Part 4 - Environmental Assessment

4.1 Introduction

The following response to the DGRs includes details of potential environmental impacts together with proposed mitigation measures. To ensure that the matters are assessed appropriately the issues are clearly set out within this report and relevant commitments are outlined in Part 5, pp 78-80.

4.2 Heads of Consideration

The DGRs call for an outline of the project including:

- *Justification for the project taking into consideration any environmental impacts of the project, the suitability of the site and whether the project is in the public interest; and*
- *Outline of the staged implementation of the project if applicable.*

Environmental Impacts

Extensive environmental studies have been undertaken since the inception of planning for the Shell Cove Boat Harbour development. Part 1.2, pp 8-9 and Part 1.3, pp 10-11 outline the environmental planning, design and approval processes undertaken in relation to the entire Shell Cove Boat Harbour development, including those lands subject to this Concept Plan Application.

The environmental impacts of the proposed development are considered to be generally positive with an anticipated improvement in the quality of water discharged to the aquatic environment through the construction of wetlands and stormwater management areas immediately north of the proposed Shell Cove Town Centre, and the rehabilitation and management of the foreshore dune environment.

This part of the report addresses the DGRs and cross references the relevant technical documents which provide a more detailed assessment of the environmental impacts of the development on the Boat Harbour Precinct.

Suitability of the Site

The site is considered suitable for the proposed development on the following grounds:

- The Boat Harbour Precinct facilities are consistent with the planning principles set out in the EIS and considered by the Commission of Inquiry in the recommendation to the Minister of Planning.
- It is located immediately adjacent to the approved Shell Cove Boat Harbour and will facilitate the development of land uses ancillary to the Boat Harbour.
- The development will facilitate land uses which will contribute to diversification of the economic base of the Illawarra in accordance with federal and state government reports and recommendations.
- It is located within the Residential 2(f) Mixed Use Zone under the SLEP. The objectives of the zone are:
  (a) To allow for mixed use residential neighbourhoods to be developed providing for a range of household preferences and needs.
  (b) To enable the development of a regional boat harbour facility and associated commercial and recreational activities.
- The site is a key component of the overall Shell Cove Masterplan which has been planned and designed to integrate with and complement the district and regional land uses.
- The site does not have any significant environmental constraints and will not adversely affect existing environmental values.

Public Interest

The project is considered to be in the public interest for the following reasons:

- The proposed development is in accordance with the overall Structure Plan and Masterplan developed for Shell Cove, the Illawarra Regional Strategy, the Illawarra Regional Environmental Plan and the objectives of the appropriate State Environmental Planning Policies.
- The site development will establish land uses which meet the needs of the local and regional community including opportunities for diversification of recreational and housing choice.
- The site development will provide for the establishment of a mixed use environment which will contribute to the diversification of the economy of the Illawarra and its employment opportunities.
- The overall Shell Cove urban area (with specific provision for a Boat Harbour and Marina complex) is included in the Illawarra Urban Development Program and the land was rezoned in 1986 to urban use in anticipation of population growth pressures in the Illawarra.
- The Illawarra has, in the past, suffered from high levels of unemployment. The Shell Cove Boat Harbour and associated urban land uses has, from the earliest stages of planning and design been identified as a project that will generate economic and employment stimulus within the region.
- The Boat Harbour Precinct is an opportunity to create a unique community focus where tourism, recreation and leisure activities can support a broad and diverse range of employment opportunities.
- The construction of the Boat Harbour and the ancillary land uses to be developed within the Boat Harbour Precinct has provided the impetus for the landfill that was placed in the Shellharbour Swamp in the past to be removed, and all impacts, including leachate and methane gas to be addressed.
- The mixed use development of the site will produce direct and indirect economic benefits within the local economy including significant employment opportunities during the construction and operation of the services and facilities to be provided.
- The site development will provide additional recreational and entertainment facilities in the region, in particular in relation to recreational boating opportunities.
- Increased public access to Shellharbour South Beach and the enhancement of the foreshore area
- The removal or remediation of actual and potential acid sulfate soils from the Shellharbour Swamp and adjoining land.
- The provision of marina berth facilities to meet existing and future demand.

Staged Implementation

The proposed development is planned to be staged over a period of ten years or more commencing with the commercial/mixed use Town Centre precinct and public boat ramp facilities.

Residential development comprising a mix of standard housing, medium density dwelling and apartments will be developed on a progressive basis in line with market demand.

To date commencement of the separately approved Boat Harbour works has advanced with completion of early stages including:

- Completion of detailed design.
- Extraction of waste from a former municipal tip to a new engineered land fill cell on another part of the Shell Cove development site in accordance with the conditions of the Boat Harbour consent. The platform created by this land fill cell will later be developed for playing fields.
- Completion and establishment of the off-site compensatory wetlands, Myimbarr, in accordance with the conditions of the Boat Harbour consent.
- Stockpiling of approximately 200,000 tonnes of large rock in preparation for commencement of construction of the breakwater and groyne.
- Attainment or advancement of all miscellaneous approvals necessary to commence the construction of the Boat Harbour.

A program for completion of the Boat Harbour works is yet to be determined.

4.3 Planning Instruments and Controls

The DGRs call for the following to be addressed:

- *Consideration of relevant statutory and non-statutory provisions, in particular relevant provisions arising from environmental planning instruments, Regional Strategies (including draft Regional Strategies) and Development Control Plans. Identify non-compliances and provide justification of departures; and*
- *Consideration of impacts, if any, on matters of national environmental significance under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.*

The relevant Environmental Planning Instruments associated with the Shell Cove Boat Harbour Precinct are expanded below.

SEPP Major Development

The Boat Harbour Precinct satisfies the requirements of the SEPP Major Development 2005 as described in both Schedule 1 and 2 as follows:

- *Schedule 1, Group 5, Clause 13*
  - *(1) Development for the purpose of residential, commercial or retail projects with a capital investment of more than $100 million.*
- *Schedule 1, Group 6, Clause 14*
  - *(1) Development for the purpose of marinas or other related land or water shoreline facilities that moor, berth or store vessels (excluding dinghies and other small craft) at fixed or floating berths, at freestanding moorings, alongside jetties or pontoons, within dry storage stacks or on cradles in hardstand areas and that:*
    - *(b) moor, berth or store more than 80 vessels in other waters.*
- *Schedule 1, Group 6, Clause 17*
  - *Development for the purpose of tourist related facilities, major convention and exhibition facilities or multi-use entertainment facilities that:*
    - *(a) has a capital investment value of more than $100 million.*
- *Schedule 2, Specified Sites, Coastal Areas*
  - *(1) Development within the coastal zone for any of the following purposes:*
    - *(b) subdivision for residential purposes of land that is not in the metropolitan coastal zone (unless it is wholly or partly in a sensitive coastal location) into more than 100 lots.*

Development within the study area is consistent with the above Clauses as follows:

- It involves subdivision of land (not including a boundary adjustment, or a strata subdivision, or a community title subdivision associated with an approved development).
- It comprises standard, medium and high density residential housing, commercial and mixed use facilities, a business park, open space, wetlands and roads.

excluding:

- The Shell Cove Boat Harbour Marina and associated development approved by the development consent (DA 95/133) as modified, originally granted by the Minister for Urban Affairs and Planning on 26 November 1996.
- That part of the Shell Cove Boat Harbour Marina development which is below low watermark.

The Director General of the DoP (previously the Department of Urban Affairs and Planning and the Department of Planning, Infrastructure and Natural Resources) as a delegate of the Minister, formed the opinion on the 2 April 2007 that the Shell Cove Boat Harbour Precinct (Ref. no. MP 07_0027) is a Major Project under Part 3A of the Environmental Planning and Assessment Act. The DGRs were issued on 1 June 2007 before being updated and reissued on 9 November 2007.

This Environmental Assessment for the Concept Plan Application addresses the updated DGRs and relates to the project identified as,

> *'Construction of Residential, Commercial, Retail, Hotel, Marina Facilities, Public Parklands and Technology Park and Subdivision at Lot 8032 DP 1072187, Lot 8100 DP 1082981, Lot 206 DP 857030, Lot 9004 DP 1117743 and Lot 30 DP 229374 Boollwarroo Parade, Shell Cove, Shellharbour.'*

The Proponent seeks approval of key conceptual design parameters including land use, accommodation types (residential and tourist), density, indicative building heights, roads and vehicle access, car parking, public and community private open space and pedestrian and bicycle connectivity, public access to foreshore, public domain works and infrastructure requirements, stormwater management and landscaping.

Further design development will be undertaken following Concept Plan Approval, and together with the detailed resolution of buildings, will form the content of subsequent Project Applications.

Other Environmental Planning Instruments

The proposed development has also been assessed against the following applicable environmental planning instruments:

State Environmental Planning Policy No. 14 – Coastal Wetlands

SEPP No. 14 – Coastal Wetlands does not apply to the development as no area of the Boat Harbour Precinct is contained within or is within 100m of a designated Coastal Wetland.

State Environmental Planning Policy No. 19 – Bushland in Urban Areas

SEPP No. 19 – Bushland in Urban Areas does not apply to the development as, pursuant to s.3(1) the Policy applies to the areas and parts of areas specified in Schedule 1 of the SEPP. Schedule 1 identifies the LGAs to which the Policy applies and Shellharbour is not identified in the Schedule.

State Environmental Planning Policy No. 26 – Littoral Rainforests

SEPP No. 26 – Littoral Rainforests does not apply to the development as no area of the Boat Harbour Precinct is contained within or is within 100m of a designated area of Littoral Rainforest.

State Environmental Planning Policy No. 44 – Koala Habitat Protection

SEPP No.44 – Koala Habitat Protection (1995) does not apply to the development as Shellharbour is not included in the SEPP and no Schedule 2 Koala food trees occur within the study area. The Boat Harbour Precinct is therefore not 'potential Koala habitat' and no further provisions of the Policy apply.

State Environmental Planning Policy No. 50 – Canal Estate Development

SEPP No. 50 – Canal Estate Development aims to prohibit canal estate development within NSW in order to ensure that the environment is not adversely affected by the creation of new developments of this kind.

In this Policy "canal estate development" means development that,

a) *incorporates...a constructed canal..., and*
b) *includes the construction of dwellings..., and*
c) *requires or includes:*
(i) the use of...fill material to raise the level of... land on which the dwellings are...located in order to comply with requirements relating to residential development on flood prone land, or
(ii) excavation to create waterways...for the purposes of providing water access to dwellings, or both.

The Boat Harbour was separately granted Ministerial consent in 1996 and does not form part of the proposed development. Accordingly, the Boat Harbour Precinct does not meet the definition of canal estate development, under Clause 3(a) above, and this policy does not apply.

The approved Boat Harbour reflects recognised State, regional and local planning policies. The Ministerial consent for the Boat Harbour recognised that the Shell Cove Boat Harbour Precinct will provide the supporting commercial, maritime and recreational facilities and residential components associated with the approved Boat Harbour.

The wetland north of the Commercial Precinct is provided to both enhance stormwater quality prior to discharge into the Boat Harbour, in accordance with the Boat Harbour consent conditions, and to act as a major overland flow path. The wetland has been sized to meet these functional requirements. In terms of SEPP 50 the wetland is of *"...minimal reasonable size and capacity to meet a demonstrated need for the works."*, and hence does not fall within the definition of canal estate development.

State Environmental Planning Policy No. 55 – Remediation of Land

SEPP No. 55 – Remediation of Land provides for a Statewide planning approach to the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. SEPP No. 55 applies to all land within NSW.

In determining this Concept Plan Application, the consent authority must consider whether the land is contaminated and if so the consent authority must be satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out.

If the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, the consent authority must be satisfied that the land will be remediated before the land is used for that purpose.

The extent of any contaminated land within the study area, and its mitigation, is discussed in this part of the EA, pp 68.

State Environmental Planning Policy No. 65 – Design Quality of Residential Flat Development

SEPP No. 65 – Design Quality of Residential Flat Development recognises that high quality design presents economic, environmental, cultural and social benefits to the State and subsequently aims to improve the design quality of residential flat development in New South Wales. SEPP No. 65 is applicable to the residential flat components of the Shell Cove Boat Harbour Precinct and these will be designed in accordance with the policy.

State Environmental Planning Policy No. 71 – Coastal Protection

SEPP No. 71 – Coastal Protection aims to protect and manage the natural, cultural, recreational and economic attributes of the New South Wales coast. SEPP No. 71 applies to land the whole or any part of which is within the coastal zone.

As a development to which this policy applies, consent for the development of the Shell Cove Boat Harbour Precinct must be determined by the Minister.

The adherence to a number of aims of SEPP No. 71 formed part of the conditions of consent for the separately approved Boat Harbour. These measures, as well as those applicable to the proposed development, are summarised below.

- Protect and improve existing public access and
- Ensure that new opportunities for public access are identified and realised

  The proposal maintains and provides enhanced opportunities for public access to the beach and to the full perimeter of the Boat Harbour via a series of parks, boardwalks and streetscapes.

- Protect and preserve Aboriginal cultural heritage, places, values, customs, beliefs and traditional knowledge

  The proposal acknowledges the presence of an Aboriginal shell midden and minor artefact sites within the study area. Work within the study area will comply with the current s.87 permit and s.90 consent issued under the National Parks and Wildlife Act. Additionally, as part of the Boat Harbour approval, an Archaeological and Heritage Protection Plan has been established. These approvals and measures will ensure that all existing and any future identified Aboriginal relics are protected and preserved as necessary.

- Ensure protection of the visual amenity of the coast and
- Protect and preserve beach environments and amenity

  The proposal protects the visual amenity of the coast by implementing maximum building heights, adopting materials that represent a coastal aesthetic, providing an open space network to enhance public access to the beach and to the full perimeter of the Boat Harbour and managing increased local population and visitor access to the foreshore.

- Protect and preserve native coastal vegetation

  An assessment of the proposal concludes that it is unlikely to have a significant impact on biodiversity values. Any loss of habitat has been compensated for by completion of the Myimbar Wetlands and the revegetation and enhancement of coastal vegetation as part of the Boat Harbour approval.

- Protect and preserve the marine environment of NSW

  An assessment of the proposal concludes that it is unlikely to have a significant impact on marine environments provided construction and operation of all proposed works is undertaken with appropriate environmental safeguards. The avoidance of aquatic impact has been offset by completion of the Myimbar Wetlands as part of the Boat Harbour approval.

- Protect and preserve rock platforms

  The proposal acknowledges the presence of rocky reefs as important to existing aquatic habitats. An assessment of the proposal concludes that it is unlikely to have a significant impact on marine environments provided construction and operation of all proposed works is undertaken with appropriate environmental safeguards. Additionally, the assessment recommends the preparation of a specific EMP for any works adjacent the intertidal rocky reef.

- Manage the coastal zone in accordance with the principles of ESD

  The proposal responds to the NSW Coastal Policy which has as its central focus the ESD of the NSW coastline. This includes the set back of development to adequately accommodate natural processes and climate change and provision of public access to the beach and the full perimeter of the Boat Harbour. As part of the Boat Harbour approval, the dunal system is to be protected and rehabilitated and beach behaviour is to be monitored.

- Ensure that the type, bulk, scale and size of development is appropriate for the location

  The proposal ensures development is appropriate to its location by establishing a number of residential, commercial and mixed use precincts which are separated by an open space network that enhances public access to the beach and the full perimeter of the Boat Harbour. In response to adjacent development, including Shellharbour Village, the distribution of residential components is such that the number of storeys increases from the outer boundaries of the precinct to the harbour edge.

- Encourage a strategic approach to coastal management

  As part of the Boat Harbour approval, beach behaviour will be monitored to provide information that will allow effective management of natural coastal processes and the impacts of climate change.

BASIX

BASIX is the NSW Government's Building Sustainability Index which ensures homes are designed to use less potable water and be responsible for fewer greenhouse gas emissions by setting energy and water reduction targets for houses and units. BASIX is applicable to all residential components (including single dwellings, low-rise and mid-rise developments) in the Shell Cove Boat Harbour Precinct and these will be designed in accordance with the policy.

Illawarra Regional Strategy

The Illawarra Regional Strategy represents the agreed NSW Government position on the future of the Illawarra and is the *'pre-eminent strategic policy document for the Illawarra and will complement and inform other relevant State and local strategies and planning instruments'*[1].

The development is consistent with the objectives of the Illawarra Regional Strategy, namely:

- The development will provide for the construction of approximately 1,000 dwellings, contributing to the provision of 38,000 new dwellings in the Illawarra by the year 2031.
- Medium density residential development in the Boat Harbour Precinct will contribute to enhanced sustainable development outcomes as the mixed use characteristics of the neighbourhood will encourage walkability and efficient utilisation of infrastructure and services.
- The development will deliver net environmental benefits including the construction of the Myimbarr Wetlands. Improvement of surface water quality runoff is anticipated.
- The development will contribute to the diversification of the economic base of the Illawarra by providing opportunities for tourism, recreational boating and marine activities, and commercial facilities.

It is noted that demonstrated compliance with the Sustainability Criteria contained within Appendix 1 of the Illawarra Regional Strategy is not required as the residential component of the project has been added to the Illawarra Development Program and therefore is already considered a release area.

Illawarra Regional Environmental Plan No. 1

The development control provisions within the IREP No. 1 establish the regional statutory context within which the site will be assessed.

- Rural Lands

  The objectives of IREP No. 1 relating to Rural Lands are not considered relevant as the study area is zoned Residential 2(f) Mixed Use and 6(a) Public Open Space under the SLEP. Surrounding areas have also been rezoned to establish non-rural land uses.

- Extractive Industries

  Extractive industries do not occur within the study area, however the existing basalt quarry at Bass Point is in close proximity. Previous studies and consents have established the parameters of the physical and functional relationship of the quarry to nearby residential and other land uses.

