



Environmental Impact Statement

Georges Cove Marina, Moorebank

Volume 1 – Main report

Prepared for Benedict Industries Pty Ltd
July 2015



EMM
EMGA Mitchell McLennan

ENVIRONMENTAL IMPACT ASSESSMENT CERTIFICATION

for submission of an environmental impact statement (EIS) under Section 78A(8) of the NSW *Environmental Planning and Assessment Act 1979*

EIS prepared by

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Applicant

Benedict Industries Pty Limited

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Proposed development

Development and operation of the Georges Cove Marina, Moorebank

Refer to Chapter 2 of the EIS for a detailed description of the proposed development

Land to be developed

Lot 7 DP 1065574, 146 Newbridge Road, Moorebank

Certification

In relation to this EIS, we certify that:

- It has been prepared in accordance with Schedule 2, Clauses 6 and 7 of the NSW Environmental Planning and Assessment Regulation 2000
- It has been prepared with all available information that is relevant to the environmental assessment of the development to which this EIS relates
- The information contained in the EIS is neither false nor misleading



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Georges Cove Marina

Environmental Impact Statement

Prepared for Benedict Industries Pty Ltd | 30 July 2015

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Georges Cove Marina

Final

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Approved by **Dr Philip Towler**

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Signature



Date 30 July 2015

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Executive Summary

ES1 Introduction

ES1.1 Overview

Benedict Industries Pty Ltd (Benedict Industries) proposes to construct and operate a marina and related facilities on the southern portion of Lot 7 DP 1065574 (146 Newbridge Road, Moorebank, referred to in this report as the “marina site”) in the Liverpool City Council Local Government Area (LGA). The proposed development will utilise about 13 ha of Lot 7 (22 ha) that adjoins the Georges River. The overall site (ie Lot 7) has been used for sand extraction, dredging and recycling operations.

The proposed development will utilise an existing sand extraction dredge pond (approximately 6 ha) as the basis for forming the final marina basin. This will largely remove the need to import fill to restore the landform following the closure of the quarry as is permitted by the existing quarry planning approval.

The architect-designed marina redevelopment (see Figure E.1) will provide an alternative means to implement the final restoration of the extractive industry activity on the marina site. It is an innovative proposal which is sensitive to the high value riverine locality and will provide valuable community recreational infrastructure which will reconnect the community with the river foreshore.



Figure E.1 View of proposed Maritime Building and wet berths from the marina basin (computer generated photomontage)

Development consent is required for the proposed development under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) pursuant to the provisions of the Liverpool Local Environmental Plan (LEP) 2008, other relevant environmental planning instruments, and the Liverpool Development Control Plan (DCP) 2008. The proposal is classified as designated development and integrated development under the EP&A Act. Liverpool City Council is the consent authority and the Sydney West Joint Regional Planning Panel (JRPP) is the determining authority. Secretary's Environmental Assessment Requirements (SEAR 912) were issued for the project on 19 March 2015.

This environmental impact statement (EIS) has been prepared in accordance with the SEARs, Clauses 71 and 72 of the EP&A Regulation and advice provided by the Council and other stakeholders. It describes the existing environment, the proposal, the legislative and policy context, proposed environmental management measures and the impacts of the project.

The proponent, Benedict Industries, is acting for the owner, Tanlane Pty Ltd.

ES1.2 Previous Georges Cove Marina development application

A previous application for the proposed Georges Cove Marina by Benedict Industries (acting for the owner, Tanlane Pty Ltd) was made to Liverpool City Council (DA-846/2012). Consent for the Georges Cove Marina was granted to Tanlane Pty Ltd by the Sydney West JRPP on 22 August 2014 (JRPP Reference Number 2012SYW035).

The validity of the consent was challenged by the proposal's sole objector, Moorebank Recyclers, in the NSW Land and Environment Court. In 18 March 2015, the court ruled in favour of the objector, declaring that the Consent was invalid because the application did not include a contamination preliminary investigation. The judge ruled that Tanlane could commission a preliminary investigation, reapply for a consent and supply the investigation to the JRPP as part of the application.

As a result, Benedict Industries is re-applying for consent for the proposed marina. The proposal is unchanged from that approved by the JRPP on 22 August 2014 and includes a Preliminary Investigation of Contamination.

