Masked Owl Discussion Paper and 7 Part Test

STAGE 14, NORTH WALLARAH PENINSULA

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1 INTRODUCTION AND BACKGROUND

This report addresses possible impacts on the Masked Owl, arising from Stockland's proposed subdivision of the Stage 14 land. This report supplements the Statement of Environmental Effects (SEE), dated 27 August 2009, the Integrated Ecological Report (which forms Appendix K to the SEE) and the report of Mr John Young dated 31 August 2009 (which forms Appendix 6 to Appendix K of the SEE). This report also responds to the report of Dr Rod Kavanagh dated 11 January 2010.

1.1 BACKGROUND TO NORTH WALLARAH PENINSULA

Stage 14 Murrays Beach covers an area of 8.5 hectares (ha) and is part of a larger proposed master planned residential development on the North Wallarah Peninsula (NWP). The following summary of the NWP site and its context is provided as background to landscape context to Masked Owl habitat provided further within this discussion paper.

North Wallarah Peninsula largely borders Caves Beach and Swansea urban areas to the north, and connects to large areas of bushland to the south.

North Wallarah Peninsula itself has been subject to an exhaustive, comprehensive and detailed planning process over the past 12 years, which has involved Local Environmental Study (LES), rezoning, Conservation and Land Use Management Plan (CLUMP) and Approved Masterplan. Of importance, many of the strategically significant outcomes identified in that planning process have already been delivered before or within the early stages of development. Of relevance to the conservation of Masked Owl habitat, this has included almost full 'delivery' of the agreed biodiversity strategy that arose from the strategic planning process (refer to extract from CLUMP), which included the dedication of Wallarah National Park (some 180 ha), coastal land dedication, identification of and progressive dedication of a major habitat corridor and foreshore reserve lands.

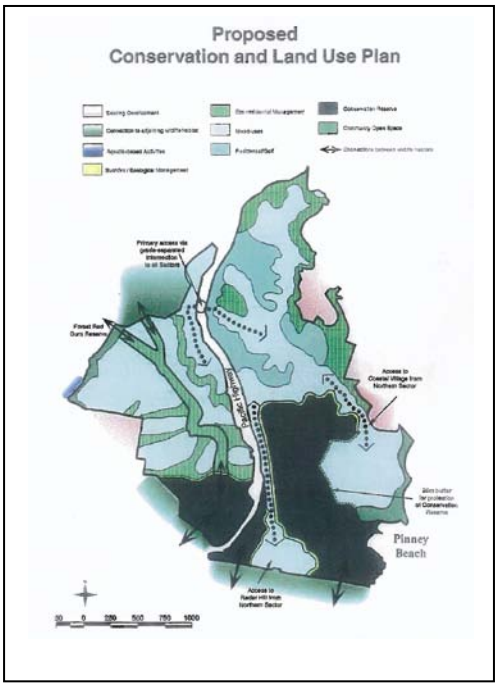

Figure 1 Extract North Wallarah CLUMP

The North Wallarah Peninsula development area is separated into three precincts:

- **Lake Sector** (west of Pacific Highway, and also known as Murrays Beach). Stage 14 is within the Lake Sector and development consents have been issued for Stages 1-13. Stage 14 is sited on the lake edge and is surrounded by the lake foreshore and approved development stages, as shown in Figure 2. Areas of the Lake Sector which

are identified by zoning and Masterplan approval for residential development, but which have not yet been approved for development include all lands to the north and east of the major habitat corridor (being Stage 13C and Swansea Valley).

- **Northern Sector** (east of Pacific Highway and north of Wallarah National Park). No applications for residential development (other than Masterplan approval) have been submitted for this sector to date.

- **Coastal Sector** (east of Pacific Highway and east of Wallarah National Park). Development Consent has been granted for Stages 1-4 within this sector, with context precinct planning completed over the precinct. Radar Hill Precinct has had no applications for residential development submitted to date (other than Masterplan approval).

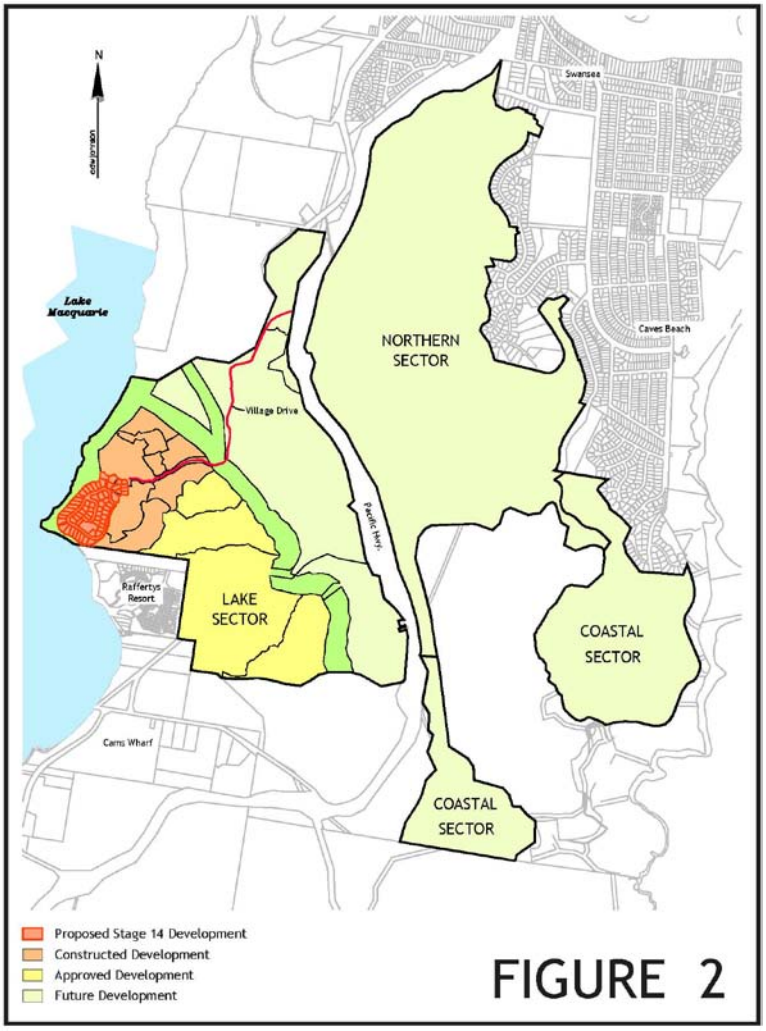

Figure 2 showing Stage 14 in the context of the greater development area

1.2 BACKGROUND TO STAGE 14 AND PURPOSE OF DISCUSSION PAPER

On 23 Oct 2001, an employee of Conacher Travers observed a Masked Owl in Stage 14 (SEE Appendix K 4.5.1, p 67). On 24 June 2009, Mr Corey Mead observed a Masked Owl in Stage 14 and heard another Masked Owl calling nearby. Between 6 and 20 July 2009, Mr Mead examined a Masked Owl nest in Stage 14 and found a single chick (report of Mr Young 31 August 2009, page 1). In August 2009, Mr Young observed a female and male Masked Owl in Stage 14 (report of Mr Young dated 31 August 2009, p2.).

A Development Application for the proposed subdivision of the Stage 14 land was submitted to Council in August 2009. Previous surveys conducted for ecological assessments during strategic planning, earlier development stages and initially for Stage 14 had not located a breeding pair of Masked Owls, although calls of the species had been heard in the vicinity. Whilst the pair had not been located, Masked Owls have been considered a likely threatened species with habitat within the North Wallarah Peninsula area throughout all assessments since 1999.

Following the 2009 sighting, Stockland sought independent expert advice from Mr. John Young an owl specialist with 30 years experience observing the breeding behaviour of Australian owls. In August 2009, Mr Young inspected the Stage 14 land and confirmed the identity of the pair of owls as Masked Owls. Mr Young noted that there were two hollow bearing trees on the site one being used as a nest tree and one as a day time roost tree by the male. Mr Young suggested the site provided little in terms of foraging habitat for the pair based on expert opinion and additional trapping of likely prey throughout the immediately adjoining development areas. A range of recommendations were provided by Mr Young at that time, all of which were incorporated into the submitted development application proposal.

Council sought independent advice from NSW owl expert Dr Rod Kavanagh. That advice was provided in a report dated 11 January 2010.

This supplementary report has been compiled to provide a detailed and comprehensive response to the issues raised in Dr Kavanagh's report. This report also contains an updated Seven Part Test of Significance, pursuant to Section 5A of the Environmental Planning and Assessment Act 1979 (EP&A Act) (Attached as Appendix A). This report concludes that there are unlikely to be any significant impacts on the Masked Owl, and that a Species Impact Statement is not required pursuant to section 78 A (8)(b) of the EP&A Act.

Details on the qualifications of those preparing this report are provided in Appendix B.

2 UNDERSTANDING OF THE ISSUES

Dr Kavanagh expresses the view in his report dated 11 January 2010, that due to uncertainty about the most appropriate management actions, a Species Impact Statement (SIS) is warranted for Stage 14. This report address the issues raised in Dr Kavanagh's report and assesses the statutory criteria set out in S5Aof the EP&A Act to determine if a SIS is required (i.e. 7 part test).

This report summarises the information and opinions available regarding the potential impacts on the Masked Owl as a result of the proposed development in Stage 14 at Murray's Beach, and collates a broader landscape context in which that development proposal sits, to inform an updated 7 part test of significance.

We note that Dr Kavanagh's report refers in places to the proposed development within Stage 14 of Murrays Beach, and sometimes to the broader master planning for the Stockland owned land elsewhere on the Wallarah Peninsula, and sometimes to lands outside Stockland ownership or control on the broader Wallarah Peninsula. This document seeks to clarify the situation with respect to those areas (outlined in Section 1.0).