- Energy

  The objectives of the IREP No. 1 relating to the minimisation of use of non-renewable resources have been addressed by the proposal as follows:

  - Street layout and lot orientation have been designed to maximise the potential for passive heating and cooling of buildings with the majority of lots oriented north south.
  - Building and landscape design guidelines will be established and implemented throughout the site to encourage utilisation of renewable resources in the construction process.
  - Street and block layouts have been designed to encourage pedestrian movement through the implementation of the principles of passive surveillance of public spaces, and the creation of pleasant microclimates through the establishment of streetscapes and open spaces which are appealing and safe.
  - The development will require additional electricity supplies however, the development of the site provides an opportunity to maximise the efficiency of existing supply infrastructure as the study area is now, essentially, an infill development and all major services have been supplied to the surrounding urban areas on the presumption that additional capacity will be taken up by the development of the site.

- Living Areas

  The objectives of the IREP No. 1 relating to living areas have been addressed by the proposal as follows:

  - Residential development will not take place on hazard prone land; landfill and acid sulfate affected areas will be rehabilitated through the removal or remediation of the material to ensure that there will be no potential for adverse impacts upon the environs or future residents.
  - A broad range of residential lot types and dwellings will be established across the Shell Cove development. Given the extensive nature of the project the mix of dwellings and densities should be considered within the context of the overall Masterplan developed for Shell Cove.
  - The site will accommodate dwellings at a higher density than other stages of the Shell Cove community due to its proximity to goods and services and the amenity to be derived from the establishment of the Boat Harbour and its associated promenades, open spaces and opportunities for social and economic activity.
  - Appropriate utilities, community facilities and services will be provided either within the Boat Harbour Precinct or in the nearby urban areas in accordance with the Shell Cove Masterplan.

- Commercial Centres

  The objectives of the IREP No. 1 relating to commercial centres are:

  a. *To ensure that commercial service centres are developed to suit the convenience of consumers and to optimise private and public investment.*
  b. *To promote shopping and pedestrian amenity in all commercial centres.*

  The proposal addresses these objectives through the provision of a dedicated Commercial Precinct as described in Part 3.5, pp 31-33.

- Coastal Lands, Wetlands and Other Water Bodies

  The objectives of the IREP No. 1 relating to coastal lands, wetlands and other water bodies are:

  a. *To protect beach systems and conserve their scenic, recreation and natural values,*
  b. *To maintain and improve public access to waterways, lakes and the sea front, and*
  c. *To protect the productive ecosystems and natural habitats of the region's estuaries, wetlands, lakes and lagoons and their scenic attributes.*

  The proposal addresses these objectives through rehabilitation of the beach reserve, provision of pedestrian access to the beach and the Boat

1 NSW Department of Planning, 2007, *Illawarra Regional Strategy*, preface

Harbour, incorporation of water quality treatment measures and implementation of the Myimbar Wetlands.

Clause 106, Sand Dune Systems:

In deciding whether to grant consent to a Development Application for development on frontal or dynamic sand dunes other than for beach restoration purposes, the consent authority shall consult with the Commissioner of the Soil Conservation Service and the Director of Public Works and consider whether:

a. *The development is unlikely to have a detrimental impact on the sand dune systems.*
b. *The development is unlikely to be detrimentally affected by the natural characteristics of the beach system.*
c. *Public access to the beach is maintained.*

The proposal is separated from the beach by the existing alignment of Boollwarroo Parade. This alignment remains for access to parking facilities for users of the public beach reserve. The beach reserve area is to be rehabilitated and pedestrian access is to be enhanced.

- Environmental Heritage

  The objectives of the IREP No. 1 relating to environmental heritage are:

  a. *To encourage the conservation of the environmental heritage of the region.*
  b. *To control the demolition and renovation of items identified by this plan as items of the environmental heritage of the region.*

  The heritage studies have identified Aboriginal objects/sites within the study area however there is only one which has been assessed as having high heritage value and it is located within a foredune on the beachfront upon which the proposal will have minimal impact. The studies have not identified any relics, sites or places of European heritage.

During the 1995 Commission of Inquiry, in response to a number of submissions, the issue of Aboriginal culture and heritage was considered. The Commission concluded that the distribution of areas of archaeological value provided opportunities to construct major elements of the proposed development without directly impacting the most archaeological significant deposit, as described above.

The complete report, included at Appendix G, provides further details regarding environmental heritage.

- High Rise Buildings

  The objectives of the IREP No. 1 relating to high rise buildings are:

  a. *To enhance the amenity and design quality of the Wollongong urban centre and of buildings within that centre.*
  b. *To preserve the landscape quality of coastal and foreshore land by encouraging the erection of buildings which are designed in harmony with that landscape.*

The proposal provides for a maximum building height of between 1 and 4 storeys apart from the landmark hotel which is in the order of 8 to 9 storeys in height. The principles governing the planning and design of the various building precincts are described in Part 3.5, pp 28-39.

Clause 139 (3) Development Applications High Rise Buildings:

In deciding whether to grant consent to a Development Application to erect a building which will have a height of more than 11 metres the Director shall take into consideration a number of planning and design principles including height, scale, bulk and density; external appearance and materials; streetscape or landscape; public amenity; wind patterns; overshadowing; views; heritage; and reflections.

The proposal responds to these principles as described in Part 4, pp 47-56 however further design development will be undertaken following Concept Plan Approval and more extensive design documentation provided as part of subsequent Project Applications.

Local Development Controls

Shellharbour Local Environmental Plan (2000)

The SLEP zones the study area as:

- Residential 2(f) Mixed Use

  The objectives of the zone are:

  a) To allow for mixed use residential neighbourhoods to be developed providing for a range of household preferences and needs.
  b) *To enable the development of a regional Boat Harbour facility and associated commercial and recreational activities.*

- Public Open Space 6(a)

  The objectives of the zone are:

  a) *To identify areas where recreational opportunities for the general use of the community are provided.*
  b) *To enable development that will enhance the public enjoyment of areas referred to in sub clause (a).*

The majority of the subject site is located within the Residential 2(f) Mixed Use Zone.

s.26 Development within the quarry buffer area in Zone 2(f), outlines the restrictions imposed upon land within the QBZ (see Fig. 2.05, pp 14). Permissible land uses include, 'light industries and industries associated with and including boat manufacture and repair; open space; recreation areas; roads; shops and commercial premises in accordance with Schedule 4; utility installations...and warehouses'.

It is noted that under the SLEP Council would be able to grant consent to the land uses listed above if it were to form the opinion that the land uses would not be unduly adversely affected by proximity to the Bass Point Quarry and that the development would not pose a restriction on the nature of operations within the quarry.

The Boat Harbour Precinct Masterplan proposes land uses within the QBZ which are consistent with the intent of the provision. A business park precinct is identified in this location and the scale, form and function of uses would be developed to provide a suitable interface between the quarry activities and those of the residential areas within the Boat Harbour Precinct.

s.25 Controls to promote commercial hierarchy within Zones 2(e) and 2(f) states, 'Despite any other provision of this plan, the Council may consent to commercial or retail development (or mixed commercial and retail development) on land within Zone 2 (e) or 2 (f) only if, in the opinion of the Council, it will promote the commercial hierarchy for the Shellharbour City local government area presented in Schedule 4'.

The proposal provides for mixed use commercial and retail development within Zone 2 (f), as described in Part 3.5, pp 31-33, in accordance with the commercial hierarchy of the Shellharbour LGA as detailed in Schedule 4.

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Environment Protection and Biodiversity Conservation Act 1999

No species listed as threatened or endangered under the Environment Protection and Biodiversity Conservation Act (1999) have been recorded in the study area.

The proposed development has been referred to the Federal Department of the Environment, Water, Heritage and the Arts. The department has considered the proposal in respect of the EPBC Act and has decided that the proposed action is not a controlled action. Accordingly assessment and approval is not required by the Federal Minister for the Environment, Heritage and the Arts. A copy of the decision is provided in Appendix H.

4.4 Key Issues

Strategic Planning

The DGRs call for the following to be addressed:

1.1 Justify the proposal with reference to relevant local, regional and State planning strategies. Provide justification for any inconsistencies with these planning strategies;

1.2 Consider the recommendations of the Shellharbour Local Government Area Retail/Commercial Study and Employment Study; and

1.3 Demonstrate consistency with the Sustainability Criteria set out in the relevant Regional Strategy (including draft Regional Strategies).

The State, regional and local planning strategies applicable to the Shell Cove Boat Harbour Precinct are discussed in Part 4.3, pp 42-45 of this report. In particular the Precinct addresses these strategies by:

- Providing for the construction of approximately 1,000 dwellings, contributing to the provision of 38,000 new dwellings in the Illawarra by the year 2031.
- Adopting medium density residential development in the Boat Harbour Precinct, contributing to enhanced sustainable development outcomes as the mixed use characteristics of the neighbourhood will encourage walkability and efficient utilisation of infrastructure and services.
- Delivering net environmental benefits including construction of the Myimbarr Wetlands and measures to enhance improvement of surface water quality runoff.
- Contributing to the diversification of the economic base of the Illawarra by providing opportunities for tourism, recreational boating and marine activities, and commercial facilities.

Shellharbour Local Government Area Retail/Commercial Study and Employment Study

The Shellharbour City Council has made available its Retail Commercial Centres Study June 08. The study acknowledges that Shell Cove offers a tourism and employment focus and proposes that the Shell Cove Boat Harbour Precinct be zoned SP3 - Tourist for the purposes of its retail and commercial centre zoning.

The study highlights the need to capitalise on the LGA's strengths - 'a great place to live, work and invest' - and identifies areas of the LGA which should be further promoted in this regard, including Shell Cove.

Proposed tourism zones along the coast, including Shell Cove, allow for opportunities to provide alternative accommodation options to those currently provided in the LGA, whilst still being located within the vicinity of local villages and attractions.

The study highlights the need to support creative and cultural centres by enhancing the public domains surrounding these cultural uses and permitting a mix of commercial/retail uses to benefit from their patronage.

The study notes that there appears to already be strong interest in the operation of the supermarket by prospective operators, and cites previous studies by Leyshon Consulting which establish that a retail centre with an overall scale of up to 8,000sqm of gross floor area would be viable.

The Council study includes a preliminary market analysis of the viability of business park precinct in the Shell Cove QBZ. Research indicates that whilst there is demand for office space in the Shellharbour LGA, there are no comparable business park developments in the area. However local agents agree that Shell Cove is probably the most suitable location for a business park, with support from the new marina development and access via two main roads.

Sustainability

The Illawarra Regional Strategy includes Sustainability Criteria at Appendix 1. It is noted that those criteria apply to areas which are being considered as new land release areas. The entire Shell Cove urban development area, including the Boat Harbour Precinct was added to the Illawarra Development Program in the 1990s. Advice has been received from the DoP (Wollongong Office) that compliance with the Sustainability Criteria does not need to be detailed as part of this report. However, the principles of sustainability as identified in the Illawarra Regional Strategy have been incorporated into the proposal as a result of the iterative nature of planning, design and the approvals process undertaken to date.

Urban Design, Visual Impact and Sustainability

The DGRs call for the following to be addressed:

2.1 Demonstrate suitability of the proposal with the surrounding area in relation to bulk, scale, amenity (including noise) and visual amenity having regard to the Coastal Design Guidelines of NSW (2003) and the NSW Coastal Policy (1997);

2.2 Address the visual impact of the proposal in the context of surrounding development and relevant mitigation measures. In particular address impacts on the amenity of the foreshore, overshadowing of public reserves, loss of views from public places and cumulative impacts;

2.3 Use visual aids such as scale models and photomontages to demonstrate visual impacts. Amelioration of visual impacts through design, use of appropriate colours and building materials, landscaping and buffer areas must be addressed; and

2.4 Demonstrate intended compliance with primary development controls under SEPP 65.

The Shell Cove Boat Harbour Precinct will be suitable in terms of bulk, scale, amenity and visual amenity and will be consistent with the objectives of the NSW Coastal Policy (1997) and the Coastal Design Guidelines for NSW (2003). The objectives of these documents are addressed in this part of the EA, pp 48-49.

The visual impact of the proposal, in the context of the surrounding development, and proposed mitigation measures, as well as building materials, landscaping and other aspects of the built form of the proposed Boat Harbour Precinct are also addressed in this part of the EA, pp 53-56.

Further design development will be undertaken subsequent to Concept Plan Approval and more extensive detail provided as part of subsequent Project Applications.

NSW Coastal Policy (1997)

The principles of the NSW Coastal Policy have informed the environmental planning and urban design undertaken in relation to the proposed Boat Harbour Precinct. The rigorous negotiations and assessment required and undertaken prior to the Department of Urban Affairs and Planning granting Development Consent for the creation of the Boat Harbour in 1996, and subsequent Development Approvals, has ensured that the entire Shell Cove development is consistent with the objectives of the NSW Coastal Policy.

The goals identified within Part B: Implementation of the NSW Coastal Policy have been addressed in the planning and design of Shell Cove. Broad planning and design responses to those goals are outlined below:

1. To protect, rehabilitate and improve the natural environment

   The proposed Boat Harbour Precinct development will result in the improvement of natural environmental values on the development site and in the immediate vicinity. A more detailed discussion of the specifics of on-site environmental values is included in this Part of the EA, pp 63-70 and Appendices B, C, D, E and F.

In summary, the Boat Harbour Precinct will include:

- An area of constructed wetlands to be located in the open space immediately north of the Town Centre. The wetlands constitute an important element of the integrated approach to catchment management and the management of urban run-off. Fig. 4.06, pp 54 illustrates the proposed relationship of the wetlands to the Town Centre and Boat Harbour.
- The Boat Harbour Precinct will include areas of the former Shellharbour Swamp which was previously a SEPP 14 Coastal Wetland. The development of the Shell Cove project has provided the impetus for the construction of the Myimbarr Wetlands to the immediate north of Shellharbour. The Myimbarr Wetlands were identified as an appropriate compensatory mechanism for the loss of the Shellharbour Swamp, which is no longer identified as a SEPP 14 Coastal Wetland.
- Environmental studies undertaken as part of the initial site selection process for a boat harbour in the Illawarra identified the presence of ASS and site contamination in and around the Shellharbour Swamp. The development of the Boat Harbour Precinct will allow for the effective remediation of ASS. Part 2.8, pp 17 and this part of the EA, pp 68-69 includes a discussion of the geotechnical conditions on site, including the presence of ASS.

2. To recognise and accommodate natural processes and climate change

   This part of the EA, pp 65 and Appendix F, identify the design response to the anticipated impacts of climate change and natural processes upon the Boat Harbour Precinct.

3. To protect and enhance the aesthetic qualities of the coastal zone

   The proposed Boat Harbour Precinct has been designed to be sympathetic to the coastal landscape. The proposed Boat Harbour Precinct will not be located on prominent ridgelines nor in an area which has been identified in any regional or local policy as an area of visual significance or vulnerability.

   It is proposed that the materials, colours, scale and form of the Boat Harbour Precinct will be complementary to the visual landscape of the Shellharbour coast and immediate hinterland. This part of the EA, pp 55 outlines the proposed character of the development. Additional design development will be undertaken prior to submission of subsequent Project Applications.

4. To protect and conserve cultural heritage

   This part of the EA, pp 71-72 and Appendix G, outline the heritage significance of the site and the ways in which the cultural heritage has been acknowledged and integrated into the proposed development.

5. To promote Ecologically Sustainable Development and use of resources
   and
6. To promote ecologically sustainable human settlement

   The proposed Boat Harbour Precinct will be developed in accordance with the principles of ESD as described in the Protection of the Environment Administration Act 1991 No. 60.

7. To provide for appropriate public access and use

   This part of the EA, pp 50-55 identifies the measures undertaken to establish, maintain and enhance public access to assets such as the ocean foreshore and public open space. A series of parks, boardwalks and streetscapes will establish opportunities for public access around the perimeter of the harbour. Streets and open spaces to be located perpendicular to the harbour will enhance access to the harbour foreshore from surrounding, non-waterfront areas and establish visual connections to the harbour from these areas.

8. To provide information to enable effective management
   and
9. To provide for integrated planning and management

   The development of Shell Cove Boat Harbour and its associated urban areas is being jointly developed by Shellharbour City Council and Australand. Whilst the role of Shellharbour City Council as a project partner has been at arms length from the normal activities of Council, the integration of ongoing management considerations into the planning and design of the Boat Harbour Precinct has been of paramount importance to the Proponents. Input from the service delivery areas of Council will maximise opportunities for planning and design.

Coastal Design Guidelines for NSW (2003)

The Shell Cove Boat Harbour Precinct is located within the overall Shell Cove Masterplan area and upon completion will be generally consistent with the description of a 'Coastal Town' as contained within the Coastal Design Guidelines for NSW. Shell Cove will have a population greater than 3,000 and will offer a range of services and facilities which will include:

- Commercial/retail Town Centre.
- Parks.
- Main Street.
- Medical facilities.

Shell Cove will have visual connections to the coast and the surrounding landscape, and have centrally and conveniently located public spaces and community facilities. The Shell Cove Boat Harbour Precinct will be located outside the extent of the existing town of Shellharbour and will not result in the loss of ecosystem function and the existing town's identity. The urban design issues of the Shell Cove Boat Harbour Precinct in relation to the Coastal Design Guidelines for NSW are discussed below.

Fig. 4.01 - Planning Principles

Relationship to the Environment

- Shell Cove Boat Harbour Precinct will incorporate visual and physical links to the natural environment through the integration of wetlands into the urban fabric immediately north of the Town Centre; the retention and rehabilitation of the foreshore dune environment to the east; and the integration of WSUD in open space and streetscapes throughout the precinct (see Fig. 4.01).
- The site forms the land platform immediately adjacent to the future Shell Cove Boat Harbour. The development of the Boat Harbour has provided the impetus for the removal of the degraded and contaminated Shellharbour Swamp and the creation of compensatory habitat areas located in the Myimbarr Wetlands.
- Access to the foreshore zone will be maintained and initiatives implemented to enhance management of visitor impacts.
- WSUD initiatives including wetlands with nutrient stripping capacity, drainage swales, and the installation of gross pollutant traps will maximise water quality prior to discharge to the estuarine and marine environments.

