.
- Applies the policy to land-based aquaculture development and oyster aquaculture development in the State and to include facility for extension of the Policy to natural water-based aquaculture.

4.2.2 Compliance Assessment

Under Part 3A of SEPP 62, OISAS must be taken into consideration for any proposed development which may affect oyster aquaculture. In particular OISAS addresses the need for the protection of water quality in order to ensure the objectives of ESD are fulfilled, securing the long-term sustainability of the oyster industry in the area.

The proposed development complies with SEPP 62 and follows the actions identified in OISAS to protect and/or improve water quality for oyster aquaculture. These actions include:

- Educational and advisory signs to be implemented for recreational boating, warning of the need to protect sanitary water quality.
- Recreational/private boating to be excluded in specific oyster harvest areas to protect sanitary water quality.

- The site is to be serviced by reticulated tower sewerage. Pump stations and infrastructure have been suitably sized to mitigate overflows. A SPS Management Plan has been prepared to outline procedures in the event of an accidental spill event.

- Stormwater runoff will be controlled to mitigate any potential stormwater impacts that would otherwise occur from uncontrolled discharge.

- A stormwater 'treatment train' has been developed (Martens and Associates, 2013a) in accordance with the principles of WSUD and best practice engineering standards to ensure estuarine water quality is maintained.

- A Water Quality Monitoring Plan (Martens and Associates, 2013b) has been prepared in accordance with OISAS, SEPP 62 and best practice engineering standards; and in consultation with NSW Food Authority, NSW OEH and local oyster farmers.

- The principles of ESD are rigorously followed to ensure that water quality is maintained and, where possible, improved such that oyster aquaculture is continued in the area for the benefit of both current and future generations.

5 Community Education

Education of the local community and visitors is paramount to the management of the local environment and its processes. An understanding and appreciation of the environment around them should instil the community and visitors to take responsibility whilst visiting the site and thus help to ensure its protection.

We recommend that the community is educated in the following ways;

- Education packages should be given to all guests at tourist facilities and staff members explaining the dynamics of the local environment which they are visiting. This should include maps of accessible and non-accessible areas, the location of bins etc, and outline the 'do's and do not's' whilst at the site (e.g. no collecting of seeds and shells, no littering, stick to paths and boardwalks).This package should also include evacuation plans in case of flood, fire and any other emergency procedures.

- Signage is an effective way of warning visitors the public of any dangers, regulations or prohibited areas around them. Signage should be used along boardwalks, walkways and in the vicinity of canoe/kayak ramp to provide education on protection and conservation of the estuarine environment including oyster leases, riparian zones, flora and fauna habitat SEPP 14 Wetlands and mangroves.

6 References

Allen Price & Associates (2013) *Sewage Pump Station Management Plan*

Martens and Associates (2013a) *Water Cycle Management Report* (Ref: P1203365JR01V04)

Martens and Associates (2013b) *Water Quality Monitoring Plan* (Ref: P1203365JR03V01)

Martens and Associates (2012) *Geotechnical Constraints Assessment* (Ref: P1002842JR02V01)

NSW Coastal Policy 1997. NSW Government 1997.

Oyster Industry Sustainable Aquaculture Strategy: Crookhaven River Oyster Aquaculture. NSW DPI (2006). www.fisheries.nsw.gov.au

