LFA (PACIFIC) PTY LIMITED

Shell Cove Boat Harbour Precinct (MP07_0027)

Preferred Project Report

November 2010

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In Conjunction with

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1 INTRODUCTION

This document is a Preferred Project Report prepared on behalf of Australand Corporation (NSW) Pty Ltd as part of the Concept Plan Application for the Shell Cove Boat Harbour Precinct (MP07_0027) under Part 3A of the Environmental Planning and Assessment Act 1979.

The information contained within this Preferred Project Report has been prepared in response to the issues raised in the submissions lodged by State government agencies, Shellharbour Council and the public during the public exhibition of the Concept Plan Application and Environmental Assessment.

The responses set out in this report address all the issues raised. Accordingly, Australand Corporation (NSW) looks forward to the Minister's favourable consideration of the Concept Plan Application and this supporting Preferred Project Report.

1.1 BACKGROUND

In February 2010, Australand Corporation lodged a Concept Plan Application for the Shell Cove Boat Harbour Precinct (MP07_0027) under Part 3A of the Environmental Planning and Assessment Act 1979. The Concept Plan Application sought consent for the development of a 100 hectare precinct surrounding the Shell Cove Boat Harbour and Marina (the Boat Harbour) that would include:

- A mixed use town centre, including a landmark hotel;
- A small mixed use precinct adjacent to the Shellharbour South Beach dunal zone
- Business Park precinct
- Standard, medium and high density residential development; and
- A comprehensive network of open space and wetlands.

The planning and design of the Boat Harbour Precinct is predicated on the development of the Shell Cove Boat Harbour, which was granted Ministerial Consent in November 1996. **Figure 1** illustrates the land for which Concept Plan approval is sought and the Ministerial Consent for the Boat Harbour.

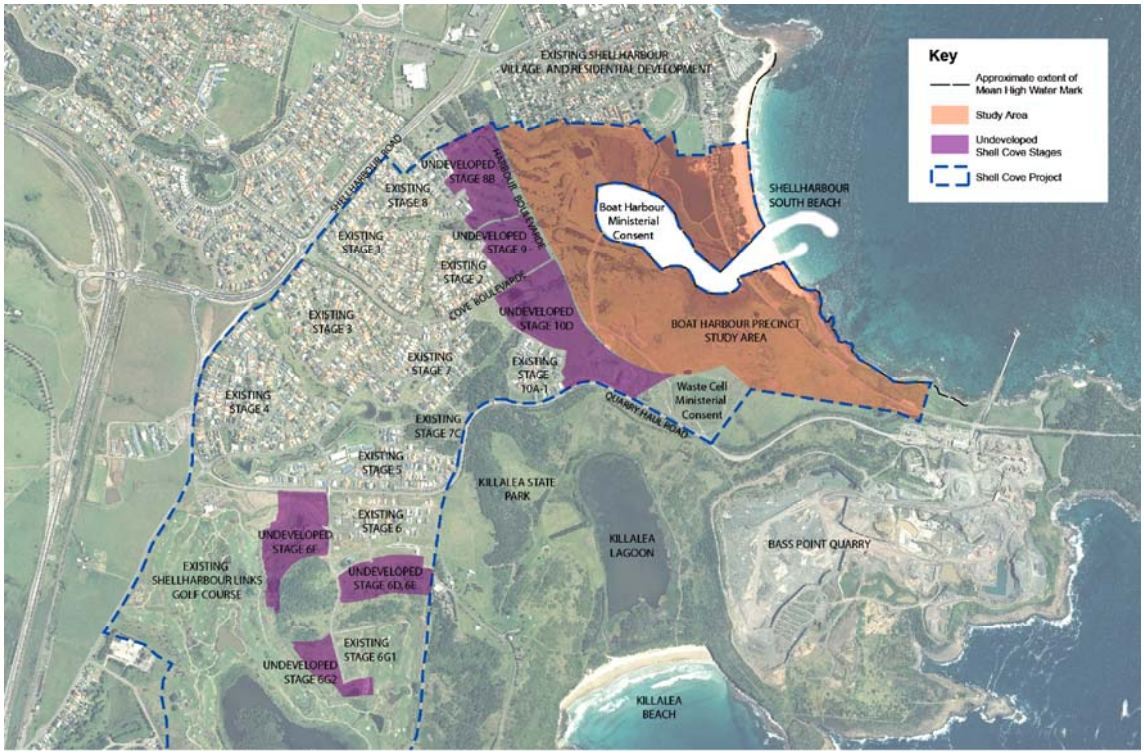


Figure 1: Boat Harbour Precinct Study Area

1.2 PURPOSE OF THE REPORT

The purpose of this report is to provide a response to all the issues raised by all the agency and public submissions as well as the key issues raised by Department of Planning (DoP) following the public exhibition of the Shell Cove Boat Harbour Precinct Concept Plan Application and Environmental Assessment.

This Preferred Project Report and associated Appendices A-G, together with the Concept Plan Application and Environmental Assessment and associated Appendices A-P lodged with DoP in February 2010, form the complete application for this project.

1.3 STRUCTURE OF THE REPORT

This report has been structured in the following manner:

Part 1	Introduction
Part 2	Summary of Submissions Identifies the issues raised in the all of submissions during public exhibition and provides an explanation of how all issues are addressed in this Preferred Project Report.
Part 3	Issues and Responses Provides responses for the issues identified in Part 2.
Part 4	Conclusion

Appendix 1	Schedule of Issues Raised in the Submissions
Appendix 2	Consultant Responses to Issues Raised in the Submissions

1.4 CONSULTANT TEAM

This Preferred Project Report has been prepared on behalf of Australand, the proponent of the project. The following consultant team contributed to the preparation of this report:

Role	**Company**
Urban Design and Planning	LFA (Pacific) Pty Ltd
Air Quality and Acoustics	Wilkinson Murray
Biodiversity	Kevin Mills & Associates
Coastal Process, Flooding and Watercycle Management	Worley Parsons
Contamination Dou	glas Partners, ENVIRON Australia
Groundwater Coffe	y Geotechnics
Traffic and Access	Aecom

The consultant responses to issues raised are provided in **Appendix 2**.

2 SUMMARY OF SUBMISSIONS

Submissions were received from State government agencies, local government and the public. The submissions raised a gamut of issues, some of which related to works that have been granted Ministerial consent as part of the Boat Harbour development and were therefore not part of the Boat Harbour Precinct Concept Plan application.

The range of matters identified across the submissions has been grouped under the following headings and are addressed accordingly in this report.

Table 1: Issues Raised

Bass Point Quarry	Encompasses matters which were raised in regard to air quality and acoustic impacts, blasting operations and shipping movements relating to the current operation and potential future expansion of the Bass Point Quarry.
Biodiversity	Includes the concerns raised regarding the existing Shellharbour Swamp and its associated flora and fauna as well as the enhancement and protection of riparian vegetation within the precinct.
Built Form, Urban Design and Landscape	Covers the comments made regarding the street network (including hierarchy and street type design), block development pattern, open space network, public transport, pedestrian and cycle links and building typology and design (including the hotel building) proposed in the Concept Plan.
Economic Impact	Issues regarding retail hierarchy, employment and maintenance funding are addressed under this heading.
Hydrology	Includes issues raised regarding coastal processes (including beach erosion, shoreline recession and coastal inundation), impact of climate change and sea level rise, flooding, stormwater and water cycle management.
Land Capability	This issue encompasses the concerns raised regarding contamination, groundwater and acid sulfate soils
Heritage	This issue specifically relates to comments regarding known Aboriginal archaeology in the vicinity of Boat Harbour Precinct.
Housing and Social Infrastructure	Issues regarding housing affordability, aged care facilities, adequacy of existing community facilities and provision of new ones (including the school, library, community centre and child care) and the provision of open space are discussed in this section.
Land Uses	Encompasses issues raised regarding the permissibility of proposed land uses within the 2(f) Quarry Buffer Zone as well proposed uses in H2 Precinct.
Noise	Specifically relates to comments regarding the noise assessment and noise attenuation measures proposed in the Concept Plan.
Traffic and Access	Encompasses issues raised regarding the proposed cycle network, access to South Shellharbour Beach foreshore and Killalea State Park, traffic management,

	public transport and car parking.
Other	This category contains a range of other issues that were raised individually such as bushfire, utilities, developer contributions and land ownership, for which a direct response can be provided.

A summary outline of issues raised in all submissions is included in **Appendix 1**.

The majority of submissions received from government authorities raised issues regarding traffic access as well as urban design. The majority of submissions received from the general public also raised concern over traffic and access, as well as climate change and sea level rise, and biodiversity (in relation to Shellharbour Swamp). **Figure 2** demonstrates the frequency of each issue raised across the submissions.

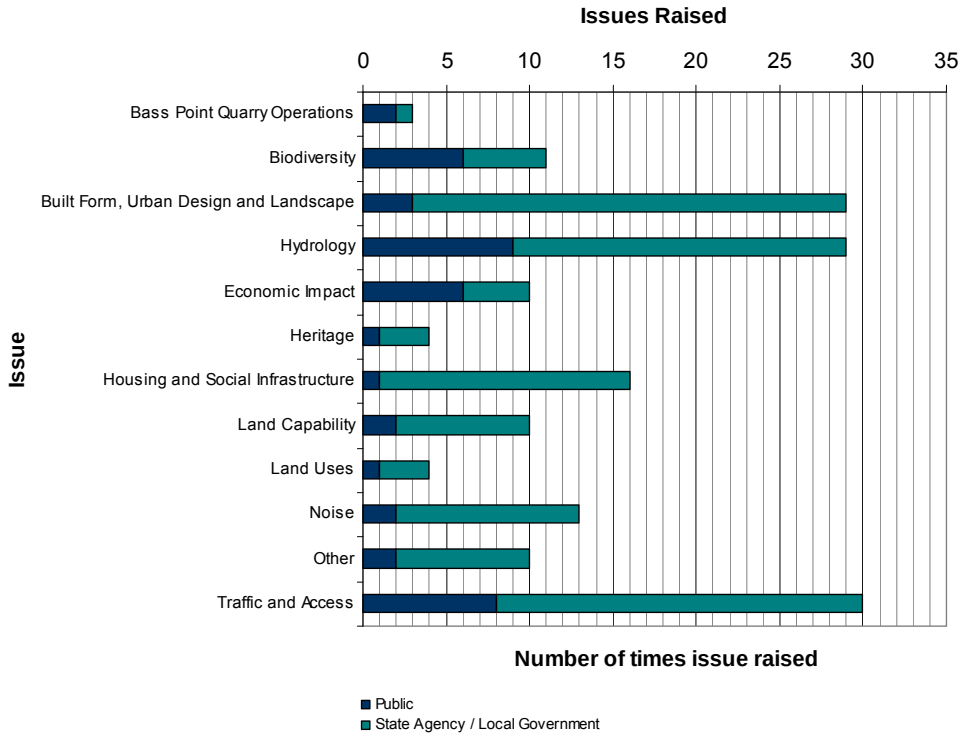


Figure 2: Frequency of issues raised across submissions

2.1 CONSULTATION

In responding to the issues raised in the submissions, further consultation has been undertaken to ensure issues are adequately addressed, as outlined in **Table 2**.

Response Author	Consulted Party	Issues Discussed
Worley Parsons	SMEC	Storm erosion demand, long term recession due to net sediment loss and long term recession due to sea level rise associated with climate change with regard to the Shellharbour Coastal Hazard Study prepared on behalf of Shellharbour Council.
Wilkinson Murray	DECCW	Meteorological conditions influencing noise criteria.
Wilkinson Murray	Heggies	Bass Point Quarry expansion draft Environmental Assessment.

Table 2: Consultation Summary

3 KEY ISSUES AND RESPONSES

3.1 BASS POINT QUARRY

The majority of issues raised regarding the Bass Point Quarry (BPQ) stem from the draft Part 3A Project Application (P08_0143) prepared by Hanson Construction Materials Pty Ltd (Hanson) seeking approval for the expansion of the existing quarry operations. Issues include:

- Air quality;
- Acoustic impacts;
- Blasting operations; and
- Shipping movements.

In responding to the potential land use conflicts and associated operational impacts between the Boat Harbour Precinct and BPQ, DoP recommended that Australand liaise with Hanson, the owner/operator of the BPQ.

3.1.1 Discussions with Hanson

Consultants for the Shell Cove project have continued to liaise with the Bass Point Quarry Owner/Operator since the inception of the project over 25 years ago. Liaison has been directed toward the future plans for Shell Cove and the interface issues between the Shell Cove project and the quarry.

The Shell Cove project began in the early 1980s with the government facilitating the Illawarra Boat Harbour/Marina Feasibility Study as well as information sessions with adjoining landowners. One of the key issues stemming from the Study's release in 1985 was related to the future land uses surrounding the harbour (as well as the project in general) and the impact of the neighbouring quarry operations. Under the direction and facilitation of DoP, there was agreement between the Quarry Owner/Operator and Council following extensive consultant studies (noise, dust, blast emissions, etc) and negotiations. Gazetted Amendment 25 to Shellharbour LEP16 encapsulated the agreement and created the Mixed Use Residential Zone over all lands in Shell Cove (including the Boat Harbour Precinct), as well as a defined quarry buffer area. These features are reflected in the Shellharbour LEP2000.

Later, following long negotiations, the Quarry Owner/Operator and Council signed a commercial deed of agreement on 21 December 1994 that included a new private quarry entrance road through Shell Cove, road noise attenuation measures, and an adjoining site within the quarry land for a major landscaped mound (to act as a landscaped buffer between the quarry, Shellharbour Village and Shell Cove). The site was specifically determined because it had no development consent for quarrying, was outside the quarry's limit of northern extraction, part of the buffer for the Shell Cove project and the Quarry Owner/Operator had determined that it was not required. Over time, amendments to the commercial deed were mutually agreed and signed. There are no provisions in the deed to modify or restrict the land uses within the Boat Harbour Precinct from those allowed under the LEP.

In addition, consultation under DA95/133 for the Boat Harbour/Marina Precinct included the Quarry Owner/Operator.

Accordingly approved residential subdivision development and housing construction have been ongoing at Shell Cove since 1994.

The Shell Cove project lodged (with the written consent of the Quarry Owner/Operator) and obtained development consent in 2002 for the major landscaped mound (to act as a landscaped buffer between the quarry, Shellharbour Village and the Shell Cove project).

Specific discussions in relation to the Quarry Owner/Operator's intention for an expansion of its quarry operations have been ongoing since the beginning of 2007. The proposed expansion underpins the basis of its draft submission under Part 3A. In the discussions, the Quarry Owner/Operator is seeking to amend the footprint of the landscaped mound to enable expansion of the quarry into land otherwise sterilised for quarry operation by the mound.

All discussions and the final agreement to amend the commercial deed with Council have been advanced on the clear mutual understanding that there is to be no new impacts on the Shell Cove project and any development within it. Any regulatory approvals and consents to permit the expansion of the quarry operations must satisfy that understanding.

The Quarry Owner/Operator has provided its written consent to the lodgement of the Construction Certificate for Stage 1 of the landscape mound works.

3.1.2 Air Quality

The issue of air quality is raised in Attachment 1 of Hanson's submission prepared by Heggies. Heggies predicts the BPQ expansion will generate increased incremental concentrations of PM_{10} (dust and particulate matter which can enter the lungs) at the southern boundary of the Boat Harbour Precinct and in the proposed sporting fields. Heggies has recommended that land use planning in the Boat Harbour Precinct takes into account these potential impacts.

The proposed land uses in the Boat Harbour Precinct are in accordance with the permissible uses of the 2(f) Zone Mixed Use Residential (including the Quarry Buffer Area) under Shellharbour LEP 2000. As discussed in the previous section, the permissible uses in the LEP, particularly those in the Quarry Buffer Area, reflect prior land use agreements between the Quarry Owner/Operator and Shellharbour Council (developed under the direction and facilitation of DoP).

It is noted that as part of Hanson's Part 3A Project Application (MP 08_0143), the Director General requires that air quality impacts be addressed. Accordingly, it is considered appropriate for the Quarry Owner/Operator to mitigate and manage any additional offsite impacts that could result from the proposed expansion of its operations.

3.1.3 Acoustic Impacts related to Bass Point Quarry

Noise Criteria

Heggies raised the issue of the inconsistency of amenity criteria set in the EA, whereby "suburban" amenity criteria was applied in Section 5.3 (page 12) and "urban" amenity criteria applied in Table 6-1 (page 16). The inconsistency is noted and it is recognised that the "urban" amenity criterion was the appropriate criterion that should have been applied in all circumstances, as advised by Council in their letter dated 8 December 2000. It is also recognised that, as noted by Heggies, the intrusiveness criteria presented in page 13 (Section 5.3) of Appendix J of the EA is the controlling criteria, which is independent of whether "urban" or "suburban" amenity criteria are used. Accordingly, amending the criteria to "urban" has no material consequences for the noise assessment.

Noise Modelling

Heggies note a significant difference in equipment noise levels assumed by Wilkinson Murray in their noise assessment for the Boat Harbour Precinct EA compared to those measured by Heggies for their Draft EA of the proposed quarry expansion. Heggies has also noted differences in predicted noise levels from the quarry.

Equipment Noise Levels

The adopted sound levels of quarry equipment presented in Appendix J of the EA was assumed based on the low-end range of typical mobile quarry equipment and basic understanding of the actual quarry operations and quarry topography. It is accepted that the predicted noise levels presented by Heggies in Table 5-4 of their submission is more reliable and accurate than those presented in Appendix J of the EA, reflecting Heggies' access to actual noise sources and detailed knowledge of the internal topography of the quarry.

Noise Levels from Quarry

Table 5-4 of Heggies' submission compares the quarry noise levels predicted by Wilkinson Murray and Heggies. The differences are partly explained by the difference in equipment noise levels discussed above.

Heggies note the proximity of Locations 1 and 7 and their prediction of equal noise levels (44dbA), compared to the 5dbA difference predicted by Wilkinson Murray (36dBA and 41dBA respectively). The difference can be explained by the location of Receiver 7 on a steep slope.

It is noted that in Location 5 (Boollwarroo Parade near entrance to the harbour) the LAeq(15minute) Heggies predicted noise level exceeds the criterion set by Wilkinson Murray by 1dB. If the expanded quarry proposal were to proceed, it is probable that reasonable and feasible noise mitigation could be designed by the quarry operator to remove this exceedance.

3.1.4 Blasting Impacts

DoP has raised the issue of blasting impacts in reference to the matters identified in Heggies' submission. It is noted that an assessment of blasting impacts from the BPQ was not part of the Director General's requirements for the preparation of the Boat Harbour Precinct Environmental Assessment.

Criteria

Heggies propose criteria for assessment of blast overpressure and vibration that are consistent with DECCW guidelines. As is generally the case, in practice the overpressure criteria are more limiting than the vibration criteria. The relevant overpressure criterion is a value of 115 dBLin, which should be exceeded by no more than 5% of blasts, which is consistent with the operational controls imposed on the quarry via the quarry's current Environment Protection Licence (EPL 2193).