Areas of Visual Sensitivity

- The Boat Harbour Precinct development will have minimal impact on existing views to and from the coast. Shellharbour Village will retain its existing relationship to the ocean, the foreshore and the hinterland.
- An enhanced open space network will be implemented in the Boat Harbour Precinct and will be easily accessible both physically and visually from the existing areas of urban development in Shellharbour and its immediate surrounds.
- The Boat Harbour Precinct is an important adjunct to the Shell Cove Marina and is widely acknowledged in local and regional planning and economic policies as an important component of the diversification of the Illawarra economy. The Shell Cove Town Centre will provide an important visual landmark in the coastal landscape and establish an opportunity for a vibrant and interesting urban environment in a marine setting.

Edges to the Water and Natural Areas

- Access to the waters' edge of the Boat Harbour will be maximised with the construction of a continuous path system which will be located around its perimeter. The pedestrian and cyclist movement system around the Boat Harbour will generally be located within public open space or in landscaped streetscapes. Managed access to the foreshore adjacent to the Boat Harbour Precinct is to be enhanced to ensure that the increase in the local population and visitors does not adversely impact upon the ecological values and stability of the foreshore environment.

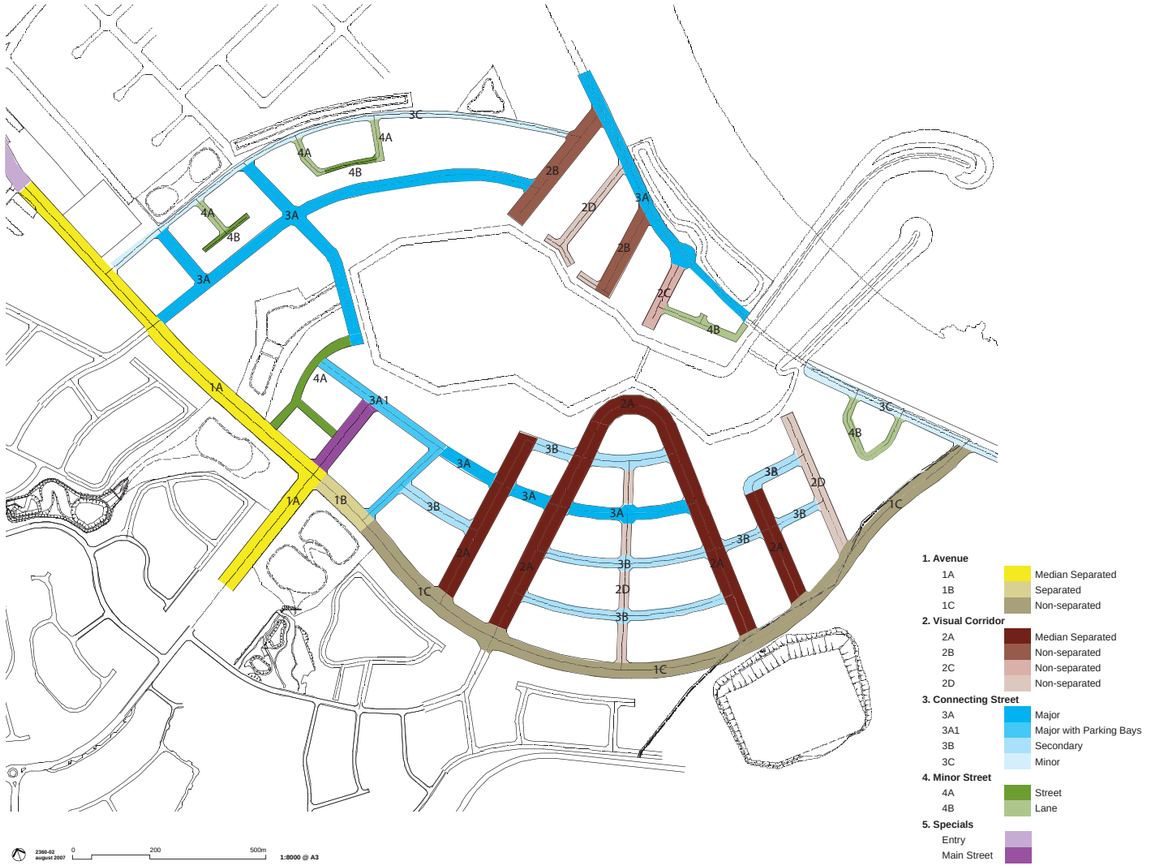


Fig. 4.02 - Street Pattern Diagram

Streets

The street layout has been designed to facilitate the establishment of a robust urban layout, incorporating a Town Centre, residential areas and land uses which will support the Boat Harbour and Marina. The aim is to create a street layout and streetscapes which incorporate spaces, built forms and linkages which will entice people and facilitate many different types of social interaction and activity.

The urban layout is designed to maximise opportunities for:

- The creation of landmark spaces, views, built forms and landscape which will contribute to a sense of place.
- Active ground floor uses that will generate a vibrant street environment.
- Built forms and spaces that will contribute to a human scale of development.
- Amenities such as street furniture, lighting and landscaping which will enhance the public realm and encourage pedestrian activity and engender a slow speed traffic environment.
- Parking which will support activities and land uses without dominating the streetscape.
- Pedestrian and cyclist movement systems which will encourage those modes of transport and reduce car dependency.
- Streetscapes which are suitable for surrounding land uses and which will support a movement system appropriate to each street type.

A detailed discussion of traffic management in relation to the proposed Boat Harbour Precinct is included in this part of the EA, pp 58-62 and Appendix A.

- Street Pattern

The street pattern diagram provides an indication of the potential hierarchy of streets (see Fig. 4.02). Whilst the street layout has been designed to provide for pleasant, walkable neighbourhoods, streets must also meet the needs of cyclists, public transport, cars and service vehicles. Street function, size, the use of street tree planting and the use of site elements and materials will reinforce the distinctive identity of the Boat Harbour Precinct.

Streetscapes will complement adjacent land uses, built form and open space and also provide for on-street activity which will support retail, domestic and community uses such as outdoor cafe seating, car parking and loading zones. Appendix O illustrates streets by type, including landscape character and proposed streetscape elements such as medians, and the relationship of built form to the public realm.

Fig. 4.03 - Artist's Impression of Main Street Character

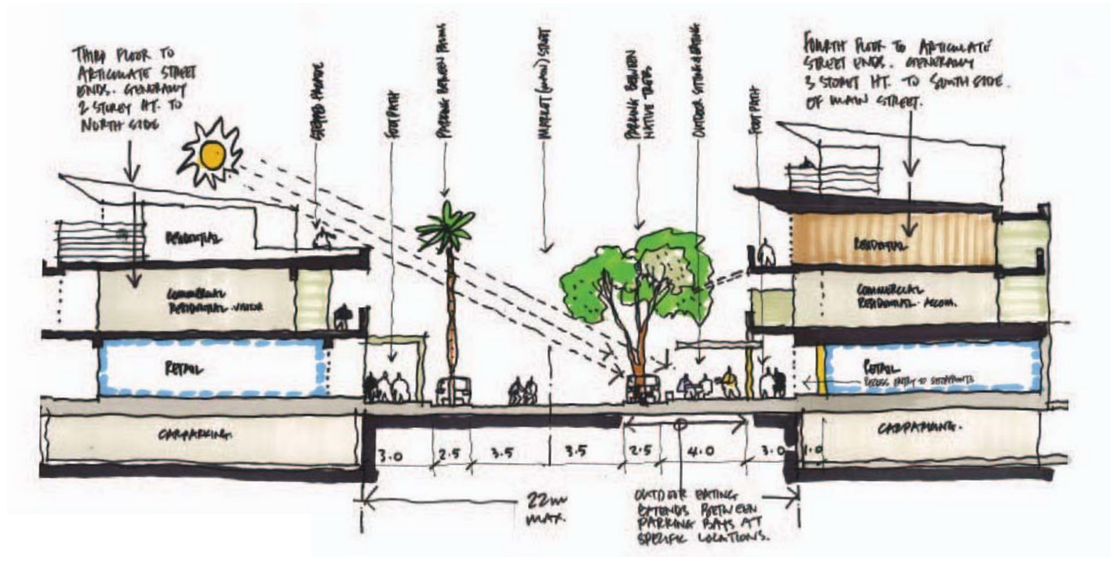


Fig. 4.04 - Indicative Main Street Cross Section

- Main Street

Main Street (see Fig. 4.12, pp 59) will be the main focus of commercial activity in the Shell Cove Town Centre and within the Shell Cove Boat Harbour Precinct. There will be an emphasis on creating a highly pedestrianised space, a strong urban character and enhancement of views to the water and marine activity in the Boat Harbour. Main Street will have long views to the Boat Harbour and urban design guidelines will assist in establishing the framework for a vibrant public realm.

Main Street character will be that of a pedestrian friendly space with narrowed road carriageway and generous footpaths to support pedestrian access, mature street tree planting and alfresco dining areas. Restaurants and cafes within Main Street will be located on the southern side of the street with built form structured to permit solar access. Street furniture and planting will be suitable for creating sheltered outdoor eating/drinking spaces.

The proposed building heights on Main Street will be generally no higher than 3 storeys (with a third storey setback) on the northern side of the road and up to 4 storeys on the southern side. The footpath on the southern side (where afternoon solar access is available) should be wider (approximately 5.0m) to support alfresco dining without compromising pedestrian accessibility and should enable 'spill out' spaces from cafes/restaurants.

It is proposed that commercial and professional uses will be generally located on the first floor of Main Street buildings with potential for residential uses on the second and third floors of buildings. The mixed use nature of the buildings will enhance activity levels, visual surveillance of the public realm as well as support the economic viability of Town Centre businesses.

Fig. 4.03 illustrates the indicative design of Main Street which gives primary emphasis to pedestrians and secondary emphasis to vehicle activity. Main Street is designed to accommodate a target vehicle speed of 20kph (designated at 40kph) with one transit lane in each direction and parallel on-street parking. Integrated street furniture is utilised to emphasise the character of Main Street and support its role as the main public thoroughfare of the Town Centre.

Fig.4.12 - Town Centre Concept Diagram and Key Roads

- Harbour Boulevarde

  Harbour Boulevarde provides the key access to the proposed Shell Cove Town Centre and accordingly the following description relates to uses associated with the town centre.

  Harbour Boulevarde (see Fig. 4.12, duplicated on this page), adjacent to the Shell Cove Town Centre, is to have parallel parking to the kerbside. It is considered critical that mature street tree planting and landscape be provided to ensure that Harbour Boulevarde presents an attractive entry to the hotel whilst maintaining its utilitarian functions. It is proposed that community uses (possibly a community space, a branch library or a tourist information centre) will be located on Harbour Boulevarde, north of Main Street. The community building/elements are to form an important visual, physical and spatial landmark.

- Other Street Environments

  Road A (the southern perimeter road, see Fig. 4.12, duplicated on this page) will directly service the main car park for the Town Centre as well as provide access to the marina carpark, supermarket and hotel.

  Road B (see Fig. 4.12, duplicated on this page) intersects Main Street and provides street frontage to retail and café activities on the eastern side of the shopping centre. It is proposed that parallel parking be provided along the length of Road B except where there is frontage to the Town Square. Robust urban design will be implemented to enable the public realm to be used in a variety of ways including special events.

  Road C (the northern perimeter road, see Fig. 4.12, duplicated on this page) will abut the wetlands feature which will be established immediately north of the Town Centre. Road C will provide access to the northern retail carpark and residential uses including apartments of 3 to 4 storeys. A 90 degree parking zone will be located at the eastern end of the road to provide parking for the northern leg of the Marina and it is anticipated that approximately 40 - 50 spaces could be accommodated in the streetscape. The creation of mixed use development which addresses the interface between residential and car park/retail uses will be explored during future stages of design.

  Mature street tree planting and landscape will be critical to ensure that Road C presents an attractive entry to residential areas. The street landscape outcome will address the wetland frontage and provide a key feature. Residential apartments will have an active ground level street frontage.

Fig. 4.05 - Town Centre Commercial Precinct Concept Diagram

Built Form

Built form, and in particular building heights, will generally be restricted by the Boat Harbour Precinct's location within the Metropolitan Coastal Zone.

In the Town Centre building heights will be up to 4 storeys, with the exception of the proposed hotel. Beyond the Town Centre the Precinct will be characterised by medium density residential development of up to generally 2 storeys, with apartment development of 3 to 4 storeys.

Fig. 4.05 illustrates the Town Centre concept and identifies the general arrangement of land uses within the Town Centre.

Fig. 4.06, pp 54 illustrates the scale of built form within the overall Boat Harbour Precinct with the upper illustration showing the Precinct in block form and the bottom illustrations showing the likely built form and arrangement, including open space, within selected blocks.

The guiding principles for the urban design of the Shell Cove Boat Harbour Precinct are:

- Building heights will generally be a maximum of 4 storeys and will generally decrease the greater the distance from the Town Centre and/or Boat Harbour.
- The proposed hotel, of 8 to 9 storeys, will provide a visual landmark. The hotel's location is slightly removed from Main Street where building heights are less, and the site enhances views to the Marina. The hotel is narrow in width and the architectural language complements the coastal condition of the surrounding built form.
- Key anchor points and/or street corners will be reinforced with higher built form, vertical elements and/or distinctive architectural features.
- Civic buildings will be of distinctive form and architectural quality.
- A supermarket will be located in close proximity to Main Street and Harbour Boulevarde but will be sleeved by retail activities which have direct street frontage.
- Basement carparking will be provided to buildings with frontage to active streets, such as Main Street, to permit retail frontage at street level. Other buildings may have basement carparking which is 'half in - half out' to achieve natural ventilation of the carpark and contribute to ESD principles.
- Apartments will be provided with private open spaces, courtyards, useable balconies and deck spaces in accordance with SEPP 65.
- Residential development on medium density and standard lots will adopt a housing typology consistent with the coastal condition of the Precinct.
- The articulation of residential and commercial facades will be achieved by the use of mixed external cladding materials and sun-screening elements.

Character and External Materials Palette

A contemporary coastal village materials palette will be adopted and will include the use of raw materials such as timber, stone, off-form concrete, rendered masonry, cor-ten, monochromatic brick, profiled metal sheet and glass. Lightweight roof forms using metal roof claddings are also proposed. The array of built form will maintain a shared character through the use of some common elements.

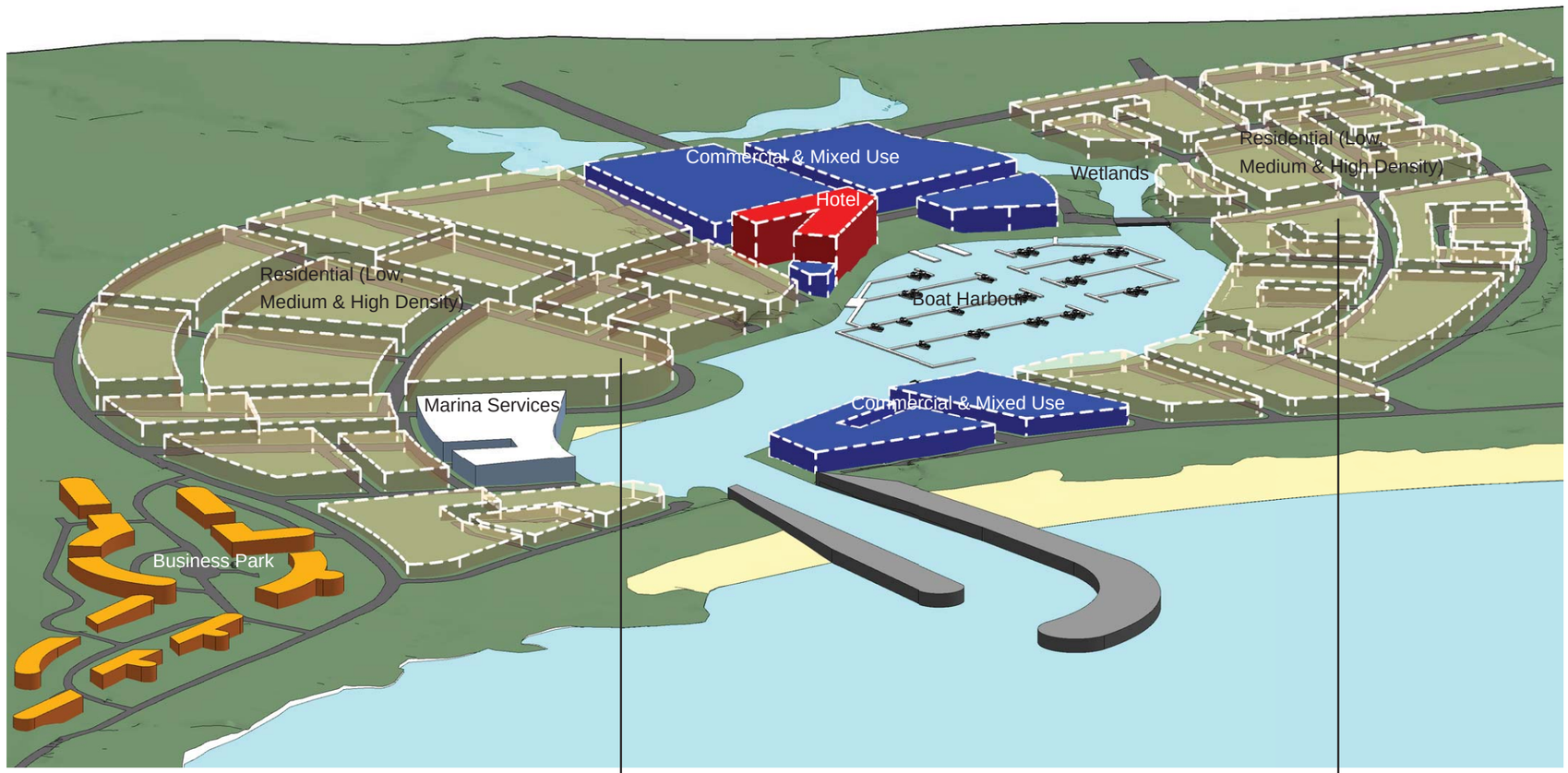
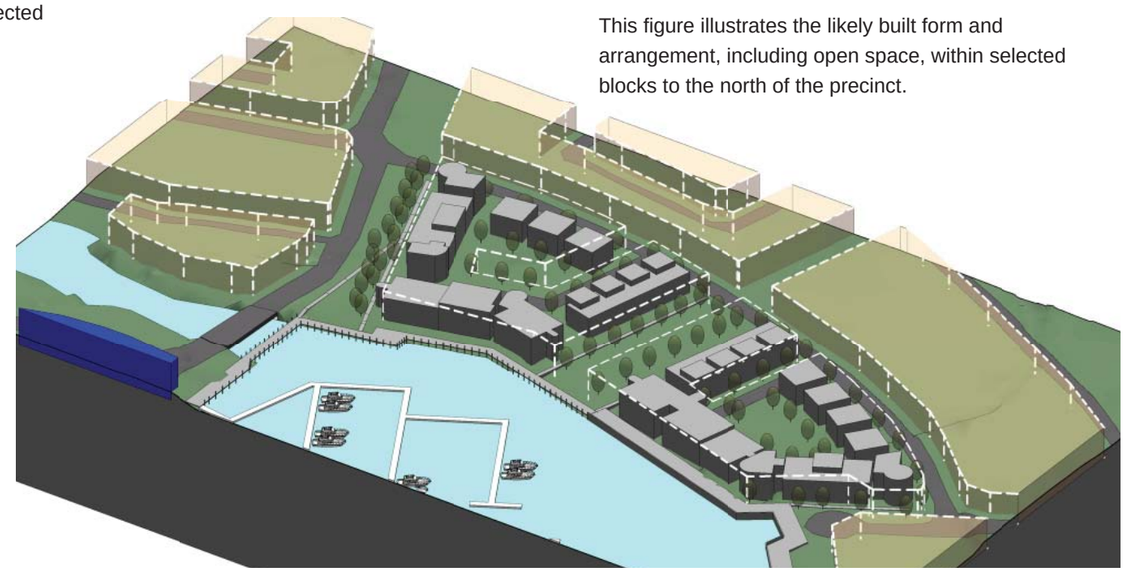