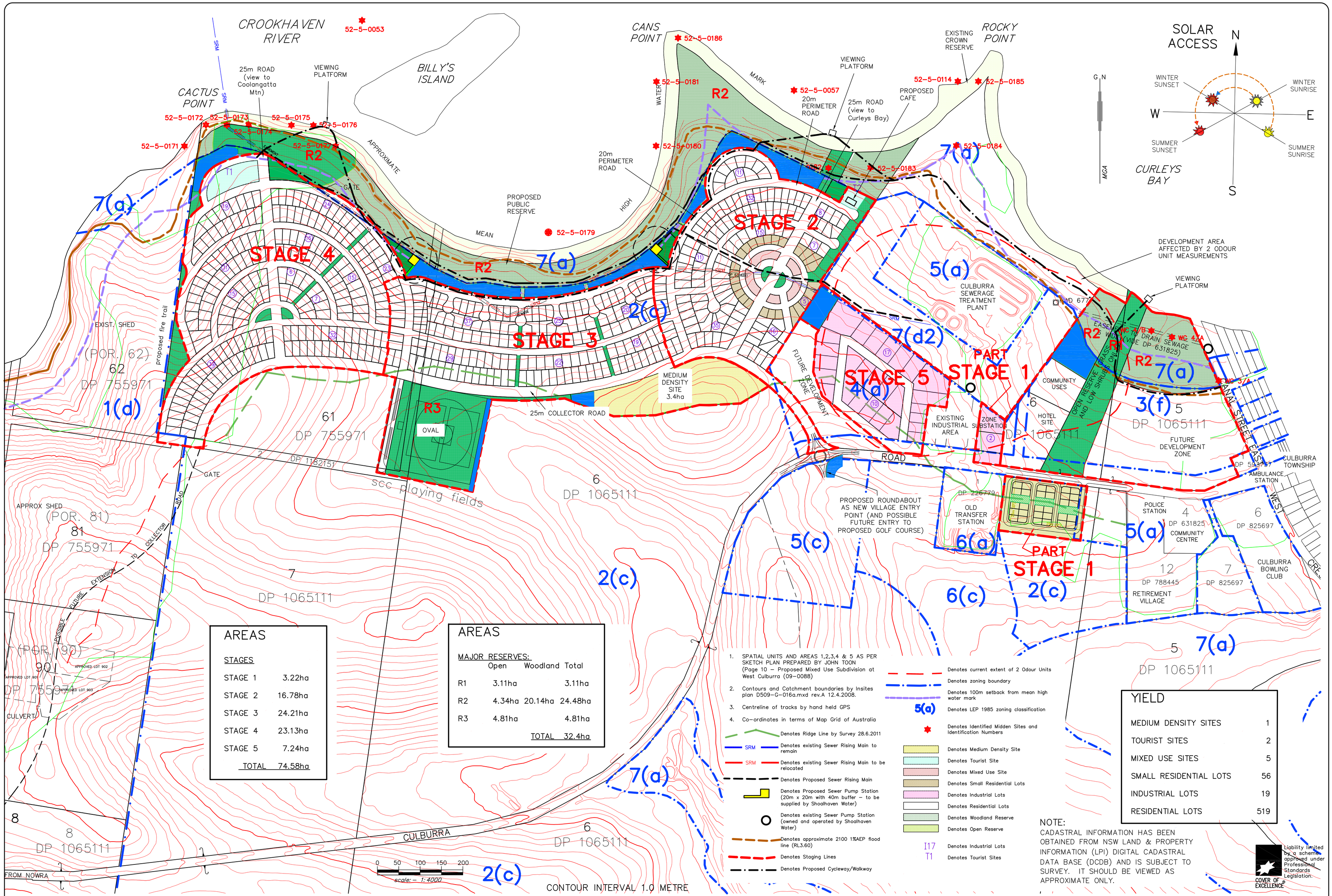
SEPP 62 *Sustainable Aquaculture* (2011)

Shoalhaven River Estuary Data Compilation Study (2005). Umwelt (Australia) Pty Ltd.

Shoalhaven City Council (2010) Crookhaven River/Curleys Bay Catchment – 2010 http://www.shoalhaven.nsw.gov.au/soe/Region/Indicator%20Results%2010/Surfacewaterqualitycrookhavenrivercurleysbay%2010.htm

SLR (2013) *Culburra West Urban Development Project Culburra Beach: Ecological and Riparian Issues and Assessment Report*.

