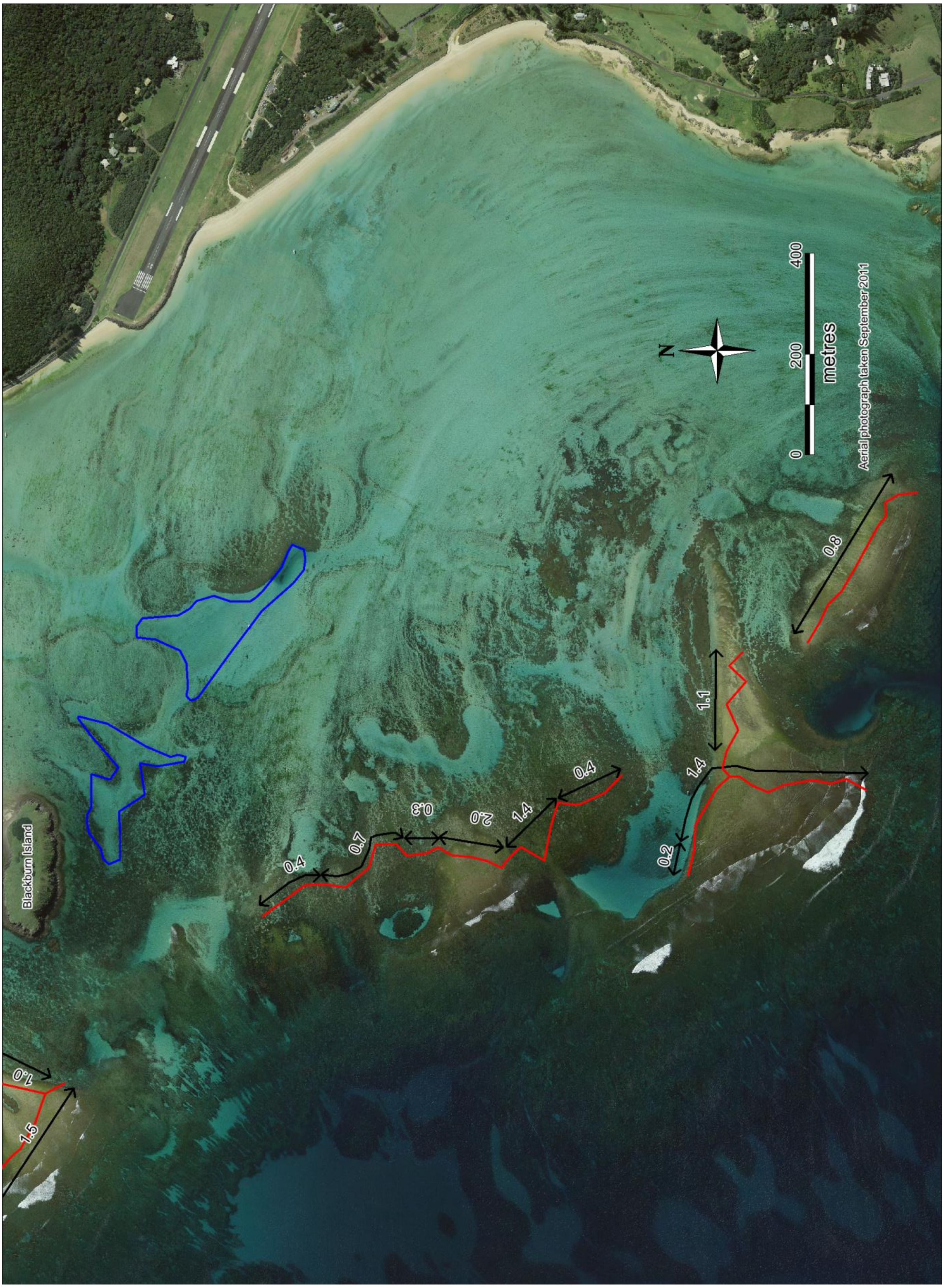

Figure 11: Position and elevation (m AHD) of reef crests south of Blackburn Island (red), with deeper Lagoon areas shown in blue

4.2.2 Coral Reef Processes

In discussing coral reef processes it is important to realise the dominant role of biological factors in reef development, and also the importance of understanding these processes for coastal management. Coral reefs are complex ecosystems, which have high diversity and productivity, an interdependence of animals and other organisms, and many symbiotic relationships (Harvey and Caton, 2010). As Harvey and Caton (2010) describe further:

- reef-building (hermatypic) corals have zooxanthellae, which are minute unicellular algae living within the coral tissue, and these have a symbiotic relationship with the coral polyp by assisting it to lay down its skeleton (a corralite) through photosynthesis, taking up polyp wastes, and supplying the coral with about 98% of its food requirements;
- over thousands of years the build-up of corallite forms a porous limestone which is the basis for reef building, along with calcareous algae;
- growth rates of corals are fastest in shallow, well-lit waters, and can be up to 20mm/year for massive corals and up to 100mm/year for branching corals;
- coral reefs depend on other organisms, particularly algae, which are the primary energy source through photosynthesis;
- there are also crustose corraline algae which are important reef-builders, and in some places algae can form up to 80% of reef sediments, particularly the platey *Halimeda*;
- boring algae are important in reef breakdown;
- corals have an asexual reproduction phase involving major spawning events;
- corals grow in warm water down to a depth of 100m, where they become light limited, and other factors restricting their growth are excessive freshwater and sediment deposition;
- there is great variation in coral growth rates, depending on the position of the reef surface relative to sea level, and vertical reef growth may be negligible on most reef surfaces that are exposed at low tide;
- vertical reef growth will also be significantly altered once it comes directly under the modifying influence of surface wave conditions, and it has been observed that most reef flats are between 100m and 400m wide; and
- another important factor in reef growth is the role of corraline algae.

Reefs are composed almost entirely of skeletal carbonate sediments produced by marine plants and animals (that is, biogenic sediments), incorporated either as the rigid framework or as unconsolidated detrital (eroded and transported) sediments (Woodroffe, 2003). The process of reef growth is complex, involving calcification by the organisms that contribute to reef, various stages of breakdown[26], transport, redistribution and cementation (Woodroffe, 2003). Woodroffe (2003) noted that numerous higher latitude (more southerly) reefs in Australia, including at Lord Howe Island, showed a similar pattern of colonisation and vertical reef growth to more tropical reefs.

Harriott et al (1995) completed a quantitative survey of the reef communities at Lord Howe Island, against which future anthropogenic impacts and natural disturbances could be assessed, and to determine whether the coral communities had changed in the 16 years since the only previous survey by Veron and Done (1979). It is recommended that ongoing monitoring and management of these coral communities is undertaken.

[26] Erosion occurs by physical processes, including wave damage, as well as biological processes (such as grazing and boring organisms).

4.2.3 Long Term Evolution

Martin et al (2014) analysed sediments that have accumulated in four Lord Howe Island coastal wetlands over the last 5,500 years[27]. They found that sediment began to accumulate over basalt bedrock about 4,500 calibrated years before 1950[28], with greater sediment availability after 2,800 calibrated years before 1950 as sediment filled sinks in the Lagoon floor and reached a shallow enough depth to be reworked by waves.

Kennedy and Woodroffe (2000) estimated that by 4,000 radiocarbon years before present most of the Lagoon had accreted to a level close to the modern Lagoon bed surface, having accumulated (in the preceding 2,500 years) over 11m of sediment in the northern part of the Lagoon and possibly up to 30m in the southern part.

Martin et al (2014) considered that increasing westerly wind strength from 600 calibrated years before 1950, combined with falling sea levels[29] and this lagoon infilling, facilitated increased sediment movement from the reef crest and the Lagoon bed to the western shore of Lord Howe Island. They noted that this caused rapid growth of the coastal plain (development of beaches) at about 500 calibrated years before 1950.

Kennedy and Woodroffe (2000) considered that the only features of the Lagoon still experiencing sediment infill were at various “holes” such as Comets Hole and Sylphs Hole. Martin et al (2014) suggested that these holes could be affecting sediment transport within the Lagoon and delaying shoreline accretion at nearby locations by acting as a sink for sediment moving between the reef crest and shoreline. Haskoning Australia independently came to the same conclusion by observation of bathymetric and sediment features in the Lagoon (Section 4.2.1).

Colin Woodroffe (School of Earth and Environmental Sciences, University of Wollongong, personal communication) considered that sediment may still be moving landward across the Lagoon bed and adding to subaerial beach sediments.

4.3 World Heritage Listing

The Lord Howe Island Group was included in the World Heritage List in 1982, as “an outstanding example of oceanic islands of volcanic origin containing a unique biota of plants and animals, as well as the world’s most southerly true coral reef” (UNESCO World Heritage Centre, 2014).