Fig. 4.06 - Boat Harbour Precinct Illustrative Built Form

This figure illustrates the scale of built form within the overall Boat Harbour Precinct and shows the Precinct in block form.

This figure illustrates the likely built form and arrangement, including open space, within selected blocks to the south of the precinct.

This figure illustrates the likely built form and arrangement, including open space, within selected blocks to the north of the precinct.



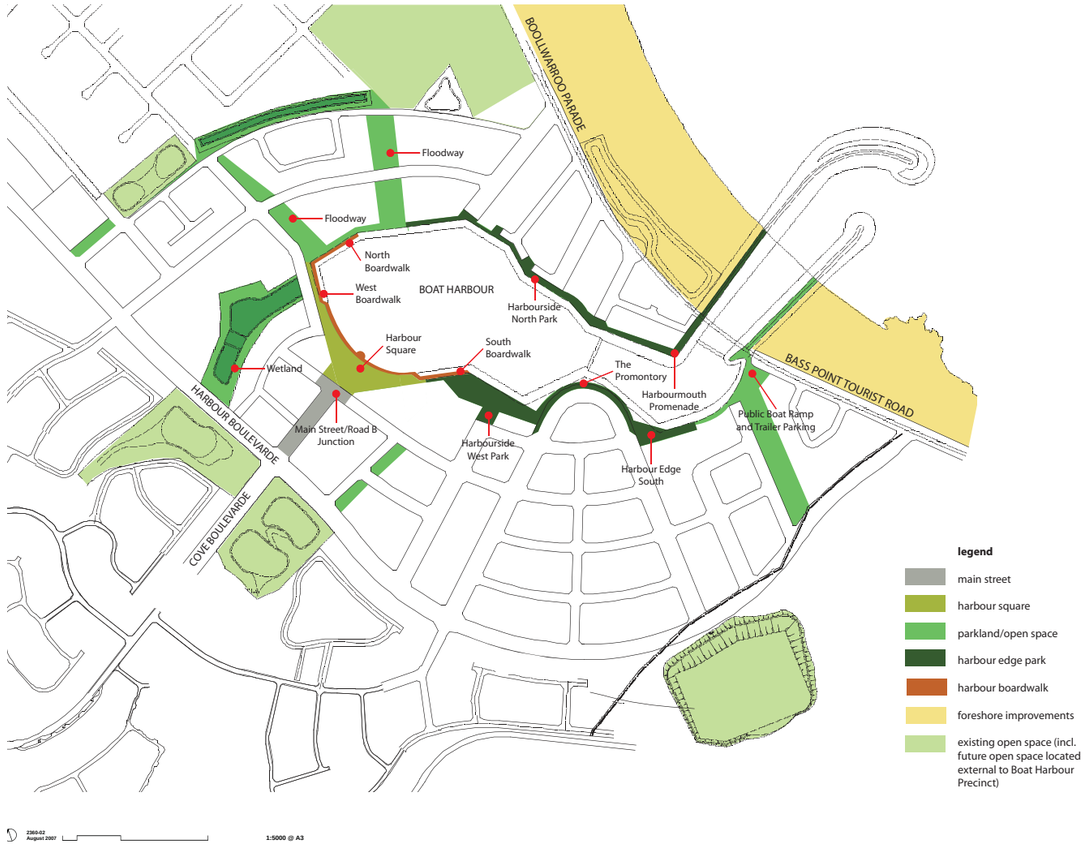


Fig. 4.07 - Indicative Open Space Network

Open Space Network

The urban layout of the Boat Harbour Precinct is designed to maximise opportunities for open space and will include opportunities for:

- The creation of landmark spaces, views, built forms and landscape which will contribute to a sense of place.
- Built forms and spaces that will contribute to a human scale of development.
- Amenities such as street furniture, lighting and landscaping which will enhance the public realm and encourage pedestrian activity and engender a slow speed traffic environment.
- Parking which will support activities and land uses without dominating the streetscape.
- Pedestrian and cyclist movement systems which will encourage those modes of transport and reduce car dependency.
- Streetscapes which are suitable for surrounding land uses and which will support a movement system appropriate to each street type.
- Linkages to the existing extensive open space network within the Shell Cove development.

Public open space within the Boat Harbour Precinct will be of a high quality, diverse in character and will provide a range of passive and active recreational opportunities. The primary areas of open space within the Boat Harbour Precinct are illustrated in Fig. 4.07 and will be:

- Open spaces associated with the Town Centre.
- Harbour edge parklands and the boardwalk.
- Parkland associated with stormwater management.
- Public boat ramp and southern foreshore.

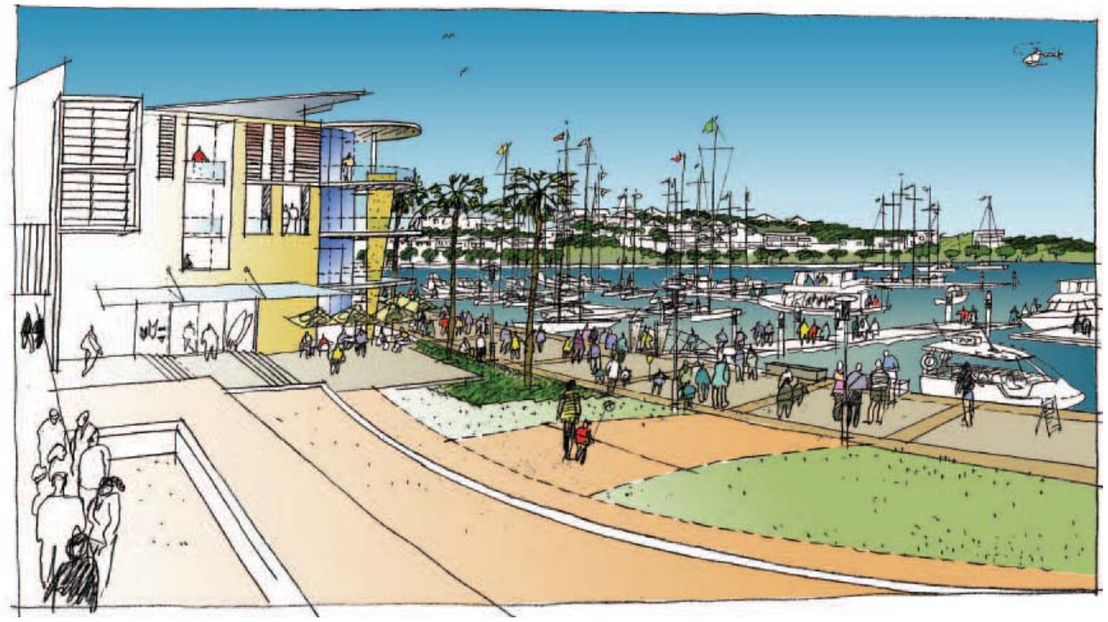


Fig. 4.08 - Artist's Impression of View Towards Harbour

Visual Impact

Development in the Boat Harbour Precinct will be appropriate in terms of form, colour, texture and landscaping and will not result in adverse impacts upon the visual character of the area and its surrounds. Figs. 4.08, 4.09 and 4.10 indicate the proposed character of the Boat Harbour Precinct including the Town Centre and its environs.

The detailed resolution of buildings has not been undertaken at this stage however indicative drawings are provided which show the aesthetic intent. The built form will be considered in further detail prior to submission of subsequent Project Applications.

SEPP No. 65 – Design Quality of Residential Flat Development

SEPP No. 65 – Design Quality of Residential Flat Development is applicable to the residential flat components of the Shell Cove Boat Harbour Precinct. SEPP No. 65 will be applied to the design of residential flat components and detailed in subsequent Project Applications.

The design quality principles that will be applied to the design of these components are: context, scale, built form, density, resource, energy and water efficiency, landscape, amenity, safety and security, social dimensions and housing affordability, and aesthetics.

A mix of low- and mid-rise apartments, demonstrating compliance with the above development controls, will line key streets within the Precinct, and in conjunction with the commercial uses at ground level, will generate activity within the Town Centre. In summary, the design of the residential components will contribute to the development of the Boat Harbour Precinct as a 'great urban place'.

Fig. 4.09 - Artist's Impression of View Along Waterfront/Harbour Square

Fig. 4.10 - Artist's Impression of View Along Waterfront

Infrastructure Provision

The DGRs call for the following to be addressed:

3.1 Address existing capacity and requirements of the development for sewerage, water, electricity, waste disposal, telecommunications and gas in consultation with relevant agencies. Identify and describe staging, if any, of infrastructure works; and

3.2 Address developer contributions, and provide the likely scope of any planning agreement with Council/ Government agencies.

The Boat Harbour Precinct forms part of the overall Shell Cove development which has been under progressive planning and development for the past twenty years, as such, masterplanning of service infrastructure for the Boat Harbour Precinct has been advanced in consultation with the relevant service authorities and executed as part of the broader project.

All lead in services to accommodate the development of the Boat Harbour Precinct are either in place or planned as part of the future development.

Key service infrastructure in place includes:

- Sewer pump station, SPS1101, construction completed including rising mains to Shellharbour Sewer Treatment Plant. This station has capacity for the fully developed Shell Cove project inclusive of the Boat Harbour Precinct. Two minor pump stations have also been planned as part of the Boat Harbour Precinct development. These stations will pump sewerage to SPS1101 before it is then pumped via the existing completed infrastructure to Shellharbour STP.
- Lead in mains for water, gas, telecommunications and power have been constructed via Cove Boulevarde as part of the broader project servicing requirements and have been developed cognisant of the future Boat Harbour Precinct development.
- Consultation with Telstra in relation to future servicing requirements has resulted in the advancement of development of a mini exchange within the Shell Cove project. This mini exchange has been developed cognisant of the capacity requirements for the future Boat Harbour Precinct development.

Developer contributions for the project are in accordance with Shellharbour City Council Section 94 Contribution Plan 2005. No further planning agreements are envisaged for the project.

Traffic and Access

The DGRs call for the following to be addressed:

4.1 Prepare a traffic impact study in accordance with Table 2.1 of the RTA's Guide to Traffic Generating Developments which addresses, but is not limited to the following matters:

- *The capacity of the road network to safely and efficiently cater for the additional traffic generated;*
- *Access to and within the site;*
- *Indicative servicing and parking arrangements;*
- *Intersection site distances;*
- *Connectivity to existing developments;*
- *Impact on public transport (including school bus routes);*
- *Provision of access for pedestrians and cyclists to, through and within the site; and*
- *Identify suitable mitigation measures, if required to ensure the efficient and safe functioning of the road network. This should include identification of pedestrian movements and appropriate provisions for shared path/cycleway/ public transport to existing and proposed road network;*

4.2 Undertake intersection modeling using aaSIDRA for all key junctions of the development with the existing road network. The modeling should consider AM and PM peak volumes and holiday peak volumes. Electronic copies of the input and output files, movement summaries and queue lengths must be submitted for evaluation; and

4.3 Protect existing public access to and along the beach and coastal foreshore and provide, where appropriate, new opportunities for controlled public access. Consider access for the disabled, where appropriate.

Two forms of modeling have been undertaken in relation to the Boat Harbour Precinct:

1. Strategic network modeling to produce estimates of daily traffic forecasts on key roads in Shell Cove including local streets within the Boat Harbour Precinct.
2. Intersection modeling of peak hour performance for key intersections affected by the proposed development.

The latest concept plan for the Boat Harbour Precinct has been assessed in the context of planning for Shell Cove as a whole and its inter-relationship with existing adjoining development. Traffic modeling formed an important component of the assessment, informing the project of likely future traffic volumes and impacts. Traffic forecasts have been produced using the Illawarra TRACKS model used by RTA and local Councils, but updated for Shell Cove by Maunsell as part of this project. The model incorporates expected road network, population and land-use changes in the Illawarra region to 2018. Traffic forecasts have been produced for the full development of Shell Cove

Fig.4.11 - Boat Harbour Precinct and Surrounds Concept Plan and Key Roads

The key findings contained in the report are:

- The existing and proposed road network within Shell Cove has been designed to have sufficient capacity to safely and efficiently cater for additional traffic generated by the Boat Harbour Precinct.
- Key intersections on Shellharbour Road that will service the development will have sufficient capacity to safely and efficiently cater for the full development of Shell Cove. A detailed traffic assessment and preliminary design has been produced for the proposed intersections of Harbour Boulevarde with Shellharbour Road, Addison Street and Brigantine Drive. This includes a revised layout of the Shellharbour Road/Harbour Boulevarde/ Wattle Road intersection; new traffic signals at the Addison Street/Harbour Boulevarde intersection; and a single lane roundabout at the Brigantine Drive/ Harbour Boulevarde intersection and at the Harbour Boulevarde/Cove Boulevarde intersection.

Fig.4.12 - Town Centre Concept Diagram and Key Roads

- There will be good access to the Boat Harbour Precinct from the existing and planned road network.
- Good access will be maintained to the Bass Point Reserve via the proposed main road network in Shell Cove, reducing existing traffic flows and impacts on local streets in the Shellharbour Village.
- There will be strong road and pathway interconnections within the Boat Harbour Precinct and to adjoining existing and planned developments. The development and associated road network have been designed to provide strong pedestrian and bicycle connections but also to minimise traffic impacts on existing development.
- Adequate parking will be provided as part of any development in the Boat Harbour Precinct, in accordance with Council guidelines.
- Preliminary planning for the commercial centre, marina facilities and business park precinct indicates that service vehicles will be able to readily access these businesses from the main roads serving Shell Cove (i.e. Harbour and Cove Boulevardes).
- All new intersections serving the Boat Harbour Precinct will be designed with adequate sight distances and for safe and efficient operation. Single lane roundabouts are proposed at the Cove Boulevarde/ Harbour Boulevarde intersection and at the Road A/Harbour Boulevarde intersection.
- The completion of a connection between Cove Boulevarde and Addison Street via Harbour Boulevarde will enable improved routing of existing bus services in the area. It will also mean that the Boat Harbour Precinct will be well served by local bus routes.
- The Boat Harbour Precinct will be designed to provide easy pedestrian and cyclist access to the harbour, together with cycle parking and comprehensive directional signage. Provision will be made for safe and efficient movements of pedestrians across Harbour Boulevarde, with linkages to proposed shared pathways on Harbour Boulevarde and the linear open space corridor associated with Watercourse No. 1. Internal movements to the harbour foreshore will be facilitated by pedestrian paths on all axial roads and open space links.

The complete report, included at Appendix A, provides details of the Traffic Impact Study undertaken in accordance with Table 2.1 of the RTA's Guide to Traffic Generating Developments. The main changes to traffic flows that are expected to occur as a result of development of the Boat Harbour Precinct are discussed below.

- Harbour Boulevarde

  Harbour Boulevarde will be built to service the Boat Harbour Precinct. The major access route to Shell Cove is Cove Boulevarde with Harbour Boulevarde forming a second major access from Shellharbour Road to Shell Cove. Harbour Boulevarde will directly service a number of important land uses in the Boat Harbour Precinct, including the proposed Town Centre, district playing fields and the business park precinct. Upon full development of the site traffic flows will vary along its length, from about 2,000 vehicles/day north of the Bass Point Reserve to almost 20,000 vehicles/day near Shellharbour Road.