It has always been acknowledged by Council and both owl experts that the North Wallarah Peninsula project, and in particular the Lake Sector (Murrays Beach – includes developed and approved Stages 1-13, and proposed Stage 14), is in no way a typical residential development and the environmental outcomes in terms of habitat retention are maximised.

Following their joint site visit in November 2009 Mr Young and Dr Kavanagh reached agreement on appropriate buffer zones around the roost and nest tree. Stockland have adopted these recommendations. Proposed layouts will be amended to incorporate a 50 m buffer around the nest tree and 30 m buffer around the roost tree (subject to some minor variations supported by Mr Young relative to road connection). However, as Dr Kavanagh points out, buffers are only a part of the story. The other points of discussion he raises largely come into play in the event that the buffers do not provided adequate protection to the roost and nest trees. In supporting these buffers, Dr Kavanagh acknowledges that Masked Owls are thought to be more tolerant of disturbances around their nest trees and roost trees than may be the case for other species of large forest owls. Mr Young has expressed agreement with this observation.

There is little published data on persistence and successful breeding of Masked Owls within close proximity to human habitation. Elliot (1935) recorded breeding of Masked Owls in a tree 100 yards (91 m) from his back door in a cleared paddock with few standing trees. Mr Young has recorded numerous situations of Masked Owls breeding in isolated trees surround by cane fields in North Queensland. One pair in Ingham has been nesting within the hollow of a large *Eucalyptus terreticornis* less than 30 m from a small town and totally surround by sugar cane for at least 20 years.

Kavanagh and Murray (1996) found that a radio tracked female Masked Owl near Newcastle spent 82% of its time in or next to environments that had been extensively modified by man.

During the non-breeding season, it roosted among the dense foliage of several introduced trees occurring on residential properties.

The Masked Owl pair in Stage 14 successfully bred and fledged young during the construction phase of Lot 29- Stages 1-7 which encroached to within 25 m of the nest tree.

There has been no testing of the efficacy of prescribed forestry buffers in protecting forest owls. Dr Kavanagh suggests that conceivably buffers in residential areas should be larger than those applied in forestry situations since trees and other vegetation are not permanently removed during forestry operations. On this point it should be noted that the Stockland development intends to retain more than 50% of the trees in Stage 14 as well as undertaking additional plantings. Furthermore Garnett (2000) notes that scarcity of Masked Owls from logged forests in NSW may be because the vigorous regrowth after logging makes the habitat less suitable for foraging (quoting Kavanagh *et al.* 1995). Mr Young considers that the Stage 14 site is not an important foraging area for Masked Owls.

An audit of forestry buffers is recommended in the DECC (2006) Large Forest Owl Recovery Plan but has not been undertaken to date. Post-development monitoring proposed by Stockland will provide important information of the appropriateness of the recommended buffers in this particular development scenario.

Dr Kavanagh identified three key issues:

- Landscape Context - availability of forested habitat Including riparian areas) in perpetuity within a home range;
- Availability of suitable alternate roost and nest trees – need to know this in the event that notwithstanding recommended buffers, the owls do not continue breed within Stage 14; and
- Distribution and location of adjacent owl territories (population context).

Dr Kavanagh further noted the need for a Masked Owl Management Plan for Stage 14 and ongoing monitoring of the site.

These issues are discussed below in the context of available information and expert opinion.

3 KEY ISSUES DISCUSSED

3.1 LANDSCAPE CONTEXT

As Dr Kavanagh points out, buffers are only part of the story and of greater importance is the landscape context. Dr Kavanagh suggests that approximately 400 ha of forested land should be available within a 2 km radius or 1200 ha home range.

Table 1 below displays statistics on land area on the North Wallarah Peninsula and its conservation status. Because the known Masked Owl pair is located on the eastern shore of Lake Macquarie, a 2 km circle drawn around the nest tree encompasses approximately 50% water, which is clearly not owl habitat. Therefore, we have repeated the analysis moving the 2 km radius to extend to the east from the nest tree, a more likely location for an owl territory. Figure 3 and Figure 4 display the two scenarios.

As the data shows, within 2 km of the nest tree (where a significant portion of the area is over water), some 47 % of vegetated land is held or planned to be held in some kind of conservation protection and will not be developed. In the adjusted home range which almost entirely covers land, 39% of an approximate home range is protected in conservation protection, being some 420 ha. Of this, 171 ha are contained within Wallarah National Park, 22 ha is in major habitat corridor and a further 24 ha in riparian, drainage or bush parks within the approved development to date throughout the Lake Sector (noting that riparian corridors were specifically identified by Dr Kavanagh as providing important habitat).

Table 1 Landscape Analysis

	Total land area (ha)[1]	Area of protected habitat (ha)	% of approximate home range protected
2 km radius of nest tree (Includes lake)	673	314	47
Adjusted 2 km radius (excludes lake)	1102	428	38.8

[1] Includes dedicated national park, habitat corridor to be dedicated to council, riparian and bushland community property, lands external to Wallarah site zoned for conservation.

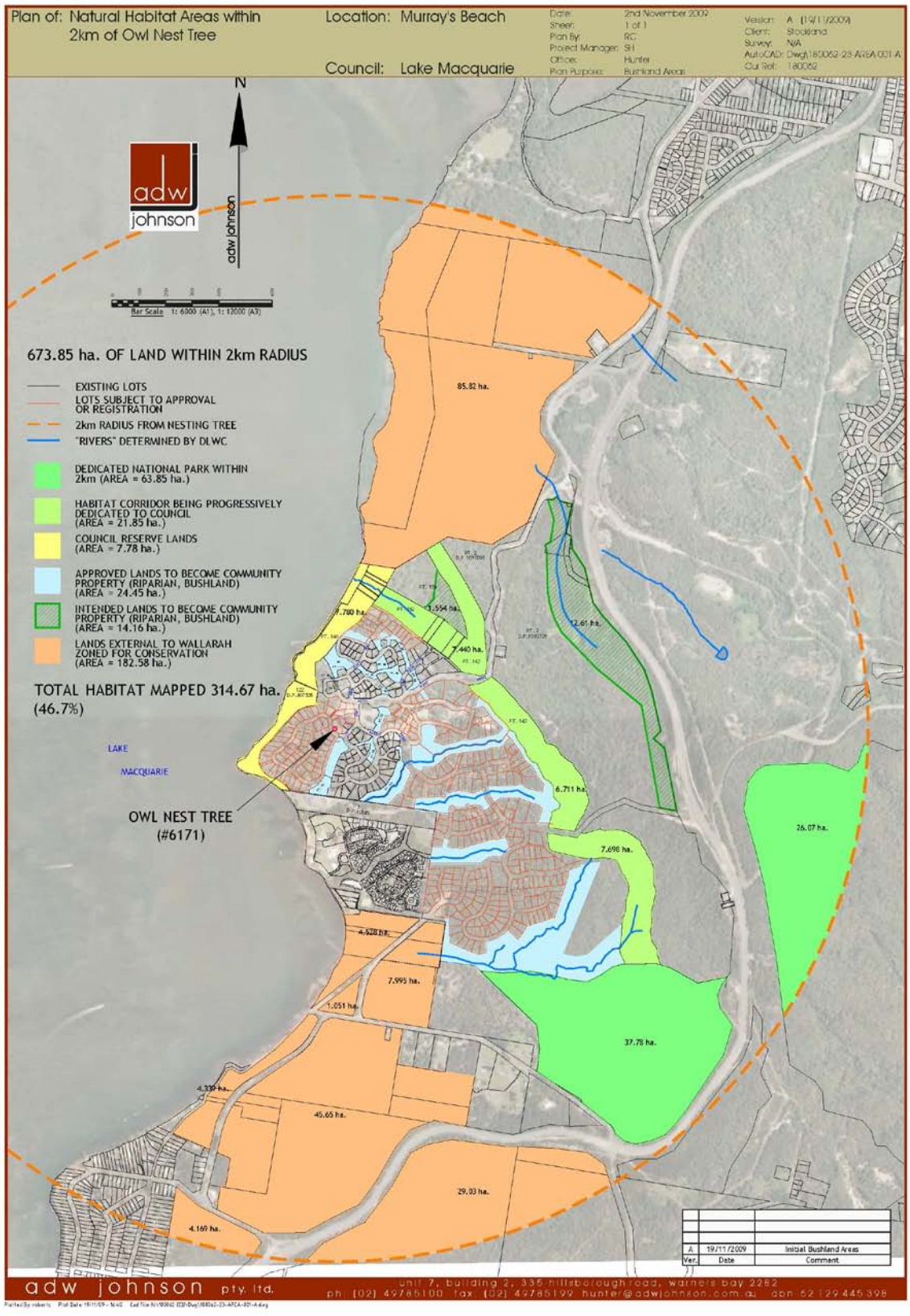

Figure 3. Protected forested land within a 2 km radius of nest tree.