All World Heritage properties in Australia are ‘matters of national environmental significance’ protected and managed under national legislation, namely the *Environment Protection and Biodiversity Conservation Act 1999*.

[27] With years reported by Martin et al (2014) as calibrated radiocarbon ages before the year 1950 AD, and denoted as “calibrated years before 1950” herein. Calibrated years are identical to calendar years (Dr Scott Mooney, School of Biological, Earth and Environmental Sciences, personal communication), so for example 500 calibrated years before 1950 was a calendar year of 1450 AD.

[28] Kennedy and Woodroffe (2000) estimated that sediments were first deposited in the Lagoon about 6,500 radiocarbon years before present, with growth of the reef crest between 6,000 and 5,000 radiocarbon years before present causing a reduction in wave energy in the Lagoon and facilitating sediment deposition.

[29] Martin et al (2014) considered that sea level may have been 1.5m higher about 2,000 calibrated years before 1950. Woodroofe et al (1995) similarly noted sea levels about 1m to 1.5m higher than present around 3,000 years ago, and probably still 1m above present levels around 900 years ago.

As further noted by UNESCO World Heritage Centre (2014):

- "The Lord Howe Island Group is grandiose in its topographic relief and has an exceptional diversity of spectacular and scenic landscapes within a small area, including sheer mountain slopes, a broad arc of hills enclosing the lagoon and Balls Pyramid rising abruptly from the ocean.
- It is considered to be an outstanding example of an island system developed from submarine volcanic activity and demonstrates the nearly complete stage in the destruction of a large shield volcano. Having the most southerly coral reef in the world, it demonstrates a rare example of a zone of transition between algal and coral reefs. Many species are at their ecological limits, endemism is high, and unique assemblages of temperate and tropical forms cohabit.
- The islands support extensive colonies of nesting seabirds, making them significant over a wide oceanic region. They are the only major breeding locality for the Providence Petrel (*Pterodroma solandri*), and contain one of the world's largest breeding concentrations of Red-tailed Tropicbird (*Phaethon rubricauda*).
- The Lord Howe Island Group is an outstanding example of the development of a characteristic insular biota that has adapted to the island environment through speciation. A significant number of endemic species or subspecies of plants and animals have evolved in a very limited area. The diversity of landscapes and biota and the high number of threatened and endemic species make these islands an outstanding example of independent evolutionary processes.
- Lord Howe Island supports a number of endangered endemic species or subspecies of plants and animals, for example the Lord Howe Woodhen, which at time of inscription was considered one of the world's rarest birds. While sadly a number of endemic species disappeared with the arrival of people and their accompanying species, the Lord Howe Island Phasmid, the largest stick insect in the world, still exists on Balls Pyramid. The islands are an outstanding example of an oceanic island group with a diverse range of ecosystems and species that have been subject to human influences for a relatively limited period.

UNESCO World Heritage Centre (2014) noted that key threats requiring ongoing attention include fishing; tourism; invasive animals, plants and pathogens; and anthropogenic climate change. The latter is significant to the consideration of coastal processes and coastline hazards herein.

4.4 Land Use

The entire Lord Howe Island foreshore is zoned as either "Zone No. 7 – Environment Protection" or "Zone No. 8 – Permanent Park Preserve" in the *Lord Howe Island Local Environmental Plan 2010*. A Foreshore Building Line also applies along the Lagoon foreshore, and from Neds Beach to Middle Beach inclusive on the eastern foreshore.

Most of the foreshore is also Crown Reserve, except for a length of foreshore south of Cobbys Beach which has a number of Portions or Lots used for recreation and agriculture/grazing as Special Leases.

Under Section 31A of the *Lord Howe Island Act 1953*, the Minister may grant permission to occupy crown land or vacant crown land, known as Permissive Occupancy. For example, the boatsheds at the northern end of Lagoon Beach, the Aquatic Club and Pinetrees boatshed are all Permissive Occupancies. Improvements on Permissive Occupancy land are generally privately owned.

5. PLANNING FRAMEWORK

Lord Howe Island is part of New South Wales. Although administered under the *Lord Howe Island Act 1953*, it comprises Crown Land and is subject to the provisions of the:

- *Crown Lands Act 1989*;
- *Environmental Planning & Assessment Act 1979*; and
- *Roads Act 1993* (NSW Land & Property Information, 2014).

All land on the island is vested in the Crown, under the management of the Lord Howe Island Board. Islanders (those persons so deemed in Section 3 of the *Lord Howe Island Act 1953*) may be granted a lease in perpetuity for residential purposes (NSW Land & Property Information, 2014).

Land may also be reserved or dedicated to the public by the publication of a notification in the Government Gazette by the Minister Administering the *Lord Howe Island Act 1953*. Special leases, not exceeding 10 years, may also be granted to Islanders for grazing, cultivation or other approved purposes (NSW Land & Property Information, 2014).

The Lord Howe Island Board is the consent authority for all development and subdivision activity that takes place on the island (NSW Land & Property Information, 2014).

Lord Howe Island (in its entirety) is within the “coastal zone” as defined in the *Coastal Protection Act 1979*, as shown on maps outlining the coastal zone[30].

[30] Specifically “New South Wales Coastal Policy 1997, Map 41 of 117” prepared by the Department of Urban Affairs and Planning.

6. COLLECTION AND REVIEW OF DATA

6.1 Aerial Photography and Photogrammetric Data

A review of aerial photography and photogrammetric data from Lagoon Beach and Cobbys Beach is provided in **Appendix B**. To summarise, rates of change of volume per year in various compartments along Lagoon Beach and Cobbys Beach (based on data from 5 dates from 1965 to 2011 and measured above 0m AHD) were as depicted in Figure 12.

It is evident that most of length of the beaches along the Lagoon at Lord Howe Island (Lagoon Beach north of the runway, and Cobbys Beach south of the runway) have been growing in sand volume or moving seaward (prograding). The only two areas reducing in volume or moving landward (receding) are located immediately north and south of the runway revetment, Seabee revetment, and bag wall structures. This is depicted in Figure 12.

Lagoon Beach has been approximately in balance (gain in the north about equal to the loss in the south, of magnitude around 550m^3/year), while the gain at the southern end of Cobbys Beach exceeds the loss at the north of that beach by about 460m^3/year. These volumes are calculated above Australian Height Datum (0m AHD), with the mean Lagoon water level equal to about 1.2 m AHD.

Review of aerial photography provides evidence that sediment is naturally mobile in the wider Lagoon and may be building up over reef areas within the Lagoon. An example of far less distinct reef features in 2011 compared to 2001 (which may be from smothering by sediment) is depicted in Figure 13 (northern end of Lagoon Beach) and Figure 14 (Cobbys Beach), at identical locations and scales for both years at each site.

Further investigation of the sources and transport direction of sediment in the wider Lagoon would be warranted to inform a longer term understanding of coastal processes and to inform the design of any future beach nourishment campaigns or other works. A preliminary conceptual model of sediment transport processes that is an attempt to document the observed beach changes and is consistent with observed circulation patterns is developed in Section 7.8.

Figure 12: Summary of long term (1965 to 2011) sand volume changes at Lagoon Beach and Cobbys Beach

Figure 13: Evidence of sediment smothering reef areas at northern end of Lagoon Beach (2001 top, and 2011 bottom), with main areas of potential smothering within red boxes

Figure 14: Evidence of sediment smothering reef areas at Cobbys Beach (2001 top, and 2011 bottom), with main area of potential smothering within red box

6.2 Sediment Data

Coastal sediments may be of either terrigenous (land) origin or biogenic (living) origin. In the former case, they often are formed predominantly of silica sand. In the latter case they are predominantly calcium carbonate derived from marine organisms, either directly from detrital skeletal material and shells or indirectly from limestone rocks (NCCOE, 2012).

At Lord Howe Island, 99% of the beach and lagoon sediments were found to be composed of skeletal carbonates. Analysis of sediment samples that were collected from beaches and the Lagoon at Lord Howe Island is provided in **Appendix C**. Samples were collected in August 2012 and May 2013.

The sample locations from August 2012 and May 2013, and median particle size (d_{50}) of the tested samples, are depicted in Figure 15 (northern end of Lagoon Beach), Figure 16 (southern end of Lagoon Beach) and Figure 17 (Cobbys Beach). Kennedy (1999) has also analysed samples from the Lagoon area, and his mean particle size testing results[31] are also depicted in these Figures. Note that all particle sizes are shown in microns (that is 10^{-6}m or μm, where 1mm equals 1000μm).