  A design for the section of Harbour Boulevarde north of and including the Brigantine Drive intersection is currently under assessment by Shellharbour City Council. Analyses of the latest traffic forecasts and intersection operation for this section of road indicate that the proposed design will ensure satisfactory operation of proposed intersections with Addison Street and Shellharbour Road.

  Traffic forecasts for the section of Harbour Boulevarde between Brigantine Drive and Road A vary between 12,000 vehicles/day to 14,000 vehicles/day. A median is preferable in this section of Harbour Boulevarde to assist with the development of right turn bays at intersections and car park accesses, as well as to aid pedestrian movements adjacent to the Town Centre. Access to properties and car parks will preferably be via controlled (i.e. priority) intersections along this section of the road. On-street parking may be allowed on this section of road if sufficient road width is provided in the design for one lane traffic to pass cars entering or exiting car parks.

  Traffic forecasts for the section of Harbour Boulevarde between Road A and Shallows Drive are expected to vary from 4,000 vehicles/day to 6,000 vehicles/day based on current model forecasts. Thus, multiple direct driveway accesses are not preferable in this section of Harbour Boulevarde. Driveway accesses will need to be restricted to forwards entry and exit to commercial or residential multi unit blocks. On-street parking may be incorporated into the design of this section of road.

  Traffic forecasts for the section of Harbour Boulevarde between Shallows Drive and the northern access to the business park precinct are expected to be 5,000 vehicles/day to 7,000 vehicles/day. Again multiple direct driveway accesses are not preferable in this section of the road and should either be via side-streets, a service road or forwards entry and exit driveways servicing multiple lots. On-street parking may be incorporated in the design for this section of road.

  It is anticipated that between 3,000 vehicles/day and 4,000 vehicles/day will use Harbour Boulevarde between the southern and northern accesses of the business park precinct. The section of the road north of the proposed boat ramp access road and potential dry berth stack should preferably have restricted driveway access. On-street parking may be incorporated in the design for this section of the road. Traffic flows are forecast to be less than 2,000 vehicles/day south of the business park precinct associated with traffic accessing Bass Point Reserve.

- Cove Boulevarde (West of Harbour Boulevarde)

  Cove Boulevarde exits as a 2 lane, 2 way road as far east as Shallows Drive. The likely traffic flows along Cove Boulevarde between Southern Cross Boulevarde and Harbour Boulevarde will be in the order of 10,000 vehicles/day to 12,000 vehicles/day. A 2 lane cross section is adequate for traffic capacity, but the road width will need to allow for the future development of bus bays, turning lanes and pedestrian refuges. The current cross-sectional design for Cove Boulevarde provides for this (11m roadway in a 25m road reserve). No on-street parking should be allowed.

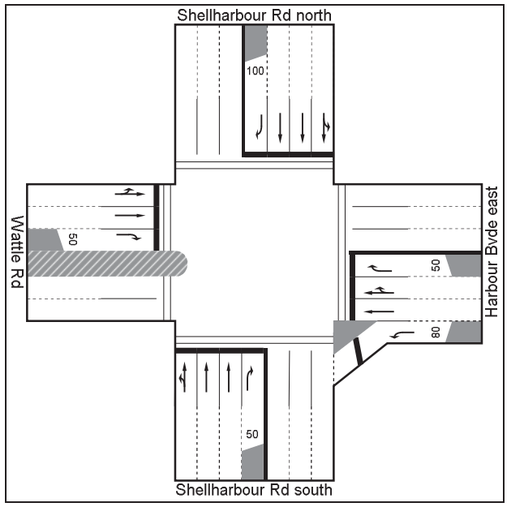
- Boat Harbour Precinct Streets

  The majority of the Boat Harbour Precinct Streets will be lightly trafficked, carrying less than 2,000 vehicles/day and can easily cater for on-street parking and safe pedestrian movements. The latest Structure Plan encourages the predominant use of Harbour Boulevarde and Cove Boulevarde in preference to Road B. In addition a planned shared pedestrian/vehicle area around the intersection of Road B and Main Street will further discourage the use of Road B by through traffic. On-street parking can be incorporated into the design of all roads in the Precinct.

  Road A will directly service the main car park for the Town Centre and is likely to carry the majority of traffic that will access the proposed hotel. Traffic forecasts for this road vary from approximately 3,000 vehicles/day at its eastern end to 5,700 vehicles/day near the Harbour Boulevarde intersection.

  Road B forms a connection between Road C, Main Street, Harbour Square, Road A and the proposed hotel. Traffic forecasts along Road B generally show less than 2,000 vehicles/day. The only exception may be some increased traffic in the vicinity of the hotel depending on final access arrangements. A direct connection to Road A is preferable.

  Road C provides access to the northern part of the Boat Harbour Precinct and will be relatively lightly trafficked, carrying approximately 2,700 vehicles/day.



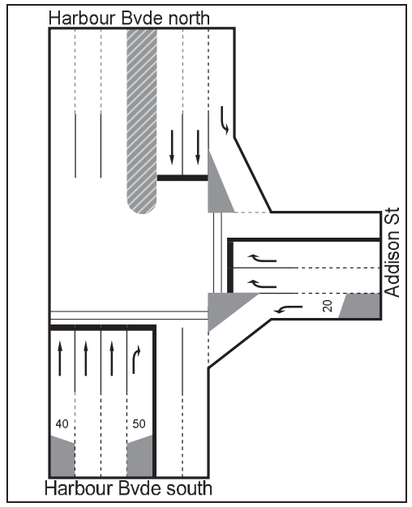


Fig. 4.13 - Proposed Intersection Layouts (as tested in SIDRA) NTS

Intersection	2018 AM Peak		2018 PM Peak		2018 Holiday Peak	
	Overall LoS	Comment	Overall LoS	Comment	Overall LoS	Comment
Shellharbour Rd / Mary St (signals)	A	Operates well in the AM Peak	B	Queuing of over 120m on Shellharbour Rd Nth approach	A	Queuing of over 120m on Shellharbour Rd Nth approach
Shellharbour Rd / Harbour Bvde / Wattle Rd (signals)	C	Queue lengths could potentially extend over 120m in the AM peak	D	Queue lengths could potentially extend over 200m on the northern approach in the PM peak	D	Queue lengths could potentially extend over 230m on the northern approach in the PM peak
Addison St / Harbour Bvde (signals)	A	Operates well in the AM Peak	A	Vehicles could occasionally queue from Shellharbour Rd through this intersection.	A	Vehicles could occasionally queue from Shellharbour Rd through this intersection.
Harbour Bvde / Brigantine Dr (roundabout – single lane approaches)	A	Operates well in AM Peak	A	Operates well in PM Peak	A	Queuing on Harbour Boulevarde Sth of around 90m
Harbour Bvde / Cove Bvde (signals)	B	Queuing of around 70m on Harbour Boulevarde Nth approach and Cove Bvde	B	Queuing of around 110m on Harbour Boulevarde Sth approach	B	Queuing of around 120m on Harbour Boulevarde Sth approach
Harbour Bvde / Road A (roundabout)	A	Operates well in the AM peak	A	Operates well in PM Peak	A	Operates well in the Holiday Peak
Harbour Bvde / Road C (roundabout)	A	Operates well in the AM peak	A	Operates well in PM Peak	A	Operates well in the Holiday Peak
Shellharbour Rd / Cove Bvde (roundabout)	B	Queuing of about 130m on Lakewood Bvde	B	Queuing of about 190m on the Shellharbour Rd Nth approach	F	Significant delays and queueing on Shellharbour Rd Nth

* The Shellharbour Rd/ Harbour Boulevarde and Addison St/ Harbour Boulevarde intersection have been modelled as isolated intersections in SIDRA3. The actual performance of these intersections are likely to be worse than shown, due to queue interactions between these intersections and the need to adjust the signal timings to manage queues.

Table 4.01 - Predicted Intersection Peformance (with full development)

Intersection Performance

Modeling of peak hour intersection performance of the proposed Shell Cove Boat Harbour Precinct was undertaken using SIDRA3. Peak hour flow estimates used in the intersection modeling were derived from the daily TRACKS traffic forecasts by applying peak to day factors and estimating AM and PM peak directional splits from local traffic counts[2]. The key intersections which will be affected by the proposed development will be Shellharbour Road/Mary Street and Shellharbour Road/ Wattle Road/Harbour Boulevarde. The proposed layouts of these intersections are illustrated in Fig. 4.13.

A summary of the results of the SIDRA3 intersection modeling for key intersections affected by the proposed development is given in Table 4.01.

The analysis using SIDRA3 assumed signal phase timings were optimised for future peak hour conditions at the Shellharbour Road/Wattle Road/Harbour Boulevarde intersection. The timings were then applied to both intersections to assess their anticipated level of performance in 2018. (It is advised that the co-ordinated phases of the Shellharbour Road/Wattle Road/Harbour Boulevarde intersection and the Addison Street/Harbour Boulevarde intersection would need to be offset to allow for adequate clearance time).

The future Shellharbour Road/Wattle Road/Harbour Boulevarde intersection is expected to operate at capacity during both future peak periods with an overall Level of Service 'C' in the AM peak and 'D' in the PM peak hour (see Table 4.01). The analysis shows that the 95th percentile queue on the Harbour Boulevarde approach is likely to extend beyond 100m in peak hours – through the nearby Addison Street intersection (around 60m to the south) but queuing can be minimised across the intersection via offset (clearance) phasing.

2 Major and minor movement was defined for each peak and turn movement at each intersection. A peak to day factor of 10% was applied to minor movements and 6.7% for major movements. These factors were derived from recent RTA traffic volume data in the area

Both Shellharbour Road approaches are expected to experience mild levels of congestion and queue lengths could potentially extend over 200m on the northern approach in the PM and holiday peaks, reducing to about 130m in the AM peak. This is acceptable given the arterial nature of the road, available queuing space and the expected peak hour volumes. A more detailed discussion of each intersection is included in this part of the EA, pp 60 and Appendix A.

The conclusions in relation to the intersections in the Shell Cove Boat Harbour Precinct are:

- Shellharbour Road/Harbour Boulevarde/Wattle Road
  The existing signalised intersection of Shellharbour Road/Wattle Road can be readily modified to enable a new connection with Harbour Boulevarde with minimal changes or impacts to Shellharbour Road.
- Addison Street/Harbour Boulevarde
  This intersection will need to be signalised and linked with signals at Shellharbour Road/Wattle Road.
- Brigantine Drive/Harbour Boulevarde
  This intersection will need a single lane roundabout. Recent studies indicate that a south bound lane dedicated for left turns is not needed.
- Cove Boulevarde/Harbour Boulevarde
  This intersection will operate effectively and more efficiently as a single lane roundabout. However traffic signals may be an option here in the longer term to enable easier pedestrian movements during peak periods of high traffic volumes occuring on Harbour Boulevarde near Cove Boulevarde.
- Road A/Harbour Boulevarde
  A single lane roundabout is recommended in this location.
- Cove Boulevarde/Shellharbour Road
  The existing roundabout will operate satisfactorily at full development of Shell Cove and no modifications to the existing intersection arrangements will be required.
- Cove Boulevarde (Main Street)/Road B
  This intersection will be suitable for the implementation of a Pedestrian Shared Zone, enabling a safe and attractive linkage between the Town Centre and the Harbour.

Pedestrians and Cyclists

The pedestrian and cycle network for the new development will be integrated with the existing network. The diverse range of community, recreational and employment travel needs at the local level will be well served by the planned road and pedestrian network which will provide good links between the Shellharbour Village, the Shell Cove Town Centre and the Boat Harbour. The Shellharbour City Cycleway and Shared Use Path Plan 2005 is illustrated in Fig. 4.14 and indicates the location of existing and proposed cycle paths and shared use paths. A revised Plan 2008 has been exhibited by Council. Refinement of the proposed path system will be undertaken in the next phases of design development.

The recommendations for pedestrian and cycle networks are to:

- Incorporate a Pedestrian Shared Zone in the Town Centre.
- Provide footpaths generally on all roads within the site to ensure that pedestrians have a choice of travel within the Boat Harbour Precinct.
- Design the pedestrian network to ensure that a minimum target of 85% of residents live within 400m walking distance to a public transport service.
- Make local streets available for use by cyclists, and manage and maintain local streets to ensure that cycling on these routes is safe and convenient.

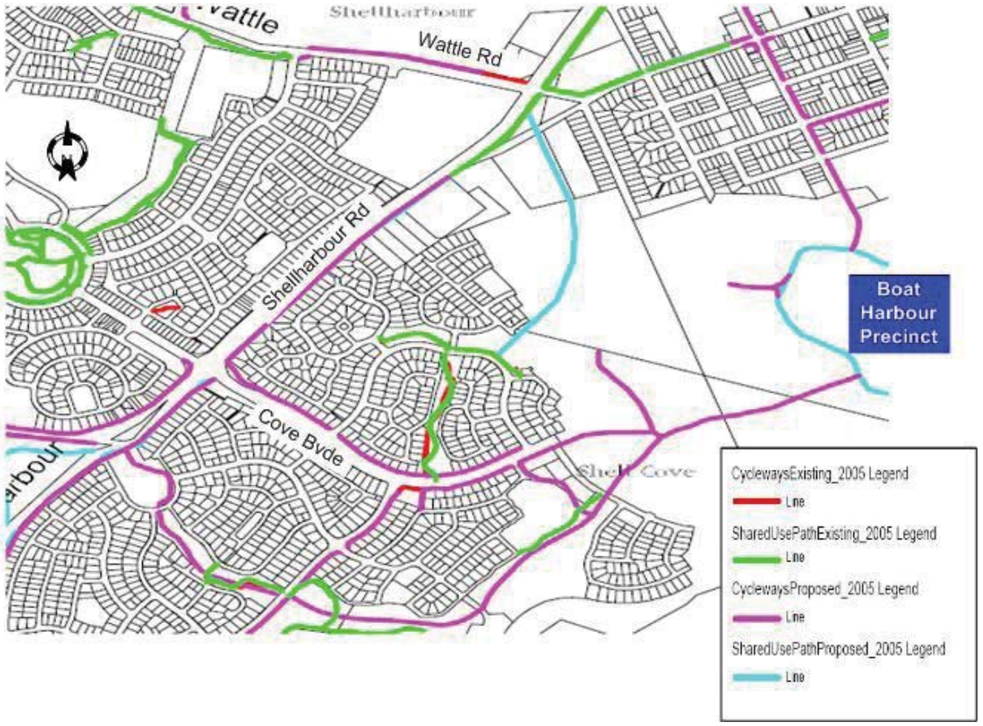


Fig. 4.14 - Shellharbour City Cycleway and Shared Use Plan 2005

Public Transport

Buses currently service Shell Cove and this will continue to be the primary form of public transport in the area although it is likely that Routes 52 and 53 will be rerouted along Harbour Boulevarde to Cove Boulevarde.

In accordance with the Ministry for Transport Service Planning Guidelines, which set out the preferred coverage for public transport, 90% of households should be within 400metres of a bus route or rail station during commuter peaks and day times. During night time periods 90% of households should be within 800m of a bus route or rail station. To achieve these targets in Shell Cove provision will need to be made for future bus routes on Cove Boulevarde, Southern Cross Boulevarde, Harbour Boulevarde and Brigantine Drive/Boollwarroo Parade. Buses will also need to service the district playing fields and the business park precinct, and some buses may need to loop through the business park's main internal road. Refinement of the proposed public transport network will be undertaken in the next phases of design development.

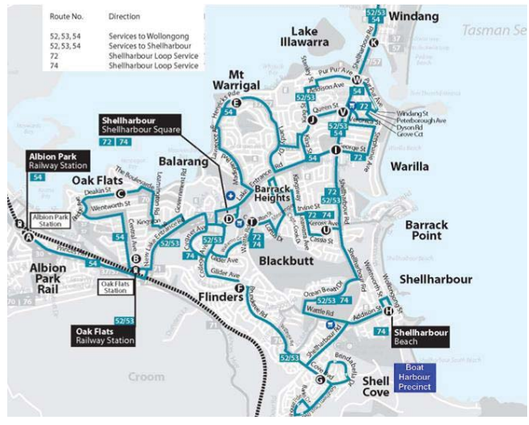


Fig.4.15 - Public Transport Routes

Parking

A parking analysis has been undertaken for the Boat Harbour Precinct based on the expected distribution of land uses in the study area. The analysis is based on the parking requirements for each of the land uses as specified by Shellharbour City Council's 'Car Parking Policy – 6th July 1992' and AS 3962-2001 for the Marina (where applicable). Estimates have been made in relation to the various components of the Boat Harbour Precinct, excluding parking requirements for the dry berth facility, the boat ramp and the district playing fields.

The estimated parking requirements are identified in Table 4.02. Approximately 996 parking spaces should be provided in the commercial and residential areas of the Boat Harbour Precinct in on-site or on-street locations.

It has been assumed that the business park precinct will be in the order of 30,000m^2 (GFA) resulting in a requirement of approximately 725 parking spaces.

Landuse	No. of Spaces
Marina	150
Hotel	289
Office/Commercial (throughout the Precinct)	241
Supermarket	58
Residential	258
Business Park Precinct (30,000m^2)	725
Total	1,721

Table 4.02 - Proposed Parking Supply by Landuse

Source: Appendix A, pp 22

Hazard Management and Mitigation

The DGRs call for the following to be addressed:

Coastal Process

5.1 Address coastal hazards and the provisions of the Coastline Management Manual. In particular consider impacts associated with wave and wind action, coastal erosion, climate change, sea level rise and more frequent and intense storms; and

5.2 Address consistency with Rivers and Foreshores Improvements Act 1948, NSW Coastal Policy, NSW Wetlands Management Policy, NSW State Rivers and Estuaries Policy and NSW Estuary Management Policy.