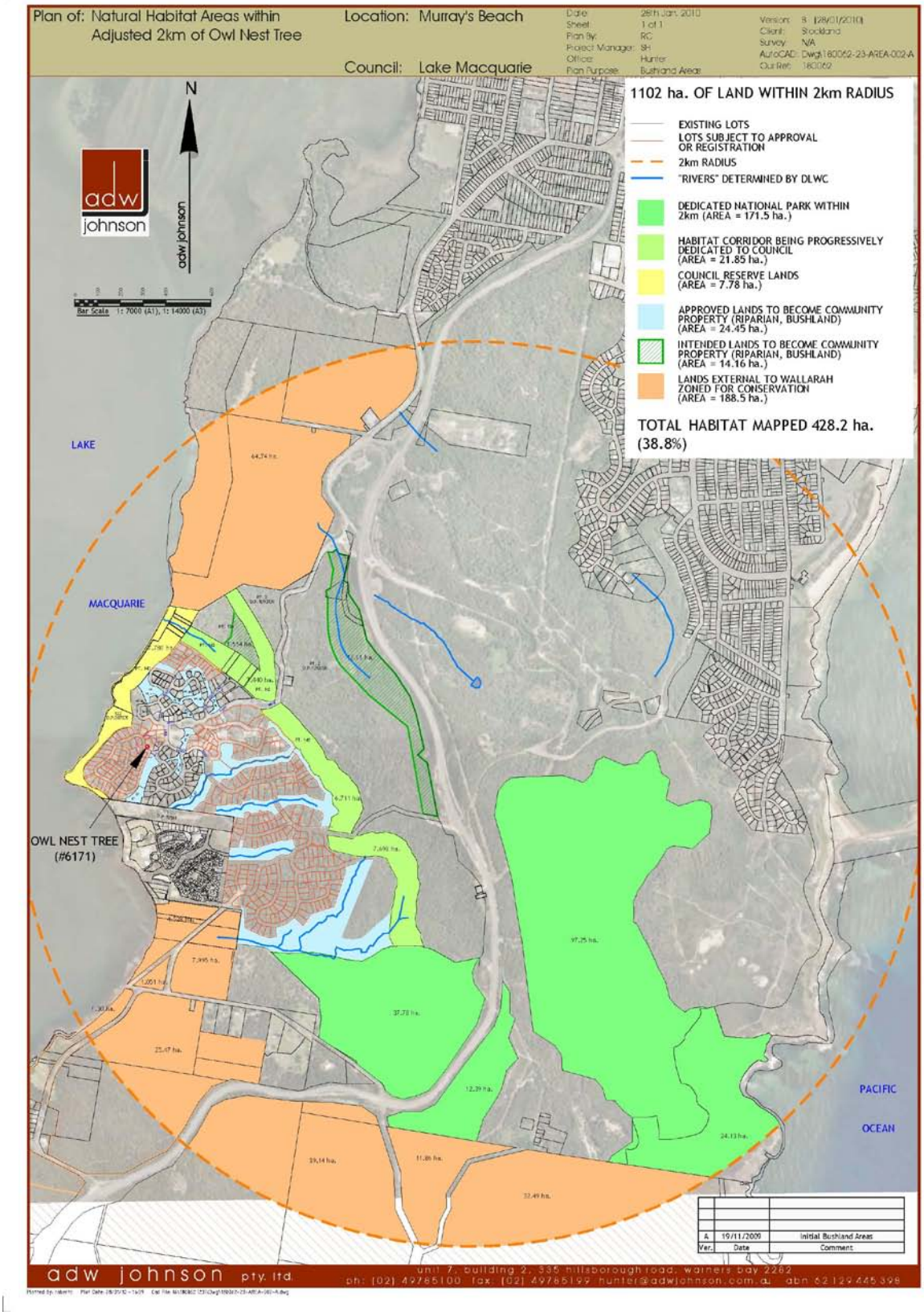

Figure 4. Protected forested land within an adjusted 2 km radius.

Areas of habitat similar to those present in the study area and suitable for the Masked Owl are present in a number of local area reserves including Wallarah National Park, Wyrrabalong National Park, Munmorah State Recreation Area, Lake Macquarie State Recreation Area, Glenrock State Recreation Area, Ourimbah State Forest, the State Forests of the Morisset Forestry District and other local area reserves. These areas are within conservation reserves or forestry areas managed by State Forests and are therefore considered secure habitats for the Masked Owl. Habitats for the Masked Owl within the Lake Macquarie LGA area are conserved within land under the zonings 6 Open Space, 7 Environmental Protection, 8 National Park and 9 Natural Resources.

In addition, it is appropriate to acknowledge the landscape context and strategic status of forested areas immediately to the south of the North Wallarah Peninsula site, which form part of the wider Wallarah Peninsula, connecting to extensive existing State Recreation Areas. The Lower Hunter Regional Strategy (LHRS) identifies significant areas of these landholdings as "proposed conservation lands 'that will be dedicated to the Government'. These areas can be seen in Figure 5 and Figure 6.

Whilst Stockland have no control over development on land not owned by them in southern Wallarah Peninsula, the intention under the LHRS and historical and current proposals over those lands (Coal & Allied and Rosecorp) demonstrate a strong likely conservation outcome. In combination, some 950 ha as a minimum are likely to become dedicated as national park or reserve.

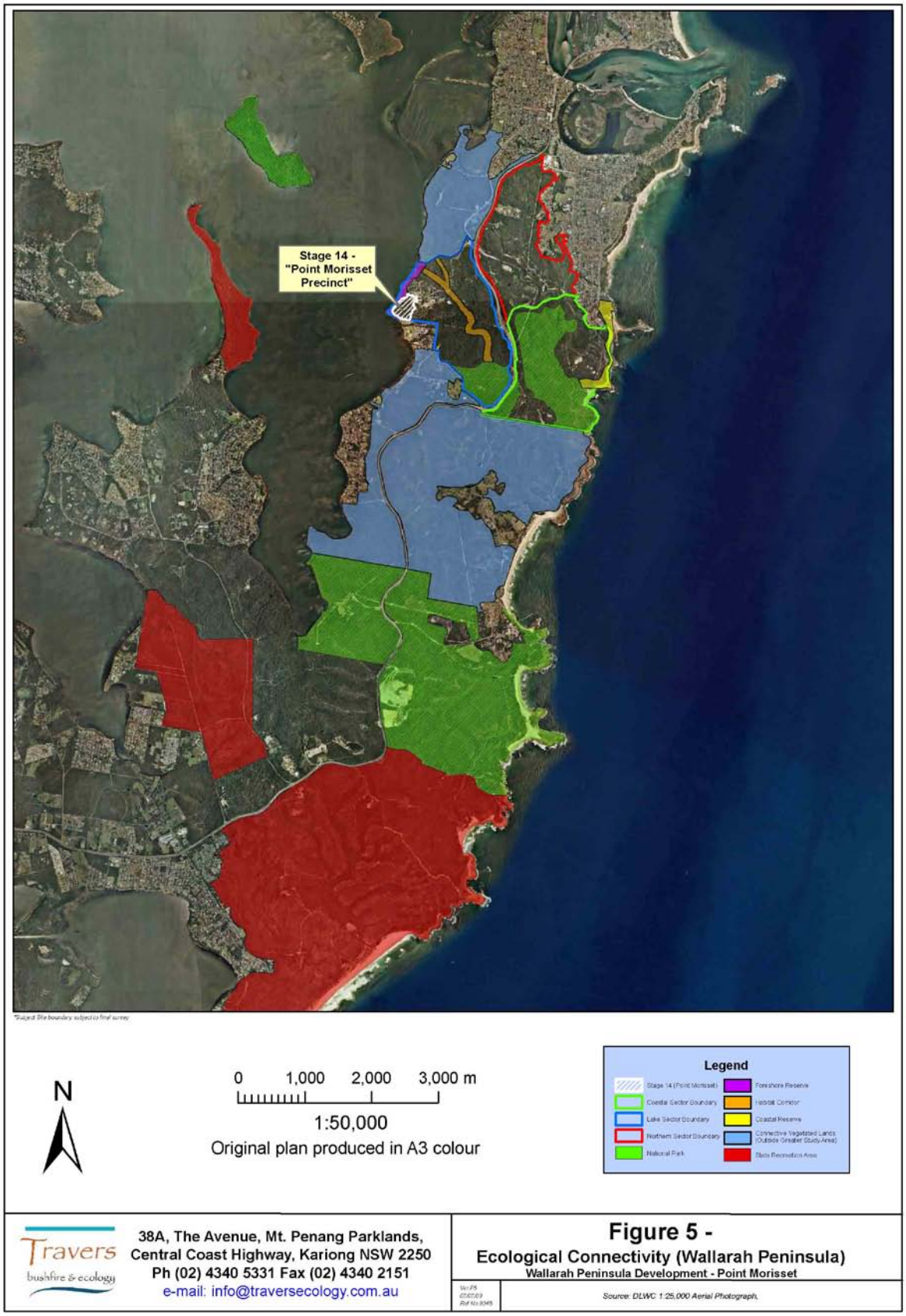

Figure 5 Ecological Connectivity at Wallarah Peninsula (Source: Travers, bushfire and ecology, 2009).