Extensive spatial sediment transport pathways could be inferred from the particle size testing results. That is, there was evidence of the continuity of the Lagoon bed and beaches, with sediment being transported from the Lagoon to the beaches. Coarser sediments were generally evident near the waterline, but otherwise there were generally similar sizes in the Lagoon and on the beach. Some of the finer sediments were at Cobbys Beach, which may be evidence of its general progradation in recent years.

Given the postulated significant infeed (onshore transport) of lagoonal sediments on to Lagoon Beach and Cobbys Beach in around 1450 AD (Section 4.2.3), and general similarity of the Lagoon and beach sediments, it can be postulated that sediments on the Lagoon bed may still be moving onshore at these beaches. Indeed, the review of photogrammetric data (Section 6.1) indicated that most of the length of these beaches has prograded over the last 50 or so years, and aerial photography (Section 6.1) gives evidence of sediment mobility in the Lagoon.

[31] Note that Kennedy (1999) used a method of Folk and Ward (1957) to determine the mean grain size, in which the mean size was determined as $(d_{16}+d_{50}+d_{84})/3$, where d_{16} and d_{84} are the 16th and 84th percentile particle sizes respectively.

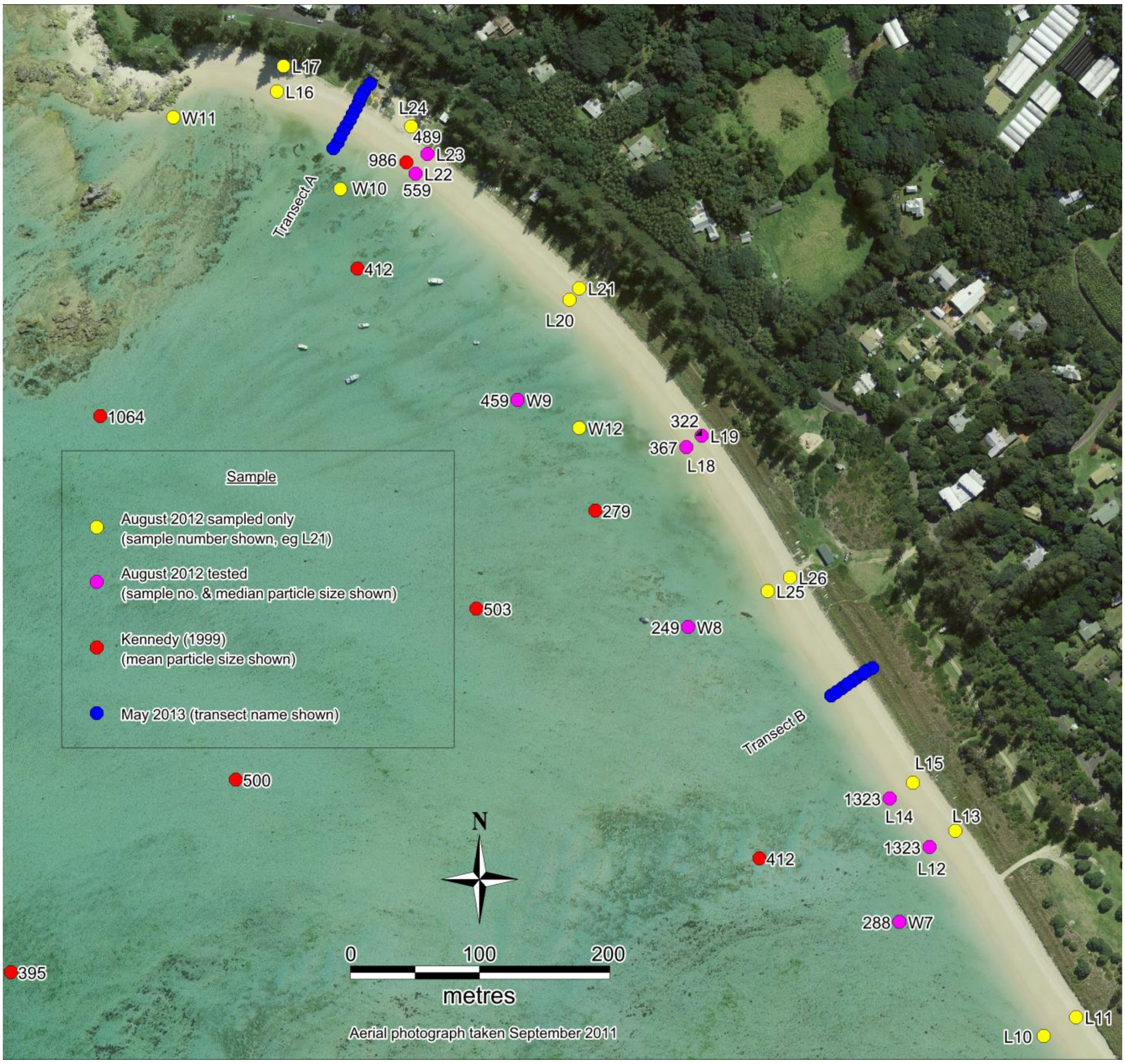

Figure 15: Sample locations and particle sizes (in microns) at north end of Lagoon Beach

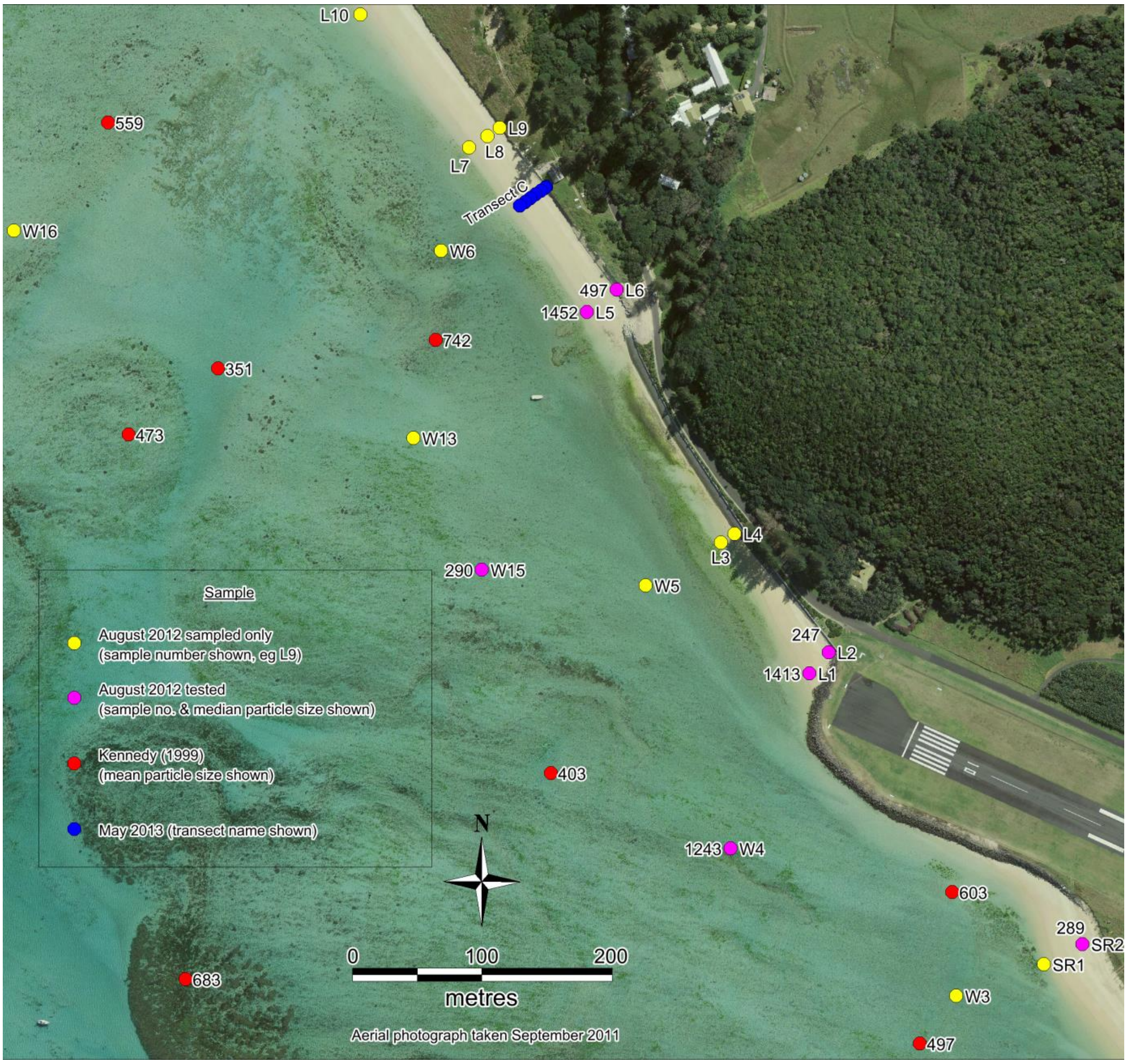

Figure 16: Sample locations and particle sizes (in microns) at south end of Lagoon Beach and adjacent to runway revetment