ES2 Proposal overview

The proposed development includes the construction and operation of the following main elements:

1. the Maritime Building (see Figure E.1) located near the western boundary of the marina site. This structure will house:
 - a dry berth facility providing 250 berths for small craft;
 - a function centre;
 - tourist, entertainment and recreational and club facilities; and
 - a petrol tank (about 60,000 L) and a diesel tank (about 60,000 L).
2. a wet berth facility for 186 small craft (including casual berths) which will consist of:
 - a marina basin;

- rock protection of the basin and foreshore including embellishment and revegetation of the river foreshore;
 - construction of public recreational facilities on the foreshore including bike paths, barbeque facilities and shelters;
 - floating berths and walkways;
 - fuel pumping facilities;
 - sewage pumpout facilities; and
 - emergency berth access.
3. three external carparking areas and basement carparking providing a total of 637 car spaces;
 4. a Private Marina Clubhouse (see Figure E.2) on the northern portion of the RE2 (private recreation) zoned land; and
 5. support infrastructure - power, water and sewerage.



Figure E.2 View of proposed Maritime Building and Private Marina Clubhouse from eastern bank of Georges River (computer generated photo montage)

It is proposed that operation of the marina berthing facilities occurs from 7.00 am to 10.00 pm seven days a week and that the Private Marina clubhouse, Marina Function Centre and associated venues operate from 7 am to 12 midnight, as previously approved by the JRPP.

ES3 Statutory framework

An overview of the statutory framework relevant to the proposal including State and Commonwealth legislation, and State, regional and local plans, policies and guidelines is provided.

ES4 Consultation

An overview of stakeholder engagement for the proposal, a description of the engagement activities undertaken, and a description of proposed ongoing consultation is provided.

Consultation was undertaken during the preparation and assessment of the original EIS submitted in 2012. The previous development application and EIS were placed on public exhibition on three separate occasions. Each exhibition period observed a minimum 30 day public exhibition period in accordance with the Environmental Planning and Assessment Regulation 2000 and the DCP. A total of six separate submissions were received. Four expressed support for the proposal; and two submissions from Moorebank Recyclers raised specific objection to vehicular access arrangements.

Further consultation was undertaken in 2015 during the preparation of this updated EIS. The following stakeholders were consulted regarding the preparation the 2012 EIS and this EIS: Environmental Protection Authority (EPA), Office of Environment and Heritage (OEH), Department of Primary Industries (DPI), NSW Office of Water (NOW), Roads and Maritime Services (RMS), Liverpool City Council, community groups and neighbours. Planned ongoing consultation is described.

ES5 Hazards

The air, noise, and water emissions from the proposal have been assessed to determine if it is classified as a potentially offensive industry under State Environmental Planning Policy No 33 – Hazardous and Offensive Development. It was determined that the proposal will not result in unacceptable levels of pollution that will impact the amenity of the area and is not a potentially offensive industry.

This EIS considers a range of potential hazards and describes proposed safeguards including for: fuel storage and dispensing; fire prevention and response; chemical storage; prevention of personal accidents; prevention of collisions; management of sewage, grey water or oil spills; and management of waste.

ES6 Impact assessment

ES6.1 Water

The impacts on sediment transport, tidal flow, water levels, water quality and flooding for the marina site were assessed.

The results of the flood modelling were used to conclude that:

- in a 20 year average return interval (ARI) flood, the impact of the planned development on flood hazard will be negligible except on the western side of the marina site where the proposed development will increase the ground level eliminating the flood hazard;

- in a 100 year ARI flood, the impact of the planned development on flood hazard will be negligible; and
- the proposed development will have a negligible impact on the behaviour of flooding in the flood storage area in the south-west of the marina site and nil or negligible impacts on other adjacent properties.

Comprehensive modelling of tidal hydrodynamics indicated that tidal exchange in the marina basin will be high due to the relatively wide entrance to the Georges River. Water flow velocities are predicted to be low. Banks can and will be designed to withstand waves generated by boats, this will include the installation of rock armouring. This will improve the aquatic environment.

The assessment of water quality found that with the implementation of the proposed environmental management measures, the proposed marina will not degrade water quality of the Georges River through discharges of copper from antifouling paints or from uncontrolled discharge of sewage. The potential impact of elevated ammonia concentrations in groundwater is summarised in Section ES6.3.

Modelling of sedimentation rates found that the required basin depth will be increased by 300 mm during quarry operations so maintenance dredging will not be required within the marina basin.