7 Attachment A – Site Plan



AREAS

STAGES

STAGE 1	3.22ha
STAGE 2	16.78ha
STAGE 3	24.21ha
STAGE 4	23.13ha
STAGE 5	7.24ha
TOTAL	74.58ha

AREAS

MAJOR RESERVES:

	Open	Woodland	Total
R1	3.11ha		3.11ha
R2	4.34ha	20.14ha	24.48ha
R3	4.81ha		4.81ha
TOTAL			32.4ha

1. SPATIAL UNITS AND AREAS 1,2,3,4 & 5 AS PER SKETCH PLAN PREPARED BY JOHN TOON (Page 10 – Proposed Mixed Use Subdivision at West Culburra (09–0088)
2. Contours and Catchment boundaries by Insites plan D509–G–016a.mxd rev.A 12.4.2008.
3. Centreline of tracks by hand held GPS
4. Co–ordinates in terms of Map Grid of Australia

Denotes Ridge Line by Survey 28.6.2011
SRM Denotes existing Sewer Rising Main to remain
SRM Denotes existing Sewer Rising Main to be relocated
Denotes Proposed Sewer Rising Main
Denotes Proposed Sewer Pump Station (20m x 20m with 40m buffer – to be supplied by Shoalhaven Water)
Denotes existing Sewer Pump Station (owned and operated by Shoalhaven Water)
Denotes approximate 2100 1%AEP flood line (RL3.60)
Denotes Staging Lines
Denotes Proposed Cycleway/Walkway

Denotes current extent of 2 Odour Units
Denotes zoning boundary
Denotes 100m setback from mean high water mark
5(a) Denotes LEP 1985 zoning classification
Denotes Identified Midden Sites and Identification Numbers
Denotes Medium Density Site
Denotes Tourist Site
Denotes Mixed Use Site
Denotes Small Residential Lots
Denotes Industrial Lots
Denotes Residential Lots
Denotes Woodland Reserve
Denotes Open Reserve
I17 Denotes Industrial Lots
T1 Denotes Tourist Sites

YIELD

MEDIUM DENSITY SITES	1
TOURIST SITES	2
MIXED USE SITES	5
SMALL RESIDENTIAL LOTS	56
INDUSTRIAL LOTS	19
RESIDENTIAL LOTS	519

NOTE:
CADASTRAL INFORMATION HAS BEEN OBTAINED FROM NSW LAND & PROPERTY INFORMATION (LPI) DIGITAL CADASTRAL DATA BASE (DCDB) AND IS SUBJECT TO SURVEY. IT SHOULD BE VIEWED AS APPROXIMATE ONLY.

Liability limited by a scheme approved under Professional Standards Legislation.
COVER OF EXCELLENCE

RATIO: 1 : 4000 (AT A1 SIZE)