Calculated Overpressure and Vibration Levels

Prediction of overpressure is based on an equation which includes two parameters specific to the site. Heggies have established such a "site law" by on site measurement, which gives similar predictions to a "typical" site law developed by Wilkinson Murray for predictions at a general site and is considered valid.

The Heggies report gives predictions for blasts with a Maximum Instantaneous Charge (MIC) of 72 kg. In the absence of other information it is assumed that this is the highest MIC proposed for blasting at the quarry.

For a series of blasts apparently using the same design, there will in general be a large spread of noise and vibration levels at any receiving point. For this reason, it is typical to predict two values – a 5% exceedance prediction and a "best fit" prediction representing a typical measured overpressure level for the given distance and MIC.

Heggies discuss only the 5% exceedance levels, and state that at the distance of the proposed residences from the quarry (330m), 5% exceedance overpressure levels would exceed the criterion of 115 dBLin. If confirmed the blast would exceed 115 dBLin at distances to over 1km, well exceeding the existing operational relevant criterion at existing residences. Accordingly, mitigation measures should therefore be applied, consistent with the quarry's operating Environment Protection Licence.

On the other hand, using "best fit" site law (as developed by Wilkinson Murray), the predicted overpressure from a 72kg MIC blast is within 115 dBLin at 330m. This indicates that overpressure levels can meet the relevant criterion at the nearest proposed residence given "typical" blast practice and conditions.

Given the measured 5% exceedance site law, controls on blasting practice at the quarry are clearly required to meet the criterion of 115 dBLin, on a 5% exceedance basis, at existing Shell

Cove residences. These controls should be designed to ensure that conditions giving rise to occasional very loud blasts do not occur. They would normally include:

- strict control of stemming for blast holes;
- ensuring adequate timing sequences for all blasts; and
- restriction of blasting under adverse weather conditions.

With such controls, the values given by the “best fit” site law should be attainable for all but 5% of blasts, and can therefore be used for assessment.

In conclusion, proposed residential development within the Boart Harbour Precinct is compatible with continued blasting at the quarry, provided however the existing strict controls on blasting practice are maintained. In any event, the prevailing controls would be required even in the absence of the proposed Boat Harbour Precinct development, in accordance with the quarry’s operating Environment Protection Licence, to ensure that the relevant criteria are met at the existing Shell Cove residences.

3.2 BIODIVERSITY

The majority of issues concerning biodiversity were in relation to the removal of the existing Shellharbour Swamp. DoP and DECC requested clarification on the extent of Ecologically Endangered Communities (EECs) in relation to the extent of approved and proposed development (Boat Harbour/Marina and Boat Harbour Precinct respectively). Other submissions commented on:

- The flora and fauna survey undertaken by Kevin Mills & Associates;
- NSW Coastal Policy 1997 goal of *'Protecting, rehabilitating and improving the natural environment of the coastal zone';* and
- Protection of riparian vegetation.

3.2.1 Shellharbour Swamp

The development of the Boat Harbour Precinct is predicated on the Ministerial Consent granted to the Boat Harbour/Marina development in 1996, which included approval to remove Shellharbour Swamp subject to the provision of compensatory wetlands in Shadforth, north of Shellharbour (Myimbarr Wetlands).

The consent stipulates under Schedule 2, Condition 1 Form of Development:

"the development shall be carried out in accordance with the Environmental Impact Statement (EIS) dated June 1995 prepared by LFA (Aust) Pty. Ltd."

The EIS states (p.2):

"The construction of the Boat Harbour/Marina will include the clearing, draining and filling of Shellharbour Swamp…"

The Ministerial Consent covers the removal of the entire Shellharbour Swamp footprint, which encompasses the Coastal Saltmarsh community and extends beyond the area mapped in the Concept Plan as 'Boat Harbour Ministerial Consent Area'. Figures 1.6 and 4.36 of the EIS illustrate the footprint of the Coastal Saltmarsh in relation to the Shellharbour Swamp footprint approved for removal

Accordingly, further consideration of impacts relating to the removal of Shellharbour Swamp is not required as part of the approval sought for the Boat Harbour Precinct.

3.2.2 Green and Golden Bell Frog

The Green and Golden Bell Frog (GGBF) is listed as endangered species under the NSW Threatened Species Conservation Act 1995.

There have been previous targeted surveys for the GGBF in the study area and nearby. The field survey undertaken on 13 May 2008 as part of the Flora and Fauna Assessment for the

Boat Harbour Precinct Concept Plan Application found there to be no findings of the species in the subject land subsequent to the recorded finding of the species in the drain along the far northern edge of the land in the 1980s.

In response to the issues raised regarding GGBF assessment, an additional habitat survey and assessment has been carried out in lieu of a fauna survey, given that the report was commissioned at a time that was outside of the preferred time of year for conducting a fauna survey in accordance with DECCW's *Threatened species survey and assessment guidelines: field survey methods for fauna – Amphibians* (DECCW, 2009).

The habitat assessment concluded that there is no significant or critical habitat in the study area for the GGBF. The wetland habitats in the area contain abundant introduced fish (Plague Minnow *Gambusia holbrooki*) and are of no value for GGBF breeding.

The proposed Boat Harbour Precinct will have a neutral impact on the biodiversity values of the species as any potential GGBF habitat is not likely to be impacted. Accordingly, there is no need to avoid, mitigate or offset any impact upon this species.

Further details of this response are provided in **Appendix 2B.**

3.2.3 Flora and Fauna Survey

Comments were received on the flora and fauna survey undertaken on 13 May 2008 as part of the Flora and Fauna Assessment (Appendix H) prepared by Kevin Mills & Associates. One public submission requested a more comprehensive survey be undertaken and another submission claimed sightings of species not listed in the survey (i.e. Eastern Brown Snakes).

It is noted that individual sightings of native wildlife from the general public can be recorded with the NSW National Parks & Wildlife Service Atlas of NSW Wildlife, which is administered by the DECCW.

The field survey was undertaken in accordance with the *Guidelines for Threatened Species Assessment.* Parts 3 and 7 of the Flora and Fauna Assessment (Appendix H) demonstrate that the survey is consistent with DECCW's *Guidelines*. Part 3 of the Flora and Fauna Assessment clearly outlines the survey methodology undertaken; noting that information collected over the past 16 years has been used where relevant to supplement the findings of the field survey. Part 7 outlines the *Guidelines* and qualifies the survey as adequate for assessment under Part 3A of the EP&A Act. Further details of this response are provided in **Appendix 2B.**

3.2.4 NSW Coastal Policy – 'Protecting, rehabilitating and improving the natural environment of the coastal zone'

Page 48 of the EA clearly outlines the Boat Harbour Precinct's consistency with NSW Coastal Policy goals.

The Ministerial Consent for the development of the Boat Harbour/Marina recognises the development of the Shell Cove area, including the Boat Harbour Precinct, from a natural

environment to an urban environment. The biodiversity values of the Boat Harbour area have been offset with the construction in the Myimbarr Wetlands and the Tongarra Creek Salt Marsh Pilot project. This is described in Page 73 of the Environmental Assessment. Accordingly, it can be argued that the goal to protect, rehabilitate and improve of flora and fauna in the Boat Harbour Precinct has been achieved by the construction of Myimbarr Wetlands and the pilot salt marsh project required as part of the Boat Harbour/Marina consent.

Apart from the above works, the protection, rehabilitation and improvement of the natural environment of the coastal zone is relevant to the Boat Harbour Precinct to the extent that existing contaminated land will be remediated, the construction of wetlands north of the town centre will provide for water quality management and that revegetation and enhancement to the coastal vegetation within the subject land will be undertaken, as set out on Page 48 of the EA.

The Ministerial Consent for the Boat Harbour fully recognised environmental offset requirements with the stipulation that the Myimbarr Wetlands and the Tongarra Creek Salt Marsh Pilot project be constructed prior to any Boat Harbour works being commenced.

3.3 BUILT FORM, URBAN DESIGN AND LANDSCAPE

This section provides responses to the issues raised regarding built form, urban design and landscape, with particular reference to the comments contained in Attachment 3 of DoP's Key Issues Paper – Urban Design Comments, Shell Cove Boat Harbour Precinct (MP 07_0026) Memorandum. Issues raised included:

- Street Network
- Block Development Pattern
- Open Space Network
- Public Transport and Cycleways
- Pedest rian Access
- Building Typology and Design

3.3.1 Street Network

Issues linked to the legibility of the street network, the proposed street types, connectivity and pedestrian permeability with adjoining residential areas were raised.

The broad principles of the street network were supported by DoP.

A detailed review of the street network and street types has been undertaken and the hierarchy simplified. Refer to **Figure 3**.

It was also noted that limited vehicular connections between the southern streets of Shellharbour Village and Shell Cove had been provided. This decision reflected concerns on the part of existing residents about the potential level of future through traffic. However extensive visual, pedestrian and cycle links between Shellharbour Village (via Old Bass Point Road, Sophia Street and Mary Street) and Shell Cove have been provided.

Legibility

Legibility relates to a place that has a clear image and is easy to understand by providing recognisable routes, intersections and landmarks to help people find their way around. The proposed street pattern provides orientation views to water, landmark elements such as the Hotel and is easily 'read' with multiple access points along Harbour Boulevarde.

Street Types

A traditional approach to a street hierarchy would include the nomination of primary distributors, integrator arterials, neighbourhood connectors, access streets, laneways and special purpose streets (e.g. Main Street, park streets, shared zones).

For the Boat Harbour Precinct, the approach has been to create a range of street types related to both traffic functions and visual/landscape character. Four types of streets are proposed including Avenues, Visual Corridors, Connecting Streets and Special Streets (Main Street/Conceptual Laneway). Within each category there are minor variations which are specific

to the location e.g. different land use, edge condition, median and water sensitive urban design (WSUD) principles. Refer to **Tables 3, 4, 5 and 6**.

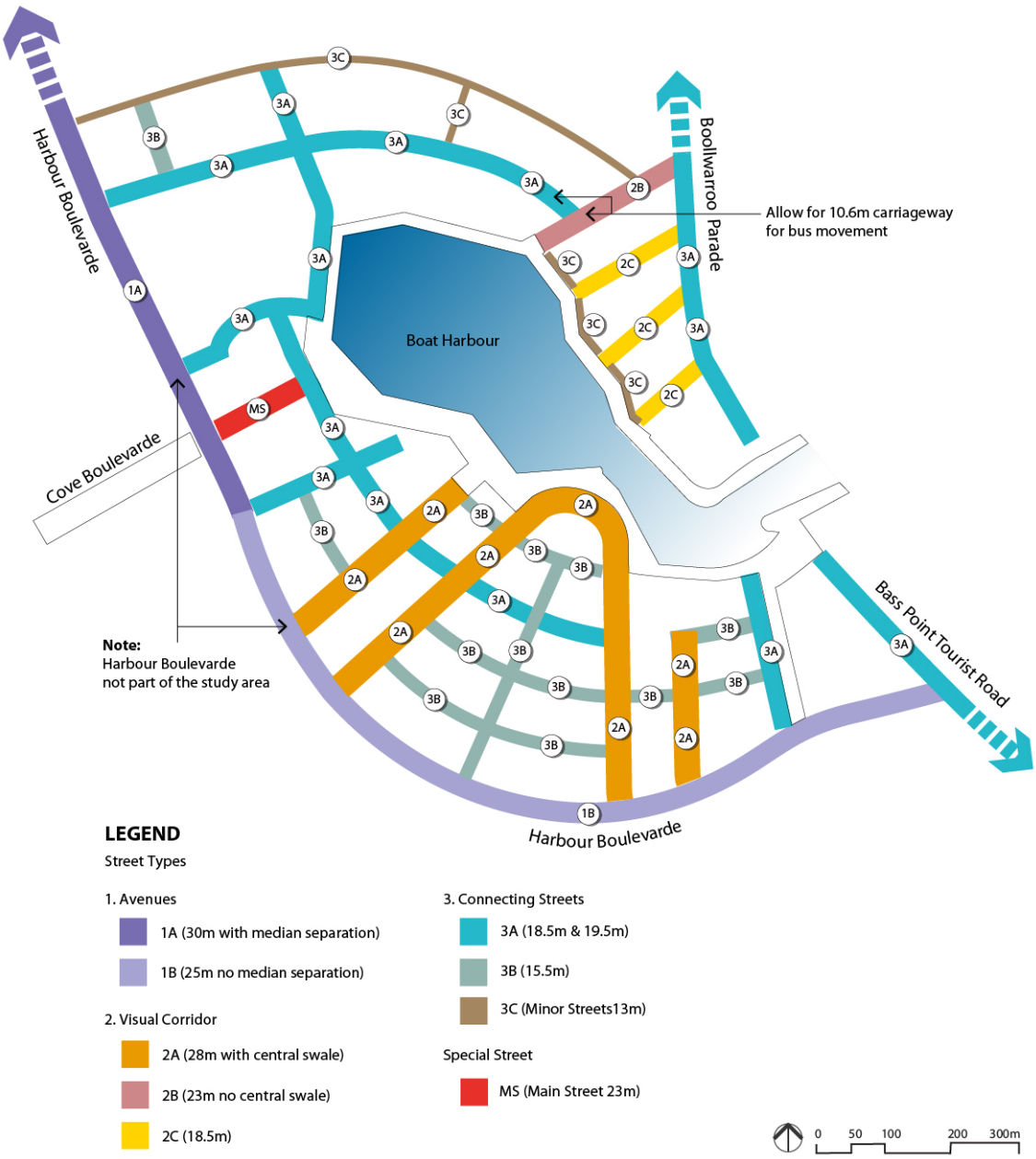


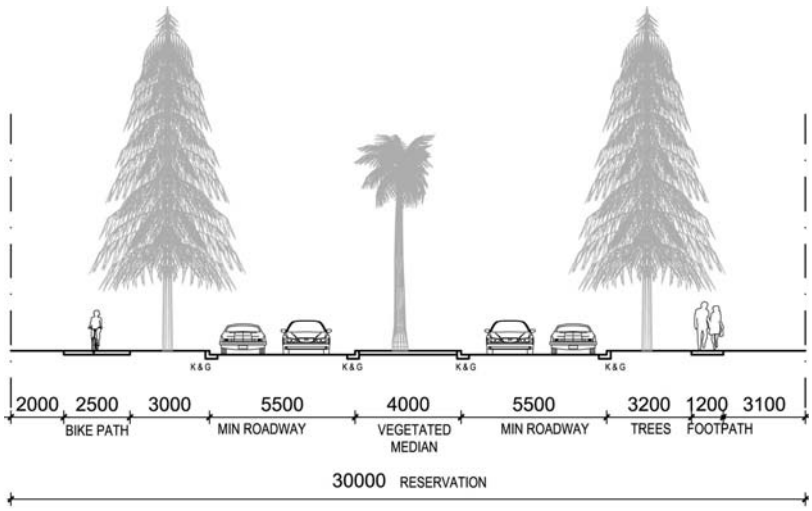
Figure 3: Street Network

TYPE 1 – AVENUES

Primary collector road system providing access to the Boat Harbour Precinct and continuing to Bass Point Tourist Road. Note: Harbour Boulevarde does not form part of the Part 3A Concept Plan Application.

Street Type 1A Typical Section

- With median
- Reserv ation width 30 metres.



Street Type 1B Typical Section

- No median
- Reserv ation width 25 metres.

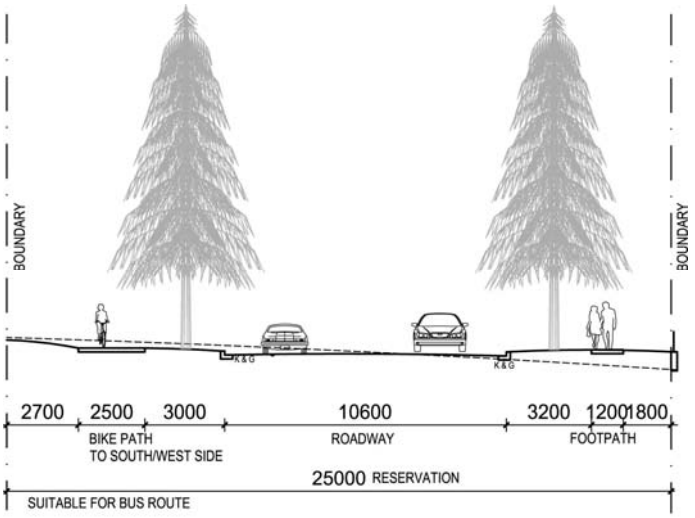


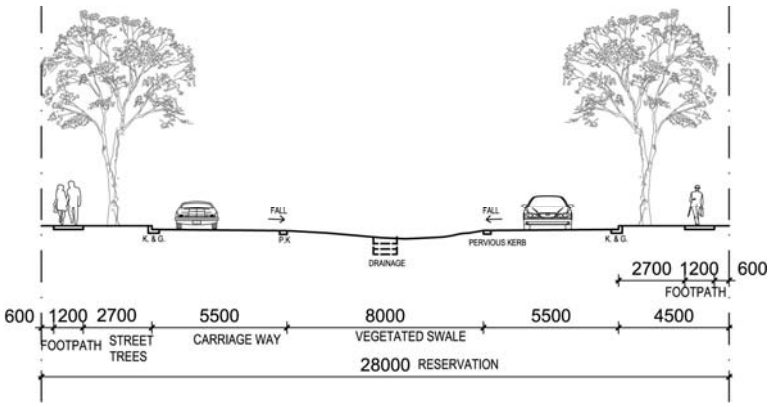
Table 3: Street Type 1 – Avenues

TYPE 2 - VISUAL CORRIDORS

Access streets that focus on the Boat Harbour water body with or without central stormwater swale. In functional terms these streets also work as avenues or connecting streets depending on location.

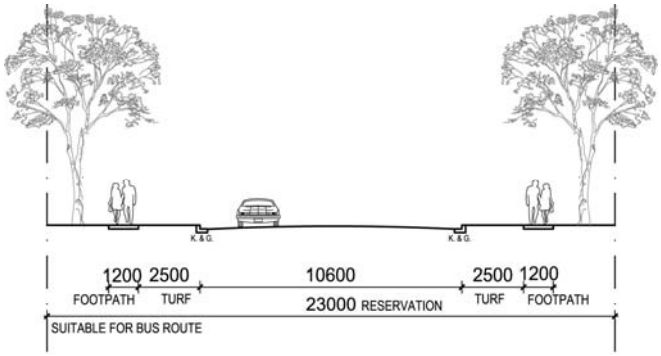
Street Type 2A Typical Section

- Central 8 metre swale two 5.5 metre carriage ways
- Two 4.5 metre verges including 1.2 metre pedestrian paths
- Reserv ation width 28 metres.



Street Type 2B Typical Section

- W ithout swale
- Reserv ation width 23 metres.