ES6.2 Soils

Nine testpits were excavated as part of the *Preliminary Investigation of Contamination*. The soil excavated from each testpit typically comprised fill overlying brown to light grey, moderate plasticity clay and dark sandy loam. The presence of anthropogenic fill is consistent with historic land filling practices on the marina site.

The project area has been identified on the Liverpool LEP (2008) acid sulfate soils map, and reference to the Atlas of ASS indicates there is a high probability for ASS to occur. Excavation of the channel between the dredge pond and the Georges River will require the removal of the existing soils. These are likely to be acid sulfate soils and will be tested and managed appropriately based on the acid sulfate soils management plan (Appendix K).

ES6.3 Contamination

The *Preliminary Investigation of Contamination* did not identify contamination issues that are considered to present an unacceptable risk to human and/or environmental health in the context of the proposed future land use. Recent sampling did not identify any exceedances of the NEPM (2013) human health based guideline values. A small number of exceedances of ecological assessment criteria were identified, that were either considered to be irrelevant, or present a low and acceptable risk, in the context of the proposed future land use.

The elevated ammonia concentrations in the groundwater and dredge pond are not considered to represent a risk to human health at the proposed marina development based on the lack of health-based assessment criteria for ammonia in water, and the limited exposure scenarios associated with the proposed future land use (ie ingestion of groundwater and pond water is unlikely in the context of a commercial marina). It is proposed to implement all of the recommendations of the Preliminary Investigation.

The marina site is suitable for the proposed future land use (the marina development) or will be suitable for this use with minor remediation that may be the outcome of the recommended investigations.

ES6.4 Ecology

No significant impacts to threatened species, populations and communities are anticipated from the construction and operation of the marina. Overall, while the proposal will require the removal and modification of small areas of terrestrial habitat, it will result in an overall improvement in the quality and amount of available habitat within the marina site.

The marina can be constructed and operated without any significant impact on river water quality. There may be some impacts from the construction of the marina to aquatic ecosystems and species, particularly from opening the marina basin to the river. However, the proposal will result in an overall increase in the area and diversity of aquatic habitat in the locality. Management measures will include marina design features to maintain and improve water quality, avoiding direct loss of existing seagrass and mangrove areas, staging of the marina entrance construction and provision of natural, or near-natural, intertidal to riparian zone habitats that support local native vegetation and linking of these habitats.

ES6.5 Traffic and parking

There will be 637 car parking spaces at the marina site. This parking will be a combination of 267 surface level car parking spaces located in parking areas A, B and C and 370 undercover car parking spaces located in two basement car park levels within the Maritime Building. This will be approximately 20% higher than the amount of car parking which was considered to be necessary (530) spaces in the formal assessment of the required car parking supply for the previously approved marina development. The detailed design of the car parks will consider the accessible car parking requirements of AS 2890.1.

The proposed development will increase traffic volumes by about 1% on Newbridge Road, Governor Macquarie Drive and the section of Brickmakers Drive south of the link road intersection. It will increase traffic volume by about 9.3% on the 300 m section of Brickmakers Drive north of the link road intersection. However, the traffic increases will remain well within the typical daily traffic capacity for Brickmakers Drive as a continuous two lane road. Brickmakers Drive will not require additional traffic calming or other traffic management measures.

The intersection of the site access link road and Brickmakers Drive will be in accordance with the design approved by the NSW Land and Environment Court (NSW LEC 30141, 2013). It is proposed that traffic signals will be installed during construction of the intersection. While these are not required for the Georges Cove Marina, the intersection is likely to require traffic signals in the longer term due to background traffic growth on Brickmakers Drive and future developments, such as the Mirvac Georges Cove residential development and a potential materials recycling facility that would use the link road. Installing these signals during the initial intersection construction will provide greater certainty regarding the adequacy of the intersection to cater for traffic from future developments and will be less disruptive than installing signals at a later date when the link road is opened to traffic. The intersection will operate at Level of Service A for the busiest times — the morning peak hour, afternoon peak hours and Friday and Saturday late evening peaks — including with the potential cumulative traffic from the proposed and planned developments.

Cyclists and pedestrians will be able to use the proposed link road pedestrian/cycle path and the riverfront pedestrian/cycle path. These paths will be 2.5 m or 3.0 m wide and will meet the DCP design width standard to permit use by both pedestrians and cyclists to access the marina, recreational areas and the foreshore.