Contamination

5.3 Identify any contamination on site and appropriate mitigation measures in accordance with the provisions of SEPP 55 - Remediation of Land.

Acid Sulfate Soils

5.4 Identify the presence and extent of acid sulfate soils on the site and, where relevant, appropriate mitigation measures in accordance with the Acid Sulfate Soil Manual (NSW Acid Sulfate Soil Management Advisory Committee 1998).

Bushfire

5.5 Address the requirements of Planning for Bush Fire Protection 2006 (RFS).

Geotechnical

5.6 Provide an assessment of any geotechnical limitations that may occur on the site and if necessary, appropriate design considerations that address these limitations.

Flooding

5.7 Provide an assessment of any flood risk on site in consideration of any relevant provisions of the NSW Floodplain Development Manual (2005) and Flood Policy of Shellharbour City Council;

5.8 Address the impact of flooding on the proposed development, the impact of the development on flood behaviour and the impact of flooding on the safety of people/users of the development, factors that may affect flooding on the site and flood Director-General's Environmental Assessment Requirements Page 6 of 13 planning levels. Implications of climate change and sea level on flooding and a range of flood events (up to and including the probable maximum flood) should be considered;

5.9 Include an assessment of the sensitivity of flood model parameters (hydrologic and hydraulic); and

5.10 Consider the potential impacts of any filling on the flood regime of the site and adjacent lands.

Water Cycle Management

6.1 Address and outline measures for Integrated Water Cycle Management (including stormwater) based on Water Sensitive Urban Design principles which addresses impacts on the surrounding environment, drainage and water quality controls for the catchment; and

6.2 Assess the impacts of the proposal on surface and groundwater hydrology and quality.

Coastal Process

Coastline Hazards

Coastal hazards have been addressed in detail by Worley Parsons (see Appendix B) including the eight coastline hazards referred to in the NSW Government Coastline Management Manual (1990): beach erosion, shoreline recession, coastal entrance behaviour, sand drift, coastal inundation, slope and cliff instability, storm water erosion and climate change. The DGRs call for the impacts associated with wave and wind action, coastal erosion, climate change, sea level rise and more frequent and intense storms be addressed in this EA. Of these hazards the most relevant to the Boat Harbour Precinct are beach erosion and shoreline recession and the effects of climate change.

- Wind and Wave Action

  The impacts of wind and wave action are most significant during storms when large waves, elevated sea levels and strong winds can cause significant beach erosion. Shellharbour South Beach is protected by Bass Point from the predominantly south and south easterly storm waves.

Coastal engineering studies were completed for the EIS as part of the approval process for the Shell Cove Boat Harbour and Marina and additional studies were completed during the design and documentation process of the breakwater at the entrance to the Boat Harbour. The studies provided a quantitative assessment of the degree of sheltering of the beach by Bass Point. These studies indicated that during a severe storm at a rip head erosion could be expected to occur back into the vegetated dune system by up to 20m. The beach would recover after the storm as the sand deposited in bars offshore during the storm would be reworked offshore.

The resulting erosion would not affect any proposed building development within the Boat Harbour Precinct and would be seaward of Boollwarroo Parade/Bass Point Tourist Road by approximately 60 to 80m. Some damage and temporary disruption to dune fences and accessways could occur but this is not unusual in severe storms along the NSW Coast. Maintenance of fences and accessways will be undertaken as required by Shellharbour City Council.

Detailed morphological modeling and physical modeling of the stability of Shellharbour South Beach has been undertaken as part of the ongoing approvals process. Full details of the beach stability investigations can be found in Appendix F of this report.

- Shoreline Recession Due to Sediment Loss

Shoreline recession has two potential causes: either a continuing net sediment loss from the beach system due to coastal processes, or an increase in sea level. It is a long term process influenced by short term fluctuation caused by storm activity.

Shoreline recession tends to occur when:

- The outgoing longshore transport from a beach compartment is greater than the incoming longshore transport of sediment.
- Offshore transport processes move sand to offshore 'sinks' from which it does not return to the beach.
- There is a landward loss of sediment by windborne transport.

Coastal engineering studies conducted for the Shell Cove Boat Harbour and Marina EIS concluded that a zero value for shoreline recession due to net sediment loss should be adopted.

Additional assessment has been undertaken and has confirmed the findings of the EIS, specifically that no significant mechanisms for sand supply and loss are present, and that shoreline recession due to net sediment loss is not a significant coastline hazard for Shellharbour South Beach. However, a conservative approach has been used to predict the long term recession rate due to net sediment loss. An allowance of 0.05m/yr has been adopted to account for uncertainties in future beach behaviour. Using that assumption the estimated shoreline recession over a period of 100 years will be in the order of 5m.

- Shoreline Recession Due to Sea Level Rise

A progressive rise in sea level may result in shoreline recession through two mechanisms:

1. Drowning low lying coastal land.
2. Shoreline readjustment to the new coastal water levels.

The second mechanism has been identified as being more likely to affect the shoreline in this location. Deeper offshore waters, resulting from sea level rise, will expose the coast to attack by larger waves resulting in changes to nearshore refraction and diffraction behaviour of waves. Significant volumes of sediment may move offshore as the beach seeks a new equilibrium. Detailed information regarding the calculation of potential shoreline recession is contained within Appendix B of this report. The DECC guidelines for impact assessment in relation to sea level rise[3] have been used to calculate the estimated shoreline recession at Shell Cove and are included in Appendix F of this report.

3 DECC, 2007, *Floodplain Risk Management Guidelines, Practical Consideration of Climate Change*

- Total Shoreline Recession

The total estimated shoreline recession (a combination of recession due to net sediment loss and recession due to sea level rise) is:

- Low 10m
- Medium 19m
- High 28m

The distance between the proposed development in the Boat Harbour Precinct and the beach is typically 150m (to Mean High Water Mark). The proposed development will not be affected by coastal processes even if erosion caused by a design storm were to occur at the end of 100 years and following a 'High' shoreline recession outcome.

In response to previous conditions of approval in relation to the Shell Cove Boat Harbour project a Beach Nourishment/Rehabilitation Management Plan has been prepared and approved for Shellharbour South Beach as part of the conditions of Development Consent and conditions of concurrence under the Coastal Protection Act 1979. The plan identifies required actions including monitoring of beach behaviour over time, and the requirement for Shellharbour City Council to develop a strategy to deal with the impacts of climate change on Shellharbour South Beach as well as other beaches within the Shellharbour LGA.

- Climate Change

The process and extent of studies undertaken as part of the Shell Cove Boat Harbour Precinct development project has clearly responded to the impacts of climate change and sea level rise over a 100 year time frame as well as addressing both existing and draft planning climate change policies.

The Worley Parsons' Flood Management Plan (see Appendix F) references DECC's Floodplain Risk Management Guideline, Practical Consideration of Climate Change (October 2007) and the DoP's Draft Sea Level Rise Policy Statement (February 2009).

The DECC guideline refers to low, mid and high level ocean impacts and increases in rainfall intensities predicted to occur up to 2100, whilst the DoP draft policy refers to predicted maximum increases at two points in the future, 2050 and 2100.

In assessing the Shell Cove Boat Harbour Precinct development project, Worley Parsons assessed the DECC high level ocean impact, a 0.91m rise in sea level, and a 30% increase in rainfall intensity.

These figures are broadly consistent with the DoP predicted sea level increase of 0.40m by 2050 and 0.90m by 2100. The DoP draft policy does not quantify potential increases in rainfall intensity.

Worley Parsons' analysis notes that between 2009 and 2100 the Shell Cove Boat Harbour Precinct development project could expect a worst case scenario increase of 0.23m in localised flood levels which can be readily accommodated within the 0.5m freeboard (relative to the predicted 1 in 100 year flood level) which all habitable buildings within the precinct will need to provide.

Consistency With Relevant Legislation and Policy

The proposal is considered consistent with the Water Management Act (2000), NSW Coastal Policy (1997), NSW Wetlands Management Policy (1996), NSW Rivers and Estuaries Policy (1993) and NSW Estuary Management Policy. In particular it is noted that:

- A Stormwater Quality Management Strategy is proposed to ensure protection of water quality within the sensitive nearshore coastal environment.
- WSUD practices will be adopted which include reduction in potable water use, inclusion of water saving devices, and internal and external reuse of non-potable water.
- The proposal involves the protection and rehabilitation of the dunal system along Shellharbour South Beach and this is embodied in a Beach Nourishment/Rehabilitation Management Plan endorsed by DECC.
- The proposal is set back a sufficient distance from Shellharbour South Beach to accommodate natural processes and climate change over a planning period of 100 years and beyond.
- The proposal provides public access to the beach and around the full perimeter of the Boat Harbour waterway.
- The proposal includes monitoring of beach behaviour to provide information that will allow effective management of natural coastal processes and the impacts of climate change.
- The project has successfully established a substantial fresh and estuarine wetland, the Myimbarr Wetlands, to offset the approved removal of the degraded Shellharbour Swamp.
- The proposal involves the creation of multiple freshwater wetlands as part of the stormwater quality management strategy.
- The proposal involves the creation of a new 20ha estuarine system (the waterway of the Boat Harbour), adding to the estuarine habitat complexity in the Shellharbour embayment.

The DGRs list the following legislation and policy for the purposes of addressing the consistency of the proposal:

- Rivers and Foreshores Improvement Act 1948.[4]
- NSW Coastal Policy.
- NSW Wetlands Management Policy.
- NSW State Rivers and Estuaries Policy.
- NSW Estuary Management Policy.

An assessment of the consistency of the proposed Boat Harbour Precinct development with the above legislation and policy is expanded below, with emphasis on 'coastal processes' as the key issue under which reference to legislation and policy is made in the DGRs.

4 The Rivers and Foreshores Improvement Act 1948 has been repealed since provision of the EARs and the 'controlled activity' provisions in the Water Management Act 2000 have now commenced (4 February 2008). Accordingly, reference is now made to the Water Management Act 2000 rather than the Rivers and Foreshores Improvement Act 1948

- Water Management Act (2000)

The objectives of the Act are to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations and, in particular:

(a) to apply the principles of ecologically sustainable development;
(b) to protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality;
(c) to recognise and foster the significant social and economic benefits to the State that result from the sustainable and efficient use of water, including:
  (i) benefits to the environment;
  (ii) benefits to urban communities, agriculture, fisheries, industry and recreation;
  (iii) benefits to culture and heritage; and
  (iv) benefits to the Aboriginal people in relation to their spiritual, social, customary and economic use of land and water;
(d) to recognise the role of the community, as a partner with government, in resolving issues relating to the management of water sources;
(e) to provide for the orderly, efficient and equitable sharing of water from water sources;
(f) to integrate the management of water sources with the management of other aspects of the environment, including the land, its soil, its native vegetation and its native fauna;
(g) to encourage the sharing of responsibility for the sustainable and efficient use of water between the Government and water users; and
(h) to encourage best practice in the management and use of water.

Assessment of Consistency

The proposed development of the Boat Harbour Precinct is considered to be consistent with the Water Management Act 2000 since:

- A Stormwater Quality Management Strategy is proposed to ensure protection of water quality within the sensitive nearshore coastal environment and the estuarine system within the boat harbour (see Appendix F).
- WSUD practices will be adopted which include reduction in potable water use, inclusion of water saving devices, and internal and external reuse of non-potable water.

- NSW Coastal Policy (1997)

The policy has as its central focus the ESD of the NSW coastline. The policy is divided into nine goals each of which have their own objectives and strategic actions. The goals represent a commitment to:

- *Protecting, rehabilitating and improving the natural environment of the coastal zone.*
- *Recognising and accommodating the natural processes of the coastal zone.*
- *Protecting and enhancing the aesthetic qualities of the coastal zone.*
- *Protecting and conserving the cultural heritage of the coastal zone.*
- *Providing for ecologically sustainable development and use of resources.*
- *Providing for ecologically sustainable human settlement in the coastal zone.*
- *Providing for appropriate public access and use.*
- *Providing information to enable effective management of the coastal zone.*
- *Providing for integrated planning and management of the coastal zone.*

Assessment of Consistency

The proposed development of the Boat Harbour Precinct is considered to be consistent with the NSW Coastal Policy 1997 since:

- The proposal involves the protection and rehabilitation of the dunal system along Shellharbour South Beach and this is embodied in a Beach Nourishment/Rehabilitation Management Plan.
- The proposal is set back a sufficient distance from Shellharbour South Beach to accommodate natural processes and climate change over a planning period of 100 years and beyond.
- The proposal provides public access to the beach and around the full perimeter of the Boat Harbour waterway.
- The proposal includes monitoring of beach behaviour to provide information that will allow effective management of natural coastal processes and the impacts of climate change.

- NSW Wetlands Management Policy (1996)

  It is the policy of the NSW Government to:

  - *Encourage the management of the wetlands of the State so as to halt and where possible reverse:*
    - *loss of wetland vegetation;*
    - *declining water quality;*
    - *declining natural productivity;*
    - *loss of biological diversity; and*
    - *declining natural flood mitigation.*
  - *Encourage projects and activities which will restore the quality of the State's wetlands, such as:*
    - *rehabilitating wetlands;*
    - *re-establishing areas of buffer vegetation around wetlands, and*
    - *ensuring adequate water to restore wetland habitats.*

  The Government's common goal in guiding decision-making for wetlands is, *'The ecologically sustainable use, management and conservation of wetlands in NSW for the benefit of present and future generations'.*

  Assessment of Consistency

  The proposed development of the Boat Harbour Precinct is considered to be consistent with the NSW Wetlands Management Policy since:

  - The project has successfully established a substantial fresh and estuarine wetland, the Myimbarr Wetlands, to offset the approved removal of the degraded Shellharbour Swamp. The Myimbarr Wetlands includes 1.5ha of saltmarsh, a tidal lagoon connected to the sea via Tongarra Creek, and 11.5ha of freshwater wetlands containing nine deep ponds and a series of shallow wetland areas.
  - The proposal involves the creation of multiple freshwater wetlands as part of the stormwater quality management strategy.

- NSW Rivers and Estuaries Policy (1993)

  It is the policy of the NSW Government to:

  - *Encourage the sustainable management of the natural resources of the State's rivers, estuaries and wetlands on the adjacent riverine plains, so as to reduce, and where possible halt:*
    - *declining water quality;*
    - *loss of riparian vegetation;*
    - *damage to river banks and channels;*
    - *declining natural productivity;*
    - *loss of biological diversity; and*
    - *declining natural flood mitigation.*
  - *Encourage projects and activities which will restore the quality of river and estuarine systems such as:*
    - *rehabilitating remnant habitats;*
    - *re-establishing vegetation buffer zones adjacent to streams and wetlands;*
    - *restoring wetland areas;*
    - *rehabilitating estuary foreshores; and*
    - *ensuring adequate streamflows to maintain aquatic and wetland habitats.*

  The objective of the NSW Rivers and Estuaries Policy is to:

  - *Manage the rivers and estuaries of NSW in ways which:*
    - *Slow, halt or reverse the overall rate of degradation in their systems.*
    - *Ensure the long term sustainability of their essential biophysical functions.*
  - *Maintain the beneficial use of these resources.*

  Assessment of Consistency

  The proposed development of the Boat Harbour Precinct does not affect the natural resources of any of the State's rivers or estuaries. The impact of the proposed development on wetlands is considered to be beneficial as noted in the Assessment of Consistency under the NSW Wetlands Management Policy.

  The proposal involves the creation of a new 20ha estuarine system comprising the waterway of the Boat Harbour. The waterway is already the subject of an approval from the Minister and is predicted to create more estuarine habitat and increase habitat complexity in the Shellharbour embayment.

- NSW Estuary Management Policy

  The NSW Government developed an Estuary Management Policy in recognition of the ecological, social and economic importance of the State's estuaries and concern regarding the long term consequences of their accelerating degradation.

  The general goal of the Estuary Management Policy is to achieve an integrated, balanced, responsible and ecologically sustainable use of the State's estuaries. The specific objectives of the policy are :

  - *protection of estuarine habitat and ecosystems in the long term, including maintenance in each estuary of the necessary hydraulic regime;*
  - *preparation and implementation of a balanced long term management plan for the sustainable use of each estuary and its catchment, in which all values and uses are considered, and which defines management strategies for:*
    - *conservation of aquatic and other wildlife habitats;*
    - *conservation of the aesthetic values of estuaries and wetlands;*
    - *cessation of further estuary degradation;*
    - *repair of damage to the estuarine environment; and*
    - *sustainable use of estuarine resources, including commercial uses and recreational uses as appropriate.*

  Assessment of Consistency

  The proposed development of the Boat Harbour Precinct is considered to be consistent with the NSW Estuary Management Policy for similar reasons to those of the NSW Wetlands Management Policy, namely:

  - The project has successfully established the Myimbarr Wetlands which includes 1.5ha of saltmarsh and a tidal lagoon connected to the sea via Tongarra Creek.
  - The proposal involves the creation of a new 20ha estuarine system (the waterway of the Boat Harbour) thus adding to the estuarine habitat and habitat complexity in the Shellharbour embayment.
  - The proposal involves the creation of multiple freshwater wetlands, including immediately north of the Town Centre, as part of the stormwater quality management strategy.

Contamination

The soil within the study area was previously assessed as part of the Shell Cove Boat Harbour and Marina Development Consent conditions. The study area was found to contain contaminated land as a result of a former municipal tip.

In accordance with SEPP No. 55 (see this part of the EA, pp 43) the municipal tip was subsequently removed and the contaminated land has since been remediated. The Validation Certificate is included at Appendix C.