Street Type 2C Typical Section

- W ithout swale
- Reserv ation width 18.5 metres.

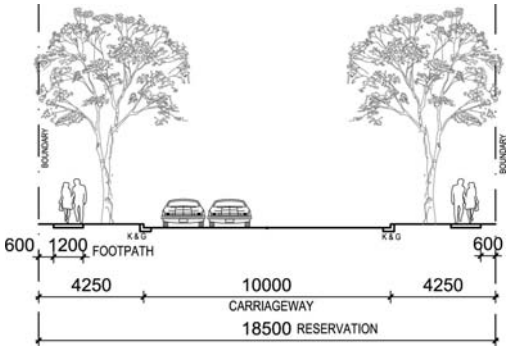


Table 4: Street Type 2 – Visual Corridors

TYPE 3 - CONNECTING STREETS

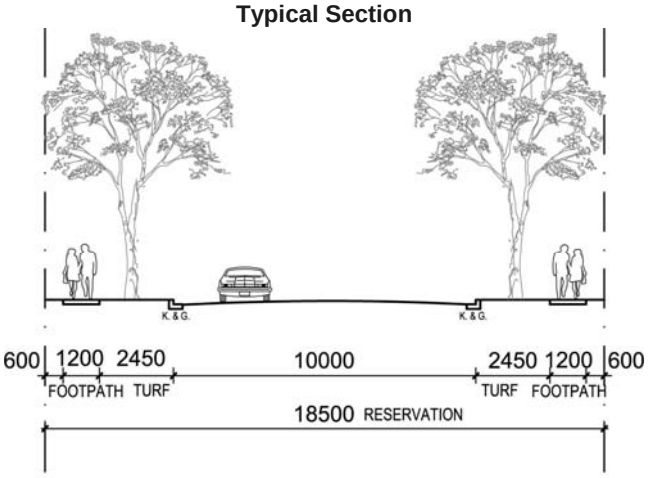
Access streets that follow the Boat Harbour edges and connect to the visual corridors. Different widths and edges. Together with visual corridors they provide a high degree of permeability within the Boat Harbour Precinct.

Street Type 3A - Main Circulating Street

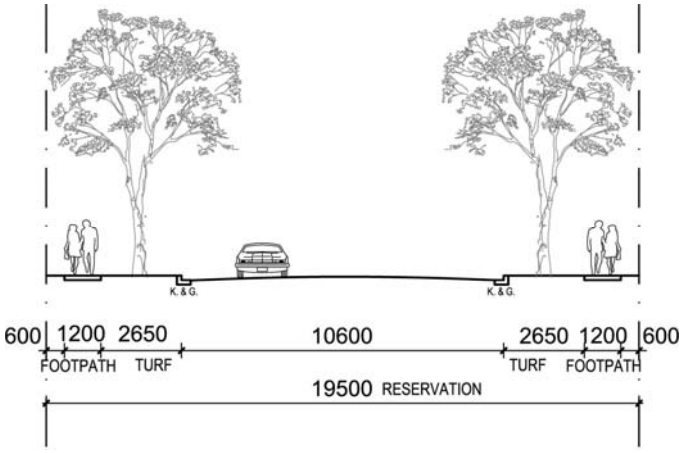
- 10 or 10.6 metre carriageway
- Reserv ation width 18.5 and 19.5 metres.

(Note: Wider road reserve utilised where bus route designated).

Typical Section



Typical Section with Designated Bus Route



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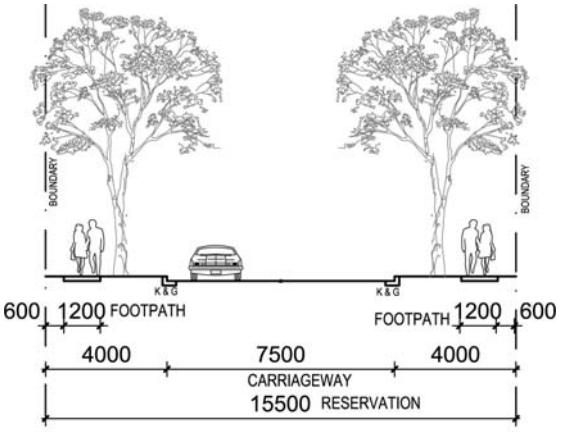
(cont.)

Street Type 3B – Secondary Street Typical Section

- 7.5 metre carriageway
- Reserv ation width 15.5 metres.



Street Type 3C – Minor Street Typical Section

- 6 metre carriageway
- Reserv ation width 13m

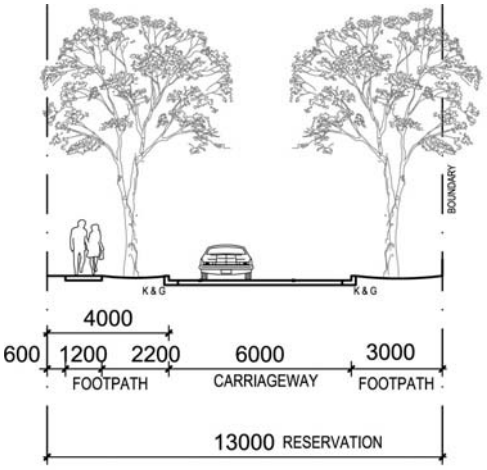


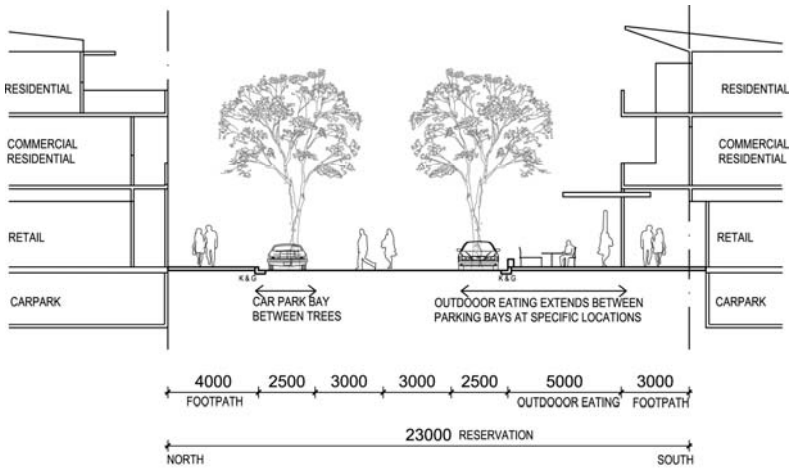
Table 5: Street Type 3 – Connecting Streets

SPECIAL STREETS

Special streets include Main Street and Conceptual Laneway

Main Street Typical Section

- 6 metre carriageway
- Two 2.5 metre car parking bays/ landscape
- Souther n extended outdoor eating zone of 5 metres plus 3 metre footpath
- Reserv ation width 23 metres.



Conceptual Laneway

- 4.5 to 6 metre carriageway
- Variable reservation

Note: Proposed location and proposed design requirements are not part of the Preferred Project Report. Any laneway would be subject to future project plan determination.

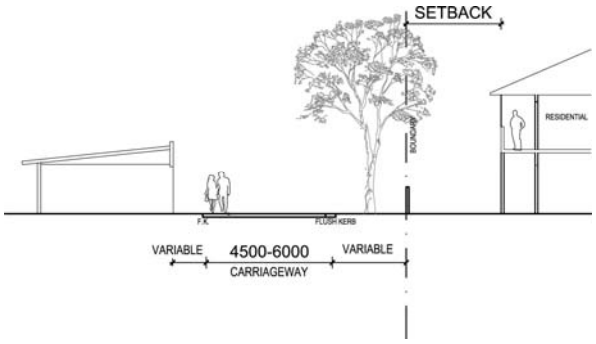


Table 6: Special Streets

Shellharbour Council Residential Subdivision DCP

Council's Residential Subdivision DCP was adopted in 1995 to regulate street types in the dominant form of Development i.e. greenfield urban development. The DCP was amended in 2004 without any change to the street type requirements. It's provisions have been successfully applied to conventional greenfields developments within the Local Government area including 1,500 lots in Shell Cove Stages 1, 2, 3, 4, 5, 6, 7, 8 and 10.

Street Types in the Boat Harbour Precinct are to be optimised by solutions that recognise the unique character, density and land mixes proposed. Street types compliant with the intention of Council's DCP, rather than the prescriptive requirements are considered to be appropriate. Council has previously exercised this discretion in the determination of two significant mixed use developments being Tullimbah Village and Shellharbour City Centre.

The following table indicates the key differences between Council's DCP and the street types proposed in the Preferred Project Report (PPR) submission.

Shellharbour Council's DCP	**Preferred Project Plan (PPP)**	**Comments**
Roll kerb and gutter in lower streets.	Vertical kerb and gutter in all streets including lower streets.	The PPR solution is more appropriate for mixed use development, providing optimal definition of pedestrian and vehicular domains.
A single concrete pedestrian footpath in major streets and busy lower order streets. Generally no footpath in quiet lower order streets.	Concrete pedestrian footpaths in all streets, including quiet lower order streets. Concrete footpaths on both sides of higher order streets.	The PPR solution provides more generous footpath facilities for pedestrian movement. As a consequence, some verge widths are greater to accommodate street trees and footpaths.
Lower order streets (defined as Access Place) require 6m road and 12m reserve.	Lower order streets have 6m road and 13m reserve.	The PPR solution provides the same functional outcome. A wider reserve is proposed to accommodate street trees and a pedestrian footpath.
Middle order streets (defined as Access Street) require 8m road and 15m reserve.	Middle order streets will have 7.5m road and 15.5m reserve.	The PPR solution provides the same functional outcome. A reduced road width and increased reserve width is proposed to accommodate street

		trees and pedestrian footpaths in a more generous verge. The road width is functional and more generous than the 7.2m width approved in the Tullimbah Village mixed use development.
Higher order streets (defined as Collector Road) require 9m-10m road and 18m reserve.	Higher order streets will have 10m or 10.6m roads with 18.5m or 19.5m reserves.	The PPR solution provides the same functional outcome. The Increased road reserve width is proposed to accommodate street trees and pedestrian footpaths in a verge width of 4.25m-4.45m. A road width of 10m is proposed, increasing to 10.6m for potential bus routes and busy collector roads. In order to simplify road types, this street has also been adopted for most visual corridors on the eastern side of the Boat Harbour and roads to the breakwaters and boat ramp. Road widths can accommodate landscaped parking bay separation as a detailed design outcome. If appropriate, this option would be subject to determination in future project plan applications.
Laneways have no status i.e. no definition or prescriptive requirements.	Conceptual laneway nominated.	The PPR identifies a conceptual laneway, but does not seek approval for this street type. If appropriate, this option would be subject to determination in future project plan applications.

Table 7: Key differences between Council's DCP and the street types proposed in the Preferred Project Report (PPR) submission

Council's Residential Subdivision DCP is considered appropriate for greenfields urban subdivision. However, it is proposed that the Part 3A Concept Plan approval does not reference Council's DCP, as the street types proposed in the Preferred Project Report provide an optimal solution with improved pedestrian facilities and landscaping opportunities, as well as an identical functional outcome. Accordingly, the Part 3A Concept Plan approval should reflect the proposed street types unless varied by future project applications.

Street Type Design

Street type designs will be further developed and provided in CAD format at the project application stage. The detail of the cross sections will also be further developed.

The extent or need for noise attenuation measures has been explored. Consultant reports indicate that noise levels from traffic on Harbour Boulevarde can be reduced to acceptable levels with the use of laminated glazing and mechanical ventilation. Acoustic barriers are not the preferred solution.

It is noted that the principal cycle path has been located on the western and southern side of Harbour Boulevarde, thus maximising the extent of cycle path that is not crossed by driveways to individual dwellings.

Connectivity

Connectivity is important within the Precinct and to adjacent Shell Cove areas. The internal road system will be highly connected with a 'warped' grid which responds to the boat harbour shape. Blocks are relatively small and there is a high degree of permeability for vehicles, pedestrians and cyclists. The street grid is likely to be based on a 60m block depth to allow for flexibility of subdivision for medium density and other housing typologies.

Some harbour edges are reserved for pedestrians rather than cars to create areas of special character and water edge connectivity.

There are three vehicular connections across Harbour Boulevarde which feed into the internal road network of the existing Shell Cove Estate and three additional cycle/pedestrian crossings.

As noted above, visual pedestrian and cycle connectivity has been provided between the southern sector of Shellharbour Village and Shell Cove. Vehicular connections have been limited to minimise through traffic impacts on existing residential streets.

3.3.2 Block Development Pattern

An issue was raised regarding the extent to which the block development pattern was illustrated in the Concept Plan.

The examples of block development patterns detailed in the Concept Plan are indicative of the approach that will be adopted in the Boat Harbour Precinct. Design detail for the blocks within the Boat Harbour Precinct will be further developed at the project application stage.

3.3.3 Open Space Network

A number of issues were raised regarding the provision of adequate and useable open space in the Boat Harbour Precinct.

Figure 4 shows the open space network including the location of three proposed Shell Cove playgrounds (as requested by DoP).

It is important to appreciate that there are a number of significant open space elements adjacent to the Boat Harbour Precinct which will be utilised by future residents for active and passive recreational purposes. These include the extensive north and south beach and foreshore zones, the existing Ron Costello Oval and the Keith Hockey Field to the north, the proposed ovals to the south on landfill, wetlands and associated open space framing Cove Boulevarde and adjacent to Sophia Street in the north. Playgrounds are proposed in the public reserves adjacent to both of these wetland areas.

Within the Boat Harbour Precinct there are a range of open space types which are multi-purpose and appropriate to an urban residential precinct including floodways to the north capable of recreational use, wetlands to the east, Harbour Square and water edge parks and boardwalk areas.

Figure 4 shows four proposed playgrounds and the relevant 400m walking distances, as well as adjacent open space and playing fields. The drawing indicates a high level of access to open space facilities. The plan also shows the water edge walkways.

3.3.4 Public Transport and Pedestrian and Cycle Access

Figure 5 indicates the pattern of existing and future bus routes for Shell Cove and indicates that the majority of residents will be within a 400m walking distance of a bus route.

Cycleways will extend from those existing within Shellharbour and Shell Cove across Harbour Boulevarde and terminate at the Harbour edge. Refer to **Figure 6**. Parts of the network will be defined as dismount zones to avoid safety risks and minimise conflicts with pedestrian use of the harbour edge walkways and retail precincts.