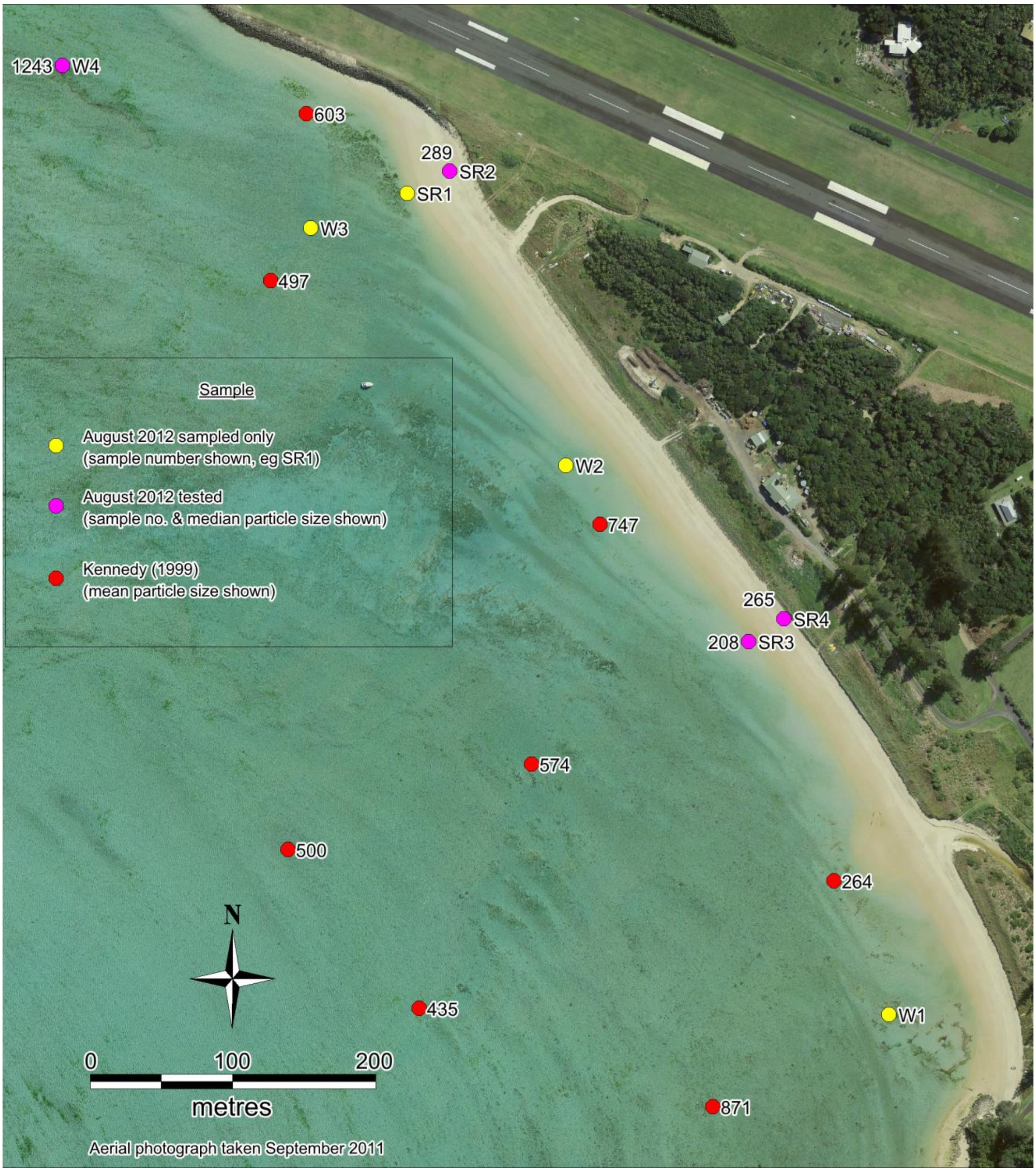

Figure 17: Sample locations and particle sizes (in microns) at Cobbys Beach

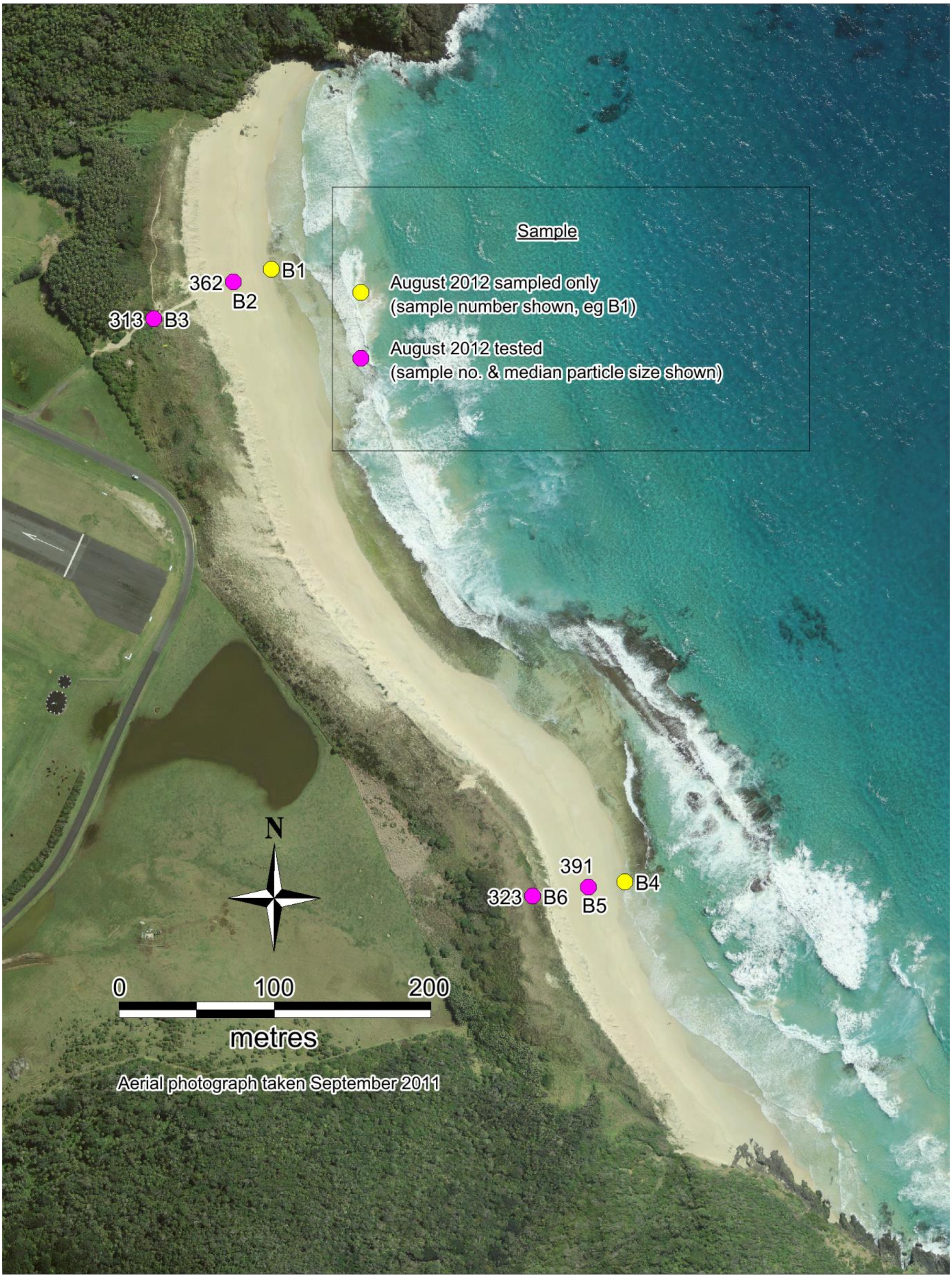

Figure 18: Sample locations and particle sizes (in microns) at Blinky Beach

6.3 Hydrographic (Bathymetric) Data

The two most recent extensive hydrographic (bathymetric) surveys of the Lagoon area at Lord Howe Island were completed by:

- the Australian Hydrographic Service in March 1997; and
- NSW Maritime in October 2008 (see Figure 19).

The shallowness of the Lagoon, particularly east of Blackburn Island, is evident in Figure 19.