There is appropriate public transport access available to and from the development for the future employees, customers and other visitors.

ES6.6 Visual

The visual assessment concluded that the overall visibility of the structures and activities on the project area would be minimal. Mitigation of these minor impacts will include screen planting using appropriate tree species on the eastern boundary of the marina site adjacent to the river, as part of foreshore embellishment, and the use of appropriate colours and materials for the Maritime Building and Private Marina Clubhouse.

Overall, the proposed development will result in an improvement to the vista when viewed from the river. In this regard, it is considered that the development would have a positive effect on the visual qualities compared to the site's current use. The Maritime Building will be partly visible over the trees on the boundary between the Georges Fair residential estate and the proposed development. However, the two-storey residential development on the Georges Fair residential estate minimises potential views and confines them to the fringe along a short section of Brickmakers Drive. The visual impacts of the proposed development will be low to moderate.

ES6.7 Noise

Operational noise levels are predicted to satisfy Project Specific Noise Levels, determined according to the *Industrial Noise Policy*, on the at all assessment locations during calm and worst case meteorological conditions. For the closest residences in the future George Cove residential development, it is anticipated that appropriate noise controls, such as distance buffers and acoustic screening, will be incorporated in the design of the development to provide appropriate noise amenity for occupants. Notwithstanding, the noise levels at George Cove generally include boat movements. Given the riverside locality and position near the subject site, and that boat movements will be generally short-term in nature, it is anticipated that such noise activity would be largely accepted to a degree by residents. People looking to buy the dwellings adjacent to the marina will be well aware of the Georges Cove Marina development (and associated noise). Those who go on to buy one of these dwellings are expected to see being 'close to the action' as a positive attribute of the location.

Maximum noise level events during the night-time period are predicted to satisfy the EPA sleep disturbance criteria at all assessment locations during calm and worst case meteorological conditions.

Music and patron noise is predicted to satisfy the Office of Liquor, Gaming and Racing criteria in most octave band centre frequencies at all assessment locations during calm and worst case meteorological conditions. Music noise from function centres has been predicted to generate exceedances at 31.5 and 63 Hz octave band centre frequencies. This can be mitigated by fitting a noise limiter on public address systems or increasing the glazing thickness to function rooms, or a combination of both. Noise control strategies will be finalised in the project design phase. Patron noise levels at the closest George Cove residences are predicted to exceed the OLGR criteria in the 125 Hz octave band centre frequency and above. This can be mitigated by the installation of partial acoustic screens at some outdoor patron areas to reduce worst-case patron noise levels. A noise management plan will be prepared and implemented that will detail strategies to control patron noise, especially during the night-time period.

Construction noise levels are predicted to satisfy the *Interim Construction Noise Guideline* (ICNG) highly affected noise management levels (NML) at all residential assessment locations. Construction noise levels above the NMLs have been predicted at most assessment locations, predominantly during site preparation earthworks and road construction. Construction noise will be proactively managed, especially when construction equipment is operating relatively close to surrounding receivers. This will primarily be achieved by limiting construction to ICNG standard construction hours. Further management and mitigation measures will be detailed in a construction noise management plan.

ES6.8 Air quality

The air quality assessment found that airborne emissions (particulates, odour and toxic substances) from the proposed operation will comply with NSW guidelines to prevent amenity and health impacts.

ES6.9 Heritage

No Aboriginal archaeological sites were identified in the project area during background research, database searches or a site survey. Due to past land use disturbances and major sub-surface destruction on the marina site, it was concluded that there is little to no potential for buried deposits.

A non-Aboriginal heritage assessment including historical research, database searches and a field survey found that marina site has been extensively disturbed by previous operations. No historic items or areas of archaeological potential were identified in the marina site.

ES6.10 Recreational boating

Use of Georges River for recreational boating and the potential impacts of boats stored at the proposed marina on river navigation were assessed.

The physical development of the marina will have very little impact on river navigation as the entire development will be on land owned by Benedict and will be outside of the Georges River channel. No structures of any kind will be erected in the river channel. The marina will improve river access and foreshore accessibility.

The scheduling of departures and retrievals during peak periods, along with the operation of a marina tender/retrieval vessel, will ensure that there will be no adverse impacts on the existing recreational boating community.