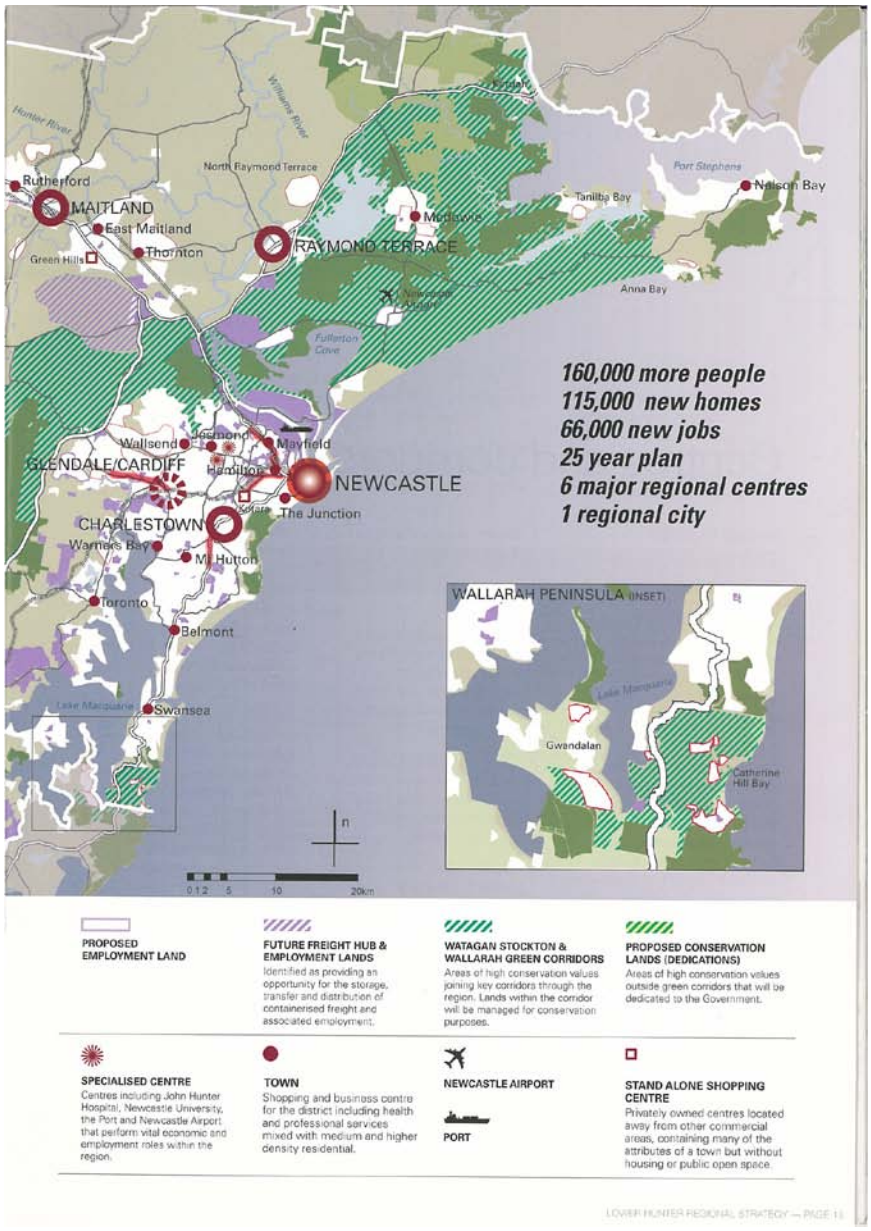

Figure 6. Lower Hunter Regional Strategy (LHRS) conservation areas.

3.2 AVAILABILITY OF ALTERNATE NEST AND ROOST SITES

The question of availability of alternate nest and roost sites is important in being able to predict potential impact on the population of Masked Owls on the Wallarah Peninsula. Specifically, it asks whether, in the event that the pair abandons the nest site in Stage 14, they have an alternative nest site to go to, thereby avoiding the complete failure of breeding for that pair. A related question is whether those 'alternative' resources are already utilised by other pairs of forest owls. The latter question can only be answered with surveys conducted during the owl breeding season. Given the very large areas of forest on the Wallarah Peninsula these questions can be answered to a reasonable extent based on a combination of survey data collected to date and expert opinion. These are discussed below.

Substantial search effort has already been invested in identifying additional hollows that could be used as nest or roost sites over a broad area to the east of Stage 14. An additional five potential nest and roost sites were identified by Mr Young during surveys over a broad area to the east of Stage 14, including a portion of Wallarah National Park. Mr Young states that 'a number of suitable hollow trees were found that would easily house the pair for nesting and roosting purposes from 250 metres east to approx 750 metres east south-east'. Figure 7 shows the location of the five trees located in the area of National Park that was searched. It is reasonable to predict that the remainder of Wallarah National Park would yield a similar density of hollow bearing trees suitable for use as nest or roost trees by Masked Owls.

In total Mr Young has personally identified eight suitable nest/roost trees within 250 m east to 750 m east south-east of the Stage 14 development and believes there would be many more. Based on his extensive experience and surveys so far of the subject land, he considers that in the unlikely event that the pair abandons the site in Stage 14, that there are more than adequate numbers of hollow bearing trees that the birds could move to. The potential utilisation of those resources by other Masked Owl pairs is addressed in Section 3.3 and 3.4 below (landscape context and population).

It should be noted that the land forming the Wallarah National Park was dedicated to NPWS in 2003 for conservation purposes by the previous land owner Lensworth as a direct conservation outcome for the North Wallarah Peninsula development. The purpose of that land dedication was to protect habitat for threatened species known or predicted to occur in the area (which included the Masked Owl), and in recognition of the development that was to proceed north of the now National Park. The boundaries of the dedicated lands were decided following detailed habitat and vegetation analysis for threatened species and abundance of hollow bearing trees. Mr Young has expressed expert opinion, following search efforts in 2009, endorsing that the National Park is extremely well sited from a habitat perspective for Masked Owls.

During October 2009 an additional potential roost tree was identified by Mr Young in approved Stage 9 development to the immediate east of Stage 14. The current approval, whilst retaining the tree, included it within a residential lot within 6 m of a development envelope and with clearing of nearby canopy trees. Stockland have sought to modify the approved layout to positively respond to this information, by protecting that tree within a 30 m buffer (including other canopy retention approved to be cleared) in future community association lands.

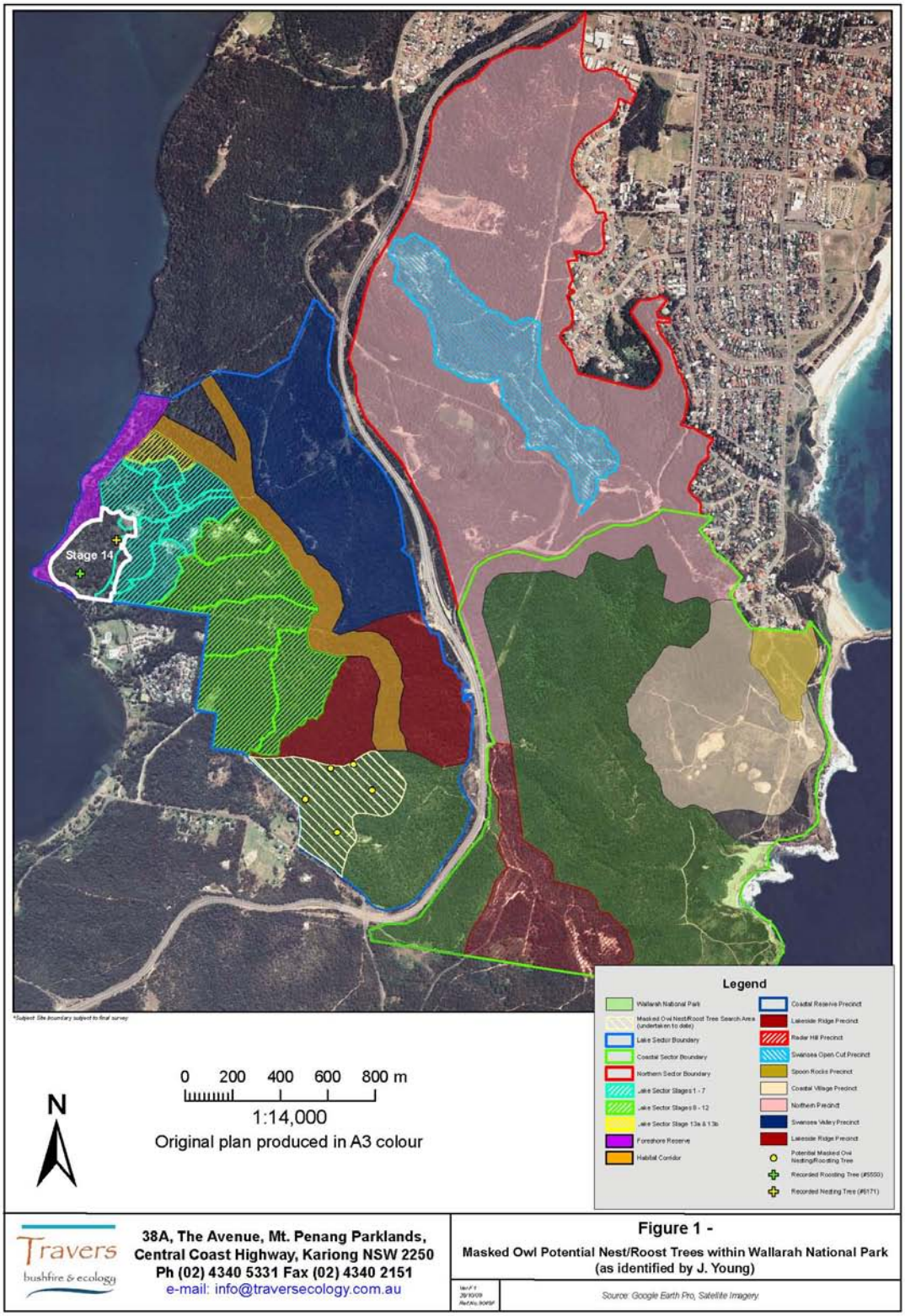

Figure 7. Masked Owl potential Nest/Roost Trees within Wallarah National Park (Source: Travers bushfire and ecology, 2009).

3.3 POPULATION STATUS

3.3.1 Local Government Area

Within the Lake Macquarie LGA, the Masked Owl has been recorded at Charlestown, Awaba, Seahampton, Edgeworth, Speers Point, Eleebana, Mount Sugarloaf, Jewells Swamp, Northville, Dora Creek, Nords Wharf, Floraville, Belmont and Awaba (NPWS 2003). Other recent local records include Belmont and Warners Bay (Kavanagh & Murray 1996).

There are six confirmed Masked Owl nest trees in the Newcastle and Lake Macquarie subregional area. It is likely that they represent separate territorial pairs of Masked Owls. These trees are located south-west of Awaba, Slatey Creek on the south-east slope of Mount Sugarloaf, Rankin Park, Charlestown and abandoned colliery land west of Plattsburgh (Travers 2009 citing Winning 2000).

Murray (1999) identified the Masked Owl at eight of thirty-six survey sites within the Lake Macquarie local government area. The Masked Owl has been detected at Bangalay Reserve Tingira Heights, Belmont, Pinny Beach, Catherine Hill Bay, Seahampton Road Seahampton, Blue Gum Creek on George Booth Drive, Wakefield Road Wakefield and Mount Nellinda Road Cooranbong.