Patterson Britton & Partners (1998) also depicted Lagoon bed contours in 1990. The Australian Hydrographic Office hydrographic chart covering Lord Howe Island is AUS 610.

Based on the 2008 data, two cross sections through the Lagoon (at the locations shown in Figure 20) are depicted in Figure 21.

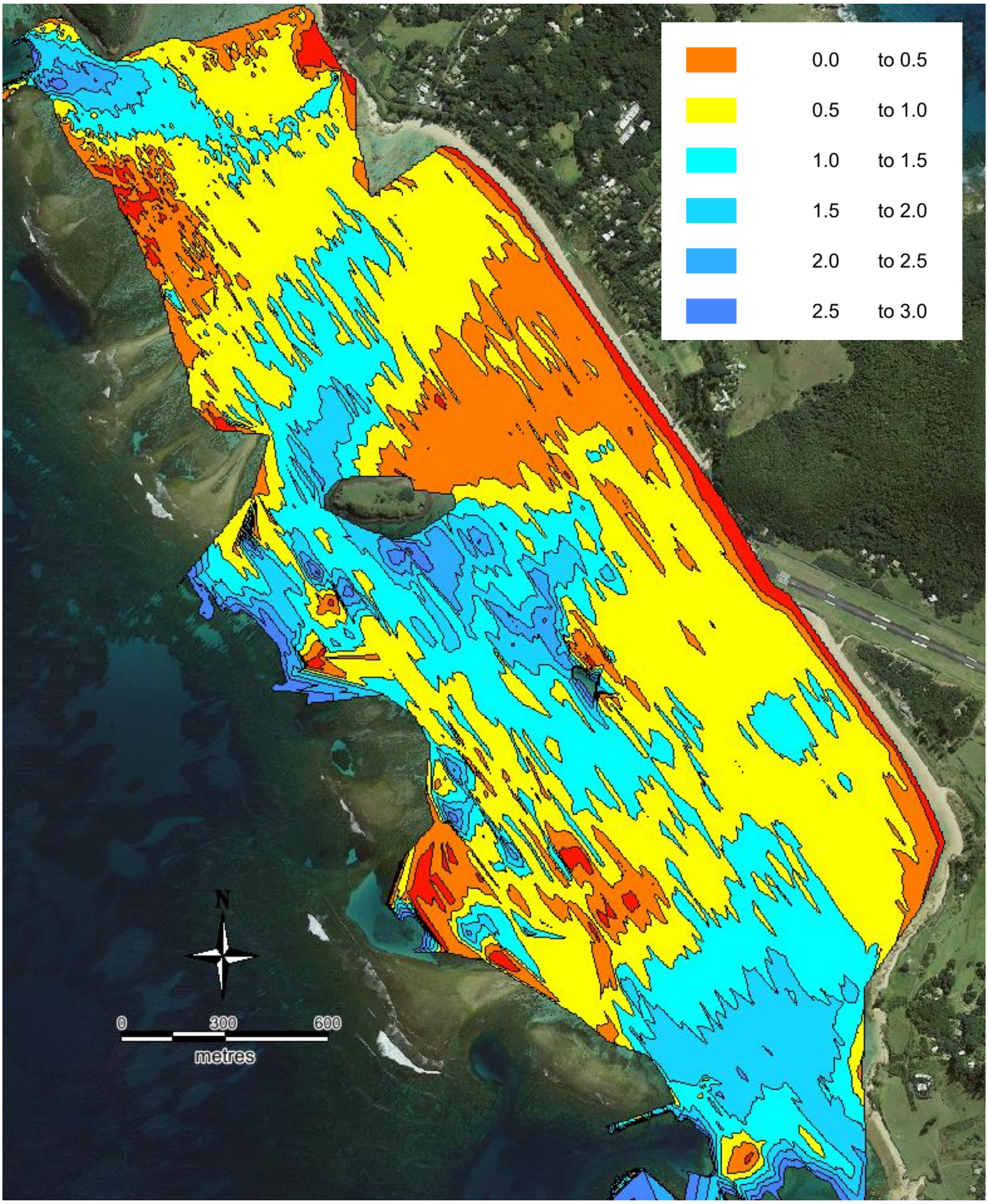

Figure 19: Bathymetric contours at 1m interval derived from 2008 survey, with depths shown relative to AHD (red areas are above 0m AHD)

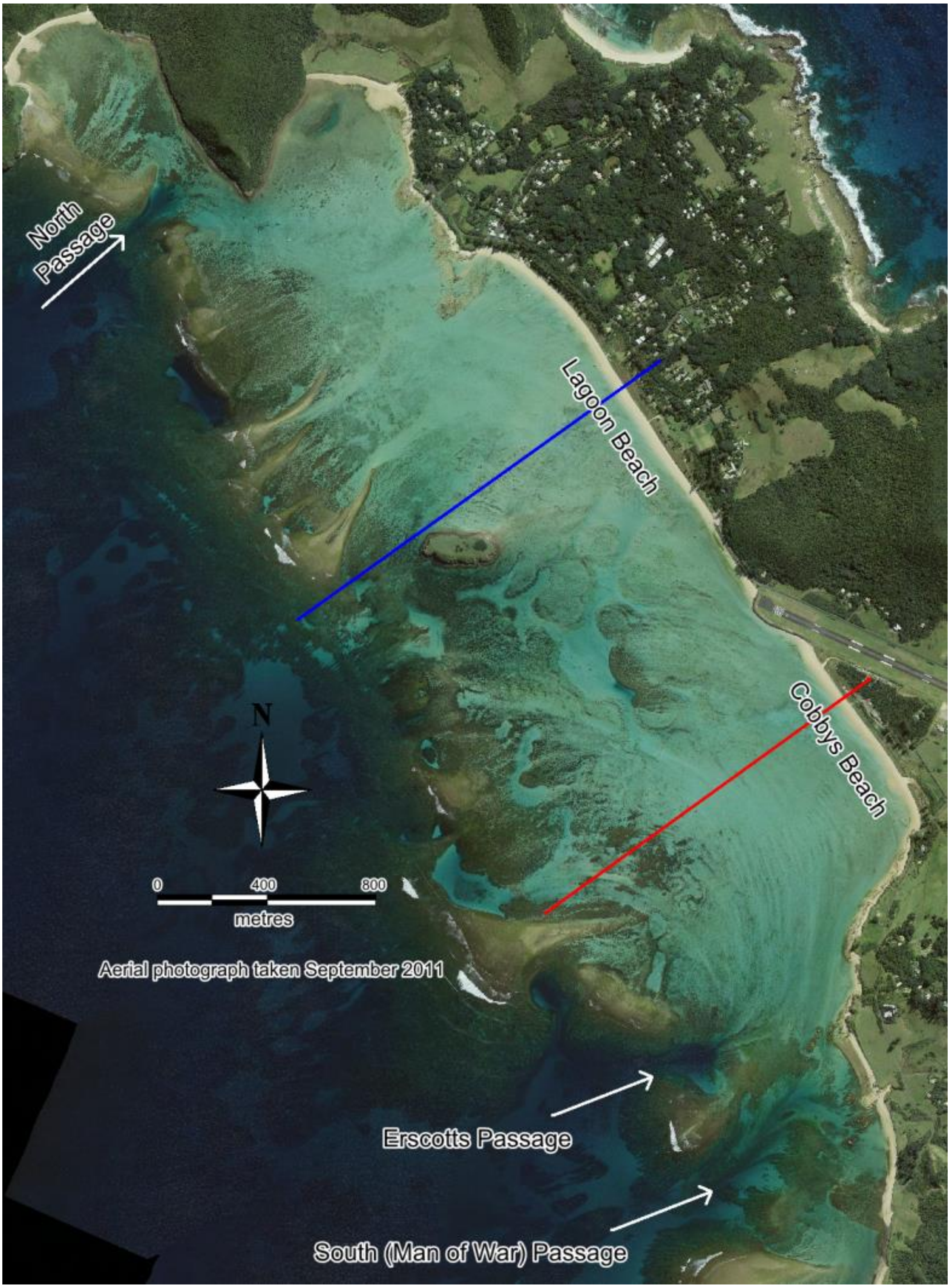

Figure 20: Locations of northern and southern profiles across Lagoon bed, depicted in cross section in Figure 21