ES6.11 Site accessibility

The proposed development will provide a recreational precinct of high scenic and recreational value within easy walking distance of about 1,200 current and future households in the Georges Fair development and the planned Mirvac Georges Cove residential development on the northern portion of Lot 7. Currently, no river or recreational access is possible or available due to the extractive and recycling operations that occur on Lot 7. Hence, the development will provide an essential quality recreational precinct for adjoining residential developments and the region. It will include a high level of disabled access to the Maritime Building, Private Marina Clubhouse, wet marina and surrounding recreational areas, including to the river foreshore.

ES6.12 Economic impacts

The development will have minor positive impacts on regional economic activity and the local impacts will provide a significant economic boost and underpin a vibrant and attractive river foreshore precinct for the community.

It is expected that the development will employ about 45 people in about 12 full-time positions and 33 part-time/casual positions. As business patronage grows, additional staff will be required. There is ample on-site parking to accommodate additional staff.

The replacement of the existing extractive and recycling industry and removal of heavy vehicle movements alone from the precinct will result in greatly improved local amenity for adjoining residential lands. Given that these industries will be replaced with a recreational precinct designed to reconnect the community with the river foreshore, it is expected that the development will have a significant positive impact on adjoining land values.

ES7 Statement of commitments

The JRPP issued development consent (subject to conditions) for the Georges Cove Marina to Tanlane Pty Ltd on 22 August 2014. It is proposed to construct and operate the marina development, if approved, generally in accordance with these previous conditions as modified by the consent authority.

An environmental management plan (EMP) will be prepared during the detailed design of the marina based on project approval conditions. The EMP will be prepared prior to commencement of the development to ensure that the commitments in this EIS and Project Approval conditions are fully implemented.

The key commitments described in this EIS are summarised in Table E.1.

Table E.1 Key commitments

No.	Commitment	Reference
Water		
1	Floor levels of the building and marina facilities have been determined using the 100 year ARI flood levels produced in the Georges River Flood Study (adopted by Liverpool City Council) and will incorporate the appropriate freeboard.	
2	Water quality in the dredge basin will be tested during construction prior to breaking through the banks to the river. The bank will only be opened if the water quality in the basin is similar to, or better than, that in the Georges River.	
3	Water sensitive urban design elements will be incorporated into the design (including the provision of wetlands) to provide stormwater treatment to reduce nitrogen, phosphorus, total suspended solids and heavy metals concentrations.	
4	Bilge and sewage pump-out facilities will be provided in the marina and discharge of sewage from boats using the marina will be prohibited.	
5	Bank stabilisation will be undertaken as part of the development.	
Soils		
6	The acid sulfate soils management plan (Appendix K) will be implemented.	
Contamination		
7	The recommendations of the Preliminary Investigation of Contamination (Appendix C) will be implemented.	
Ecology		
8	The foreshore vegetation will be embellished and a vegetation management plan will be prepared and implemented.	
9	The marina basin will be constructed in a manner that ensures that it is regularly flushed, that sediment accumulation is minimised, and that the entrance channel location avoids direct loss of existing seagrass patches or mangrove trees.	
10	Natural, or near-natural, intertidal to riparian zone habitats will be provided that support local native vegetation and link these habitats.	

Table E.1 **Key commitments**

No.	Commitment	Reference
Noise		
11	A 2 m high acoustic barrier will be constructed to the west of the marina clubhouse carpark.	
12	Partial acoustic screening (eg louvres) will be installed on the north balconies of the Private Marina Clubhouse and Maritime Building.	
13	Music noise from the function centres will be managed and/or mitigated to limit low frequency noise in 31.5 and 63 Hz octave band centre frequencies.	
Recreational boating		
14	The scheduling of departures and retrievals during peak periods, along with the operation of a marina tender/retrieval vessel, will ensure that there will be no adverse impacts on the existing recreational boating community.	

ES7.1 Conclusion and justification

The proposed development will greatly improve the existing visual amenity of the local area by facilitating the cessation of quarrying and recycling activities and by the removal of associated infrastructure which is rapidly becoming an incompatible land use given the development of adjoining residential precincts. In particular, the proposed development will provide recreational facilities for the neighbouring Georges Fair residential estate and the planned Mirvac Georges Cove residential estate residential precinct earmarked for the northern portion of Lot 7.