Garnet (2000) cites a 1999 estimate of 1500 to 2000 pairs in north-east NSW and 190 pairs in the State Forest and protected areas of the south –east (citing Higgins 1999 and Kavanagh 1997).

3.3.2 Wallarah Peninsula (Northern and Southern – between Swansea/Caves and existing SRA)

A number of previous studies have identified this species within the general peninsula area as well as within the study area. These include:

- Forest Fauna Surveys (1999): Tingira Heights (1995), Belmont (1995), PinneyBeach – Lakeside Sector (1995), Catherine Hill Bay (1995), Seahampton(1996), George Booth Drive (1996), Wakefield (1995) and Cooranbong (1996).
- TUNRA and Fly By Night Bat Surveys (1995): A tentative identification of a Masked Owl call was recorded during the study. The study indicated that the Masked Owl was also tentatively identified by a member of the Hunter Bird Observers Club at Camp Yondaio, as a roadkill at Pelican in 1972, and was heard in a large quarry near Camp Yondaio in March 1995, although no owl was observed.
- Lake Macquarie City Council (2001): identified the record of a Masked Owl approximately 5 km south of the site.

Estimates of the total area of available (non-developed) potential habitat for the Masked Owl within the Wallarah Peninsula area, suggests available habitat that could support home ranges for at least four pairs of Masked Owls. Additional contiguous areas of habitat to the south of this area (including large areas of uninterrupted vegetation in the vicinity of Frazer Park, Wybung,

Freemans, Budgewoi Peninsula) are likely to provide potential home ranges for a number of additional pairs of Masked Owls (assuming population saturation of potential habitat areas).

3.3.3 North Wallarah Peninsula

As this area is a Peninsula, there are natural boundaries to potential habitat to the east and west, while Swansea forms a northern boundary.

It is considered that the Stockland development area, the private land to the north of the site (along the lake shore and zoned for conservation) and areas south to the northern end of Nords Wharf (zoned for conservation) would provide enough habitat for a pair of Masked Owls. When combined, the approximate areas of this land would be commensurate with the approximate area of a typical Masked Owl home range and is largely represented in the 2km landscape context analysis in previous sections of this report.

Travers (2005) noted that at that time all available Masked Owl records from the Atlas of NSW Wildlife (NSW NPWS 2003) and additional sightings, from the Wallarah Peninsula area were made in Coastal Plains Smooth-barked Apple Woodland (Map Unit 30) and Coastal Foothill Spotted Gum/Ironbark Forest (Map Unit 15) of the LHCCREMS (House 2003) vegetation mapping. When considering the availability of these two vegetation types within the local area, the majority of vegetation on the northern peninsula has been classified as one of these two habitat types (i.e. largely all likely to provide habitat for Masked Owl). These vegetation types are well represented within the conservation reserves of the area, including Wallarah NP, Pulbah Island Nature Reserve, Munmorah State Recreation Area, Point Wolstoncroft and Wangi Point.

The Stockland site sits within the south-eastern sector of the Wallarah Peninsula as identified by Forest Fauna Surveys (1999). This study was commissioned by Lake Macquarie City Council to locate populations and indicate the extent of suitable habitat for large forest owls. Three sites were surveyed on the Wallarah Peninsula. This study indicated that the Powerful Owl and Masked Owl were detected within the Wallarah Peninsula on several occasions. The report concluded that the viability of large forest owls in that sector was relatively secure based on the existing area of remnant vegetation. It was recommended that planning decisions in this area take into account preservation and connectivity of forest stands. Since the time of that study, planning decisions have clearly taken into account preservation and connectivity of forest to proactively retain the security for viability of large forest owls and have included:

- conservation zoning of private lands north and south of the Stockland North Wallarah Peninsula site under Lake Macquarie LEP 2004;
- conservation zoning (and dedication) of Wallarah National Park and major habitat corridor in NWP as part of biodiversity and habitat analysis to facilitate the North Wallarah Peninsula development (including development of current Stockland lands), under North Wallarah LEP 2000;
- approval of NWP Masterplan including Ecological Site Management Plan (to facilitate forest cover connectivity throughout the development area, including riparian areas);

- Identification of conservation land dedication to the south of Stockland site under the Lower Hunter Regional Strategy (and outcomes to deliver those land dedications currently before the State Government).

3.3.4 Conclusion

Giving consideration to the available habitat (refer landscape context section of this report) and food resources, Mr Young has predicted that available habitat on the Wallarah Peninsula could support home ranges for at least three, if not four pairs of Masked Owls (Mr Young *pers. comm.* 2010, Travers 2009 Integrated Ecological Assessment S4.5.1 p 70).

The habitat may support - over the Wallarah Peninsula area (northern and southern), of which one pair is likely within the North Wallarah Peninsula area (which consists of the National Park, major habitat corridor and the majority of Stockland development area).

On the basis of that informed prediction, it is reasonable to assert that the likely alternative nesting and roosting sites reported in Section 3.2 (of which there could be some 30 alternatives in the National Park and major habitat corridor alone) are unlikely to be 'unavailable' to the masked owl breeding pair identified in Stage 14 (due to competition from other Masked Owls), should they seek to relocate as development progresses.

4 SAFEGUARDS AND OFFSETS

Following the confirmation of a breeding pair of Masked Owls in Stage 14 in June 2009, and in recognition of the significance of the find, Stockland made modifications to the proposed layout and put strict mitigation measures in place to ensure that impacts to the Masked Owls were minimised to the greatest extent possible. In designing these safeguards input was sought from Mr Young who has 30 years experience observing the breeding behaviour of Australian Owls and is internationally recognised for his deep knowledge of owl behaviour.

Mr Young has recommended additional modifications to layouts to provide for buffer widths generally as agreed between both owl experts, and this discussion paper has been prepared to 'draw out' pertinent information and expert opinion in response to Dr Kavanagh's queries on alternative roost and nest sites, landscape context/habitat analysis of home range and adjacent territories and population predictions – with an updated 7 part test of significance.

In addition to project modifications, Stockland have committed to mitigating potential impact by preparing a Masked Owl Management Plan for the Stage 14 breeding pair (further details provided below), which will incorporate civil works management, land management, nest box installation and monitoring programs. Preparation of such a management plan is in accordance with the Recovery Plan for this species.

We believe that with the sensitive, carefully timed development proposed for Stage 14, the population of Masked Owls on the Wallarah Peninsula will not be significantly impacted (refer to 7 part test of significance attached to this report and context provided in Sections 2 and 3 above).

Furthermore, the commitments to monitoring (further details provided below) will provide vital information that will contribute to a better understanding of Masked Owl response to sensitive residential development and enable better assessments to be made on impacts of residential development on owl conservation.

Outlined below are the commitments made by Stockland thus far regarding protection of the Masked Owl breeding pair in Stage 14.

4.1 DEVELOPMENT DESIGN AND CONSTRUCTION SAFEGUARDS

The commitments set out below reflect the recommendations in Mr Young's report which is annexed to the SEE. Stockland in its development application proposes to meet these commitments.

- Retention of Roost Tree 5550
- Retention of Nest Tree 6171
- Retention of perch trees 5483 and 5548
- 30 m radius buffer put in place around roost tree
- 50 m radius buffer put in place around nest tree

- Shifting of road alignment, lot boundaries and development envelopes further away from the nest and roost trees (including reduction in lot yield to incorporate buffers)
- Inclusion of the nest and roost trees and buffers in future community association land, with specific management requirements
- Road speed limited to 40 km/hr within the development

4.1.1 Construction timing

- No subdivision civil works including road construction to occur between March and September (owl breeding season).

4.1.2 Habitat Retention and Provision

- Tree protection and retention controls across Stage 14 to be retained (i.e. in the order of 50% tree retention proposed to date, which includes some 330+ mature native trees retained within the stage area, including Spotted Gum, Ironbark and Forest Red Gums);
- Retention of all mature trees within the 30m and 50m buffer areas;
- Provision of additional tree planting within Stage 14 area to provide for landscape succession, as well as planting proposed in adjoining foreshore reserve to solidify its ecological role (as detailed in the Stage 14 landscape strategy);
- Protection and identification of some 50 hollow bearing trees within the Stage 14 development proposal, which retains potential trees for arboreal mammals, owls and other birds, and inclusion of their ecological status on individual lot site analysis and development envelope plans;
- Appropriate identification of all hollow bearing trees during civil construction to protect them from construction activities and specifically for trees 5350 & 5548;
- Three specifically designed 'masked owl' suitable nest boxes to be provided as part of Stage 14.

4.2 COMMITMENTS TO ONGOING MONITORING & MANAGEMENT AS PART OF STAGE 14

4.2.1 Masked Owl Management Plan

A Masked Owl Management Plan (MOMP) will be prepared prior to any construction commencing. The scope of the MOMP will be to manage the breeding pair of Masked Owls in relation to the development in Stage 14 but where possible will incorporate information gathered about the broader context.

The MOMP will be written to enable updating to reflect any new findings relevant to the management of the Masked Owl pair as a result of monitoring or work that Stockland undertakes outside the parameters of Stage 14 specifically across their landholdings (refer Section 4.4).

The MOMP will:

- provide a background to the Masked Owl – general and in context to local area
- specify any civil construction practices that may be applicable
- Prescribe management requirements for the two areas of land around the nest and roost tree, including landscaping requirements (if any)
- detail timing and responsibilities for all management actions as part of an Implementation Schedule
- Document a long term monitoring program on the Masked Owl and its response to the development
- provide a reporting timeframe on monitoring outcomes
- provide a timeframe for revision and update of the plan so that it can be responsive to findings of ongoing monitoring
- detail a monitoring and maintenance schedule for nest boxes.