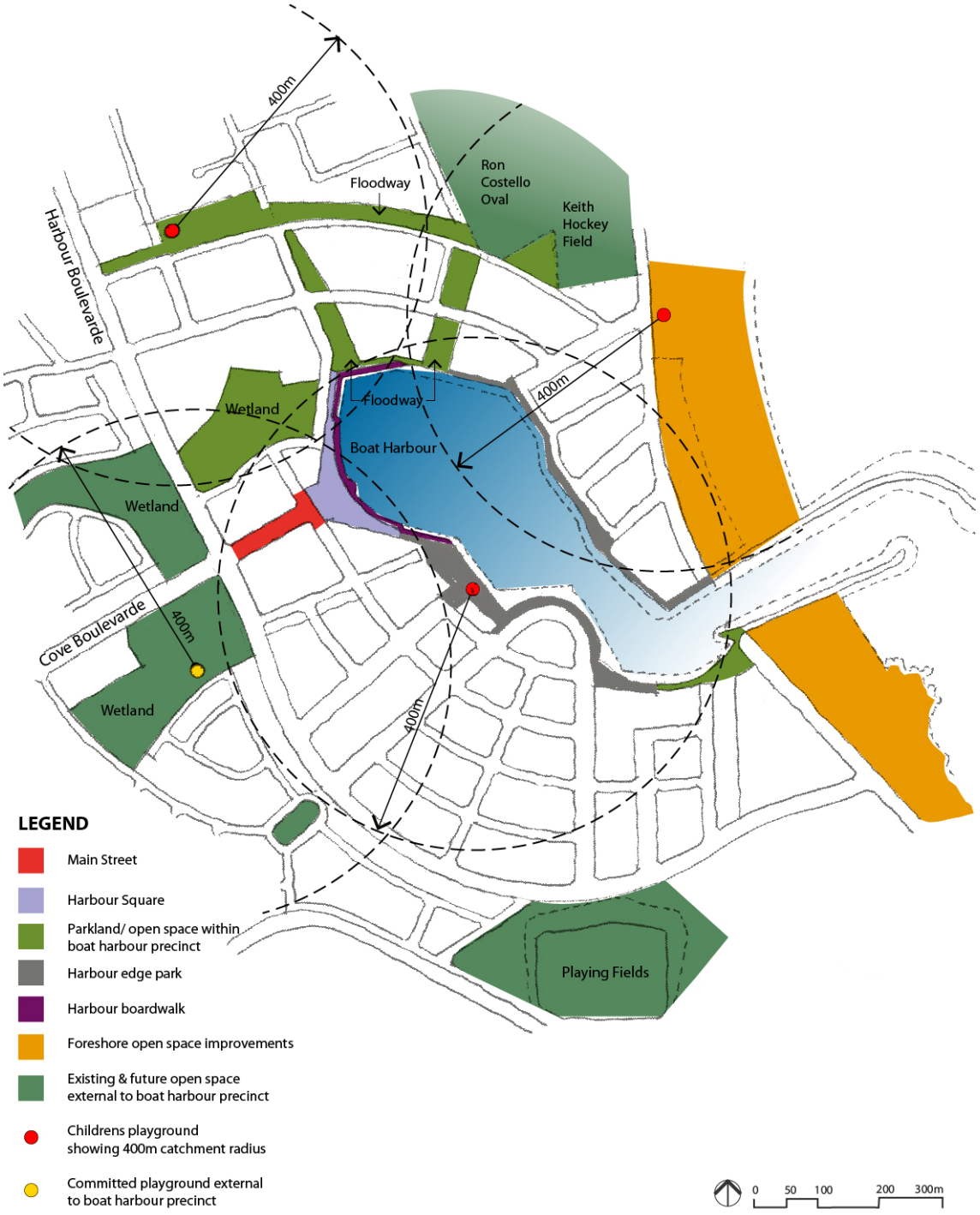


Figure 4: Open space

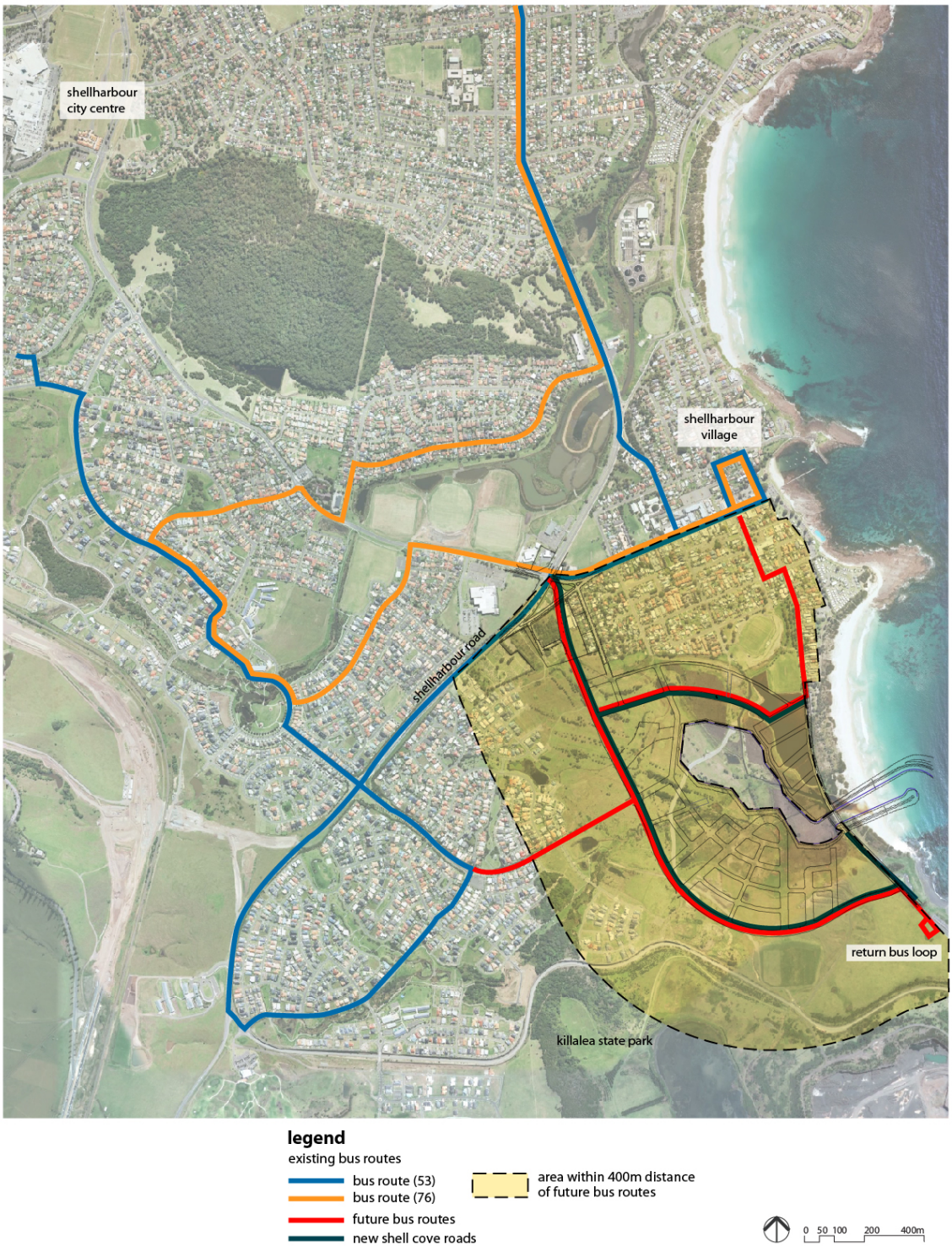


Figure 5: Bus routes and 400m catchment area

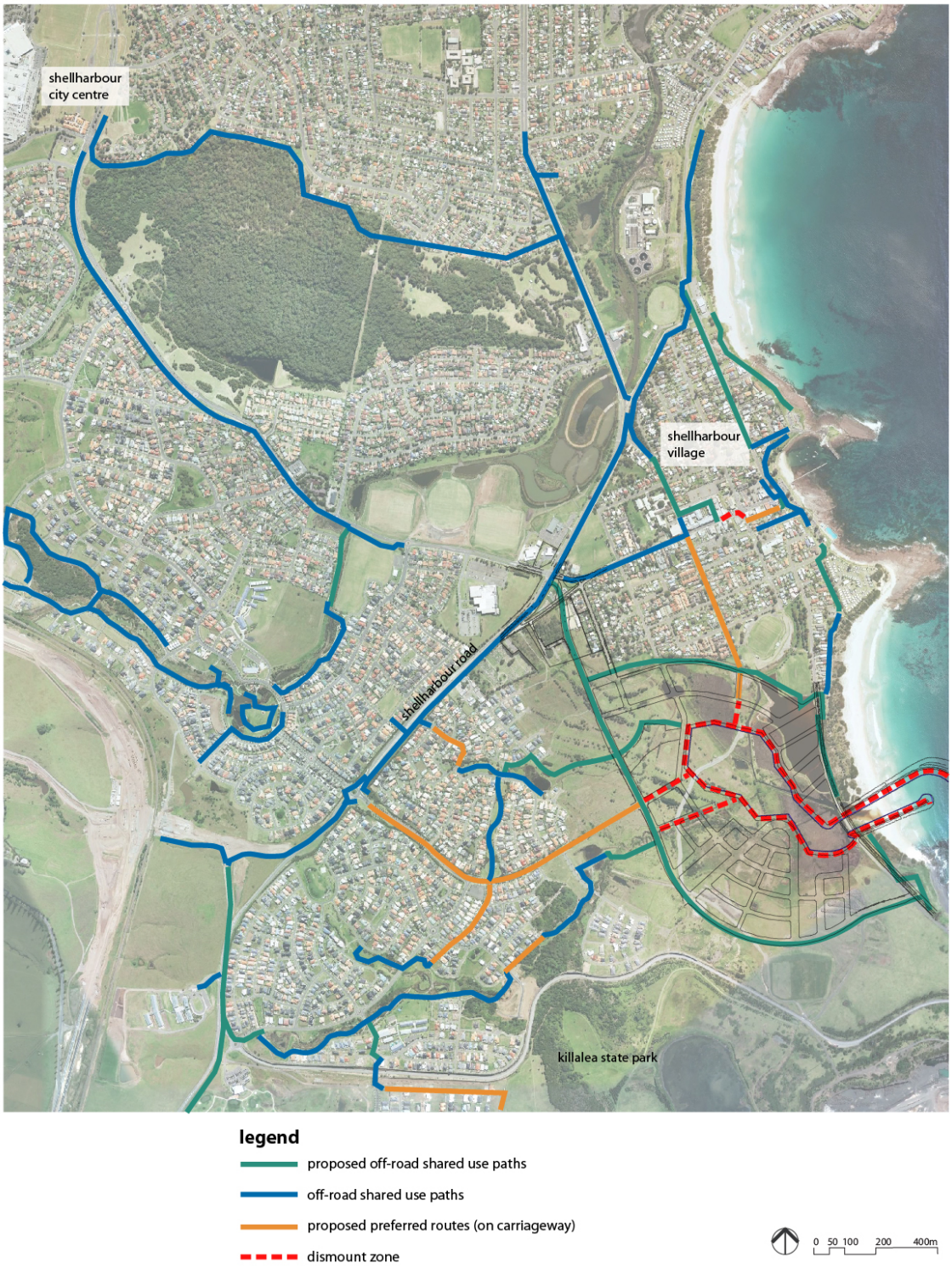


Figure 6: Proposed cycleways

3.3.5 Building Typology and Design

DoP commented on the importance of promoting architectural diversity in the Boat Harbour Precinct. It is intended by the proponents that a range of talented architects and designers be involved with the design of apartment and commercial buildings within the Boat Harbour Precinct. Additionally, Design Guidelines will be prepared to ensure that an appropriate high quality architectural character evolves which reflects the coastal/maritime setting.

The detailed design of the Hotel will explore the possibility of a more slender tower on a podium base oriented in a more south-west/north-east direction. However, this is unlikely to have any real impact on views across the Town Centre given that views will be largely down street corridors.

The proposed guidelines will require buildings to be designed to address public walkways, main open space areas and boulevardes.

3.4 ECONOMIC IMPACT

Issues raised regarding the impact of the Boat Harbour Precinct on the local economy include:

- Impact of Boat Harbour Precinct on the retail hierarchy of Shellharbour LGA;
- The potential for diversification of economy; and
- Fundin g mechanisms.

3.4.1 Retail Hierarchy

Concerns were raised over the potential impact of the proposed Boat Harbour Precinct Town Centre on the viability of the Shellharbour Village with regard to the commercial hierarchy of Shellharbour LGA.

The scale of the Boat Harbour Precinct Town Centre (7,930m^2) is consistent with a Leyshon Consulting report which found that a retail centre in the order of 7,000m^2 would be viable. It is consistent with the commercial hierarchy for Shellharbour City LGA as listed in Schedule 4 of the Shellharbour LEP 2000. Schedule 4 identifies a District Centre of up to 10,000m^2 in Shell Cove within the 2(f) Mixed Use Residential zone, while Shellharbour Village is also identified as a district centre.

According to the Shellharbour Retail & Commercial Centres Study, which was prepared by Hill PDA in March 2008 and subsequently endorsed by Council, it is likely that Shellharbour Village might experience further competition in the long term with retail/commercial development at Shell Cove. Expenditure modelling has indicated that there is no immediate demand for expansion of the retail precinct in Shellharbour Village and without any major anchor supermarket, most residents and visitors of Shellharbour Village are likely to depend on other higher order centres in the LGA for food and grocery shopping.

The Town Centre within the Boat Harbour Precinct will primarily serve the needs of Shell Cove. Given that approximately half of the retail floorspace will be taken up by a new supermarket, it is likely to attract food and grocery spending by Shellharbour residents and visitors which would otherwise be spent outside of Shellharbour Village.

3.4.2 Diversification of Economy

A number of submissions questioned whether “diversification of city and regional economy” (Shellharbour City Council website) could be accomplished in Shell Cove.

Pages 38 and 41 of the EA clearly explain how diversification of economy will be achieved. In addition to the comments provided on Page 38, the proposed Business Park will contribute to satisfying the demand for office space in Shellharbour LGA and provide opportunities for high-tech, white collar employment opportunities.

3.4.3 Funding mechanisms

Public concern was raised over the potential costs to Shellharbour LGA residents for the Beach Nourishment / Rehabilitation Management Plan and social infrastructure.

Shellharbour City Council will be responsible for the implementation and funding of the Beach Nourishment / Rehabilitation Management Plan. The implementation of the plan will be initiated once formally handed to Council.

The provision of social infrastructure in Shell Cove will be funded by developer contributions in accordance with Shellharbour City Council Section 94 Contribution Plan 2005 (Amendment 1), to be levied at the project application stage. A number of facilities proposed for Shell Cove are already identified in Council's Section 94 Contributions Plan 2005 (Amendment 1). It is understood that Council will be preparing a new Developer Contributions Plan over the next 12-18 months, based on further discussions between the proponent and Council.

3.5 COASTAL PROCESSES

Issues relating to coastal processes were raised across many of the submissions. Public concern was raised mainly over potential coastal hazards, whereas agency submissions generally requested further clarification of modelling data and methodology.

As part of the submission review process, DoP engaged Parsons Brinckerhoff (PB) to provide specialist advice on the hydrological aspects in the EA including coastal processes.

Responses to the detailed issues raised are set out below.

3.5.1 Beach Erosion and Shoreline Recession Hazard Lines

Two submissions raised the issue of mapping the beach erosion and shoreline recession hazard lines for the present time, 2050 and 2100:

- The submission by Shellharbour City Council highlighted the need to include mapping of the Zone of Reduced Foundation Capacity and Stable Foundation Zone as well as the usual Zone of Wave Impact and Zone of Slope Adjustment. The submission also made reference to the Shellharbour Coastal Hazard Study prepared for Council by SMEC (2010) and the desirability of using this Study, rather than the hazard assessment in the Environmental Assessment, for purposes of determining planning and development controls for the Shell Cove Boat Harbour Precinct development.
- The submission from DoP, which relied upon the report prepared by its external consultant Parsons Brinckerhoff.

To respond to the submissions it has been necessary to review the SMEC (2010) Coastal Hazard Study. This Study was not available at the time of preparation of the coastal processes / coastline hazard assessment included in the Environmental Assessment (September 2009).

Findings in SMEC Coastal Hazard Study (2010)

In the SMEC (2010) study, the combined beach erosion and shoreline recession hazard zones for three planning periods were presented, namely:

- present time, or immediate period (Appendix D, Figure D.25);
- Year 2050 (Appendix D, Figure D.28); and,
- Year 2100 (Appendix D, Figure D.31).

The hazard lines included definition of the Zone of Reduced Foundation Capacity and Stable Foundation Zone, as well as the Zone of Wave Impact and Slope Adjustment. Refer to **Figures 7, 8** and **9**.

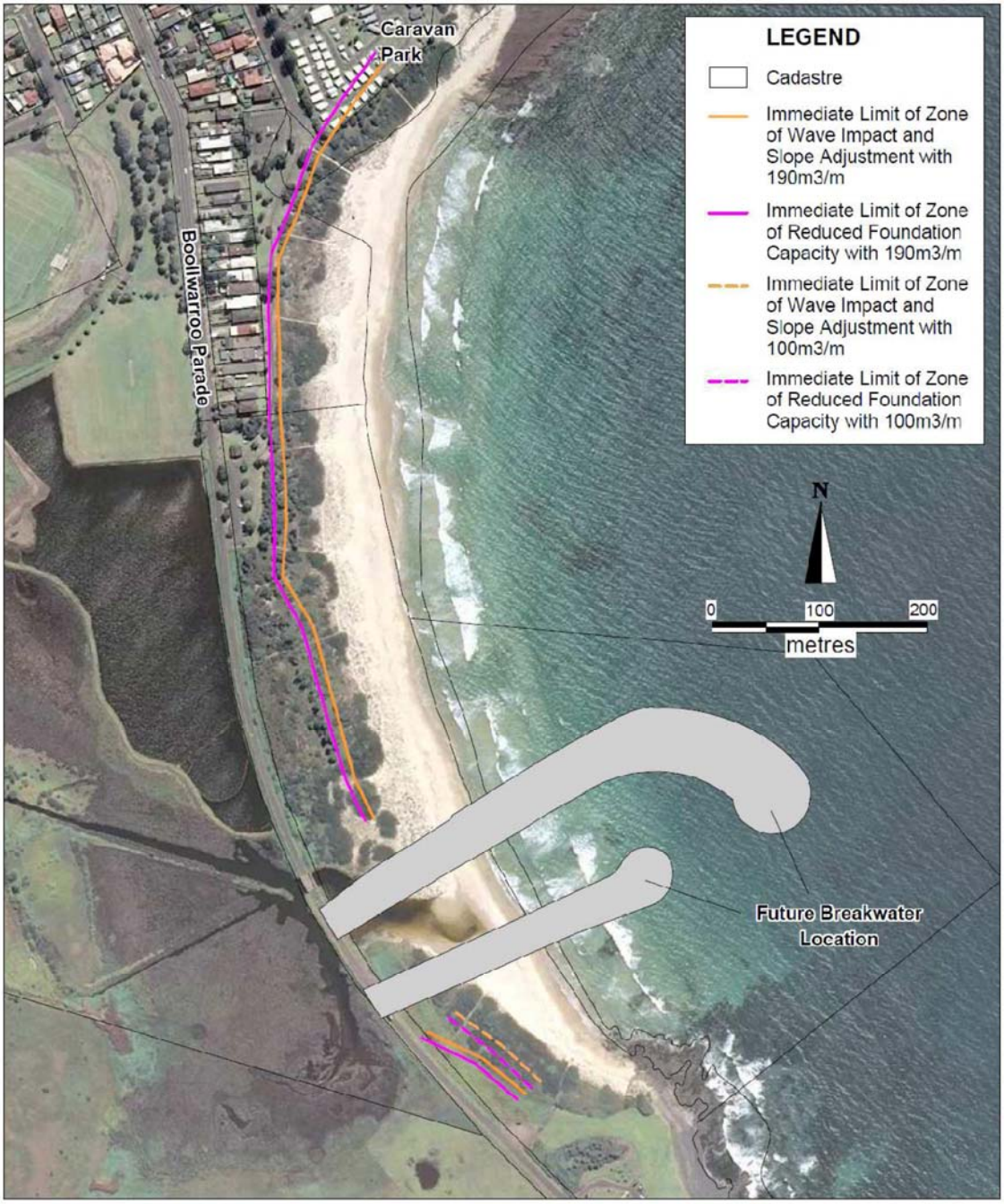


Figure 7: Beach erosion and shoreline recession hazard zones in immediate period (SMEC, Appendix D, Figure D.25)

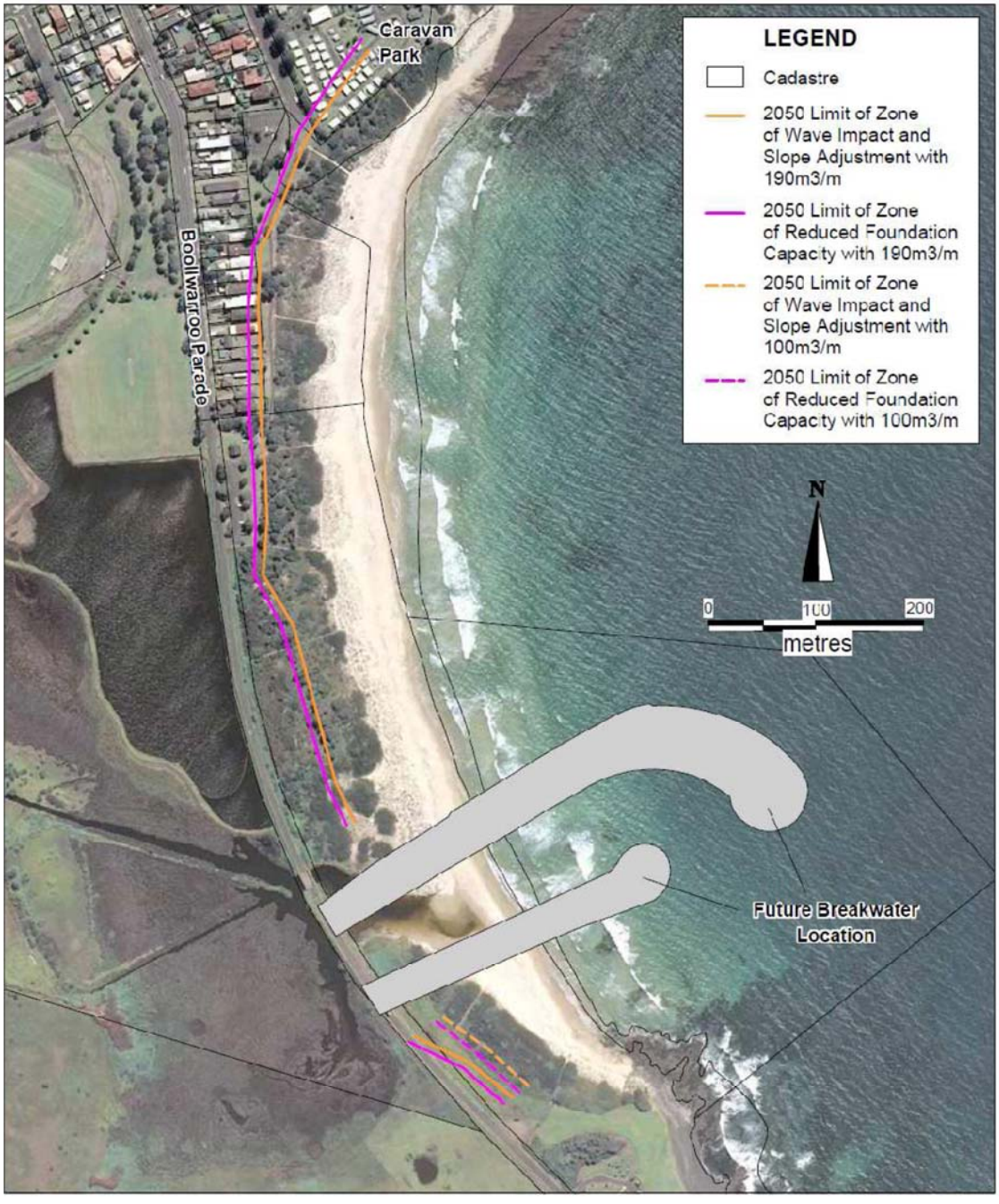


Figure 8: Beach erosion and shoreline recession hazard zones, Year 2050 (SMEC, Appendix D, Figure D.28)