DATUM:
ORIGIN:
DATE OF PLAN: 27 SEPT. 2013

	SURVEY	AERIAL PHOTOGRAPHY
DESIGN	JT/MP	
DRAWN	CEG/DS	
CHECK'D	MJP	

	REVISION	BY	DATE
01	ROAD DETAIL ADDED SOUTH OF CULBURRA RD	MJP	08.10.2013

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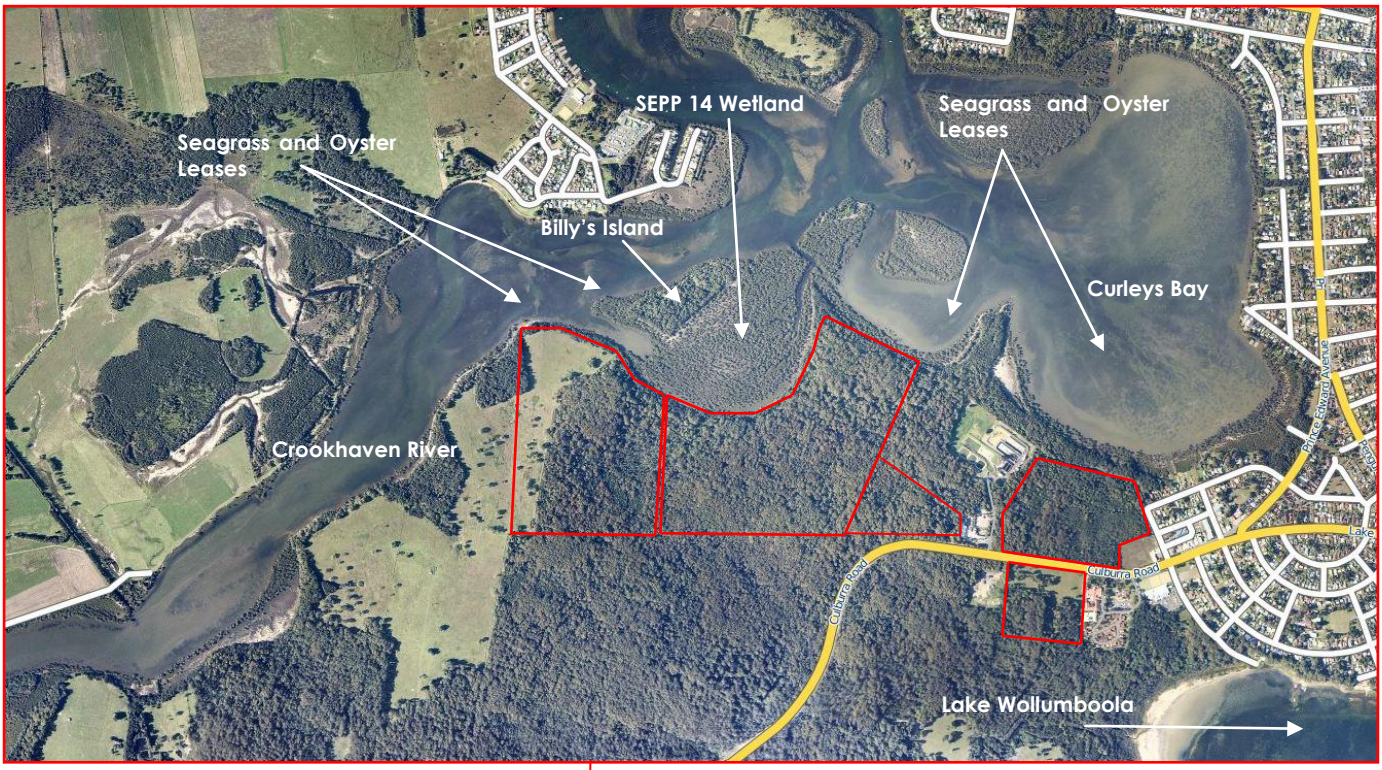
SKETCH PLAN SHOWING SITE CONSTRAINTS & PROPOSED SUBDIVISION OVER PART OF DP 1065111, LOT 2 DP 1182151 AND PORTIONS 61, 81 & 90 DP 755971 AT WEST CULBURRA FOR REALTY REALIZATIONS