A multi-species owl management plan that addresses owl conservation and management on the entire Wallarah Peninsula, as inferred by Dr Kavanagh, is not the responsibility of Stockland to prepare. Stockland can only be responsible for preparing management plans in relation to developments undertaken on their land.

The issue that requires addressing is the potential impact on Masked Owl in Stage 14. It is not feasible to attempt to address management of other owl species in response to this issue when the development application at hand has no potential to impact on other owl species.

4.2.2 Monitoring

A monitoring program will be specified within the MOMP to conduct annual monitoring of the Masked Owl nest and breeding activity prior to and during Stage 14 development. The monitoring would be conducted for a period of at least 5 years post development. The monitoring program will be conducted by Mr Young.

4.3 WALLARAH NATIONAL PARK LAND DEDICATION

Section 1.0 of this report outlined the dedication of the Wallarah National Park. For further background, in 2003 prior to the development approval process commencing, 180 ha of land was dedicated to form part of Wallarah National Park as an informal offset. A memorandum of understanding was formed between the then Department of Environment and Conservation (now DECCW) and Stockland. This land dedication pre-dated the legislative framework introduced for biodiversity offsets in 2007[2] by the NSW Government so no formal audit of biodiversity values was conducted at the time of dedicating the offset. However, the biodiversity values of the offset

[2] *Threatened Species Conservation (Biodiversity Banking) Regulation 2008*.

land are acknowledged in the MOU and Wallarah NP Interim Management Guidelines, and alone the incorporation into the National Park estate attests to the high ecological value of the land.

The documented ecological values of the Wallarah National Park offset include:

- Threatened plants
- Threatened fauna
- Habitat resources

This is acknowledged in the LES and CLUMP (which directed the identification of the land for dedication). The ESMP for the site states that 'the location of these conserved areas coincides with those parts of the site with the greatest conservation value and is based on a scientific investigation of the ecological values of the site'.

The Wallarah National Park Interim Management Guidelines (2003) (p15) state "*The national park will be closely tied to the Wallarah Peninsula Project being managed by LWP (*now Stockland*). It is anticipated that many visitors will be associated with the development of the Wallarah Peninsula and several points of access to the national park will be via development areas. The national park will be bounded by the development to the north, north east and a small section in the south (Radar Hill). Planning and management for the national park will be conducted in liaison with LWP and consideration will be given to provision of NPWS visitor information in the Lake sector of the Wallarah Peninsula Project".*

4.4 STOCKLAND COMMITMENT BEYOND STAGE 14

Whilst not relevant to Stage 14 assessment directly, in recognition of the large forest owls usage of the North Wallarah Peninsula site, Stockland are reviewing areas approved for development (Stages 10-12 Lake Sector), similar to the approach they have taken in Stage 9, and will assess modifications to layouts as a result of that review work.

In addition, expert owl input will be sought and provided within all future development applications in the Lake and Northern Sectors for which there are no development consents (other than the approved Masterplan), to identify any potential or actual nest and roost tree locations and recommendations relating to those where they are found to occur outside of the core conservation areas. Some of this work has already commenced to inform planning for development over those other areas.

Over time, this input will expand and supplement the knowledge of potential roost and nest trees and update and refine the landscape context picture with Stockland landholdings and an improved understanding of the status of large forest owl population and usage of the North Wallarah Peninsula area under Stockland's control. That knowledge can, as relevant, be fed into updates of the Stage 14 MOMP, link into monitoring of the Stage 14 Masked Owl pair usage of the identified nest tree, expansion of that MOMP to other development areas, or new management plans for other large forest owl species (likely for northern sector). This work can then contribute to comprehensive study or plan for the wider Peninsula that Council or DECC may wish to progress.

It is noted that within the Wallarah National Park Statement of Interim Management Intent, actions include research and survey encouraged into distribution, habitat and ecology of species in the park, with priority given to species including Powerful Owl) and recovery plans will be implemented, as Priority 2 activities. To our knowledge, these activities have not been pursued to date.

However in recognition of the objectives of the Recovery Plan and to promote current scientific understanding and proactive environmental management, Stockland propose to contribute to an ARC linkage grant to that would fund a PhD student to undertake and publish the necessary research.

5 LIKELIHOOD OF IMPACT

Substantial existing information and expert opinion as outlined in preceding sections of this discussion paper lead to a conclusion that the development proposed at Stage 14 will not have a significant impact on the breeding pair of Masked Owls, and further that the population of Masked Owls on the Wallarah Peninsula will almost certainly not be placed at risk of extinction as a result of the development.

In support of this conclusion the following points are noted:

a) Of all the Australian Owl species Masked Owls appear to be the most resilient to disturbance – a fact acknowledged by both Mr Young and Dr Kavanagh.

b) The owls have successfully bred and fledged one young at the Stage 14 nest site, persisting through the construction and occupation of a dwelling on Lot 29 some 25 m away from the nest tree, suggesting they are resilient to disturbance.

c) The proposed buffers around the nest and roost tree have been agreed to by both owl experts. They are based on current best practice in the NSW State Government forestry industry, and only form part of appropriate owl management.

d) Substantial alternative nesting and roosting resources have been identified by an owl expert in sample areas of adjacent forested areas that have been dedicated for conservation as a direct outcome of the North Wallarah Peninsula residential project. Density of such resource has been extrapolated over the balance of the high quality conservation lands supporting the expert opinion on the substantial alternative resource available, without even taking into account any such resource that may also exist elsewhere across the North Wallarah Peninsula area (see discussion section 3.1).

e) In a landscape context, more than adequate habitat resources[3] are protected for a Masked Owl pair in the North Wallarah Peninsula area, with some 400 ha of forested habitat protected by various conservation zonings or riparian protection (see discussion section 3.2).

f) There is substantial evidence and expert opinion that at least four pairs of Masked Owls occur on the wider Wallarah Peninsula, including one pair within the Northern Wallarah Peninsula area which includes Stockland landholdings. There is substantial forest cover zoned and identified for conservation south of the NWP and outside the 2 km likely home range of the NWP pair to inform expert opinion that there will not be such competition for NWP habitat or alternative nesting and roosting resource such that it is 'unavailable'

[3] Based on Dr Kavanagh requirement for 400 ha protected in perpetuity within a 2km radius.

for the NWP pair should they abandon nesting within Stage 14 at any time in the future (see discussion 3.4).

The Recovery Plan for Large Forest Owls (DECC 2006) lists objectives and management actions recommended to ensure that viable populations of the species continue in the wild in NSW in each region where it presently occurs. There are substantial indications that the Masked Owl pair at Stage 14 are resilient enough to handle the slow encroachment of low impact development and will persist. Protective buffers and other safeguards have been implemented in an attempt to increase the probably that they persist. The monitoring of the response of the owls to this unique development will provide vital information that will contribute to a better understanding of Masked Owl response to sensitive residential development and enable better assessments to be made on impacts of residential development on owl conservation.

It is our considered expert opinion that Stage 14 development is unlikely to result in a significant effect on Masked Owls, drawing from this discussion paper and the updated 7 part test of significance. Accordingly a Species Impact Statement is not considered necessary.

It is appropriate that a range of development conditions should be applied to any Stage 14 approval to incorporate management and monitoring requirements (see discussion in section 6.0). Whist not directly relevant to the Stage 14 development application, consideration of large forest owls will need to be made by Stockland and consent authorities in all development applications which occur within the North Wallarah Peninsula where no development consent has yet to be issued (e.g. all lands east of the major habitat corridor and the Northern Sector). Any new knowledge obtained through those considerations should be updated and shared with authorities to contribute over time to a better understanding of the Masked Owl across the NWP area and as part of the wider Wallarah Peninsula area and broader conservation to the south.

Table 2 below summarises our response to the key points raised by Dr Kavanagh and justification for our finding of no significant impact and no requirement for SIS.

Table 2 Summary of response

Issue Identified by Dr Kavanagh	Stockland Response
Adequacy of Buffers	Buffers to be implemented as per agreed by owl experts.
Landscape context	Assessment of protected lands within a 2 km radius of the nest, under several scenarios suggests more than adequate availability of habitat.
Availability of alternate nest and roost sites	Targeted sample surveys and resource density and habitat extrapolation, and expert opinion, suggests there are substantial additional trees within the owl's home range (in conservation zoned and protected lands) that provide suitable sized hollows for alternative roosting and nesting

Issue Identified by Dr Kavanagh	Stockland Response
	should that ultimately prove necessary, and that those would not be rendered 'unavailable' by predicted density of other large forest owl pairs.
Monitoring Program	Stockland has committed to this should the development proceed and monitoring can form part of any approval condition. *Monitoring cannot be achieved within a SIS.*
Masked Owl Management Plan	Stockland have committed to the preparation and implementation of a MOMP relating to Stage 14 and that can form part of any approval condition. *Management cannot be achieved within an SIS.*

6 PROPOSED CONSENT CONDITIONS

There is some confusion or lack of clarity in the Dr Kavanagh's document as to the scale and geographic scope to which a Masked Owl Management Plan should apply. On this issue Stockland make the following observations and comments:

The scope of monitoring and management planning needs to be concentrated on that necessary to adequately and satisfactorily address issues pertaining to the Masked Owl pair in Stage 14. We do not accept that a peninsula wide study of multiple owl species that seeks to locate every owl nest or roost is a reasonable, appropriate or even feasible expectation to place on Stockland. The current state of knowledge on large forest owls is poor, but Stockland cannot be expected to take full responsibility for closing this knowledge gap.

Stockland proposes to incorporate all the recommendations outlined in Section 4.1 (relating to development design, habitat retention and construction management) and to prepare and implement a management plan for the Masked Owl relative to Stage 14 impacts, undertake annual monitoring of the Masked Owl response during subdivision development and for a certain number of years post development and annual monitoring of specially designed and installed nest boxes, as outlined in Section 4.2.