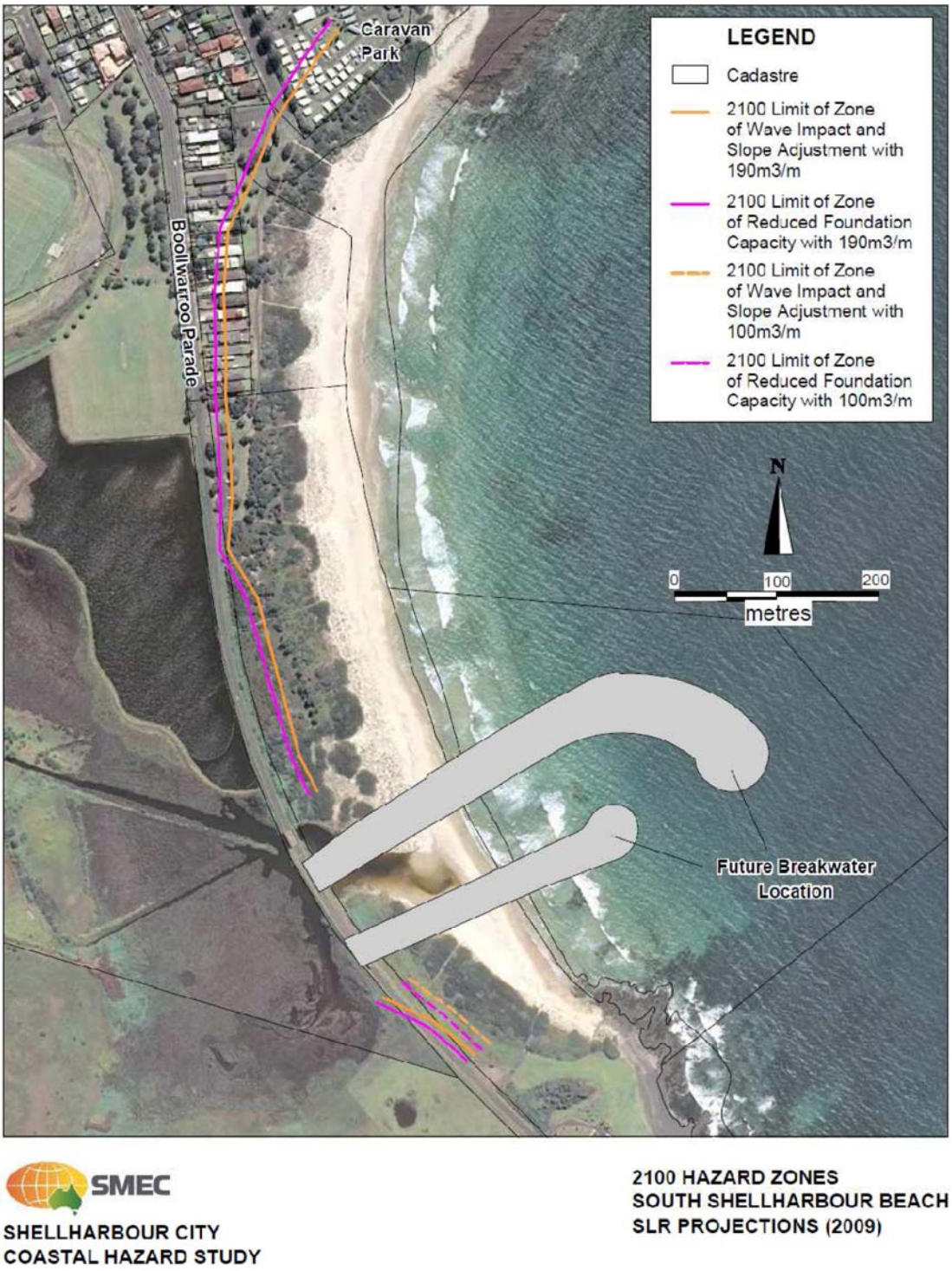


Figure 9: Beach erosion and shoreline recession hazard zones, Year 2100 (SMEC, Appendix D, Figure D.31)

South of the proposed Boat Harbour entrance two sets of hazard lines were produced for a given planning period, reflecting two possible values proposed for the 'storm demand', or 'storm bite', which makes up the beach erosion hazard; namely values of 190m^3/m and 100m^3/m. In the SMEC (2010) report it was noted that:

" The sensitivity of the hazard mapping to storm bite values of 190 m^3/m and 100 m^3/m has been illustrated on the map for the southern end of Shellharbour South Beach. While insufficient data are currently available to determine an accurate storm bite for this part of the beach, wave climate analysis in Appendix F indicates that wave climate is milder at the southern end of the beach than at the northern end and that storm bite is likely to be lower at the southern end".

Detailed studies completed at Shellharbour South Beach as part of the further investigation and detailed design of Shell Cove Boat Harbour also confirm the milder wave climate at the southern end of the beach and thus the justification for a lesser storm bite or storm demand in this area.

The hazard mapping produced by SMEC (2010) and shown in **Figures 10**, **11** and **12** demonstrates the following:

- north of the proposed Boat Harbour entrance:
  - the limit of the Zone of Reduced Foundation Capacity in the immediate, 2050 and 2100 planning periods are all seaward of Boollwarroo Parade
- south of the proposed Boat Harbour entrance:
  - the limit of the Zone of Reduced Foundation Capacity in the immediate, 2050 and 2100 planning periods, for a storm bite of 100 m^3/m, are all seaward of Bass Point Road.

The SMEC (2010) study therefore demonstrates that development within the Shell Cove Boat Harbour Precinct landward of Boollwarroo Parade / Bass Point Tourist Road would not be impacted by beach erosion and shoreline recession hazards up to the planning period of 2100.

It should also be noted that the hazard mapping in SMEC (2010) assumes no management of the beach erosion and shoreline recession hazards into the future. The major component of the shoreline recession hazard is recession due to sea level rise which will be addressed by a Beach Nourishment / Rehabilitation Management Plan. This Plan has been prepared for Shellharbour South Beach as a requirement of development consent and the conditions of concurrence under the *Coastal Protection Act 1979* and is to be implemented by Shellharbour City Council (refer to section on Beach Nourishment / Rehabilitation Management Plan).

The SMEC (2010) study establishes that even if the recession hazard due to sea level rise is not managed in the future, development within the Shell Cove Boat Harbour Precinct landward of Boollwarroo Parade / Bass Point Tourist Road would not be impacted.

The findings of the SMEC (2010) study are consistent with the hazard assessment contained in the Environmental Assessment which concluded that the proposed development within the Boat

Figure 10: Comparison of SMEC (2010) and Environmental Assessment Immediate Coastline Hazard Lines (at landward limit of Zone of Reduced Foundation Capacity) *(Source: WP/SMEC)*

Figure 11: Comparison of SMEC (2010) and Environmental Assessment 2050 Coastline Hazard Lines (at landward limit of Zone of Reduced Foundation Capacity) *(Source: WP/SMEC)*

Figure 12: Comparison of SMEC (2010) and Environmental Assessment 2100 Coastline Hazard Lines (at landward limit of Zone of Reduced Foundation Capacity) *(Source: WP/SMEC)*

Harbour Precinct would be sufficiently set back not to be impacted by erosion and recession for a planning period of 100 years.

There are a number of matters of detail in the SMEC (2010) study that differ from the hazard assessment contained in the Environmental Assessment. These are noted in the following sub-section.

In particular, it is considered the recession allowance for sea level rise is high in SMEC (2010) due to the high multiplying factor adopted in the application of the Bruun Rule compared to what is considered reasonable for the local circumstances at Shellharbour South Beach.

As such, while the general findings of the SMEC (2010) study are endorsed, the specific positions of the hazard lines are regarded as being too far landward.

Comparison Between SMEC (2010) and Environmental Assessment

A comparison of the parameters adopted in SMEC (2010) and the Environmental Assessment for determination of the beach erosion and shoreline recession hazards is provided in **Table 8**.

	SMEC (2010)	**Environmental Assessment**
Beach Hazard		
▪ storm demand	190m^3/m (see Note 1)	160m^3/m (see Note 1)
Shoreline Recession Hazard		
▪ due to net sediment loss	0 m/year	0.05m/year
▪ due to sea level rise		
– Sea level rise amount	0.4m (2050)	
	0.9m (2100)	0.91m (2100)
– Bruun Rule multiplier	31 and 43 (see Note 2)	25

Notes:

1. This storm demand is applicable north of the proposed entrance to Shell Cove Boat Harbour. South of the entrance SMEC (2010) considered a value of 100m^3/m. The Environmental Assessment noted that a value of less than 160m^3/m would be appropriate. The SMEC (2010) value of 100m^3/m is considered to be reasonable and conservatively high.

2. Value of 43 north of proposed Boat Harbour entrance, and value of 31 south of proposed Boat Harbour entrance.

Table 8: Comparison of Parameters in SMEC (2010) and Environmental Assessment

Based on the parameters in Table 8, the differences between the hazard lines in SMEC (2010) and the lines that would be determined based on the approach taken in the Environmental Assessment (adopting the NSW Government's planning benchmark values for sea level rise in each case) include:

- present time, or immediate period:
  - north of proposed Boat Harbour entrance : Environmental Assessment line would be 6m further seaward of SMEC (2010);

  - south of proposed Boat Harbour entrance : Environmental Assessment line would be equivalent to SMEC (2010);

- 2050:
  - north of proposed Boat Harbour entrance : Environmental Assessment line would be 12m further seaward of SMEC (2010);
  - south of proposed Boat Harbour entrance : Environmental Assessment line would be equivalent to SMEC (2010);

- 2100:
  - north of proposed Boat Harbour entrance : Environmental Assessment line would be 18m further seaward of SMEC (2010);
  - south of proposed Boat Harbour entrance : Environmental Assessment line would be equivalent to SMEC (2010);

The above outcome is depicted on the **Figures 10**, **11** and **12**, for the extent of the Shell Cove Boat Harbour Precinct and indicates the minor differences between the SMEC conclusions and the EA results. In no circumstance is any impact identified on lands west of Boollwarroo Parade.

3.5.2 Coastal Inundation / Overtopping Hazard

General

The issue of coastal inundation was raised in two submissions:

- the submission from Shellharbour City Council in which it was stated that the Environmental Assessment:
  - did not clearly demonstrate the influence of potential sea level rise on coastal inundation;
  - did not calculate inundation for the present, 2050 and 2100 climate change scenarios.
- the submission from DoP, which relied on the report prepared by its external consultant Parsons Brinckerhoff, and in which it was requested more detail be provided in terms of overtopping volumes and how much land will be inundated taking into account sea level rise.

In the submission of Mairi Petersen it was also noted that “the ocean along South Shellharbour Beach has risen and crossed the roadway along Boollwarroo Parade at least twice in the last 100 years...”

Extent of Inundation

An estimate of the wave runup level (inundation level) along Shellharbour South Beach in a 100 year Average Recurrence Interval (ARI) event at the present time was provided in the

Environmental Assessment, contrary to the statement in the Shellharbour City Council submission, and was equal to approximately 5m AHD. It was also noted that runup levels at the southern end of the beach, eg south of the proposed Boat Harbour entrance, would be lower than 5 m AHD due to the additional wave sheltering provided by Bass Point.

Inundation levels along Shellharbour South Beach at the present time have also been estimated by SMEC as part of their Shellharbour Coastal Hazard Study carried out for Shellharbour City Council (SMEC, 2010). In the SMEC (2010) study the maximum inundation level for a 100 year ARI event was estimated to be 4.6m AHD, ie slightly lower (lesser hazard) than that included in the Environmental Assessment (SMEC report, Appendix D, Table D.4).

In Section 3.4 of the SMEC (2010) report it was noted that the value of 4.6m AHD would be conservatively high since they had combined the 100 year ARI wave conditions with the 100 year ARI still water level (these conditions may not necessarily occur concurrently).

Accordingly, the value of 5m AHD adopted in the Environmental Assessment can also be regarded as conservative, consistent with the general approach that was taken in the Environmental Assessment.

SMEC (2010) produced a map showing the extent of the maximum inundation at present along Shellharbour South Beach by simply shading in the foreshore area that was at a level of 4.6m AHD or less (Appendix D, Figure D.7). This is overly simplistic in that it does not take into account the attenuation, spreading out and infiltration processes that occur as wave runup overtops the crest of a dune and attempts to propagate further landward. Even so, the SMEC map showed that inundation would not extend beyond Boollwarroo Parade, ie would not extend to the proposed development areas within the Shell Cove Boat Harbour Precinct.

SMEC (2010) noted that wave runup could reach some of the existing houses along Shellharbour South Beach, seaward of Boollwarroo Parade, but acknowledged that.... " the impact would be limited due to absorption of the wave runup along the dune and if the houses and roads are affected, the impact would not be significant as the energy would be very low" (SMEC, Appendix D, Section 2.3.4).

It is apparent that the assessments of inundation at the present time outlined in the Environmental Assessment and in the Coastal Hazard Study for Shellharbour City Council are consistent in that no impact on development within the Shell Cove Boat Harbour Precinct is predicted.

Consideration then needs to be given to the expected inundation hazard for the 2050 and 2100 planning timeframes in response to climate change (sea level rise). This topic would not appear to be given any significant attention in the SMEC report for Council, the only reference that can be found is a footnote to Table 3 in Section 3.4 to the effect that wave runup levels calculated for the Present Day (ie 4.6m AHD) would be expected to increase as a result of future sea level rise due to climate change.

In the Environmental Assessment discussion was presented as to the expected change in the inundation hazard over time, i.e. that the wave runup level and overtopping of the dunes east of

Boollwarroo Parade would increase (in the absence of any raising of the dune crest level). However, it was noted that the hazard was not considered significant due to several factors:

- when waves overtop a dune crest they tend to 'fold over' the crest and travel as a sheet flow at shallow depth, spreading out and infiltrating over the sandy profile landward of the crest;
- a swale is to be maintained behind the dune system (seaward of Boollwarroo Parade), north of the proposed Boat Harbour entrance, which would collect overtopping flows prior to them reaching Boollwarroo Parade and allow drainage back to the Boat Harbour entrance channel and / or natural infiltration. South of the proposed Boat Harbour entrance, wave runup levels would be lower due to the lesser wave climate (sheltering by Bass Point) and wave overtopping of the foreshore is not expected;
- should any overtopping flows reach Boollwarroo Parade / Bass Point Tourist Road (not expected), the drainage systems in these roads would collect and distribute the flows to the Boat Harbour or other drainage systems without impacting on the proposed development.

As part of the preparation of the response to the submissions on the Environmental Assessment, calculations of the overtopping volumes have been made at the present time and for expected overtopping conditions in 2050 and 2100. These are based on the estimated wave runup levels (inundation levels) in 2050 and 2100 being equal to the present day wave runup level of say 4.6 m AHD plus the benchmark sea level rise values to 2050 (0.4 m) and to 2100 (0.9 m), ie inundation levels of 5.0 m AHD in 2050 and 5.5 m AHD in 2100. The method of calculation is discussed later.

These calculations show that the overtopping volumes at the present time would be around 0.1 litres per second per metre length of dune parallel to the beach (0.1 L/s/m), would increase to around 0.5 L/s/m in 2050 and would increase to around 2 L/s/m in 2100. These volume rates would only exist around the peak of high tide, say for 2 hours, given that when the astronomical tide level falls overtopping would cease. The volumes of water involved over this two hour period would be less than 1 m^3/m at present, around 4 m^3/m in 2050 and around 15 m^3/m in 2100.

The above flow rates and storage requirements are not excessive. Even at 2100 a combination of pipe drainage and / or storage could readily accommodate a flow rate of 2 L/s/m and storage of 15 m^3/m such that inundation does not extend beyond (landward of) Boollwarroo Parade / Bass Point Tourist Road. Figure D.7 in Appendix D of SMEC (2010) can therefore be taken to be a representation of the possible extent of inundation up to 2100. Refer to **Figure 13.**

It follows that the extent of the inundation hazard would not impact adversely on development within Shell Cove Boat Harbour Precinct, situated landward of Boollwarroo Parade / Bass Point Tourist Road.

Figure 13: Maximum Wave Runup, North and South Shellharbour Beaches

Inundation Volumes and Land Inundated Taking into Account Sea Level Rise

This matter, raised by DoP (Parsons Brinckerhoff), has been largely addressed in the above section. Calculations of overtopping volumes have been made based on the actual beach and dune profiles at Shellharbour South Beach, benchmark values of sea level rise of 0.4 m in 2050 and 0.9 m in 2100, and methods outlined in HR Wallingford Technical Report W178 "Overtopping of Seawalls Design and Assessment Manual" and EurOtop "Wave Overtopping of Sea Defences and Related Structures : Assessment Manual" (Die Kuste version), August 2008.

The overtopping volumes determined are:

- present time : 0.1 L/s/m
- 2050 : 0.5 L/s/m
- 2100 : 2 L/s/m

The land inundated would be confined to that land east of Boollwarroo Parade / Bass Point Tourist Road as noted above.

Ocean Crossing the Roadway along Boollwarroo Parade

It is difficult to comment in detail on the matter raised by Mairi Petersen as the timing and location of ocean waters crossing the roadway twice in the last 100 years are not specified in the submission.

It is possible that the area in question may be near the existing breakout point of the swamp across the beach where, as a result of the regular breakouts, the dunes are lower in elevation.

As part of the Shell Cove Boat Harbour development the dunes in this area will be reformed and stabilised at a crest level of 4.5 m AHD (to match the typical crest elevation further north), accordingly overtopping behaviour in the future would be consistent with the predictions made above. In addition, a Beach Nourishment / Rehabilitation Management Plan has been prepared and approved for Shellharbour South Beach as a requirement of the conditions of development consent and conditions of concurrence under the Coastal Protection Act 1979. This will ensure maintenance of a stable dune system into the future.