The proposed development has the following objectives:

1. to embellish and stabilise the foreshore and former quarry dredge site in accordance with the objectives of the RE1 (public recreation) and RE2 (private recreation) zones which are set out in the LEP as follows:
 - a) to enable land to be used for public open space or recreational purposes (RE1 and RE2);
 - b) to provide a range of recreational settings and activities and compatible land uses (RE1 and RE2);
 - c) to protect and enhance the natural environment for recreational purposes (RE1 and RE2);
 - d) to provide sufficient and equitable distribution of public open space to meet the needs of residents (RE1 only);
 - e) to ensure the suitable preservation and maintenance of environmentally significant or environmentally sensitive land (RE1 only); and
 - f) to enable land uses that are compatible with, and complimentary to, recreational uses (RE2 only).
2. to develop recreational facilities to cater for the population in the western part of Sydney as well as people moving into the area with the development of the Georges Fair and future Georges Cove residential precincts;
3. to provide recreational and ancillary facilities for the growing population of boat owners and users in the western part of Sydney;

4. to address the demand for wet (floating) berths and dry berths;
5. to provide a range of public benefits including:
 - a) a land/water interface for the local community to enjoy the Georges River;
 - b) casual public berths for boats and water taxis to pick-up and drop-off passengers, and to access the marina facilities, including a function centre, kiosk, commercial, tourist and club facilities;
 - c) public access to fuel and sewage pumpout facilities which are currently unavailable in the upper reaches of the Georges River; and
 - d) access to recreational facilities for persons with disabilities.
6. to provide temporary emergency berth access for Marine Area Command (Water Police), NSW Maritime (RMS), medical evacuation and other emergency services; and
7. to improve the amenity and environmental quality in the upper reaches of the Georges River. In particular, the reconnection of the community with the Georges River foreshore.

The RE1 zoned lands, once rock protected and regenerated, are to be dedicated to the Council and held in public ownership in perpetuity in accordance with the voluntary planning agreement already executed with Liverpool City Council. The proposed development will accelerate this process.

Having regard to the overall environmental impacts determined as part of this EIS, the proposed redevelopment is not considered likely to give rise to any significant adverse cumulative impacts on the environment. The assessment has demonstrated that any environmental impacts during construction or operation of the marina can be mitigated through normal operating procedures.

Overall, the proposed Georges Cove Marina will have biophysical, social and economic benefits. The development satisfies the four principles of ecologically sustainable development.

It is therefore recommended that the proposed Georges Cove Marina, is approved subject to the mitigation measures outlined in this EIS.

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1 Introduction

1.1 Proposal overview

Benedict Industries Pty Ltd (Benedict) proposes to construct and operate a marina and related facilities on the southern portion of Lot 7 DP 1065574 (146 Newbridge Road, Moorebank, referred to in this report as the “marina site”) in the Liverpool City Council Local Government Area (LGA) (Figure 1.1). The proposed development will utilise about 13 ha of Lot 7 (22 ha) that adjoins the Georges River (Figure 1.2). The overall site (ie Lot 7) has been used for sand extraction, dredging and recycling operations. These have been undertaken by entities controlled by Benedict in accordance with all relevant regulatory requirements including planning consents, environmental protection licences and other permits.

The proposed development will utilise an existing sand extraction dredge pond (approximately 6 ha) as the basis for forming the final marina basin. This will largely remove the need to import fill to restore the landform following the closure of the quarry as is permitted by the existing quarry planning approval.

The architect-designed marina redevelopment will provide an alternative means to implement the final restoration of the extractive industry activity on the marina site. It is an innovative proposal which is sensitive to the high value riverine locality and will provide valuable community recreational infrastructure which will reconnect the community with the river foreshore.

There has been wide public support for the proposed development with only one objector, Moorebank Recyclers Pty Ltd. Moorebank Recyclers is applying to develop a recycling facility immediately south of the proposed marina site (State Significant Development application number MP 05_0157). It is understood that Moorebank Recyclers believe that the development of the marina and associated public access to the bank of the Georges River will result in stricter environmental controls being required, decrease the likelihood of the recycling facility being approved, and, if approved, will increase the cost of complying with environmental criteria to protect the amenity of the area.