To that end, a possible consent condition relating to the Masked Owl (in addition to approval of a modified layout which incorporates the 30 and 50m buffers with owl expert endorsed encroachments and proposed tree retention/landscape strategy and the like), could be:

Prior to issue of a Construction Certificate for Stage 14 works, a Masked Owl Management Plan is to be prepared and submitted to Council by a recognised owl expert. It is to include:

- Background on general Masked Owl Ecology;
- Background on general Masked Owl Habitat and Resources Context within the North Wallarah Peninsula area (summarising the relevant information from the submitted Discussion Paper by **ngh**environmental and John Young Wildlife February 2010).
- Prescribe any Stage 14 Subdivision Civil Construction Practices, including details on what civil works in what areas are not to occur during specific breeding season times.
- Prescribe Management Requirements for the future Community Association Land areas containing the Nest and Roost Trees within Stage 14.
- Prescribe Installation, Maintenance and Monitoring Schedule for three specially designed Masked Owl Nest Boxes.
- Document a Monitoring Program on the Masked Owl nest and breeding activity within Stage 14 (from 2010, during and for at least 5 years post civil construction being completed);

- Provide a Reporting Program on all Monitoring Outcomes, including provision of annual monitoring report submitted to the Consent Authority;
- Provide for revision and update of the plan on a biannual basis for the length of the Monitoring Program, to reflect any new findings relevant to the management of the Masked Owl pair as a result of the monitoring work, or information gathered by Stockland or others about the broader context outside the parameters of Stage 14 development.
- Include an Implementation Schedule which details timing and responsibilities for all aspects of the Management Plan.

7 REFERENCES

Department of Environment and Conservation (NSW) 2006. NSW Recovery Plan for the Large Forest Owls: Powerful Owl (*Ninox strenua*), Sooty Owl *Tyto tenebricosa*) and Masked Owl (*Tyto novaehollandia*e). DEC, Sydney.

Elliot, A.J. (1935). Some Notes on two Masked Owl Nestlings. *Emu* 34:196-199.

Forest Fauna Surveys (1999). Distribution of the Large Forest Owls in the City of Lake Macquarie. Report prepared for Lake Macquarie city Council.

Garnett, S.T. and Crowley, G.M. (2000). The Action Plan for Australian Birds 2000. (Natural Heritage Trust). Environment Australia Canberra ACT.

Kavanagh, R.P., Debus, S., Tweedie, T and Webster, R. (1995) Distribution of Nocturnal Forest Birds and Mammals in North-eastern New South Wales: Relationships with Environmental Variables and Management History. *Wildlife Research* 22: 359-77.

Kavanagh, RP and Murray M (1996). Home Range, Habitat and Behaviour of the Masked Owl *Tyto novaehollandiae* near Newcastle, New south Wales. *Emu* 96: 250-257.

Lake Macquarie Local Environmental Plan (2000). North Wallarah Peninsula.

Lunney D. (2004) Conservation of Australia's Forest Fauna (2nd edition) edited by Daniel Lunney. Royal Zoological Society of NSW, Mosman, NSW, Australia.

Manidis Roberts (2003). North Wallarah Peninsula Masterplan. Ecological Site Management Plan.

New South Wales National Parks and Wildlife Service. (2003). The Wallarah National Park Interim Management Guidelines.

Travers Bushfire and Ecology (2005) Flora and Fauna Assessment Stages 8-12 Lake Sector North Wallarah Peninsula. Report Prepared for Lensworth Wallarah Peninsula Pty Ltd.

Travers Bushfire and Ecology (2009) Integrated Ecological Assessment Stage 14. Point Morisset Precinct Murrays Beach. Report prepared for Stockland Wallarah Peninsula Pty Ltd.

Woodward Clyde (2000). North Wallarah Peninsula Project Conservation and Land Use Management Plan. Report Prepared for Lake Macquarie city Council.

Woodward-Clyde (1999). North Wallarah Peninsula Project – Local Environmental Study.

Appendix A **7 PART TEST**

Section 5A of the *Environmental Planning and Assessment Act 1979* (EPA Act) states that in the administration of s78A, there are seven factors that must be taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats. Those factors are listed in part 2 of s5A and are known as a seven part test. If a seven part test concludes that a significant impact is likely on any of the above then the proponent is required to prepare a Species Impact Statement (SIS). Threatened species and habitat have the same meaning as in the *Threatened Species Conservation Act 1995* (TSC Act).

The Seven Part Test aims to improve the standard of consideration afforded to threatened species, populations and ecological communities, and their habitats throughout the planning and assessment process and to ensure this consideration is transparent. Listed under the *Threatened Species Conservation Amendment Act 2002* (TSCA Act), the revised factors affect s5A EP&A Act, s94 *Threatened Species Conservation Act 1995* (TSC Act) and s220ZZ *Fisheries Management Act 1994* (FM Act).

The seven factors to be considered when determining whether an action, development or activity is likely to significantly affect threatened species, populations or communities, or their habitats, are addressed below for the Masked Owl at Stage 14 Murrays Beach. This section should be read in conjunction with the substantial background information provided in the main body of this report. In preparing this assessment the Threatened Species Assessment Guidelines (DECC 2007) have been taken into account, as required under s 5A (1)(b) of the EPA Act.

The Masked Owl is listed as Vulnerable on Schedule 2 of the TSC Act.

a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Masked Owls breed annually between March and September peaking in May to July. The distinctive courtship behaviour can begin as early as February. The birds nest in large hollows of old eucalypts. The nest hollow is typically greater than 40 cm wide and greater than 100 cm deep. There is no relationship with distance to streams (DECC 2006). Roosting hollows can also be used as nest sites and are usually located in dense forested gullies. Caves and cliffs are also used as roost sites. A pair is faithful to a nesting hollow but may also use alternative breeding hollows in the territory in different years (DECC 2006 quoting data from various sources).

The pair of Masked Owls in Stage 14 bred in the 2009 season and fledged one young. This breeding event occurred within 25 m of house construction in Stage 1-7 with no effect on the life cycle of the birds.

Alternative breeding hollows have been located in nearby forest including the national park, by owl expert Mr Young.

Protective measures will be put in place including a 50 m buffer around the nest tree and a 30 m buffer around the roost tree, controls on construction activity during the breeding season, retention of perch trees

Masked Owls are the most resilient of all Australian Owls and there is substantial evidence that they can tolerate disturbance around their roost and nest trees (including vegetation clearance, human occupation, and construction activity). It is the expert opinion of owl specialist Mr Young that given evidence of their successful breeding during disturbance in 2009 and with all recommended safeguards put in place there will be no impact on the breeding pair of Owls in Stage 14. In the event that the owls do not select the Stage 14 trees again to breed there are ample alternative nest and roost sites in forest within their home range, including numerous protected in the Wallarah National Park.

It is thus highly improbable that the local population of Masked Owls will be placed at risk of extinction as a result of the proposed development at Murrays Beach.

b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

Not applicable

c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable

d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed

The subject site has an area of 8.5 ha. Residential development encircles the site on its northern, eastern and south-eastern boundaries. The shores of Lake Macquarie form the western and south western boundaries of the site. House construction has occurred to within 25 m of the known nest tree. The habitat within which the owl nest tree is located is already highly modified; selected canopy trees have been removed and the understorey has been reduced to less than 5% cover and is regularly slashed.

Mature trees will be removed for the proposed development but canopy connectivity will be retained with a tree retention rate in the order of 55%. Approximately 50% of the hollow bearing trees on the site will be retained and the majority of those to be removed (about 36 trees) contain

only small hollows, unsuitable for Masked Owls or their prey. There is arboreal connectivity only across the site, and the loss of approximately 45% of the canopy trees will not break the canopy connectivity to the Foreshore Reserve area or nearby riparian zones. Within the general locality (Lake Sector) there are designated and approved habitat corridors linking the Foreshore Reserve to Wallarah National Park, all connected to a large patch of similar native vegetation greater than 500 ha.

No breeding or roosting habitat for the owls will be removed and the existing roost and nest tree will be protected in an exclusive buffer zone. Identified perch trees will also be retained. The site is not thought to provide important foraging habitat (Mr Young *pers. comm.)*. Supplementary roosting habitat in the form of custom designed nest boxes will be placed in Stage 14 approximately 100 m from the existing roost tree.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposal will not result in any increased fragmentation or isolation. Connectivity to other tracts of forest will be retained through the foreshore reserve and habitat corridor to the National Park.

Figure 5 shows vegetation connectivity at the landscape level. The site itself is currently altered and surrounded by residential development to within 25 of the nest tree and the environment was such during the last breeding season. Further development at Stage 14 will result in some further loss of trees but canopy connectivity will be retained through a higher than usual tree retention rate (in the order of 55%).

A Habitat Corridor is situated to the north-east of Stage 14. In addition Stage 14 is bound to the north and west by the Foreshore Reserve. The presence of these corridors means that the removal of vegetation from within the site will not isolate areas of habitat. These corridors will provide a link between habitats to the south within Wallarah National Park and habitats to the north (zoned for protection). This corridor is generally 100 metres in width. It branches into two corridors in the northern section of the Lake Sector. These branches provide connectivity to both the habitats to the north (outside of Lake Sector) and to Foreshore Reserve. The northern link to the Foreshore Reserve includes an area of Swamp Mahogany, which adds to the overall diversity within the corridor and aids the movement of fauna, thereby increasing connectivity. Stage 14 currently has little connectivity to the south.

There is some level of fragmentation in the area immediately surrounding stage 14 as a result of development that has occurred to date. However the foraging behaviour of this species is such that some level of fragmentation and disturbed forested landscapes are known to be an ecological advantage for this species' predatory habits.