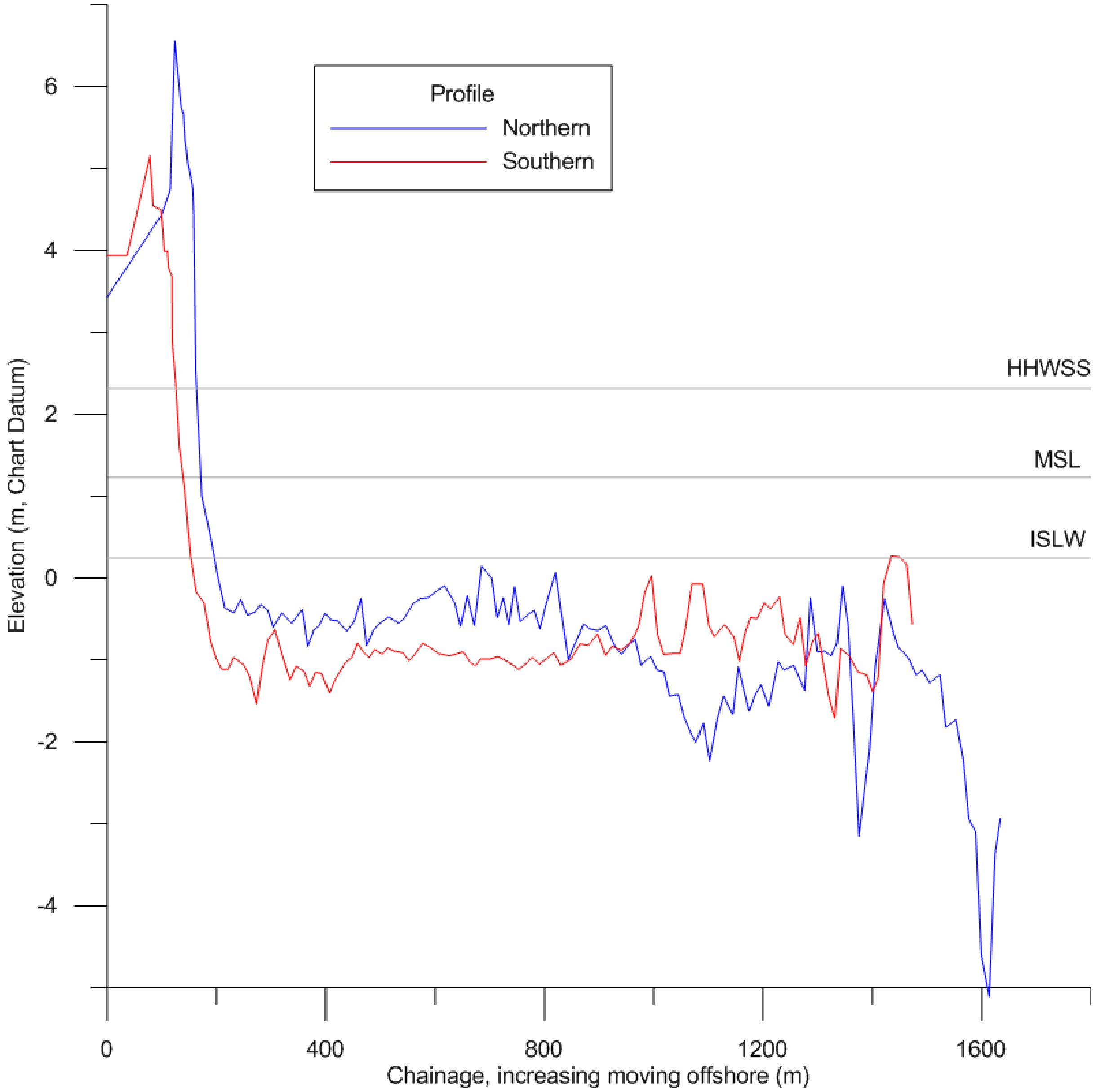

Figure 21: Example cross sections through dune and Lagoon, with profile locations depicted in Figure 20

6.4 Water Levels

Water levels in the Lagoon vary with astronomical tide and other processes, with water flowing (mainly out) through the three main reef passages (Figure 4) and in via wave overtopping and direct oceanic ingress over the coral reef at higher stages of the tide (with the reef crest being about 0.2m below mean sea level on average).

Manly Hydraulics Laboratory (MHL) has operated a water level recorder at the jetty at Lord Howe Island since 1994 on behalf of OEH. Based on review of data collected every 15 minutes from 1994 to 2013, various statistics were derived including tidal planes (Table 1) and exceedance probabilities

(Table 2). From this analysis, the mean neap range is 0.85m, and the mean spring range is 1.55m. The highest water level recorded was 2.84m AHD on 14 July 1995. The largest positive residuals in the record (where measured water levels were above predicted tide levels) were found to be about 0.8m.

Table 1: Tidal planes in Lagoon at Lord Howe Island

Tidal plane	Water level (m AHD)
High High Water Solstice Springs	2.31
Mean High Water Springs	2.01
Mean High Water	1.83
Mean High Water Neaps	1.66
Mean Sea Level	1.23
Mean Low Water Neaps	0.81
Mean Low Water	0.63
Mean Low Water Springs	0.46
Indian Springs Low Water	0.24

Table 2: Exceedance probabilities for water levels in Lagoon at Lord Howe Island

Probability of exceedance (%)	Water level (m AHD)
0.1	2.53
1	2.30
5	2.05
10	1.91
50	1.23
90	0.58

Besides astronomical tide, water levels in the Lagoon at Lord Howe Island are strongly dependent on regional oceanographic circulation patterns. The Bureau of Meteorology provides forecasts of sea level anomalies (and other parameters such as sea surface temperature) based on an Ocean General Circulation Model and real-time observations, known as BLUElink Ocean Forecasts produced by the *Ocean Model, Analysis and Prediction System* version 2.0 (OceanMAPSv2.0).

As described by Bureau of Meteorology (2014a), variations in the elevation of the ocean are mainly caused by the earth's rotation and changes in water density at depth. A phenomenon that has a dominant influence on the general circulation of the ocean is the so-called 'eddy'. This term refers to a cyclonic motion (in the form of a vortex) on the scale 10 to 200km in diameter that forms, propagates throughout the ocean and later decays. Throughout this cycle the eddies redistribute heat and salt. Common forms of eddies found in the Australian region are 'warm-core' and 'cold-core' eddies (where the interior of the eddy is either warmer or colder than the surrounding ocean respectively). A warmer, less dense water column has a larger specific volume leading to an increase in surface height and pressure compared to the surrounding ocean. In the presence of the earth's rotation, this pressure gradient radiating out from the warm core of the eddy is 'geostrophically' balanced by vortical currents circulating around the core. The term 'geostrophic' refers to the situation where, for an observer on the earth's surface, the vortical currents (the circulating currents flowing around the eddy) induce an equal and opposite Coriolis force to balance the gradient in pressure. A warm-core eddy, which has a pressure gradient radiating out, leads to anticyclonic motion, which is anticlockwise in the southern hemisphere. A cold-core eddy has a pressure gradient force that is focused toward the core, which leads to cyclonic motion that is clockwise in the southern hemisphere. Good examples of these can be found in the Tasman Sea as part of the East Australian Current. The change in density between the eddy core and the surrounding ocean can be detected as a change in the surface height of the ocean of the order of one metre.

An example of sea surface temperature and sea level anomaly results from BLUElink is provided in Figure 22 for offshore of NSW (including Lord Howe Island), and in Figure 23 for a more zoomed in area surrounding Lord Howe Island. The considerable variability in sea level is evident, for example where Lord Howe Island has a sea level anomaly of -0.2m, and a few hundred kilometres towards the mainland there is a sea level anomaly of +0.5m (that is, 0.7m higher).

A plot of the daily average water level at Lord Howe Island (as measured by MHL) versus the sea level anomaly at Lord Howe Island (from BLUElink) is provided in Figure 24 for the April 2011 to February 2013 period[32]. It is evident that the daily average water level at Lord Howe Island is strongly influenced by the regional oceanographic water level.

[32] The assistance of Mr Ben Modra of MHL in providing the plotted data is gratefully acknowledged. The measured data was normalised against the full record average, and the BLUElink data was adjusted to have the same average water level as the measured data.