REF. No. 25405–37

SHEET 1 OF 1 SHEETS REVISION 01

M:\Projects\20000\25000s\25405\Drawings\25405–37 Proposed Subdivision.dwg

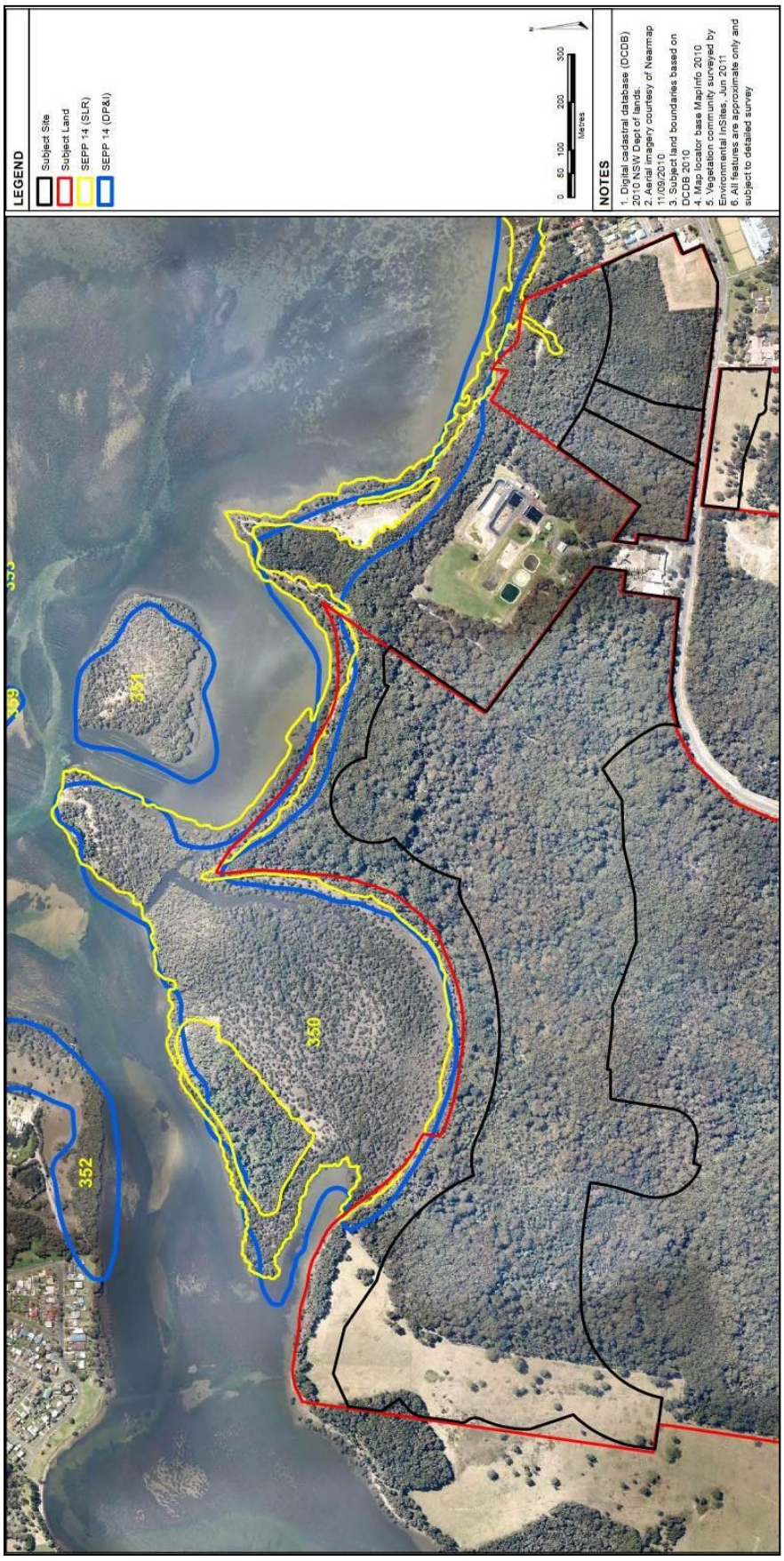
8 Attachment B – Figures



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	MLK	**Site Locality and Regional Context**	Drawing No: Figure 1
Approved:	AN		
Date:	17.10.2013		
Scale:	NA		Job No: P1203365