The presence of the Owl in Tree 6171 beside already constructed urban footprints including dwellings and roads suggests that the birds may not be directly affected by adjoining site conditions and further, that they may have in fact acclimatised to slowly encroaching development (Mr Young *pers. comm.).*

Thus there will be no further fragmentation of roosting, breeding or foraging habitat and fundamental values for roosting, breeding and foraging will be retained. This is according to owl expert Mr Young, and based on the surrounding development activities incurred in close proximity until now.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

Elements of the site are important for breeding habitat in the form of a hollow bearing nest tree and roost tree used by the male. Both of these trees are to be protected and the breeding cycle will be protected by avoiding civil construction during the breeding season in close proximity to the trees. The site does not provide important foraging habitat and the owls are likely to travel many kilometres from the site to forage.

In conclusion, the loss of habitat within the Stage 14 precinct is ecologically acceptable given that:

- The remnant vegetation is mostly comprised of canopy species only whereby less than 5% of the shrub layer remains, already significantly reducing the potential of threatened species occurrence.
- Approximately 55% of trees will be retained as they provide hollow bearing resources and a winter flowering resource for fauna.
- Better areas (or at least equivalent) of vegetation will be conserved within the Foreshore Reserve, community drainage reserves, habitat corridors and within Wallarah National Park.
- The proposed landscape planning involves the planting of E. tereticornis trees and associated community species within the Foreshore Reserve, drainage lines and road reserve.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

No critical habitat has been declared for this species.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

The DECC (2006) Recovery Plan for Large Forest Owls identifies eight overall objectives each with a number of priority actions within it. Table 3 below outlines recovery actions to which Stockland intend to contribute through this project and which we recommend be drafted into development consent conditions.

Table 3 Recovery Actions for Large forest Owls

Recovery Plan Objective	Recovery Plan Objective details	Stockland Response
Objective 1	Model and map owl habitat and validate with surveys.	Stockland have commenced survey and mapping of owl habitat and breeding pairs within their land holdings on the Wallarah Peninsula. The work commenced in October 2009 and will continue throughout the 2010 breeding season. Survey results can be provided to DECCW to assist with validation of their models.
Objective 2	Monitor Owl population parameters (numbers, distribution, territory fidelity and breeding success).	Stockland will monitor the post development breeding success and territory fidelity of the Stage 14 breeding pair. Stockland will further contribute to an ARC Linkage grant to fund a PhD scholarship to undertake the broader research into large forest owls on the Wallarah Peninsula which is currently lacking. This research could adopt monitoring of the known pair in Stage 14.
Objective 3	Audit Forestry Prescriptions.	Whilst this action relates to forestry operations there are no existing guidelines on appropriate buffers for residential developments. Stockland will undertake post-development monitoring to confirm the efficacy of the nest and roost tree buffers, adopted from forestry prescriptions.
Objective 4	Ensure the impacts on large forest owls and their habitats are adequately assessed during planning and environmental assessment processes.	Whilst it is the responsibility of DECCW to disseminate guidelines and tools to assist consent authorities and consultants to assess and mitigate impacts on large forest owls, data gained post-development on this project will make a significant contribution to understanding the impacts and mitigation related to such developments. Specifically, in regard to objective 4.2 outlined below.
Objective 4.2	Monitor and report on the effectiveness of concurrence and licence conditions that have previously been applied to reduce	Stockland is proposing to conduct monitoring and reporting in accordance with this objective. Specifically, post-development monitoring in accordance with

Recovery Plan Objective	Recovery Plan Objective details	Stockland Response
	the impacts of developments on the three large forest owl species or their habitats. This involves pos-development monitoring.	consent conditions will provide precisely the outcome recommended under this priority action and will contribute to the development of a set of guidelines that may be used to mitigate the impacts of developments on the Masked Owl outside conservation reserves and State forests.
Objective 5.	Minimise further loss and fragmentation of habitat by protection and more informed management of significant owl habitat (including protection of individual nest sites).	The nest site on Stage 14 is to be protected within a 50 m radius buffer zone. Surveys to be undertaken by Stockland will provide a significant contribution to more informed management of owl habitat. A significant contribution to protection of owl habitat was made with the dedication of the 180 ha Wallarah National Park.
Objective 5.3	Encourage private landholders to undertake management options to conserve and/or actively manage large forest owl habitat (and particularly nest sites) through incentive Property Vegetation Plans, Voluntary Conservation Agreements or other management initiatives.	This has been actioned since the original conceptual planning stages by provision of extensive forest conservation areas and connective corridors throughout the Lake Sector and most notably the conservation by the developer of the Wallarah National Park (180 ha).
Objective 6	Undertake Research on key areas of biology and ecology including trialling nest boxes for owls and their prey.	Stockland have committed to undertake post-development monitoring including monitoring of nest box use at Stage 14 and this could be incorporated into the PhD program.
Objective 6.1	Seek an ARC Linkage grant or other joint funding opportunity to initiate research into identified key areas of the biology and ecology of the large forest Owls.	Stockland propose to contribute to an ARC Linkage grant to fund a PhD scholarship to undertake research into large forest owls on the Wallarah Peninsula.
Objective 7	Increase Community Awareness and involvement in owl conservation.	Stockland to consider future possibilities for raising community awareness.

Thus, the development is consistent with the objectives and actions of the relevant recovery plan and will contribute significantly to achieving those objectives.

g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A key threatening process is defined in the *TSC Act* (1995) as a process that threatens, or could threaten, the survival or evolutionary development of species, populations or ecological communities.

Key threatening processes relevant to the proposal include:

- clearing of native vegetation
- loss of hollow-bearing trees
- Removal of dead wood and dead trees

The removal of native vegetation on the subject site is not likely to significantly affect the Masked Owl due to the extent of canopy vegetation to be retained, the lack of existing terrestrial vegetation structure and better quality natural vegetation within the local area; all of which has been validated in the biodiversity strategy (CLUMP 2000 and ESMP 2003).

The main threat to this species is likely to be the clearing of forest for agriculture and intensive logging (Garnett 2000) which remove old trees containing suitable nesting hollows. In addition the vigorous regrowth following logging is thought to limited foraging habitat availability.

Hollow-bearing tree surveys have identified and mapped hollows according to class categories based on the size and numbers of hollows present (Travers 2009). Field assessment to finalise the road and lot layout has been undertaken to ensure that hollow-bearing trees are best incorporated into the proposal according to their class. The majority of trees bearing medium to large hollows will be retained, overall tree retention will be in the order of 55%. Supplementary habitat will provided in the form of specially designed nest boxes to be placed within Stage 14.

The nest tree and roost tree will be retained and strictly protected under supervision of Mr Young.

Therefore the development will not exacerbate any of threatening processes to the extent that they will impact on the Masked Owls pair in Stage 14, nor the Masked Owl Population of the Wallarah Peninsula.

Conclusion

Based on the information presented in this document and the assessment against the Section 5A heads of consideration, it is considered unlikely that the proposed development in Stage 14 will have a significant effect on the pair of breeding Masked Owls. Further, this report concludes that it is highly unlikely that the proposed development is likely to have an adverse effect on the life cycle of the species such that the local population of the Masked Owl is placed at risk of extinction.

This is in view of the following key facts:

- The pair has successfully bred on the site during construction and subsequent occupation of a dwelling.
- Protective buffers as agreed by owl exerts will be put in place around the roost and nest trees.
- There are substantial additional roost and nest trees available in forested habitats within the bird's home range.
- No breeding or foraging habitat is being removed.
- In a landscape context, more than adequate habitat resources are protected for a Masked Owl pair in the North Wallarah Peninsula area, with some 400 ha of forested habitat protected by various conservation zonings or riparian protection.

Appendix B QUALIFICATIONS OF MR JOHN YOUNG AND DR JACQUELINE COUGHLAN

Mr John Young Wildlife Enterprises.

Mr Young's principal area of interest is Australian birdlife and as a result of more than 30 years observing, researching and filming bird behaviour he is one of Australia's leading authorities on the breeding biology of birds, in particular owls. Over the last 30 years he's been involved with numerous projects for television, film, books, periodicals, university studies and conservation projects.

He is an acknowledged expert at locating breeding birds in the wild and has found more than 600 species of Australian birds. He discovered the first nests ever found for several species including the lesser sooty owl, the red boobook owl and the green-backed honeyeater. In more recent times, he has worked with the Queensland and NSW Parks and Wildlife Services to locate nests and capture live young of the near-extinct eastern bristlebird.

He consults on an ongoing basis to the EPA, State Parks & Wildlife Services and various commercial organizations on a range of projects including habitat protection, the location and preservation of rare and endangered species and environmentally-responsible property development.

Dr Jacqueline Coughlan BSc, PhD, Grad Dip Env. Law. Principal Ecologist nghenvironmental.

Dr Coughlan joined **ngh**environmental a year ago as Biodiversity Manager Sydney. Her practical ecological skills in terrestrial and freshwater ecology have been developed over 20 years in several states. She has designed, conducted and managed numerous fauna and flora surveys in New South Wales, Queensland and Western Australia. Dr Coughlan is experienced in all vertebrate fauna survey techniques including specialist threatened species surveys and habitat assessments and has conducted surveys in a broad range of environments including forest, woodland, grassland, mangrove, wetland, coastal and island communities. Dr Coughlan's specialist skills in bird ecology have been used in impact assessment in Australia and internationally in grasslands and wetlands of Inner Mongolia.

Dr Coughlan has a Graduate Diploma in Environmental Law from Sydney University (2009) and has a thorough working knowledge of State and Commonwealth environmental legislation. Her PhD (2000) focused on the ecology of bird communities in rare dry rainforest vegetation in far north Queensland. The work has been published in Conservation of Australia's Forest Fauna (Lunney 2004).

Dr Coughlan has worked for a broad range of private and government clients including Department of Defence, NSW RTA, British Gas, WWF, Stockland Developments, Landcom, Sydney Water and NSW Maritime and has been engaged by several legal firms to provide expert witness statements to cases in the Land and Environment Court regarding fauna issues.