3.5.3 Climate Change

General

A number of the submissions raise the issue of climate change, including those prepared by the Illawarra Greens, Mairi Petersen, Sonya McKay, Shellharbour City Council, and DoP / Parsons Brinckerhoff. The climate change matters raised can be summarised as follows:

- has sea level rise due to climate change been considered;
- provide further information on sea level rise impacts on wave climate and beach erosion hazard; and,
- impact of sea level rise on inundation.

The Environmental Assessment did give consideration to the impact of climate change on coastline hazards, specifically the impact on the shoreline recession hazard and on inundation. Both issues have been addressed in considerable detail above.

The magnitude of the sea level rise considered in the Environmental Assessment to the year 2100 comprised three values corresponding to 'low' (0.18 m), 'mid' (0.55 m) and 'high' (0.91 m) sea level rise scenarios, which was the appropriate approach at the time (September 2009).

Subsequently, planning benchmark values for sea level rise of 0.4 m to 2050 and 0.9 m to 2100 have been recommended by the NSW Government and have been considered in this response.

Parsons Brinckerhoff in their report on behalf of DoP has referred to a potential sea level rise of 1.1 m by 2100. This value is not current NSW Government policy and, accordingly, is not addressed in this response.

The points addressed below include:

- sea level rise impact on wave climate; and,
- sea level rise impact on beach erosion hazard.

Sea Level Rise Impact on Wave Climate

Ocean waves are generated by the wind. Sea level rise per se would not affect the wave climate (height, period and direction) approaching the coast.

At the shoreline, waves are 'depth limited', i.e. the maximum wave height that can occur (for a given wave period) is a function of the available water depth, which in turn is governed by the prevailing water level and seabed level (including consideration of seabed scour at the times of storms).

Although the water level will increase in elevation with sea level rise, giving the potential for greater water depth and thus larger wave heights, morphological changes to the beach profile will also occur as a result of sea level rise such that the beach berm level and nearshore profile will adjust upwards. As a consequence it is considered unlikely that there would be any significant change in the nearshore wave climate due to sea level rise.

Sea Level Rise Impact on Beach Erosion Hazard

The beach erosion hazard is generally defined by the "storm demand" which is the volume of sand measured above 0 m AHD which can be eroded from a beach in a severe storm or closely linked series of storms.

The storm demand is dependent on a number of factors but importantly the height and period of the incident wave climate. As sea level rise is not expected to significantly alter the incident wave climate at the beach (as noted above), sea level rise would not be expected to have a significant impact on the beach erosion hazard. Therefore the value of storm demand adopted for assessment of the present day beach erosion hazard is also appropriate for adoption in 2050 and 2100. This is accepted methodology in coastline hazard assessment. It was also the

methodology adopted by SMEC in the Shellharbour Coastal Hazard Study conducted for Shellharbour City Council

3.5.4 Seawall Crest Level

DoP raised the matter of the proposed crest level of the seawall within the Boat Harbour of 2.0 m AHD and has sought information on the selection of this adopted height.

Firstly, it should be noted that the seawall crest level does not represent the building platform level. The actual building platforms will step up above the seawall crest to a minimum of approximately 3m AHD.

The seawall crest level was established having regard to a number of factors:

- elevated still water levels in the Boat Harbour at times of ocean storms;
- consideration of sea level rise due to climate change;
- foreshore design objectives; and
- available adaption measures.

The available minimum freeboard of 0.5 m between the 100 year elevated still water level of 1.5m AHD and the minimum seawall crest level of 2.0m AHD is essentially fully available to accommodate an amount of postulated sea level rise. The extent of wave action on top of the still water level in the Inner Harbour at times of extreme storms is relatively low, typically less than 0.1 to 0.2 m (Patterson Britton, 2005). In any case, some lapping of waves over the seawall crest for a period of less than a few hours in extreme storms is considered acceptable.

Having regard to the planning benchmark values for sea level rise, temporary inundation beyond the seawall crest in a 100 year ARI storm event (for less than a few hours), for the sections of seawall at the minimum crest level of 2.0 m AHD, would not be expected to occur for some 50 to 60 years into the future. Inundation beyond the seawall crest in the absence of storms, ie due to astronomical tide only plus sea level rise, would not be expected to occur until the next century (beyond 2100). This situation is considered reasonable when such time frames are beyond the life of boardwalk structures (which could be rebuilt at a higher level) and when the crest of seawalls can be increased in level over time.

3.5.5 Beach Nourishment / Rehabilitation Management Plan

The issue of beach nourishment and / or rehabilitation management was raised in two submissions regarding:

- who will pay for the Beach Nourishment / Rehabilitation Management Plan;
- what will happen if the prediction in the WorleyParsons report that "the development would not be threatened by coastal processes over a planning period of 100 years and beyond" is not correct.
- whether the Beach Nourishment / Rehabilitation Management Plan has been reviewed and approved by the appropriate stakeholders and, if so, what agencies were involved;
- who will be responsible (Council or Developer) to implement and fund initiatives recommended in the Plan.

Need for a Beach Nourishment / Rehabilitation Management Plan

Preparation of a Beach Nourishment /Rehabilitation Management Plan was necessary to address Conditions of Consent clause 15(d)(xi), the original Conditions of Concurrence Clause 3(v) under the Coastal Protection Act 1979 (March 1998), and the further Conditions of Concurrence (second dot point) for the modified Boat Harbour development approval (September 2007). It was prepared in two parts, reflecting the Construction Phase and the Operational Phase of the project. The former part of the Plan was included in the Construction Environmental Management Plan (Patterson Britton, 2007a), the latter part of the Plan was included in the Operation Environmental Management Plan (Patterson Britton, 2007b).

Review and Approval of the Beach Nourishment /Rehabilitation Management Plan

The Beach Nourishment/Rehabilitations Management Plan (construction phase and operational phase) has undergone significant review and approval procedures as required under the Boat Harbour Conditions of Consent and Conditions of Concurrence. The agencies and stakeholders involved in the consultation, review and approval of the plan included:

- NSW Land and Water Conservation (now Department of Environment, Climate Change and Water (DECCW);
- NSW Planning, Infrastructure and Natural Resources (now DoP); and
- Shell Cove Compliance Committee, which includes among other members, a local community representative and a Shellharbour City Council technical officer.

Responsibility for Implementation and Funding of the Beach Nourishment /Rehabilitation Management Plan

Responsibility for implementation and funding of the construction phase Beach Nourishment/ Rehabilitation Management Plan rests with the appointed Construction Contractor and would extend to the end of the Construction Contract. The Construction Contractor has not yet been appointed.

In accordance with the further Conditions of Concurrence issued by the then Minister for Climate Change, Environment and Water in September 2007, Shellharbour City Council is responsible for implementation and funding of the operational phase Beach Nourishment /Rehabilitation Management Plan.

Prediction of Coastal Processes Impacts in WorleyParsons (2009)

The predictions made in WorleyParsons (2009) are considered to follow accepted methodology and be conservatively based. The report has been reviewed technically by a range of parties, including Shellharbour City Council and consultants on behalf of DoP.

Specific matters raised during the review process have been addressed throughout this response. The original WorleyParsons (2009) report together with the responses provided in this Preferred Project Report are considered to provide a sound conservative basis for prediction of coastal processes impacts and management of coastline hazards.

3.6 LAND CAPABILITY

Issues relating to contamination, acid sulfate soils, flooding, watercycle management and groundwater were raised across many of the submissions.

As part of the submission review process, DoP engaged Parsons Brinckerhoff (PB) to provide specialist advice on the hydrological aspects in the EA including flooding, stormwater, water cycle management, groundwater and acid sulfate soils.

3.6.1 Contamination

Both DoP and Shellharbour City Council raised an issue relating to the detailed site audit for the 3.7 ha site within Shellharbour swamp (and within the Boat Harbour Precinct) that had been previously used by Shellharbour City Council as a refuse dump.

DoP and Shellharbour Council sought further information on contamination assessments for the balance of the Boat Harbour Precinct. In this context DoP requested an assessment in accordance with SEPP 55 Remediation of land.

An issue raised by the Illawarra Greens was directed toward the potential adverse health impacts associated with what was defined as “contaminated ground”.

Former Council Refuse Site

Ministerial consent was provided to remove waste material deposited in the former Council tip and to transfer the waste to the Shell Cove Waste Containment Cell (SCWCC) immediately south of the Boat Harbour Precinct. The Ministerial consent provides for the land above the SCWCC to be developed for playing fields in the future.

The waste material was removed and encapsulated in the SCWCC with DECCW approval under the framework of EPL 12426.

As part of the due process associated with the transfer of Council initiated waste a site audit of the former waste site was carried out in accordance with the DECCW protocol on completion of the waste transfer process.

A copy of the Site Audit report for the former Council landfill site prepared by Phillip Hitchcock (November 2009) is included in **Appendix 2E**. The Site Audit report validates the suitability of the site for residential development, without the need for any further remediation.

Phase 2 Contamination Assessment

A detailed contamination assessment of the Boat Harbour Site has been completed by Douglas Partners tabled Phase 2 Contamination Assessment Proposed Shell Cove Boat Harbour Precinct Shellharbour NSW October 2010. Refer to **Appendix 2D**.

The assessment process included a review of historical information, site walkover survey, limited intrusive sampling, laboratory analysis of samples, data interpretation and reporting. Refer to **Figures 14** and **15**.

Figure 14: Boat Harbour Precinct Aerial (June 1963) (*Source: Douglas Partners*)

Figure 15: Location of boreholes

The report notes that a Site Audit Statement prepared by Phillip Hitchcock, an EPA Accredited Site Auditor, indicated that following remediation/relocation of the landfill, the former Council landfill area was suitable for the proposed development including residential use with accessible soil/garden.

The site history investigation indicated that the greater majority of the site was vacant until at least pre 1960s. The north-western sector was developed into a golf course in the 1970s and occupied around 17 percent of the Boat Harbour Precinct. The golf course ceased operation in 2004 and has since remained vacant. The remainder of the site, other than for the former Council landfill, appeared to have been used as farm land.

The site inspection confirmed the former golf course use in the north-western portion of the site. Remnants of the old former farm related structures on the south-eastern portion of Lot 206 in DP 857030 were observed including a fragment of asbestos-containing material (ACM).

Bricks, bitumen pavement electrical cables, vehicle engine parts and a recently discarded empty engine oil drum were found scattered to the west of the Boat Harbour Precinct (i.e. outside the Boat Harbour Precinct), scattered around the location of former farm buildings.

Stockpiles of boulders were observed on site. Some of the stockpiles contained soil.

Intrusive investigations indicated that topsoil fill has been placed on the fairways. Sandy clay and clayey sand were observed in the greens. Silty clay filling with traces of sand were observed in tee boxes. Clay was observed underlying fill in all locations.

Laboratory results indicate that the majority of the soil samples analysed were within the Site Assessment Criteria (SAC), other than some exceedances of the Provisional Phytotoxicity-based Investigation Levels (PPIL) identified in the western and southern portion of the site (former golf course and former farm related structures), which may indicate that plant growth in some proposed residential lots may be affected.

Organochlorine Pesticides (OCP) Aldrin, dieldrin, chlordane, DDD, DDE, DDT and heptachlor were detected but were within the applicable Health Based Investigation Levels (HIL). It is noted, however, that due to the limited number of samples taken, it is likely that OCP maybe present in all or most tees and greens of the former golf course areas that has not been sampled.

Whilst no asbestos was detected in the soil samples analysed, an asbestos fragment was found in the near-surface location of a former farm structure in the south-eastern portion of the site. In this regard, the potential presence of asbestos contamination in that location cannot be discounted.

Laboratory results of the majority of the groundwater samples analysed were within the respective GILs with the exception of minor exceedances of copper and zinc. Chloride was also detected in excess of the ANZECC 2000 guidelines for recreation purposes. Elevated copper, zinc and chloride concentrations are probably indicative of background concentrations. Douglas Partners note that natural soil across the site contains elevated copper concentrations and that elevated groundwater concentrations of zinc commonly occur. Chloride may be associated with

connate salt, whilst copper and zinc are ubiquitous in groundwater at concentrations higher than the groundwater investigation level (GIL).

The laboratory Practical Quantitation Limit (PQL) for heptachlor, DDT, phenols and benzo(a)pyrene were higher than the respective GILs. While it appears unlikely that they are present, no firm statement can be made for these particular analytes without undertaking trace analysis.

Douglas Partners concluded that based on the findings of the Phase 2 Contamination Assessment, there is no major contamination issue that will preclude the development of the Boat Harbour site. Subject to further investigation to delineate the extent of the OCP and heavy metal impacts in the former golf course area; and heavy metals and asbestos in the locations of the former farm structures to the south-east, the site can be made suitable for the proposed development. The report also noted that asbestos pipework may be present in the golf course area, however this can readily be managed by implementing an Unexpected Finds Protocol for asbestos during development. Stockpiles that contained residual soil should also be evaluated for waste classification prior to disposal for possible reuse to backfill the former Council landfill area or an appropriate location elsewhere on the site.

Groundwater investigation is also recommended in the location of the former golf course area to ascertain OCP and heavy metal impacts (if any). To manage the PPIL exceedances and the findings of further soil and groundwater investigations, a Remediation Action Plan (RAP) will need to be prepared to render the identified areas suitable for the intended development.

Accessible Soil/Garden

The Illawarra Greens raised a concern that appears to be based on the site audit of the former Council refuse site following the transfer of the waste to the Shell Cove Waste Containment site.

The concern appears to rest with the classification by the auditor indicating that the site is suitable for “residential with accessible soil including garden (minimal home grown produce contributing less than 10% fruit and vegetable intake), excluding poultry”.

The Illawarra Green’s concern is that residents may grow their own produce without realising the potential health impacts from the “contaminated ground”. It was suggested that all residents should be made aware that they reside on “contaminated ground” and that all owners and lessees should also be advised.

It is noted that the site audit, to which the Illawarra Greens refer, only relates to the 3.7 hectare former Council Refuse Site, which represents less than 4 per cent of the total Boat Harbour Precinct.

The residential classification accorded to the site by the site auditor is a standard residential classification under DECCW guidelines.

It is also noted that in the auditor’s overall comments that the site was defined as a former shallow land form, and following remediation all waste has been removed and that the remaining soils and ground water contained low contaminant levels.

It was also noted that the site is to be filled by at least 4 metres.

Given the above classification by the site auditor and associated comments, the 3.7 hectare former landfill site does not have potential adverse health impacts and cannot be defined as "*contaminated ground*".

Commitment

Based on the conclusions of the Phase 2 Contamination Assessment, the Applicant commits to undertake the recommended further investigations in the former golf course area and in the location of the former farm structures to the south-east of the site as part of the relevant Project Application investigations.

3.6.2 Acid Sulfate Soils

The issue of acid sulfate soils (ASS) was raised in the submission by Shellharbour City Council. Council noted that any concept plan approval should give due consideration to how the preloading process and treatment of ASS will be staged and managed throughout the life of the project.

Staging and Management of Preloading and Treatment of Acid Sulfate Soils

The long term treatment of the ASS that is left in insitu on the site (i.e. capping and consolidation) is described in the following section. The manner in which this process is staged will depend on the Contractor's final work method and construction programming but is likely to take place progressively over a total period of 3 to 4 years.

The ASS that is excavated rather than left insitu would be managed by a number of techniques:

- excavation and reburial below the Inner Harbour;
- excavation and transport off site to a DECC licensed landfill;
- excavation, neutralisation and beneficial reuse (sandy textured ASS);
- excavation, neutralisation and incorporation into landscaped mounds, with interim use as surcharge material (silt/clay textured ASS).

The staging of the above activities will depend on the Contractor's final work method and construction programming but is likely to take place progressively over a period of 3 to 4 years. Any short term stockpiling of untreated ASS for subsequent use as surcharge material would be limited to one week, based on the results of bench scale oxidation tests. Daily monitoring would be used to check that the pH of the stockpiles does not drop to unacceptable levels.

The entire process of the management of ASS is the subject of an Acid Sulfate Soil Management Plan and associated Water Quality Management Plan (incorporated within an Environmental Management Plan), and a s96 modification application, all of which require approval of DoP.

The applicant must also obtain an Environment Protection Licence (EPL) from DECCW for construction of the Boat Harbour, which will include a range of conditions relating to the management of acid sulfate soils to ensure no measurable environmental impact.

In addition to the specific requirements of the EPL, a licensee also has a number of general obligations as set out under the Protection of the Environment Operations Act 1997 and the Regulations made under the Act, including to:

- ensure persons associated with the licensee comply with EPL;
- control the pollution of waters and pollution of air;
- report incidents causing or threatening material environmental harm to the environment.

The above approval processes provide significant controls on potential environmental impacts associated with the management of acid sulfate soils at the site.

Long Term Oxidation of Acid Sulfate Soils

The acid sulfate soils (ASS) in question are those which would remain insitu under the land platform of the Boat Harbour development. The Coffey Geotechnics report (September 2009) which was reviewed by Parsons Brinckerhoff notes that this material would be capped and consolidated (Section 3.2.2). Some explanation as to why this material would not be subject to oxidation in the longer term is provided by Coffey Geotechnics in Section 5.4 of their report. Further explanation is provided in Patterson Britton (2005).

The capping and consolidation approach for management of insitu ASS under the land platform was developed in collaboration with Dr Ian White of Australian National University, based on Dr White's successful employment of the methodology for management of insitu ASS in the Tweed area.

Consolidation and capping has the following benefits in the management of the insitu ASS:

- consolidates ASS down the soil profile;
- causes the watertable to rise;
- decreases the rate of transport of oxygen into the soil profile;
- decreases the hydraulic conductivity of the soil;
- increases the capillary fringe thickness above the watertable.

The minimum total thickness of capping material above the insitu ASS would be approximately 2m, comprising a bridging layer, a drainage layer, general fill, and structural fill. Coffey Geotechnics (2009) confirmed that the consolidation of the insitu ASS which would take place due to the capping material and surcharging would be such that the top surface of the ASS would be below the long term groundwater levels at the site following Boat Harbour construction thereby avoiding oxidation.

3.6.3 Flooding

DoP and Council raised a number of issues relating to the flooding sector of the EA, including:

- Flood Planning Level / Climate Change;
- Additional flood mapping information;
- Flood impacts in the vicinity of Ron Costello Oval;
- Council's Floodplain Risk Management DCP and flood risk; and
- Clarification of 1-Dimensional and 2-Dimensional modelling.

As part of the submission review process, DoP engaged Parsons Brinckerhoff (PB) to provide specialist advice on the hydrological aspects in the EA including flooding.

Responses to the detailed issues raised are set out below.

Flood Planning Level

DoP requested a full explanation of the Flood Planning Level (FPL) adopted for the Boat Harbour Precinct, noting that it would be more prudent to use a 0.9m (high range) sea level rise to account for the impact of climate change.