martens

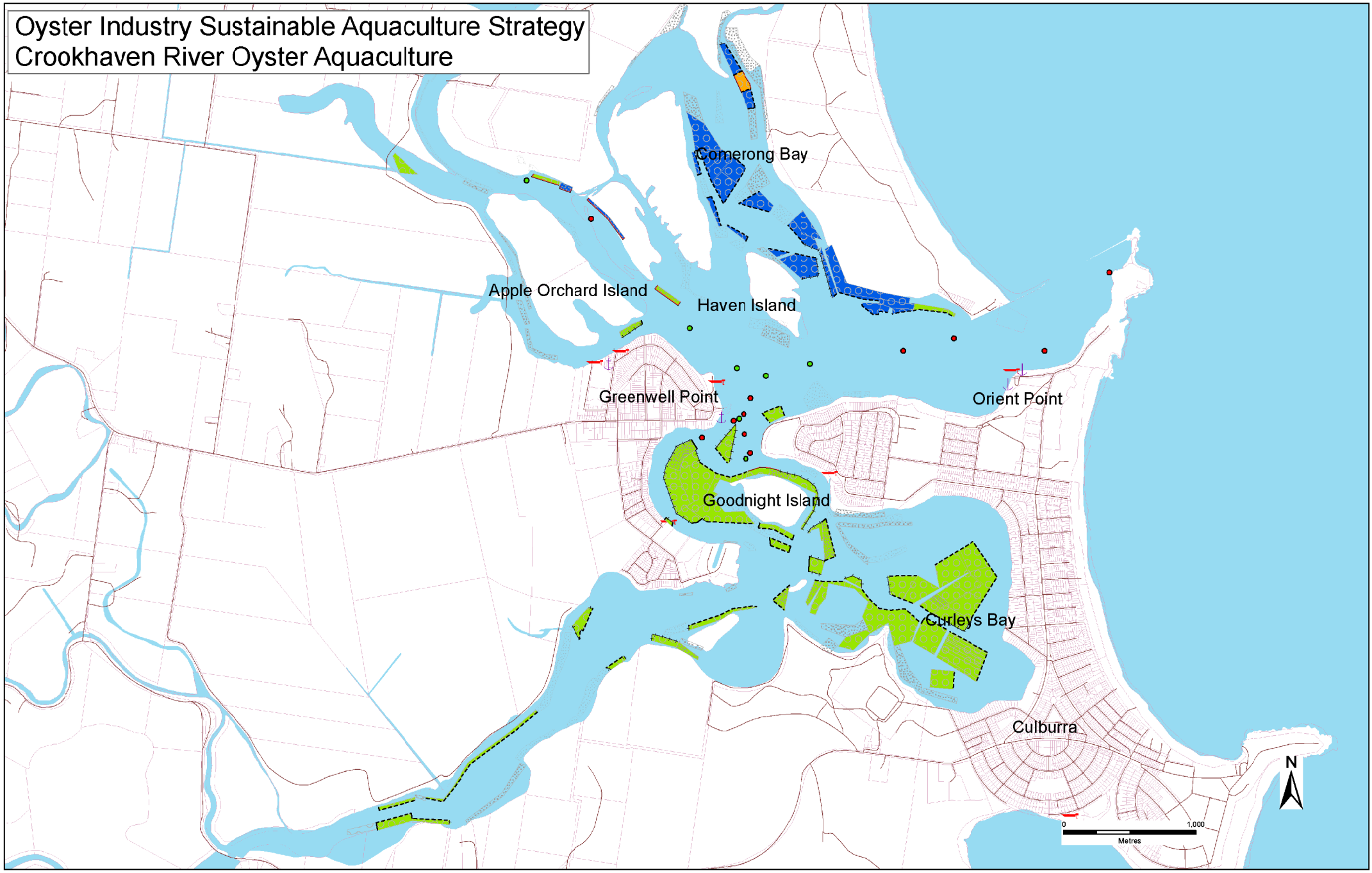
Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	MLK	**Vegetation Mapping (SLR, 2013)**	Drawing No: Figure 2
Approved:	AN		
Date:	17.10.2013		
Scale:	NA		Job No: P1203365



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	MLK	**SEPP 14 Wetland Mapping (SLR, 2013)**	Drawing No: Figure 3
Approved:	AN		
Date:	17.10.2013		
Scale:	NA		Job No: P1203365

9 Attachment C – Crookhaven Oyster Aquaculture

Oyster Industry Sustainable Aquaculture Strategy
Crookhaven River Oyster Aquaculture



Legend

- Priority oyster aquaculture areas
- Current oyster aquaculture leases to be phased out
- Current leased area in National Park Estate
- Leases within Marine Park Boundaries
- Current leasec area within Merimbula Airport Jurisdiction

Minimum Lease Marker post intervals

- 10 metre intervals
- 25 metre intervals
- 50 metre intervals
- Special navigation and marking condition

All other boundaries 100 metre intervals

- Former leases
- Current leases
- Cadastral boundaries (shorelines are indicative only)
- Roads

- Launching ramp
- Marina or boatshed
- Public wharf
- Port marker
- Starboard marker

NSW DEPARTMENT OF PRIMARY INDUSTRIES

August 2006

Source: data from the Department of Lands, NSW DPI, NPWS, and NSW Maritime Authority
Datum: Geocentric Datum of Australia (GDA)
Grid: Mapping Grid of Australia (MGA94)

Prepared by GIS section, Aquaculture Management Branch, Division of Agriculture & Fisheries, NSW DPI.