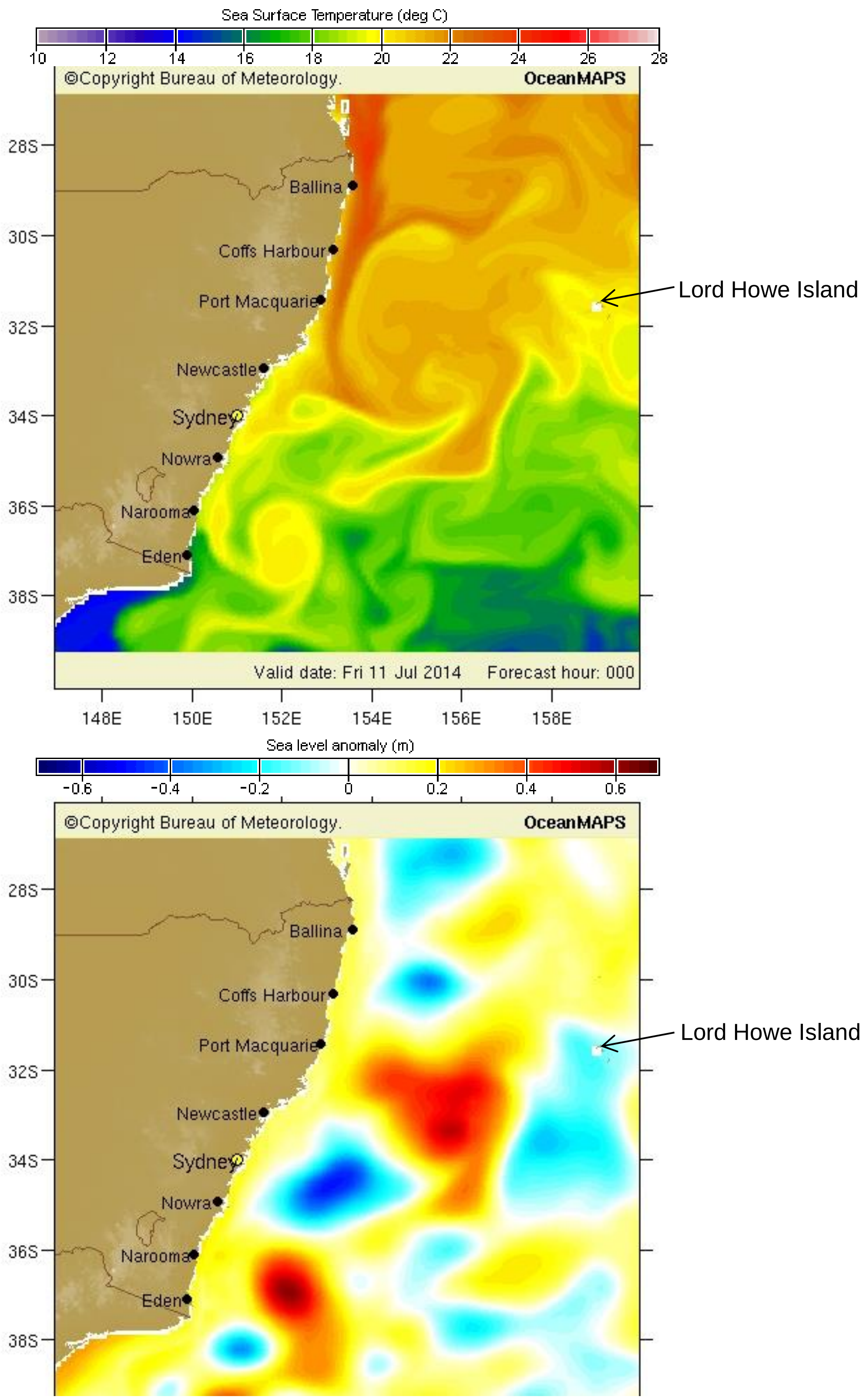

Figure 22: Example of sea surface temperature (top) and sea level anomaly results (bottom) from BLUElink for offshore of NSW

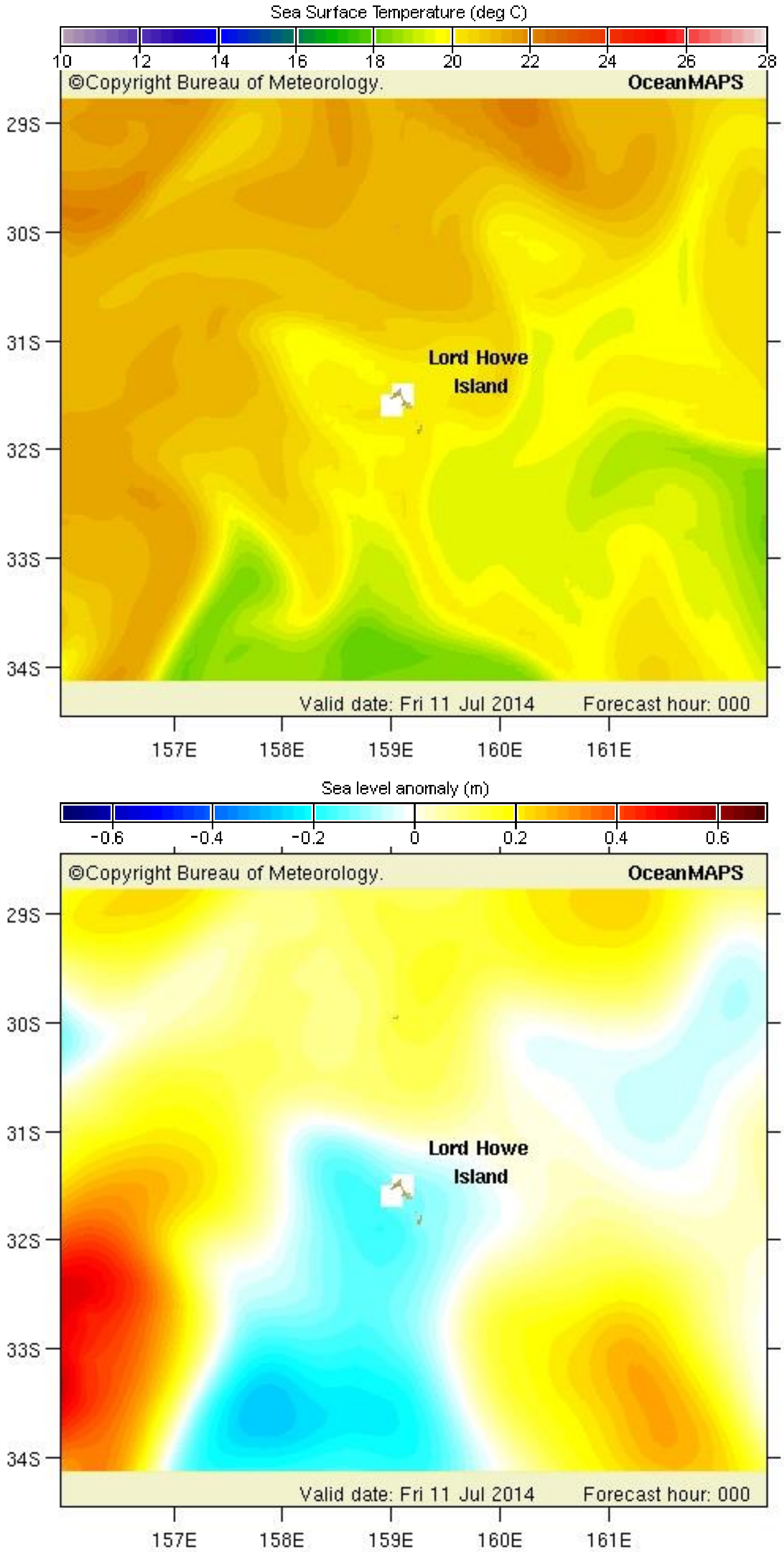

Figure 23: Example of sea surface temperature (top) and sea level anomaly results (bottom) from BLUElink for area surrounding Lord Howe Island