The EA documents the evolution of flood modelling within the Boat Harbour Precinct. At the time of preparing the Boat Harbour Precinct flood model sea level rise was addressed by the 2007 Department of Environment and Climate Change publication, 'Practical Considerations of Climate Change'. This document provided low (0.18m), medium (0.55m) and high (0.91) climate change scenarios.

The EA adopted the medium range scenario (0.55m) to incorporate the impacts of climate change into the FPL and additionally assessed the sensitivity of the high climate change scenario coupled with an increase in rainfall intensity of 30%.

It should be noted that flood modelling for the 0.91m sea level rise and 30% increase in rainfall intensity has been undertaken for the 100 year ARI event. Based on this modelling, the 100 year ARI flood level within the Boat Harbour does not exceed the minimum road level of 2.5m AHD for areas immediately adjacent to the Boat Harbour.

Since the submission of the EA, the NSW DoP has issued the *'NSW Coastal Planning Guideline Adapting Sea Level Rise, August 2010*'. This guideline recommends that a year 2100 sea level rise of 0.90m should be incorporated into FPLs. Accordingly, the Boat Harbour Precinct will adopt this recommendation into FPLs adjacent to Boat Harbour and the major overland flow paths identified in the EA submission.

Commitments

The Applicant commits to adopting Flood Planning Levels based upon the 100 year ARI flood level plus 0.90 m sea level rise (for the year 2100) plus 0.50 m (to comply with Council's freeboard requirement).

The Applicant commits to undertake the preparation of a FPL map in accordance with Figure 5 of the NSW Coastal Planning Guideline Adapting to Sea Level Rise for subsequent project applications when more detailed definition of final design levels is available. This will include localised flood modelling for each stage of the Boat Harbour Precinct to demonstrate compliance with the NSW Coastal Planning Guideline Adapting to Sea Level Rise.

The Applicant commits to undertake an assessment of the impact of 0.9m sea level rise on the 5 year and 100 year ARI and PMF storm events during detailed design phases of the Boat Harbour Precinct associated with subsequent project applications.

Flood Impacts in the Vicinity of Ron Costello Oval

There are some minor increases and decreases in flood levels within Shellharbour Village for the 100 year ARI event. A decrease in the range of 0.01m to 0.05m is predicted along the northern boundary of the site and part of Boollwarroo Parade. The maximum increase is predicted to be 0.02m to 0.03m to the north of Ron Costello Oval. These increases are not significant; consequently mitigation measures are not proposed for the following reasons:

- The predicted minor increases are localised to a small area and unlikely to have any significant or measurable impact.
- The increase is negligible in the context of sea level rise impacts of up to 0.9m.
- The overall result is positive with most effected properties within Shellharbour Village benefiting from a minor reduction in flood levels in the 100 year ARI event and a significant reduction in the PMF event.

Commitment

The Applicant undertakes to ensure that the development does not result in any significant increase in flood levels on adjacent properties. Flood impacts will not exceed those identified in Appendix F of the EA.

Shellharbour Floodplain Risk Management DCP

The Boat Harbour Precinct has been prepared with due consideration of flood risk, as required by Council's Flood Plain Risk Management Development Control Plan (and the NSW Flood Plain Development Manual 2005).

The external consultant engaged by DoP to provide specialist advice has indicated that Appendix F of the EA provided a comprehensive assessment of flood risk and also indicated that compliance with the NSW Flood Plain Development Manual and Council's Flood Plain Risk Management DCP had been satisfactorily demonstrated.

Commitment

Flood risk will be assessed in all future project applications for consistency with the concept plan and compliance with the NSW Flood Plain Development Manual 2005 and Council's Flood Plain Risk Management DCP.

Clarification of 1-Dimensional and 2-Dimensional Modelling

Flood modelling was undertaken by Cardno Lawson Treloar using SOBEK modelling software.

SOBEK utilises both 1-Dimensional and 2-Dimensional modelling techniques. Flow within dedicated water courses (i.e., creeks, culverts, channels, etc) are modelled as 1-Dimensional until such a time when the bank of the water course is overtopped. Flood behaviour beyond the banks is modelled as 2-Dimensional. The flooding extents documented within Appendix F of the EA are 2-Dimensional.

3.6.4 Water Cycle Management

DoP and Council raised issues about the water cycle management component of the EA relating to:

- How proposed Water Sensitive Urban Design (WSUD) measures will meet reduction targets;
- Clarification of the extent of pollutant reductions from the pre-development and post-development condition;
- Efficiency and hydraulic residence time of constructed wetlands;
- Compliance with pollutant reduction targets for all stages of the development;
- Details of stormwater quality modelling provided; and
- Consideration of additional aspects including construction impacts, impact of major flood on the proposed systems, on-site detention requirements, impact of seepage flows on groundwater quality and a water quality monitoring program.

While responses to the detailed issues raised are set out below, it is important to acknowledge that the detailed stormwater quality management processes, including the stormwater 'treatment train' system, have formed an integral part of the detailed stormwater quality assessments that have resulted in Ministerial consents including:

- Determination of Development Application No. 95/133 (26 November 1996)
- Notice of Modification to Development Consent (6 September 2004)

The objective of the adopted stormwater management strategies has been to match the pre-development pollutant concentrations at the Shellharbour Swamp / Tasman Sea confluence.

Accordingly, part of the defined stormwater quality control system has already been implemented with some 36% of the total wetland area already in place. A further 38% is planned to be constructed in association with the development of Shell Cove Stages 9 and 10, which lay outside the Boat Harbour Precinct, with the balance of the wetlands (26%) located within the Boat Harbour Precinct.

Water Sensitive Urban Design (WSUD) Measures to Meet Reduction Targets

It is important to note that the Stormwater Quality Management Strategy also considered the Department of Environment and Conservation (DEC) guidelines as presented in 'Managing Urban Stormwater: Council Handbook', Environmental Protection Authority (1996). This document identifies the following reduction targets:

- 80% reduction in average annual loads for Total Suspended Solids;
- 45% reduction in average annual loads for Total Phosphorus; and
- 45% reduction in average annual loads for Total Nitrogen.

The stormwater quality modelling tool MUSIC was used to estimate the average annual pollutant loads generated by the proposed development and to determine the efficiency of the proposed WSUD measures.

The Boat Harbour Precinct will include a suite of WSUD measures, including rainwater tanks, bio-retention swales, bio-retention basins, gross pollutant traps and constructed wetlands. The Stormwater Quality Management Strategy proposes arrangement of these measures in a strategic fashion throughout the Shell Cove development area to utilise a 'treatment train' approach to stormwater quality improvement. Rainwater tanks will be provided on each residential lot and other measures will be incorporated into the Boat Harbour Precinct in accordance with Figure 2 of Sub-Appendix B of Appendix B of the EA.

A preliminary site grading plan has been developed for the Boat Harbour Precinct that considers the requirement to drain stormwater runoff to the Harbour via the proposed WSUD measures. The proposed drainage network and WSUD 'treatment train' result in the following average annual reductions in pollutant loads:

- Total Suspended Solids 82%;
- Total Phosphorus 57%; and
- Total Nitrogen 47%.

Extent of Pollutant Reductions from the Pre-Development and Post-Development Condition

The Stormwater Quality Management Strategy had been prepared to demonstrate that the Boat Harbour Precinct development will not discharge increased volumes of Total Suspended Solids, Total Phosphorus and Total Nitrogen at Shellharbour South Beach than in the existing scenario.

Additionally, the Stormwater Quality Management Strategy satisfies the DEC guidelines.

The existing (i.e., pre-development) pollutant concentrations were subject to thorough investigation and modelling works. Section 3 of Sub-Appendix B of Appendix B of the EA details the measures that were taken to verify the existing Event Mean Concentrations for the predevelopment catchment. The efficiency of Shellharbour Swamp was included when estimating the existing stormwater pollutants being discharged at Shellharbour South Beach.

Extensive documentation has been prepared on the derivation of existing stormwater pollutant loads, such documentation includes:

- 'Shell Cove Boat Harbour Precinct Stormwater Quality Management Strategy', WorleyParsons, September 2009;
- 'Shell Cove Stormwater Quality Management Issue No.1', Patterson Britton and Partners,
- 2005;
- 'Shell Cove Master Plan Review, final report on water management, GHD, 1999; and
- 'Shell Cove Commission of Inquiry, Report on Stormwater Issues for Submission in Reply', GHD,1996.

Table 9 below nominates the average annual pollutant loads arriving at Shellharbour South Beach for the existing, the developed (untreated) and developed (treated). The percentage reductions between the existing and developed (treated); and between developed (untreated) and developed (treated) are shown in **Table 10**.

Location	Average Annual Pollutant Load (kg/year)								
	Suspended Solids			Total Phosphorus			Total Nitrogen		
	Existing	Developed (untreated)	Developed (treated)	Existing	Developed (untreated)	Developed (treated)	Existing	Developed (untreated)	Developed (treated)
Shellharbour South Beach	70,700	262,000	46,700	202	429	185	1,840	3,290	1,750

Table 9: Average Annual Pollutant Loads – Shellharbour South Beach *(Source: Worley Parsons)*

	Existing and Developed (treated)	Developed (untreated) and Developed (treated)
Suspended Solids	34%	82%
Total Phosphorus	8%	57%
Total Nitrogen	5%	47%

Table 10: Pollutant Reductions at Shellharbour South Beach *(Source: Worley Parsons)*

Stormwater Quality Modelling

DoP sought further clarification of the MUSIC predictions presented in Sub-Appendix B of the EA, noting that they are less than the EPA curves which indicated the wetlands are not sufficient. Inconsistencies in the wetland properties presented in Sub-Appendix B were also identified with particular attention given to the volume and hydraulic residence times for Wetland No.1.

Shellharbour Council has sought further clarification of the pollutant export rates and assumed pollutant reduction percentages contained within Tables 5.12 and 5.13 of the Stormwater Management Strategy.

It is noted that the water quality monitoring program undertaken for Wetland No.1 has confirmed the conservative basis of the stormwater 'treatment train' set out in the EA.

MUSIC Predictions

The topography of the Shell Cove development area has provided a number of constraints that control the placement of wetlands. Whilst individual constructed wetlands may not, when viewed in isolation, meet the performance of the EPA curves, they form a necessary component of the overall treatment train which achieves the required pollutant reduction targets.

Wetland Properties

The hydraulic residence times nominated in Table 5.9 of Sub-Appendix B of Appendix B of the EA were approximated based upon the permanent pool volume within each wetland and based upon the mean daily runoff into the corresponding constructed wetland. **Table 11** summarises the hydraulic residence times for each of the constructed wetlands.

Wetland	Estimated Hydraulic Residence Time (days)	Permanent Pool Volume (m^3)	Average Annual Runoff (ML/vear)
1 19		5955	113
1a 6		1655	94
2 1		514	168
2b 2		925	168
3a 2		3430	503
3b 3		3570	497
5 5		8000	648
6a 1		1750	742
6b 2		3220	739
7 12		3500	103

Table 11: Constructed Wetlands Hydraulic Residence Times *(Source: WorleyParsons)*

The hydraulic residence times nominated above in Table 11 have not been used to estimate the efficiency of a constructed wetland in removing stormwater pollutants. MUSIC utilises accepted algorithms to estimate the hydraulic residence time and performance of a constructed wetland based upon surface area, permanent pool volume, outlet characteristics and extended detention depth.

It is noted that the Concept Plan Application for the Boat Harbour Precinct relates only to wetlands 6a, 6b and 7. Wetlands 1, 1a, 2 and 2b have been constructed in accordance with data forming part of the detailed submissions that led to both the original Ministerial consent in 1996 for the Boat Harbour and the Section 96 Modification Consent in 2004. Wetlands 3a, 3b and 5 do not form part of this Concept Plan Application given that they are located to the west of the Boat Harbour Precinct.

Pollutant Export Rates and Assumed Pollutant Reduction Percentages

The approach to estimating existing stormwater runoff pollutant concentrations was outlined in Section 3 of Sub-Appendix B of Appendix B of the EA.

In summary, it was decided to adopt existing EMC values based on the statistical overview undertaken by Duncan in 1999 and then updated in 2004. The adopted EMC values generated lower concentrations of stormwater pollutants than the collected data. Thus, the adoption of

Duncan's EMC values should be considered as conservative (i.e., the EMC values are under estimating existing pollutant loads which must not be exceeded in the proposed scenario).

Consideration of Additional Aspects

DoP has identified a series of issues that should be considered. Responses to the issues are set out below.

Construction impacts on water quality for different stages of the development

It is proposed to stage the construction of the Boat Harbour Precinct. The nature of the staging plan will require the bulk of stormwater infrastructure to be built during the early stages of the development. Thus, it is likely that the stormwater quality will exceed the anticipated performance up until the construction of the Boat Harbour Precinct is finalised.

Supporting documentation for the interim scenarios (i.e. each stage) will also address Sediment and Erosion Control in accordance with Council's requirements and the "*Blue Book*".

Impact of major flood events on the proposed systems

The majority of WSUD mechanisms within the Boat Harbour Precinct are "on-line". That is, they coincide with designated overland flow paths. Thus, WSUD mechanisms will need to be designed to accommodate storm events up to the 100 year ARI event. This can be readily achieved by:

- Appropriate design of inlet structures;
- Appropriate design of outlet structures; and
- Provision of adequate deep water zones to limit damage to macrophytes within the constructed wetlands.

Whether on-site detention is proposed

Given the downstream location of the Boat Harbour Precinct catchment (i.e. immediately adjacent to the ocean) there is no requirement to preserve existing downstream flow regimes or infrastructure. Thus, on-site detention is not proposed. However, the flooding extents documented within the EA include existing on-site detention upslope of the Boat Harbour Precinct.

Impacts of seepage of flows from stormwater treatment devices and the impact on local ground water quality

The proposed WSUD features do not intercept the proposed ground water table for the Boat Harbour Precinct. Thus, the stormwater treatment devices are expected to have no significant impact on ground water quality.

Water Quality Monitoring Program During and Post Construction

A water quality monitoring program has previously been undertaken on Wetland No. 1 to assess urban pollutant loads and wetland treatment efficiency for a typical residential catchment. This

monitoring confirms the conservative basis of the treatment train proposed in the EA. An ongoing water quality monitoring program is required under the Boat Harbour Consent. No further post construction monitoring is proposed.

3.6.5 Groundwater

The issue of groundwater was raised in two submissions:

- the submission by the NSW Office of Water (Attachment B to DoP letter dated 10 May 2010):
  - this submission outlined the requirements of the NSW Office of Water in relation to basement construction and temporary, semi-permanent and permanent dewatering. The submission is of a guideline nature and does not require a specific response at this time;
- the submission by DoP (Attachment 1 to DoP letter dated 4 June 2010), which was informed by the review report prepared by its external consultant Parsons Brinckerhoff. Two issues were raised:
  - clarify why acid sulfate soils will not become oxidised in the long term and affect groundwater quality (refer 3.6.2);
  - the impacts to groundwater quality should be discussed making reference to the NSW State Groundwater Protection Policy

3.6.6 Other

DoP, DECCW, Shellharbour City Council, Illawarra Greens and Karen Gough raised issues regarding the capability of land to support the development, including:

- Adequacy of the contamination investigation (refer to Section 3.6.1);
- Remediation of land (refer to Sections 3.6.1 and 3.6.2); and
- Acid sulfate soils (ASS) (refer to Section 3.6.2).

3.7 HERITAGE

A number of issues were raised by the agencies and the public regarding known Aboriginal archaeology in the vicinity of Boat Harbour Precinct.

Numerous studies have been conducted over the area of the Boat Harbour Precinct over the past twenty years and have included consultation with the local Aboriginal community.

Early studies undertaken in the initial feasibility stages and in preparation for the Boat Harbour/Marina EIS identified the location of middens within the coastal dune zone. Accordingly, design work has advanced with key criteria aimed at the protection and retention of these middens.

Recent consultation with the local Aboriginal community has been conducted under the framework of sections 87 and 90 of the NPWS Act. This process has culminated in a consent under section 90 and permit (2534) under section 87 of the NPWS Act being issued by DECCW in September 2006. The consent and permit applies to the known Aboriginal sites/objects as well as any other Aboriginal sites/objects present (but excluding human skeletal remains) within Shell Cove lands including the Boat Harbour Precinct.

The Shell Cove Boat Harbour consent 95/133 requires the preparation of an Archaeological and Heritage Protection Plan in consultation with the local Aboriginal Community and NPWS. These plans have been prepared with consultation with the local Aboriginal Community and NPWS and encapsulate the middens in the dunal zone as well as a number of low significance AHIMS registered sites. These plans have been endorsed by DECCW and approved by the Director General of the Dept of Planning in accordance with the conditions of consent 95/133. Additionally the plans are referenced in the section 87 permit and section 90 consent issued by DECCW and accordingly provide the framework for management and protection of the midden and for monitoring and collection of objects associated with other identified sites within this framework.

3.8 HOUSING AND SOCIAL INFRASTRUCTURE

Issues raised in relation to the provision of housing and social infrastructure by Shellharbour City Council, Illawarra Greens and DoP have been considered in the context of the wider Shell Cove area.

In addition to the social infrastructure proposed in the Concept Plan for the Boat Harbour Precinct, a number of other facilities including seniors living, child care centres and a GP super clinic will be provided as part of the overall Shell Cove project, which will also serve Boat Harbour Precinct residents. Refer to **Figure 16**.

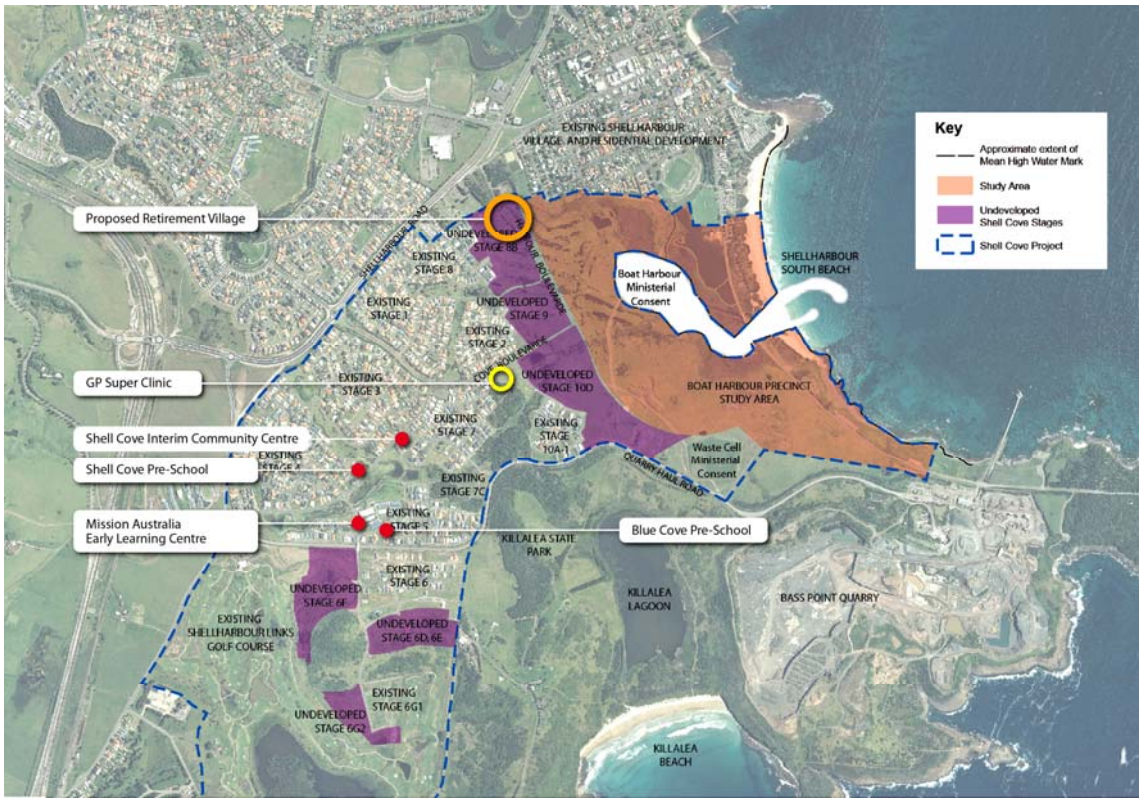


Figure 16: Social infrastructure outside of Boat Harbour Precinct

3.8.1 Housing Affordability

The Shellharbour LGA provides for a broad range of predominantly detached housing options with numerous affordable suburbs to its north eastern and western extremities.