Following the gazettal of the Liverpool Local Environmental Plan (LEP) 2008 on 28 August 2008, Lot 7 was rezoned from Rural 1(a) to a combination of Medium Density Residential (R3), Private Recreation (RE1), Public Recreation (RE2) and Business Enterprise (B6) (Figure 1.3). The development of a marina and related recreational facilities is expressly permitted with consent within these zones.

Development consent is required for the proposed development under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) pursuant to the provisions of the Liverpool LEP 2008, other relevant environmental planning instruments (EPIs), and Liverpool Development Control Plan (DCP) 2008. The proposal is classified as designated development and integrated development under the EP&A Act. Liverpool City Council is the consent authority and the Sydney West Joint Regional Planning Panel (JRPP) is the determining authority.

The proponent, Benedict Industries, is acting for the owner, Tanlane Pty Ltd.

1.2 Subject site

1.2.1 Topography

The marina site is in a generally flat landscape typical of the Georges River floodplain. Currently, the marina site is largely made up of a dredge pond created by extractive industry operations (see Section 1.3). The surface level of the marina site was 2.8 m before extractive industry operations started. Surveying records indicate that the marina site sloped gently from the riverbank (approximately 2 m Australian height datum (AHD)) to approximately 4 m AHD along the western boundary of the marina site.

1.2.2 Access

Existing vehicular access to the recycling facility site (Lot 7) is currently from Newbridge Road. This access will eventually be decommissioned and vehicular access to the marina development will only be permitted via an approved link road connecting to Brickmakers Drive which joins Newbridge Road.

1.2.3 Surrounding land uses

A Mirvac residential estate (the Georges Cove residential estate) is planned on the northern portion of Lot 7 DP 1065574. Newbridge Road (a six lane Roads and Maritime Service (RMS) Class 1 Road) is adjacent to the northern boundary of the lot. There is an industrial area north of Newbridge Road.

The marina site is adjacent to the Georges River to the east. There is expansive recreational open space within the Bankstown LGA to the east of the Georges River. This area is characterised by open grasslands with some rural sheds, outbuildings and three to four residential dwellings.

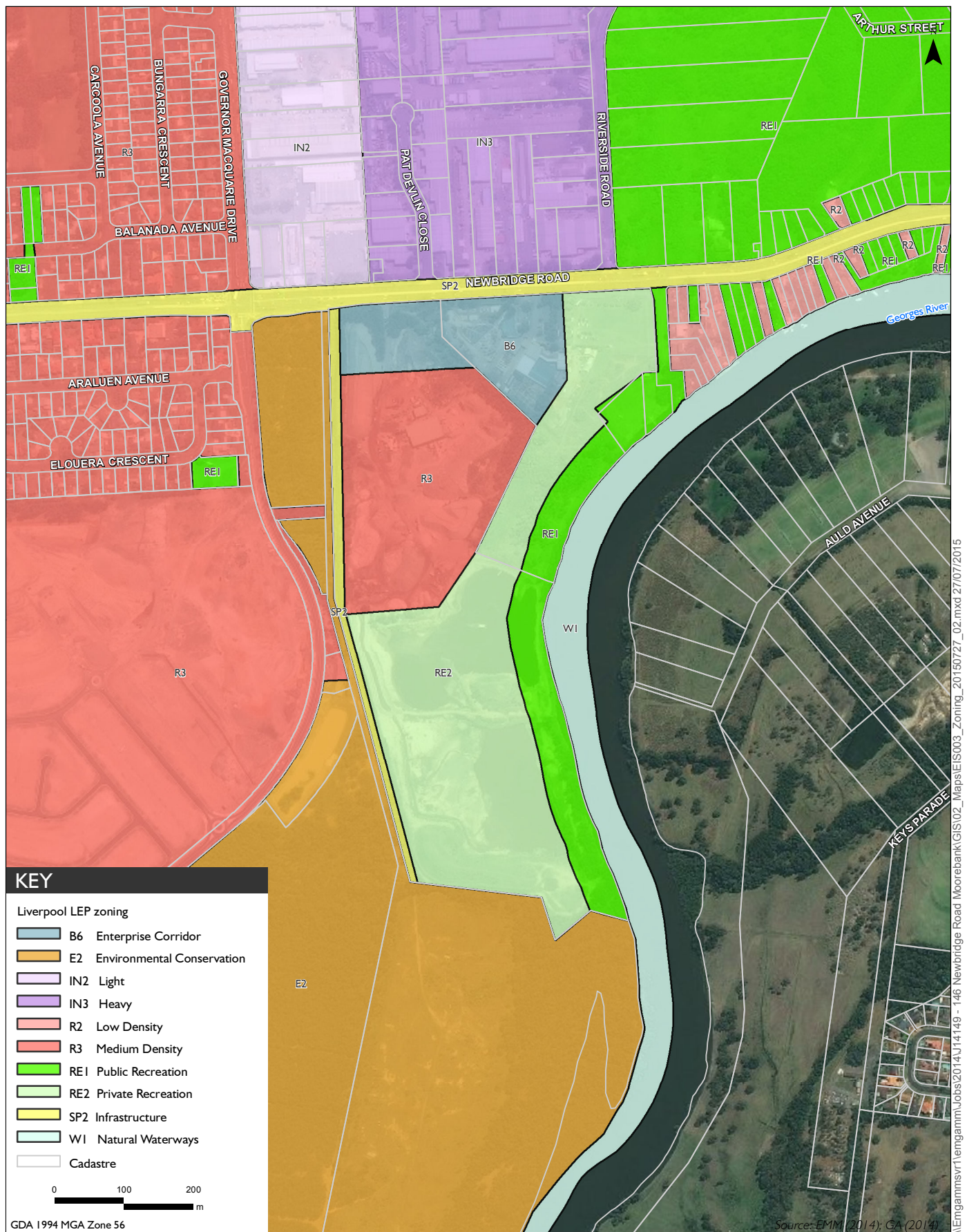
The Georges Fair residential estate (960 houses which are close to completed) is to the west of the marina site.