Acid Sulfate Soils

- Extent of Acid Sulfate Soils

  The Boat Harbour and Boat Harbour Precinct sites contain locations of Acid Sulfate Soils (ASS) generally in low lying estuarine areas of the sites. The presence and extent of ASS in these locations has been assessed and mapped by Coffey Geotechnics Pty Ltd (see Appendix D).

  The assessment undertaken by Coffey included field mapping, subsurface investigation including test pits, boreholes and vibrocores, ASS screening and SPOCAS laboratory testing. The analysis was complemented by an array of prior investigations undertaken by other consultants on the site as part of previous studies for the Boat Harbour. These prior studies were integrated with Coffey's assessment to provide an extensive assessment of the sub surface conditions.

  The ASS was found to occur in estuarine sediments. These sediments are described by Coffey as generally dark grey to black in colour and having a high moisture content. The estuarine sediments were further categorised as either sand or silt/clay with the following characteristics:

  - Sand; comprising silty sand and sand: this material was generally loose to medium dense and encountered in the eastern parts of the site at the interface with littoral sands.
  - Silt/Clay; comprising clayey silt/silty clay and clay: this material was generally very soft to firm. Some organic material and sandy lenses were encountered within the material.

  The Estuarine Sediments (ASS) can be separated into Actual Acid Sulfate Soils (AASS) and Potential Acid Sulfate Soils (PASS) depending on the degree of oxidation that has occurred. Generally soils that have been permanently below the water table would be classified as PASS for which the pH is typically >4. The overlying soil is classified as AASS for which the pH level is <4. A number of geotechnical investigations have been undertaken and these estimate that AASS does not generally occur greater than 2m below the top of the soil.

- Acid Sulfate Soils Mitigation Measures

  Mitigation measures to address the identified ASS within the Boat Harbour and the land platform surrounding the Boat Harbour have been separately approved as part of the separate Boat Harbour consent. The approved measures have been addressed in Environmental Management Plans prepared in accordance with the Boat Harbour development consent and in the separate Environmental Protection Licence (EPL12426) issued by DECC for the project.

  Measures to mitigate impacts from ASS incorporated as part of the separate Boat Harbour approval were developed by Worley Parsons in association with Professor Ian White of the Australian National University with the aid of data collected by Coffey. These measures include:

  - Burial of AASS on site below the boat harbour.
  - Disposal of PASS off site to a licensed DECC facility.
  - Lime neutralisation of PASS and reuse of the material on site.
  - Capping and consolidation of insitu ASS.

  Accordingly, any ASS management required after completion of the presently approved works is expected to comprise isolated and nominal treatment of excavated ASS. The treatment for these isolated instances would comprise neutralisation with lime followed by either reuse at an appropriate location on-site or off-site disposal (following appropriate waste classification) in accordance with ASS MAC guidelines.

Bushfire

The proposed development does not occupy land identified as bushfire prone land by Shellharbour City Council however an assessment against the Planning for Bushfire Prevention guidelines has been undertaken (see Appendix E).

The assessment concurs that the proposed development is not located on bushfire prone land. However, the assessment notes a minor potential future fire hazard from the dunal zone abutting Shellharbour South Beach resulting from plans to revegetate this area to Tall Heath. This hazard can be accommodated with the incorporation of an Asset Protection Zone (APZ) of 19m between any residential, commercial or retail building and the hazard, and the incorporation of level two building construction standards (under Australian Standard AS 3959 (2000)) for the adjacent buildings. The APZ can be readily accommodated within the proposed road reserve located between the hazard and proposed buildings without the need for impact on the developable land.

The assessment also acknowledges that the proposed development can make use of an existing reticulated water supply, and that access and egress can be adequately addressed by use of the existing public road.

Overall the proposed development complies with the Planning for Bushfire Prevention guidelines.

Geotechnical

Detailed discussion of the geotechnical limitations in respect of the Boat Harbour Precinct has been provided as part of the report prepared by Coffey Geotechnics Pty Ltd and is included at Appendix D of this report.

Coffey note that a number of geotechnical investigations carried out on the site have identified significant thicknesses of compressible clayey silt/silty clay type soils (also known as soft soils). The treatment of these soft soils to enable appropriate structural criteria to be met for building purposes will be undertaken as part of the approved Boat Harbour construction works.

The proposal for treatment of the soft soils in accordance with the existing approval provides for preloading of soft soil areas identified within the land platform surrounding the Boat Harbour to avoid the need to support lightly loaded engineered structures on piled foundations and will reduce post construction settlement and differential settlement to tolerable levels. Material to form temporary preload mounds will be sourced from excavation of the Boat Harbour.

The assessment of strategies for limiting long term settlement has been made on the basis of the following design criteria:

- Design life of 60 years.
- Long term (post preloading) total settlement less than 40mm.
- Building loads of 25kPa (considered as a uniform load over the site).
- Wick drains will be installed as required to reduce the duration of preloading.
- Preloading will be carried out assuming a specific construction methodology involving the placement of compacted fill up to the final design surface followed by the placement of a compacted preload mound above the design surface.

- The total height of preload mound above final design surface levels equals the calculated height of preload fill plus the estimated primary consolidation settlement over the duration of preload. Following satisfactory preloading, the compacted preload would be removed and extra compacted fill placed, as required, to bring levels up to final design level.

The site classification will need to be reviewed on the basis of the settlement and pore water pressure monitoring results. It is anticipated that lots could be designed for Class 'M' conditions as advised above. However, if the ground conditions in localised areas are worse than expected the foundations of some buildings may need to be designed in accordance with a more severe classification than 'M'.

Flooding

A Flood Management Plan has been proposed for the project and is discussed in detail in Appendix F of this report.

The plan responds to the NSW Floodplain Development Manual (2005) and the Shellharbour City Council's Floodplain Risk Management DCP (2006) as follows:

- Flood Impact

  The proposed development will not result in a significant increase in flood levels on adjacent properties for either the 5 year ARI, 100 year ARI or PMF event, and in some areas of adjacent properties flood levels are reduced for the 100 year ARI and PMF event. The proposed development will be designed such that flooding will have no adverse impacts.

- Flood Hazard

  The proposed development restricts high flood hazards to the main flow channels and reduces the extent of existing high hazard areas within the Shellharbour Village.

  The proposed development includes waterway corridors to be used as floodways - using Water Sensitive Urban Design principles and incorporating wetlands, natural creeklines and open space areas - to manage and contain flood hazards.

- Flood Planning Levels

  A Flood Planning Level of the 100 year ARI flood level plus an allowance of 0.5m freeboard will be adopted for all development adjacent to major overland flow paths.

- Flood Emergency Response

  The Flood Emergency Response requires that residents and visitors remain on site during all major events up to and including the PMF event, and if required the site can be traversed by heavy vehicles. Safe pedestrian and vehicular access routes out of the site are available in events up to and including the 100 year ARI flood.

- Impacts of Climate Change

  Both DECC's Floodplain Risk Management Guideline, Practical Consideration of Climate Change (October 2007) and the DoP's Draft Sea Level Rise Policy Statement (February 2009) have been considered.

  The DECC guideline recommends sensitivity testing of flood behaviour over a designated range of climate change induced impacts on sea levels and rainfall intensity. Even when adopting a combination of the highest sea level rise and highest rainfall intensity rise, the resultant 100yr ARI flood level can be comfortably accommodated within the adopted freeboard of 0.5m. As such, the adopted habitable floor levels are considered adequate to accommodate possible climate change induced effects on flooding. (See also this part of the EA, pp 65).

Assessment of the Sensitivity of Flood Model Parameters

An assessment of the sensitivity of the hydrologic and hydraulic parameters has been undertaken as part of the climate change analysis. This is via inclusion of 20% and 30% increases in rainfall intensities and sensitivities of tailwater conditions.

Sensitivity analysis of the hydraulic roughness for the proposed development has been undertaken. An increase in hydraulic roughness of 20% results in an increase in flood levels across the site up to a maximum of 0.15m in the 100 year ARI event.

Sensitivity analysis for blockage of the proposed bridges through the development has been undertaken. The blockage scenario demonstrates an increase in flood levels in the range of 0.1-0.4m in the 100 year ARI event.

The proposed freeboard adopted in the flood planning level is able to accommodate the increase in flood levels due to the sensitivity scenario testing.

Water Cycle Management

A Stormwater Quality Management Strategy has been prepared by consultant Worley Parsons based on the outcomes of the Commission of Inquiry for the Shell Cove Boat Harbour and Marina development and the guidelines included in the Environment Protection Authority's 1996 document 'Managing Urban Stormwater: Council Handbook'. The resulting 'Refined Stormwater Quality Management Report' is included at Appendix F of this report.

A range of measures based on WSUD principles have been adopted as part of the water cycle management strategy and these address potential impacts of the proposal on the environment. These measures include rainwater tanks, grass swales, vegetated drainage corridors, bio-retention swales and basins, gross pollutant traps and wetlands.

A MUSIC model was utilised to estimate the pollutant load exports and water volumes generated by the catchment for the pre-development and developed conditions. A conservative approach was adopted for selection of parameters of the model, in that Event Mean Concentrations (EMCs) adopted for pre-development conditions were low, EMCs adopted for developed conditions were high and the performance of wetlands was understated compared to actual measured wetland data from the site.

Notwithstanding the conservatisms in the modeling the predicted pollutant export in the developed condition is equal to or less than the pollutant export in the pre-development condition. This ensures the water quality in the Boat Harbour would be satisfactory and there would be no adverse impact on sensitive nearshore coastal waters.

Integrated Water Cycle Management

The following measures have been adopted as part of the Shell Cove water management strategy to address the potential impacts of the proposed development on the environment:

- Rainwater tanks.
- Grass swales.
- Vegetated drainage corridors.
- Bio-retention swales and basins.
- Gross pollutant traps.
- Wetlands.

Rainwater tanks have been sized to meet the minimum BASIX requirements of total potable water reduction of 40% and it has been assumed that water saving devices will be implemented on taps, shower heads and toilets. It has also been assumed that the tanks will be used for internal and external non-potable water reuse such as toilet flushing, washing machines and garden irrigation.

Fig. 2 in Appendix B of the Worley Parsons report illustrates the proposed stormwater treatment strategy (see Appendix B of this report).

Impacts of the Proposal on Surface and Groundwater Hydrology and Quality

- Surface Water Hydrology and Quality

  A MUSIC model was utilised to estimate the pollutant load exports and water volumes generated by the catchment for the pre-development and developed conditions. The assessment of the potential impacts of the proposed development on surface and groundwater hydrology indicated that:

  - The pollutant export to the Boat Harbour waterway from the developed catchment does not exceed the pollutant export from the catchment under pre-development conditions, including allowance for treatment provided by Shellharbour Swamp (i.e. pollutant export as measured at Shellharbour South Beach).
  - The overall pollutant export to Shellharbour South Beach from the developed catchment (including 'J2' and 'A Rural 2' which do not drain to the Boat Harbour waterway) does not exceed the pre-development export.

  Accordingly the impacts of the proposed development on surface water quality are acceptable. Appendix B of this report provides details regarding the performance of the proposed water quality management strategy.

  A reduction in pollutant export will be achieved relative to the developed scenario (with no treatment measures incorporated). The results show that the EPA Guidelines of 80% reduction in suspended solids export, 45% reduction in total phosphorous export and 45% reduction in total nitrogen export will be achieved.

- Groundwater Hydrology

  Groundwater levels would be expected to be shallow in the wetland, near the surface and vary up to several metres below the surface across the site. Groundwater is expected to flow in a general easterly direction.

  The presence of shallow groundwater levels over part of the site indicates that groundwater interacts with surface water. The shallow water table conditions mean that the capacity of the groundwater system to accept rainfall recharge is limited. This is expected to result in surface runoff into the wetlands following extended periods of high rainfall.

  Based on field investigations and monitoring of groundwater levels, a groundwater model was established and calibrated to model the existing groundwater conditions and groundwater conditions following construction of the Boat Harbour by Coffey Geotechnics (2004). Modelled groundwater contours are shown in Figs. 14 and 15 in Appendix A of the Coffey Geotechnics report (see Appendix D).

  The groundwater study undertaken by Coffey Geotechnics indicated the following:

  - Modelled groundwater drawdown impacts to the west and south-west of the Boat Harbour range from approximately 2m to 2.5m at the Boat Harbour edge and reduce to about 1m at a distance of 200m from the proposed Boat Harbour shore.
  - Modelled drawdown impacts to the north of the harbour affect groundwater levels within the estuarine aquifer, the alluvial aquifer and the underlying latite. Modelled drawdown in these aquifers ranges from approximately 2m at the harbour edge reducing to 1m at a distance of 300m from the harbour shore. Modelled groundwater flow direction rotates from roughly eastward to southerly and south-easterly.
  - The creation of the Boat Harbour will act to interrupt natural easterly groundwater flow to the beach and ocean area. Modelled groundwater levels show the presence of a gentle mound between the Boat Harbour and ocean with groundwater levels varying between 0m AHD and 0.5m AHD.
  - Modelled drawdown impacts to the south of the proposed inlet channel reduce from approximately 1.5m at the harbour shore to zero at a distance of 200m from the harbour shore.

Heritage and Archaeology

The DGRs call for the following to be addressed:

7.1 Address the draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, July 2005);

7.2 Identify whether the site has significance to Aboriginal cultural heritage and identify appropriate measures to preserve any significance (Aboriginal community consultation should be undertaken in accordance with DEC's Interim Community Consultation Requirements for Applicants); and

7.3 Identify any items of European heritage significance and, where relevant, provide measures for the conservation of such items.

The Cultural Heritage Review undertaken in response to the DGRs is included at Appendix G of this report. The review notes that a number of archaeological investigations have been completed in relation to the Shell Cove Boat Harbour and associated urban development. The three primary archaeological field surveys (McIntyre 1985, Hotchkin, et al. 1986, Navin Officer 1995a) and an associated field survey of the Quarry Haul Road easement (Navin Officer 1995b) have variously included:

- Reviews of the history of extensive subsurface disturbance in the past.
- Archaeological subsurface testing of a shell midden and associated lithic scatter (AHIMS Site 52-5-207) in a sand dune on Shellharbour South Beach, and within the slope adjacent to Shellharbour Swamp.
- Archaeological ground surface surveys in the Shell Cove area generally, including the development area for the proposed Harbour Boulevarde/Shallows Drive.

No Aboriginal or (protected) non-Aboriginal objects or structures were identified on the slopes adjacent to the Shellharbour Swamp. McIntyre and Navin Officer concluded from their field surveys and reviews of land use history that the archaeological sensitivity of the slopes was generally low.

Registered Aboriginal objects/sites are known to occur within the study area. However, only part of one of these sites, AHIMS 52-5-207, is assessed as having relatively high heritage value. This site is a shell midden within a foredune on the beachfront.

Fig. 4.16 - Location of Aboriginal Objects (Sites) Within the Study Area

A review of cultural heritage reports, other scientific and historical information and archaeological surveys and inspections indicates that there is no reasonable likelihood of revealing any further undisturbed and/or scientifically important Aboriginal sites or objects within the Boat Harbour Precinct. The potential for significant, undisturbed Aboriginal sites is assessed as low to negligible.

Consultation and liaison with the aboriginal community, in relation to the Shell Cove Boat Harbour and associated urban development, has occurred over a 24 year period. Further consultation was undertaken in 2006 in accordance with DECC's 'Interim Guidelines for Aboriginal Community Consultation'.

The review notes that no European heritage relic, site or place of State significance in terms of the Heritage Act 1977 and no identified physical evidence of Colonial era built heritage is known to occur within the Shell Cove Boat Harbour Precinct.

In general the Shell Cove area has been extensively modified and transformed by colonial-era and modern land use practices and developments. These processes have diminished the preservation of both Aboriginal and non-Aboriginal cultural heritage sites within the area.

Two Archaeological and Cultural Heritage Protection Plans have been prepared by Australand and a ss87/90 consent and permit (No 2534) has been granted by DECC for the wider Shell Cove Development Area.

The requirements, protocols and guidelines in these plans and consent and permit, and the provisions of both the NP&W and Heritage Acts provide adequate and appropriate protection and conservation/salvage for Aboriginal and non-Aboriginal cultural heritage within the proposed Boat Harbour Precinct.

The Development Consent conditions pertaining to heritage and archaeology are as follows:

- *Aboriginal Relics*
  - *14(a) The Applicant shall protect all portions of the Shellharbour Aboriginal midden site identified as being of relatively high archaeological value in Figure 20 of Appendix 6 of the EIS in accordance with the Archaeological and Heritage Protection Plan prepared in accordance with this consent.*
- *Environmental Management Plans (EMPs)*
  - *15(d) Each of the environmental management plans shall contain the following relevant elements:*
  - *(vi) An Archaeological and Heritage Protection Plan to be prepared by the Applicant in consultation with the local Aboriginal community and NPWS and shall include details relative to:*
    - *maintenance;*
    - *management;*
    - *monitoring; and*
    - *remedial measures.*

The Development Consent, certain pre-development activities and the NP&W Act and consent and permit have been the subject of serial litigation in the NSW Land and Environment Court by opponents to the proposed development. In three judgments, delivered in 2005 and 2007, all claims have been dismissed and the integrity of the consents and permit upheld.

Flora and Fauna

The DGRs call for the following to be addressed:

8.1 Outline potential impacts on aquatic and terrestrial flora and fauna and their habitats (within the meaning of the Threatened Species Conservation Act 1995 and the Fisheries Management Act 1994). Provide measures for their conservation, where relevant;

8.2 Provide predictions of any impacts on aquatic environments on or adjacent to the site, in particular on offshore rocky reef areas and measures for mitigation; and

8.3 Address measures to protect and manage the riparian corridor and adjacent aquatic habitats.

Terrestrial Flora and Fauna

The proposed Boat Harbour Precinct development has been assessed against the Threatened Species Assessment Guidelines (August 2007). The term 'threatened species' refers to species, populations and communities listed as threatened under the NSW Threatened Species Conservation Act (1995) and/or the NSW Fisheries Management Act (1994).