The Boat Harbour Precinct will provide for a diverse mix of housing options including apartments, town homes and detached housing.

3.8.2 Retirement Living

A Seniors Living development is presently planned by Warrigal Care in the Shell Cove Stage 8 precinct directly abutting the Boat Harbour Precinct. This development will provide 54 to 63 independent living units, 160 bed residential aged care facility plus community facilities for community care services and day respite programs. Future expansion of this development is also possible.

Additionally, the need for further facilities will be reviewed on an ongoing basis within the proposed flexible framework of the Boat Harbour Precinct concept plan.

3.8.3 Community Facilities

The long term planning for the Shell Cove project includes the provision of a community centre within the Boat Harbour Precinct. This centre is included within the Shellharbour City Council section 94 Contributions Plan.

An interim community centre has been incorporated into the project as a result of resident surveys that indicated an early demand for a facility. The community centre has been funded via section 94 with Australand project managing the delivery of the facility for Council. The centre has been developed using a standard house so that at termination of its interim use as a community facility the building can revert to a standard residential dwelling, with proceeds controlled by Council and available for the long-term community centre.

The building comprises a number of rooms with multiple-use potential and has been solidly booked by resident groups since its completion. Regular uses of the building include gardening club meetings, euchre club, exercise classes, playgroup, craft groups, etc.

3.8.4 Child Care

There are presently three childcare centres located in the Shell Cove project, two operated by a local private operator and one operated by Mission Australia. The centres are:

- Blue Cove Pre-school – Bribie Avenue, Shell Cove
- Shell Cove Pre-school - Southern Cross Boulevarde, Shell Cove
- Mission Australia Early Learning Centre – Bribie Avenue, Shell Cove

Both the Mission Australia Early learning Centre and the Blue Cove Pre-school provide for after school care.

3.8.5 General Practitioner Super Clinic

A GP Super Clinic is currently under development within the Stage 10 precinct which adjoins the Boat Harbour Precinct. This facility is being delivered under the Federal Government GP Super Clinic program in regional areas and is being coordinated by the Illawarra Division of General Practice.

The lifestyle medical centre will provide a valued community resource for the Shell Cove project delivering access to GPs, practice nurses, allied health professionals, specialists and pathology

services as well as providing related exercise facilities, walking groups and health management programs.

3.8.6 Open Space Provision

Refer to Section 3.3.3.

3.9 LAND USES

The most commonly raised issues relating to land use were:

- Permissibility of uses in Mixed Use Residential Zone 2(f) Quarry Buffer Area; and
- Details of proposed land uses within the mixed use precincts A2 and H2.

3.9.1 2(f) Quarry Buffer Area

The Concept Plan proposes a Business Park in the Zone 2(f) Quarry Buffer Area, which will provide for high-tech, white-collar and marine-related employment opportunities within the Boat Harbour Precinct.

Clause 26(1) of Shellharbour LEP clearly allows for the development of commercial uses, subject to such uses not imposing a restriction on the nature of operations within the quarry.

3.9.2 A2 and H2 Mixed Use Precincts

The Concept Plan provides for the key uses proposed in A2 and H2 precincts – potential dry boat storage in A2 and a potential beach front hotel in H2. A range of other uses will be provided to complement the proposed key uses, with further details to be provided at project application stage.

3.10 NOISE

Noise issues related to the operational impacts of the BPQ (particularly in terms of blasting) as well as the noise criteria and methodology adopted in the noise modelling undertaken by Wilkinson Murray.

3.10.1 Blasting impacts

Section 3.1.3 addresses noise impacts related to current and proposed BPQ operations.

3.10.2 Noise Criteria and Methodology

DECCW raised some concern over the noise criteria and methodology used in the noise assessment for the EA.

Noise Criteria

Page 13 of Appendix J of the EA sets out intrusiveness criteria of 45dB, based on accumulated Rating Background Level (RBL) noise levels for residential land use within 200m of the ocean noise. DECCW has recommended a criterion of LAeq15min 40dBA to be applied to all residential locations near the ocean, given the variable effect of the ocean on the background noise vary over time.

Given that the sound of the ocean is normally considered as a usual part of the background noise for coastal residences, it is not considered necessary to apply the stricter criteria recommended by DECCW. If the background is measured over a sufficiently long period, then the RBL will take into account the quiet periods that occur at times near the ocean.

Meteorology

Adverse meteorological conditions can influence the propagation of noise. An assessment according to the method set out in the NSW Industrial Noise Policy (INP) considers propagation under adverse conditions if these are a “feature” of the area. In particular, night-time temperature inversions are considered a “feature” of the area if they occur more than 30% of the time during winter nights.

DECCW’s submission discusses the findings of the environmental assessment of the Tallawarra Stage B Power Station, concluding that Class F temperature inversions were a significant feature of the general area. Accordingly, they consider that the assessment of noise emission from the Bass Point Quarry should include the effects of temperature inversions on night-time noise propagation.

However, based on Wilkinson Murray’s analysis of data from Port Kembla for the year 2008, it is considered that there are no adverse meteorological conditions that require consideration in assessing noise propagation from the quarry. It should be noted that Heggies reached the same conclusion based on an analysis of data from Kiama for the period January 2004 to September

2009. Both weather stations are a similar distance from the site, with Port Kembla to the north and Kiama to the south of Shell Cove.

The Bureau of Meteorology website does not list “Warrawong” station, although it is probably no more than a few kilometres from the Port Kembla weather station, if not the same station under a different name. Different conclusions from closely spaced weather stations over different periods emphasise the complexity of deriving appropriate meteorological parameters for the noise assessment, which are also influenced by local geography.

In the absence of data specific to the Boat Harbour site (given DECCW’s reliance on the analysis provided for the Tallawarra EA), it is not possible to conclude with certainty that adverse meteorological conditions would be a significant feature.

Notwithstanding, assessment of the impact of meteorological conditions on noise propagation from the quarry has been investigated using the noise model prepared for the Boat Harbour Precinct EA. It showed that during times of temperature inversion the noise from the quarry would be increased by approximately 3dBA at the surrounding residential receivers. Accepting the results of the Heggies noise model, this would mean there would be exceedances of up to 4dBA at the most affected point within the development during times of temperature inversion. Therefore the ‘modelling’ impact of meteorological conditions is not considered significant, as noise management measures at the quarry could reduce or eliminate any exceedance.

3.11 TRAFFIC AND ACCESS

A number of traffic and access issues were raised, including:

- NSW State Plan target of 15% commuter trips to and from Wollongong CBD
- Cycle access to the Boat Harbour and Killalea State Park
- Impact of Boat Harbour Precinct on Shellharbour Road
- Clarification of Boat Harbour Precinct Town Centre car parking numbers
- Street network, hierarchy and design

Street network, hierarchy and design have been considered as design matters and as such are addressed in Section 3.3.1.

3.11.1 Public Transport

The NSW State Plan includes a 15% target for commuter trips to and from Wollongong CBD during peak hours by 2016. The planning of transport facilities in the Boat Harbour Precinct has been designed to contribute to the achievement of this overall target.

The provision of bus routes and bus stops in the Boat Harbour Precinct will contribute to the target; with bus stops located within a 400m walking distance from the majority of future residents (at least 85%). Refer to **Figure 7** in Section 3.3.4.

To meet the State target there needs to be a range of bus services, including rapid frequent bus routes, peak express services, frequent local bus services and local coverage services, which are integrated within the existing public transport system to meet and encourage public transport demand in Boat Harbour Precinct. Currently, coverage services in Shell Cove operate with relatively low frequencies and low average speeds. Consideration of frequent, direct peak hour connections between Oak Flats Station, Shellharbour/Shell Cove, Warilla and Albion Park, as well as peak express and rapid frequent services connecting to Wollongong are to be considered in future amendments to the bus network.

Consultation will be undertaken with local public transport providers at the detail design / project application phase of the project.

3.11.2 Cycle Network

The proposed plan for pedestrian and bicycle connections in the development is integrated with the surrounding development providing linkages between Shellharbour Village and existing Shell Cove precincts to the Boat Harbour Precinct. The cycleway network within the Boat Harbour Precinct terminates at the Harbour edge at a dismount zone to avoid safety risks and minimise conflict with pedestrian use. Refer to **Figure 6** in Section 3.3.4.

3.11.3 Pedestrian Access

Pedestrian Bridge

A number of submissions were in favour of a potential pedestrian bridge over the Boat Harbour/Marina entry. A pedestrian bridge does not form part of the Concept Plan proposal. A sketch (Figure 3.04 of the EA) simply demonstrated preliminary masterplan design investigations. The bridge option was eliminated during the preliminary review processes given significant difficulties associated with bridge opening operational criteria and/or the required height of a fixed bridge that would allow for masted vessels to enter or leave the Boat Harbour. It is noted that DoP concurs that a pedestrian bridge would not be viable given that it would need to be either of great height or openable.

Edge Conditions

The entire edge of the Boat Harbour is to be publicly accessible at all times. There are a range of edge conditions proposed for the Harbour, some with streets and some with pedestrian ways overlooked by housing, the Town Centre or the Hotel.

In particular, the streets in Precinct H1 will be linked by minor streets adjacent to the Boat Harbour.

Site links for pedestrians and active frontages will be incorporated in the Town Centre. Pedestrian access will utilise safe streets and open space corridors.

Access to Killalea State Park

There are currently two points of access to the Killalea State Park (KSP) via the Shell Cove project. Refer to **Figure 17**. These include the main entry off Killalea Drive and a pedestrian bridge across the quarry road in the vicinity of Hinchinbrook Drive. These access points are consistent with the 2000 Structure Plans endorsed by Council.

Bicycle and vehicle access is only permissible via the main entry to the KSP located off Killalea Drive.

The pedestrian footbridge from Hinchinbrook Drive is regulated under a deed of agreement between the KSP and Council, which specifically precludes access to the KSP from this point for bicycles or motorcycles.

Discussions with the KSP Trust have been previously held and it is noted that the KSP holds a firm position that no further points of access into the KSP will be permitted. This position is premised on the Park's need to control access into and out of the KSP.

A long-term strategy to provide a coastal walk connection to the KSP from Bass Point has been developed separately by Council and the KSP.

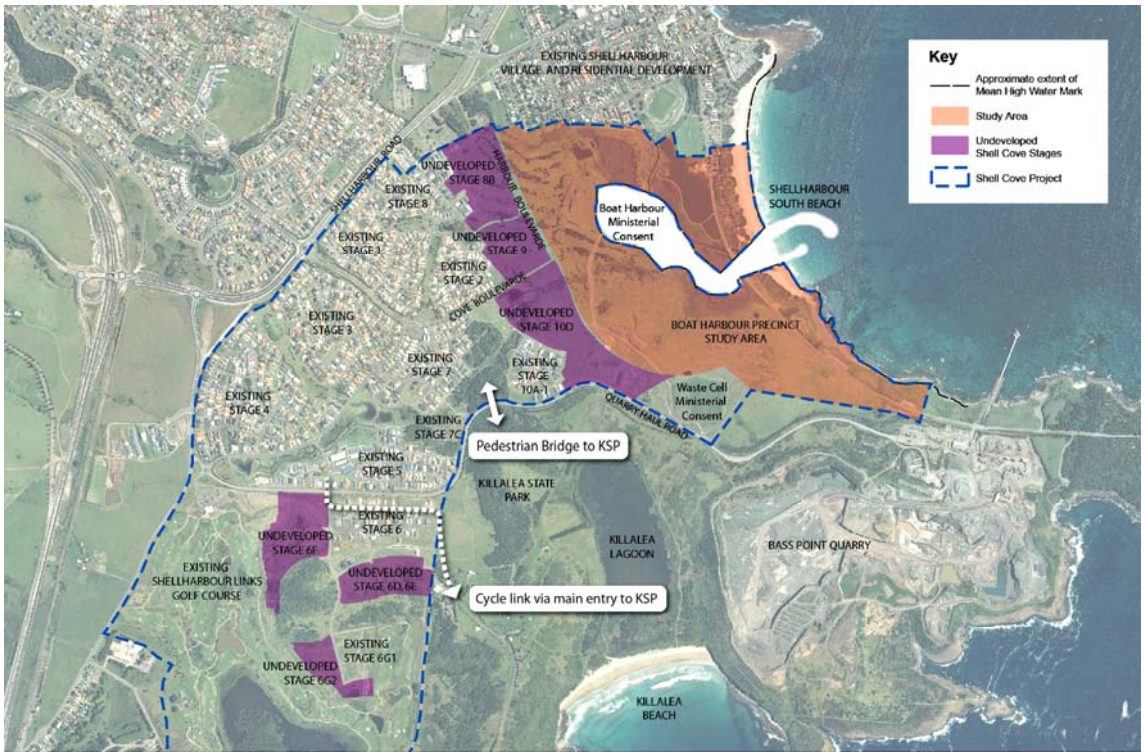


Figure 17: Pedestrian and cycle access to Killalea State Park

3.11.4 Connection to Shellharbour Road and Addison Street

The proposed extension of Harbour Boulevarde to form intersections with Addison Street and Shellharbour Road are an important element of access to the Boat Harbour Precinct, but are not subject to the Concept Plan approval being sought for the Boat Harbour Precinct. A preliminary design for these intersections has been submitted to RTA for review and the design has been agreed in principle by RTA subject to more detailed traffic modelling and refinement of the detailed design prior to finalisation of the design and the issuing of a construction certificate.

The traffic analyses included in the Traffic Study prepared in March 2009 used traffic forecasts extracted from the Illawarra 2018 TRACKS model. This assumes full development of the Boat Harbour Precinct and surrounding development, as well as inherent regional land use growth and road network assumptions agreed by Council and RTA. It is considered that the best available information available at the time was used to produce the figures contained in the study.

3.11.5 Car Parking

The parking numbers provided in Table 4.2 of the Traffic Study prepared in March 2009 were based on preliminary concept design plans for future car parks in the Boat Harbour Precinct and do not coincide with the rates in Table 4.1 and floor space estimates. Accordingly, an update of possible parking supply estimates for the main commercial uses has been prepared in **Table 12**, using Council's current parking rates. The overall figures are broadly consistent with the EA data.

Landuse	Use	Number of Spaces
Marina	300 berths	150
Hotel	150 rooms Bar area, lounge, dining area and employees to be determined	300
Office/commercial	2,500m^2 63	
Supermarket	3,500m^2	175
Other retail	3,300m^2	95
Technology Park	30,000m^2	750
Total		**1533**

Table 12: Possible Parking Supply by Land Use

The details of parking provision will form part of future project applications when more detailed architectural plans are produced. All residential parking will be accommodated on-site in accordance with Council's development control plans and parking associated with other uses will be detailed at the time of future project applications. The swept path of service vehicles accessing roads serving various residential and commercial buildings in the area will also be reviewed as part of the final design processes.

Resident and employee parking will generally be provided on-site or in public off-street car parks. Public car parking could be provided in areas adjacent to the marina, shopping centre, business park and recreation facilities. The extent to which visitor parking requirements are met by on-street parking will depend on the final design of streets in the area and the amount and type of traffic using each street. A decision on these issues will form part of future project application processes.

3.12 OTHER ISSUES

3.12.1 Bushfire

The NSW Rural Fire Service (RFS) provided a number of conditions, including the potential requirement for an Asset Protection Zone (APZ) and APZ Management Plan to protect residences in the south of the precinct from vegetated areas over the Waste landfill cell.

These conditions will be addressed at the project application stage.

3.12.2 Utilities

Integral Energy noted that there is currently no capacity in Integral Energy's distribution network to supply to the Boat Harbour Precinct. Two new 11kV underground feeders and major works at Shellharbour Zone Substation will be required, which will take approximately 3 years from design to construction.

This issue will be addressed at the project application stage.

3.12.3 Developer Contributions

Shellharbour City Council has indicated that a new Section 94 Contributions Plan will be prepared and is seeking further information from the proponent.

Further discussion between Council and the proponent will ensue.

3.12.4 Land Ownership

DoP requested clarification on the future ownership for ongoing maintenance of roads and public facilities.

Shellharbour City Council will have future ownership and responsibility for roads and public facilities.

4 CONCLUSION

The responses set out in this Preferred Project report address the issues raised in the submissions lodged by State government agencies, Shellharbour Council and the general public.

This Preferred Project Report provides detailed responses to the issues raised relating to the information provided in the Environmental Assessment (including Appendices). It also sets out commitments to the issues raised following careful examination of the submissions.

As part of this report, additional drawings are included which address the development proposal and respond to the issues raised in the submissions. The detailed responses are consistent with the intent of the Concept Plan Application and Environmental Assessment submitted in February 2010 and will not have any adverse environmental impact.

This Preferred Project Report and associated Appendices 1 and 2, together with the Concept Plan Application and Environmental Assessment and associated appendices A-P lodged with DoP in February 2010, represent the complete application for the Shell Cove Boat Harbour Precinct project.

Accordingly, the Minister's favourable consideration of the Concept Plan Application and this supporting Preferred Project Report is sought.

5 GLOSSARY

EA (Environmental Assessment)	refers to Shell Cove Boat Harbour Precinct Concept Plan Application and Environmental Assessment, as prepared by LFA in February 2010
Boat Harbour	refers to the Shell Cove Boat Harbour/Marina development which was granted Ministerial Consent in November 1996.
Boat Harbour Precinct	refers to the Shell Cove Boat Harbour Precinct Concept Plan
BPQ	Bass Point Quarry
DoP	Department of Planning
LGA	Local Government Area