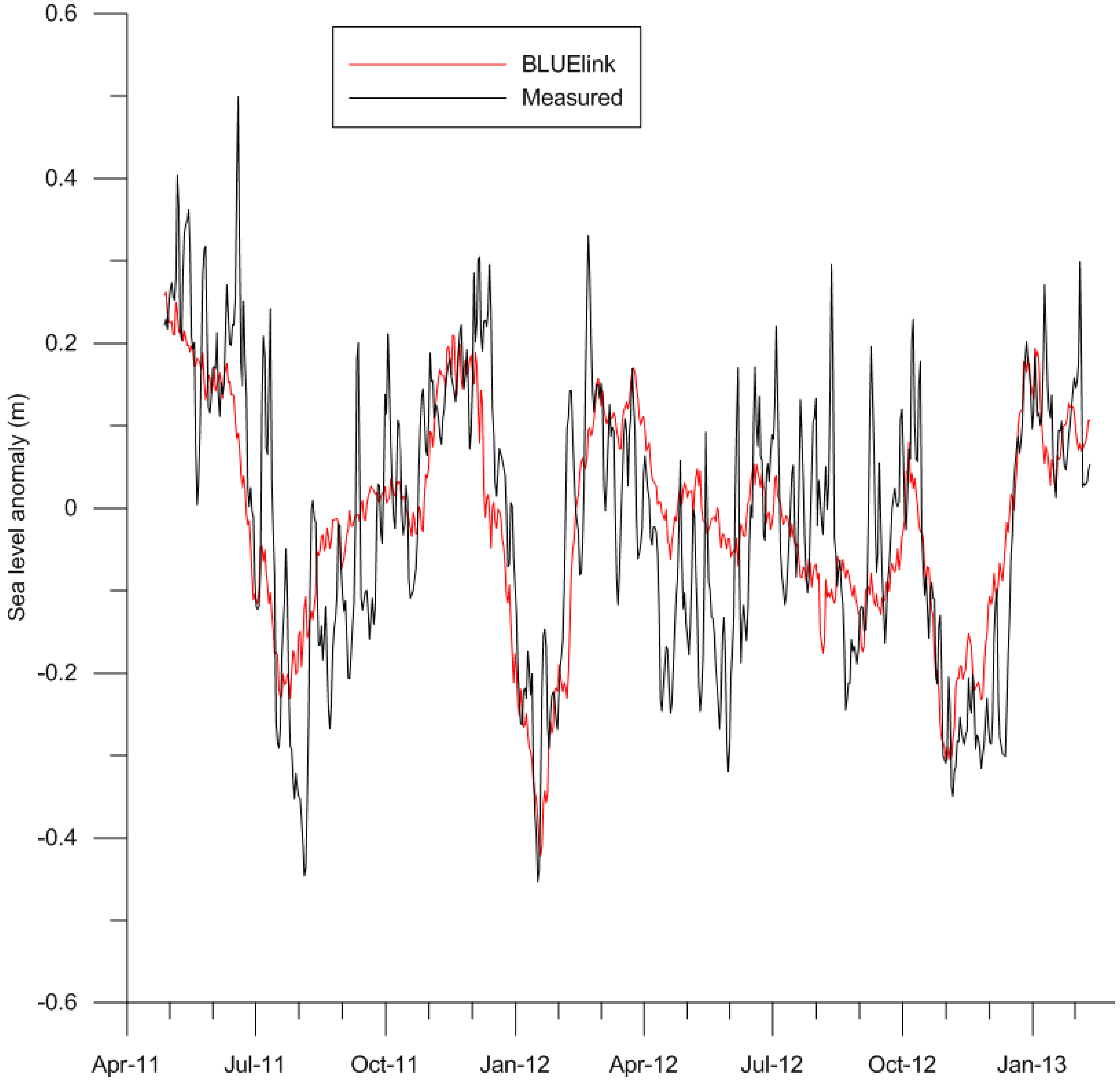

Figure 24: Comparison of measured daily average sea level anomalies in Lagoon and regional oceanographic sea level anomalies (from BLUElink) at Lord Howe Island

6.5 Wave Data

There are no known long term wave measurements offshore of or within the Lagoon at Lord Howe Island. However, there are simulated numerical hindcasts of wave conditions for most of the world's oceans that have been developed by the National Centers for Environmental Prediction in the United States (specifically the Marine Modeling and Analysis Branch of the Environmental Modeling Center) using the WAVEWATCH III® model. Details of the WAVEWATCH III® model are provided in Tolman (2009), but in essence it can be noted that the model uses winds from an atmospheric model to generate the waves.

A 31 year (from 1979 to 2009 inclusive) WAVEWATCH III® model so-called "Climate Forecast System Reanalysis Reforecast" wave hindcast at the closest model output location to Lord Howe Island[33] was downloaded from the National Centers for Environmental Prediction (2013). Details on the derivation of this time series are provided in Chawla et al (2011, 2012) and Spindler (2011). This 31 year time series had a 3 hourly time step, with output variables comprising wind speed and direction, significant wave height (H_s) and direction (θ), and peak spectral wave period (T_p). The resulting time series was analysed, with various statistics determined as listed in Table 3.

Table 3: Statistics from analysis of 31 year WAVEWATCH III® model wave hindcast at Lord Howe Island

Statistic	H_s (m)	T_p (s)
Median	2.7	11.7
Mean	2.8	11.6
Minimum	0.7	3.8
Maximum	10.4	23.4
Standard deviation	1.0	2.4
90% percentile	1.7	8.4
10% percentile	4.2	14.5
5% percentile	4.8	15.5
1% percentile	6.0	17.6

The median significant wave height (H_s) was 2.7m, substantially (80%) larger than the median H_s on the NSW mainland of about 1.5m (Shand et al, 2011). The median peak spectral wave period (T_p) at Lord Howe Island was found to be 11.7s, 23% larger than the corresponding mainland value of about 9.5s (Shand et al, 2011).

The vector average (and vector average weighted by wave height) wave direction at the Island was found to be about 228°, that is from the south-west[34]. SW waves dominated the record (with 34% of waves), and there were 29% from the SSW, 8% from the WSW and 6% from the S. That is, 63% of waves came from the SW-SSW octant, and 77% from the S-WSW quadrant.

These directional characteristics are very different to the NSW mainland, where at Sydney (for example)[35] only 0.9% of waves have been measured as coming from the SW-SSW octant, and the vector weighted wave direction is about 140° (from the SE).

In the Lord Howe Island WAVEWATCH III® data set, there were four events with H_s equal to 9m or larger (in 1982, 1986, 1988 and 2006), with the highest H_s value being 10.4m in 2006. All of these events had a T_p value of about 14s. In the 2006 event, H_s exceeded 8m for 21 hours, and 7m for 57 hours.

[33] The model had a spatial resolution of 0.5°, with the closest grid point to Lord Howe Island being at 31.5°S and 159°E. The surrounding 8 grid points were also analysed, with similar results to the adopted location closest to Lord Howe Island.
[34] Bearing relative to true north. For example, 0°, 90°, 180° and 270° represents waves from the north, east, south and west respectively.
[35] Based on analysis of directional data collected (and provided) by MHL from 1992 to 2012, with this data owned by OEH.

It can be concluded that the south-western side of Lord Howe Island is exposed to a higher wave energy wave climate than the NSW mainland, emphasising the importance of the coral reef in protecting the Lagoon and its beaches from wave action.

6.6 Meteorological Data

Based on statistics from the Bureau of Meteorology Lord Howe Island Airport station, derived from data collected between 1988 and 2014 (Bureau of Meteorology, 2014b):

- mean annual rainfall at Lord Howe Island is about 1500mm, with about 150 days of daily rainfall exceeding 1mm each year (on average);
- the wettest months (on average) are June and May, and the driest months (on average) are October and December, without an overly distinct wet and dry season;
- mean minimum temperatures vary from 13.5°C in August to 21.0°C in February (17.1°C annual average);
- mean maximum temperatures vary from 18.9°C in August to 25.7°C in February (22.1°C annual average); and
- the most dominant winds are from the south-west and east.

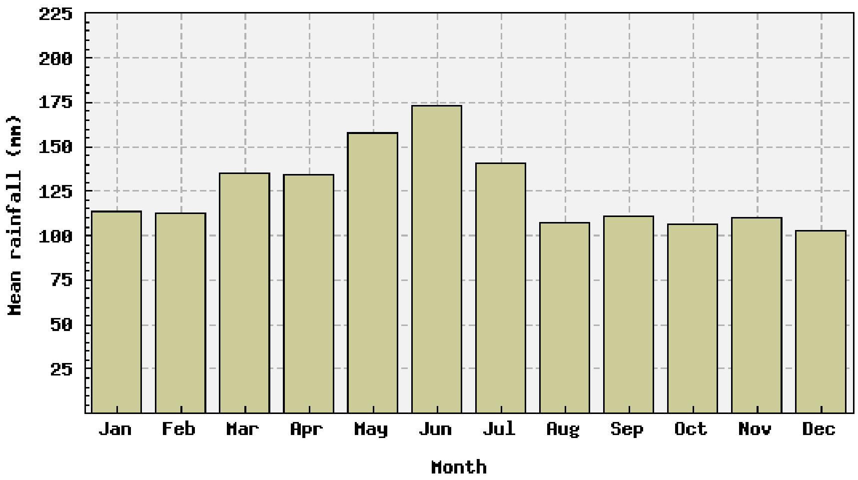

Figure 25: Mean monthly rainfall at Lord Howe Island Airport based on data from 1988 to 2014

The Bureau of Meteorology currently records meteorological data at two sites at Lord Howe Island, namely the Airport[36] (Station 200839) and at Windy Point[37] (Station 200715), with the station locations shown in Figure 26. The Airport site was established in 1988, with temperature, dew point, wind speed and direction , rainfall, mean sea level pressure and cloud amount recorded. The Windy Point site was opened in November 2003 (says 2010 in daily file), and only wind data has been recorded at this site.

[36] Denoted as "Lord Howe Island Aero" by the Bureau of Meteorology, with a station elevation of 5m.
[37] Denoted as "Lord Howe Island Windy Point" by the Bureau of Meteorology, with a station elevation of 4m.