An assessment of the potential impacts has been applied to the identified threatened species and communities within a 5km radius of the study area. Those species that may have areas of habitat within the study area are the:

- Grey-headed Flying-fox.
- Australasian Bittern.
- Painted Snipe.
- Swift Parrot.
- Green and Golden Bell Frog.

The assessment concludes that the proposed development is not likely to have a significant impact upon threatened species, populations or communities. The proposal will not lead to a diminution of the biodiversity values as the loss of highly modified habitats has been compensated for by the completion of a large area of wetland, the Myimbarr Wetlands, and other habitats nearby, along with revegetation and enhancement to the coastal vegetation within the study area. In summary the proposal will maintain and improve biodiversity values. A more detailed discussion of the assessment is included in Appendix H of this report.

- Maintain or Improve Biodiversity Values

A small number of trees will be removed to accommodate the development. It is considered that the removal of these trees will not adversely affect the habitat of the Grey-headed Flying-fox or the Swift Parrot which may be occasional visitors to the area. The Grey-headed Flying-fox may visit some of the trees in summer however most of the existing trees do not provide food for this bat and there is no likelihood of this species camping in the area.

The Swift Parrot has been recorded at Bass Point, mainly in the 1980s. The species may visit the stand of Coast Banksia (*Banksia integrifolia*) near the beach where this tree flowers in winter. The area will not be cleared for the Boat Harbour Precinct development so there is unlikely to be a negative impact on the Swift Parrot. In fact, in the long term, habitat values for both the Grey-headed Flying-fox and the Swift Parrot are likely to be improved as more suitable food trees are likely to be planted in larger numbers than currently available.

The Australasian Bittern occurs in freshwater wetlands and has been recorded at Barrack Swamp, to the north of Shellharbour Village. The species may visit small dams and drains in the vicinity of the Boat Harbour Precinct and the substantial area of fresh wetland which has been constructed at the Myimbarr Wetlands to the immediate north of Shellharbour Village will provide extensive habitat for this species.

The Painted Snipe has been recorded just once in 1986 at the Shellharbour Swamp. It is a rare migratory species that may visit any wetland and the removal of any wetland areas during the course of the development of the Boat Harbour Precinct is unlikely to have a negative impact on this species. The creation of the Myimbarr Wetlands will provide extensive habitat for this species.

The Green and Golden Bell Frog was recorded in the drain along the northern edge of the study area in the 1980s. There have been no subsequent observations despite several targeted surveys in more recent times. The wetlands in the area are infested with the Plague Minnow *Gambusia holbrooki* which renders them less suitable for the Green and Golden Bell Frog.

Although some coastal saltmarsh will be lost in conjunction with the separate boat harbour construction, this has been compensated for by the construction of the Myimbarr Wetlands which includes areas of saltmarsh and will ensure that biodiversity values are not diminished. It is likely that the new areas of saltmarsh and the Myimbarr Wetlands will provide a more diverse environment than existing habitat areas and it is concluded that the long term viability of populations of the Grey-headed Flying-fox, Swift Parrot, Australasian Bittern, Painted Snipe and the Green and Golden Bell Frog will not be reduced, nor will their extinction be accelerated.

- Endangered Populations

  No endangered populations occur within the study area therefore no further assessment of significance is required.

  The development of the Shell Cove Boat Harbour Precinct has been referred to the Federal Department of the Environment, Water, Heritage and the Arts. The department has considered the proposal in respect of the EPBC Act and has decided that the proposed action is not a controlled action. Accordingly assessment and approval is not required by the Federal Minister for the Environment, Heritage and the Arts. (See Appendix 4 of the Flora and Fauna Assessment, Appendix H of this report, for a copy of the referral decision).

Aquatic Flora and Fauna

An assessment of the impact of the Boat Harbour Precinct development on aquatic ecology has been undertaken and is included at Appendix I. The assessment makes the following conclusions in regards to the protection of habitats and biota:

- The avoidance of aquatic impact for the total project within the presently degraded Shellharbour Swamp has been offset by the provision of higher value integrated wetlands at Myimbarr. The impacts on adjacent aquatic habitats have been either avoided by the implementation of strict construction and operation safeguards to prevent water quality degradation, or offset by the provision of additional rocky reef habitat in the form of rock breakwalls. Avoidance of impact on the high conservation value natural intertidal rocky reefs has been achieved by re-designing the original breakwater to avoid any direct loss to construction.
- Consideration of impacts under the EPBC Act and matters of National Environmental Significance have concluded that provided the framework of safeguards already in place for approved works is implemented for the proposed works, there would be no significant impact on threatened aquatic species. This conclusion is confirmed by the Department of the Environment, Water, Heritage and the Arts decision described under ‘Endangered Populations‘ above.

The assessment recommends measures for mitigation, protection and management of the potential impact to aquatic habitats and biota as follows:

- Construction and operation of all proposed works should be undertaken in accordance with environmental safeguards. Table 1 of the Marine Pollution Research report nominates these (see Appendix I).
- All proposed works should be undertaken within a framework of a specific Environmental Management Plan (EMP).
- Any proposed works adjacent to the remaining intertidal rocky reef south of the harbour entrance, should be undertaken within the framework of an EMP which provides the highest levels of construction related protection to ensure that there is no impact from waste or construction water or spill runoff on the adjacent rocky reef. Further, the EMP should ensure that there is no significant increase in trampling or disturbance of the adjacent intertidal rocky reefs arising from construction related activities. This includes potential increased foot traffic by virtue of cordoning off the work areas and concentrating public access onto parts of the reef.
- All proposed works should be included in the overall integrated water quality and waste management strategy in consideration of environmental management of any aquatic impact, including, where appropriate, utilisation of the existing integrated water quality and aquatic ecology monitoring program.
- EMPs for any construction elements with the potential for direct runoff or disturbance to existing natural aquatic habitats (such as those adjacent to the intertidal rocky reef or beach habitats) should consider the need for additional and specific localised monitoring requirements.

It is concluded that provided construction and operation of all proposed works is undertaken with appropriate environmental safeguards there would be no significant impact on threatened aquatic species. In adopting these safeguards the objectives of the DECC/Department of Primary Industry guidelines with regards the protection of aquatic habitats and biota would be met, and the Shell Cove Boat Harbour Precinct can provide a ‘maintain and improve’ outcome for remaining aquatic habitats and biota.

Noise, Odour and Air Quality

The DGRs call for the following to be addressed:

9.1 Address potential noise impacts, in particular noise from the adjacent quarry and road traffic noise, for future residents and appropriate mitigation measures;

9.2 Address odour impact from existing or proposed new sewage system in accordance with DEC's Technical Framework for Assessment and Management of Odour from Stationary Sources in NSW 2006; and

9.3 Address NSW Action for Air and Action for Transport Plans.

Potential Noise Impacts

The Bass Point Quarry is a potential noise source as it operates 24 hours a day and has an expected resource lifetime of 56 years. A private haul road provides access to the quarry and a noise barrier is being built on the northern side of the haul road to protect all residences along the route. The haul road has been the subject of previous acoustic investigations and specific noise goals have been determined. An assessment of air quality and noise has been completed (see Appendix J). That report includes the results of modeling of potential noise impacts, from the adjacent quarry and road traffic, upon residential areas. Noise was predicted using the Cadna A software. This software implements the procedures of International Standard ISO 9613 Acoustics – Attenuation of Sound During Propagation Outdoors.

Noise levels have been predicted for daytime and night time operations. As the quarry operates 24 hours a day the worst case scenario for noise would occur during night time operations when the background noise level is lowest and meterological enhancement of noise propagation is most likely.

In relation to noise impacts, the Wilkinson Murray report concludes that:

- Noise from the haul road to the Bass Point Quarry is predicted to be satisfactory at all residential lots in the Boat Harbour Precinct.
- Noise from the Bass Point Quarry is predicted to exceed the night time noise criterion by up to 4dBA at some of the closest lots during adverse meteorological conditions. This is considered a minor noise impact.
- Noise from the quarry will be satisfactory at the business park precinct and the recreation oval.

Odour Impacts

The existing Shell Cove development is serviced by a network of reticulation mains, trunk gravity mains, and a number of sewage pumping stations (SPSs) and their associated pressure (rising) mains. All sewage collected in the Shell Cove development site is pumped to the existing Shellharbour sewerage network that drains to the Shellharbour Sewerage Treatment Plant (STP) for treatment.

The Shell Cove Boat Harbour Precinct will be serviced by a reticulation system that collects sewage and conveys it to a number of proposed SPSs which will transfer the sewage to the existing SPSs and subsequently to the Shellharbour STP.

Odour in sewerage systems is generally related to the levels of septicity experienced within the system. Odour control measures are therefore designed to reduce septicity and the associated generation of hydrogen sulphide (H_2S) gas, which is the typical cause of odour problems in sewerage systems.

Sydney Water requires the following parameters to be met in the design of SPSs and associated pressure mains:

- H_2S gas concentration to be equal or less than 10 ppm.
- Total dissolved sulphide in sewage to be less than 0.5 mg/L.
- pH of sewage to be above 6.8.

Although the DEC's *Technical framework for Assessment and management of odour form stationary sources in NSW (2006)* is acknowledged, discussions with Sydney Water have confirmed that they operate under an existing licence and any additions to their system need to comply with these licence conditions (see Appendix K).

Air Quality

The key objectives of the NSW Action for Air Plan are:

- Integrate air quality goals and urban transport planning.
- Provide more and better transport choices.
- Make cars, trucks and buses cleaner.
- Promote cleaner business.
- Promote cleaner homes.
- Manage the impact of open burning.
- Monitor, report on and review air quality.

To meet the broad objectives of the Action for Air Plan the following design concepts have been incorporated into the planning and design of the Shell Cove Boat Harbour Precinct:

- The land use pattern within the proposed Boat Harbour Precinct will minimise internal traffic generation thus minimising the impact on air quality.
- Direct pedestrian and vehicle access to the Boat Harbour foreshore will be established.
- Continuous pedestrian access to the Boat Harbour edge will be achieved upon completion of the harbour foreshore works.
- Pedestrian and cycle paths will provide access to key facilities.
- Minimisation of through traffic to Bass Point and the proposed technical park.
- Provision of public transport.
- Provision of direct access to the arterial road network.

Socio-Economic Impacts

The DGRs call for the following to be addressed:

10.1 Address the potential social and economic impacts of the development particularly with regard to any increased need for facilities such as schools, hospitals and community facilities.

Economic Impact Assessment

The potential economic impacts of the proposed development of the Boat Harbour Precinct are discussed in detail in Appendix L of this report. In summary, the Boat Harbour Precinct is expected to generate significant numbers of new jobs in the construction industry, increased visitor expenditure, increased local job opportunities through the provision of a Business Park, and new expenditure and employment in retail, conferencing, restaurants and tourism. The proposed Boat Harbour Precinct will generate an economic impact in Net Present Value (NPV) terms of $1.3 billion over a 20 year period from 2007. That will consist of:

- $959 million in construction and maintenance expenditure.
- $307 million in residential expenditure from residents living within the Boat Harbour Precinct.
- $39 million in tourist expenditure from guests staying at the hotel.

The Boat Harbour Precinct will directly generate 968 full-time equivalent (FTE) jobs consisting of:

- 465 direct jobs over 20 years from the construction of the Boat Harbour Precinct.
- 153 direct ongoing jobs on average over 20 years from maintenance expenditure at the site.
- 306 jobs on average over 20 years will be created from resident expenditure on goods and services.
- 44 jobs from tourist expenditure.

The Boat Harbour Precinct will subsequently generate:

- A total of 1252 jobs will be created from second and third round multiplier expenditure impacts in other industries resulting from the first round of expenditure flowing from construction, residents and visitors to the resort. These jobs will be created in industries supplying the construction, retail and hospitality sector.
- Supported employment will account for 1249 jobs, based on the floorspace which will be supplied in retail, commercial and business park development.

The breakdown of employment on a direct and indirect basis and the expenditure impact of construction and visitor activity is provided in Table 4.03.

Direct Employment	
Construction Employment (pa)	465
On-going Maintenance Employment (pa)	153
Resident Generated Employment (pa)	306
Visitor Generated Employment (pa)	44
Total	968
Indirect Employment	
First Round Effect	291
Industrial Support Effect	209
Consumption Induced Effect	752
Total	1,252
Supported Employment	1,249
Total Employment	**3,469**

Table 4.03 - Direct/Indirect Employment Breakdown

Source: Appendix L, pp 17

The Shell Cove Boat Harbour Precinct represents a major investment in local and regional areas. The benefits include:

- A major ongoing construction program across a number of different residential and commercial products supporting spending and employment multipliers throughout the region.
- The offer of a wide range of residential dwellings not typically available in the area.
- The provision of local jobs in retailing, hospitality and the commercial sector, which, combined with the provision of commercial/recreational activities for residents, encourages sustainable private commuting behaviour.

The Shell Cove Boat Harbour Precinct will contribute to the establishment of a sustainable regional economy within the City of Shellharbour through new expenditure from residents and tourists, and will further develop a focus for tourism within the region. The provision of a hotel with conference facilities as well as the golf course development is likely to attract delegates and businesses looking for a unique experience in an attractive recreational location.

Social Impact Assessment

The Social Impact Assessment undertaken in relation to the Boat Harbour Precinct is included at Appendix M of this report. The key finding of the study is that due to the relatively small residential component of the Boat Harbour Precinct there will be limited community infrastructure requirements. However these infrastructure requirements are already being addressed through planned infrastructure in the masterplan, or surrounding community infrastructure within a 10km catchment radius.

The catchment and surrounding area have been found to be very similar to regional NSW in most socio-economic and demographic indicators. As of the 2006 Census the population of Shell Cove and the greater Shellharbour LGA area was characterised by:

- Household sizes which are slightly below state averages.
- Household incomes which are approximately 10% lower than the state average.
- Age distribution which is generally in line with regional averages with the exception of the 5-15 year age group which is above the state average.
- Owner/purchaser households represent a slightly higher proportion of households than those same households in both the 10km catchment and Shellharbour LGA.
- A distribution of family types broadly in line with state proportions. The proportion of couples with children was slightly higher in the 10km catchment and in the Shellharbour LGA than the state average.
- The 10km catchment and Shellharbour LGA both have a high proportion of low density dwellings.
- The proportion of residents born overseas is slightly higher than the state regional average.

Consultation

The DGRs require that an appropriate and justified level of consultation be undertaken with the following agencies during the preparation of the environmental assessment:

Agencies or other authorities:

- *Commonwealth Department of Environment and Water Resources*
- *Shellharbour City Council*
- *Department of Environment and Climate Change*
- *Department of Primary Industries*
- *Department of Natural Resources*
- *Roads and Traffic Authority*
- *NSW Police*
- *NSW Department of Education and Training*
- *NSW Department of Health*
- *Department of Planning Regional Office, Wollongong*
- *Local Aboriginal Land Council/s and other Aboriginal community groups*

Public:

Document all community consultation undertaken to date or discuss the proposed strategy for undertaking community consultation. This should include any contingencies for addressing any issues arising from the community consultation and an effective communications strategy.

The consultation process and the issues raised should be described in the Environmental Assessment.

Agencies or Other Authorities

Consultation with the listed agencies and authorities has occurred during the studies undertaken in support of this Concept Plan Application as outlined in Table 4.04.

The details and extent of consultation can be found in the specialist consultant reports included as Appendices to this report.

The Proponent has also undertaken consultation with relevant agencies and authorities during the course of the project.

Agency/Authority	Consultant
Commonwealth Department of Environment and Water Resources	WorleyParsons (Appendix B)
Shellharbour City Council	Maunsell (Appendix A) WorleyParsons (Appendix F) National Heritage Consultants (Appendix G) Kevin Mills & Associates (Appendix H) Marine Pollution Research (Appendix I) MacroPlan (Appendix L and M)
Department of Environment and Climate Change	WorleyParsons (Appendix F) National Heritage Consultants (Appendix G) Kevin Mills & Associates (Appendix H) Wilkinson Murray (Appendix J)
Department of Primary Industries	Kevin Mills & Associates (Appendix H) Marine Pollution Research (Appendix I)
Department of Natural Resources	WorleyParsons (Appendix F) MacroPlan (Appendix M)
Roads and Traffic Authority	Maunsell (Appendix A)
NSW Police	MacroPlan (Appendix M)
NSW Department of Education and Training	MacroPlan (Appendix M)
Department of Planning Regional Office, Wollongong	MacroPlan (Appendix M)
Local Aboriginal Land Council/s and other Aboriginal community groups	National Heritage Consultants, and other consultant archaeologists (Appendix G)
Sydney Water	GHD (Appendix K)
NSW Rural Fire Service	BES (Appendix E)

Table 4.04 - Consultation with Agencies or Other Authorities

Public

Public consultation has been ongoing throughout the various project stages and has included community information days, design workshops, resident group meetings, presentations to open Council meetings and informal discussions.

In particular, community information days, where conceptual details of the proposal were on display and attendees were asked to fill in a feedback form, generated positive responses.

Attendees were asked for their overall opinion and most and least liked aspects of the proposal, and in particular their view of the scale of development, the boat harbour marina and transport and access. The proposal was generally liked with pedestrian access to the waterside and provision of a boardwalk being the most liked aspects. The height of buildings was the least liked aspect however when asked attendees qualified their responses by noting a preference for a maximum of 3 storeys. The Shell Cove Boat Harbour Precinct adopts heights in the order of 3 to 4 storeys (except for the landmark hotel) which is consistent with both the NSW Coastal Design Guidelines and public preference.

Project communication, documenting current and future proposals and/or development, was also considered important. Subsequently, the Proponent has sought to provide the public with up to date information.