The land directly to the south of the marina site is zoned Environmental (E2). A materials recycling facility is proposed to be developed by Moorebank Recyclers in this area. Further to the south there is a golf course and other recreational facilities.





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Site zoning
 Georges Cove Marina
 Environmental Impact Statement
 Figure I.3

1.3 Currently approved site activities

In 1993, the Land and Environment Court granted consent for the extraction of sand from the overall site (Lot 7) via dredging and dry extraction methods.

The consent for the sand extraction was granted by the New South Wales (NSW) Land and Environment Court in *Maron Investments Pty Limited v Liverpool City Council* [1993] NSWLEC25 on 31 March 1993. The approval requires the rehabilitation of the site (Lot 7) on cessation of extractive industries with the importation and processing of waste materials permitted to fill empty cells and return these areas to their natural landform.

The extractive industries on the site are reaching the end of their economic life. It is expected that final extraction operations will be completed within six months. The quarry consent and Environmental Protection Licences permit the restoration of the site back to natural surface levels via the importation of waste materials. Approval of the marina proposal will remove this need.

Final restoration of the site has not yet commenced and the dredge ponds created from the sand extraction operations remain. However, the final years of dredge operations have anticipated the development of the marina and current configuration of the dredge pond closely meets the requirements of the proposed marina basin.

Development of the marina requires the use of the dredge basin which would be largely unfilled. This will greatly reduce the quantity of virgin excavated natural material (VENM) that would be needed to restore the site back to natural surface levels. However, some VENM and rocks (but no other waste materials) will still be imported to assist with shaping the marina basin, restoring landforms and for bank armouring.

1.4 Other associated approvals

The following approvals are associated with the planned activities.

The alignment (Figure 1.4), design, construction and use of the link road have been approved by Liverpool City Council (DA-61/2014 and DA 1552/2006/B).

DA-1552/2006 was approved by Liverpool City Council on 24 April 2007 for the construction of a road bridge connecting the marina site to Council land. The consent did not involve connection to Brickmakers Drive. The road bridge required an easement to enable a right of carriageway over an existing portion of an access handle adjacent to Lot 7.

DA-1552/2006 was subject to Class 4 legal proceedings in the NSW Land and Environment Court. The judgment in *Moorebank Recyclers Pty Ltd v Liverpool City Council* [2009] NSWLEC 100 concluded that the consent was valid. The matter was appealed in the NSW Court of Appeal with judgment made in *Tanlane Pty Ltd v Moorebank Recyclers Pty Ltd* [2008] NSWSC 1341 which was dismissed. Subsequent legal proceedings in the Supreme Court sought to grant an easement over Moorebank Recycler's land pursuant to Section 88K of the *Conveyancing Act 1919* were heard in *Tanlane Pty Ltd v Moorebank Recyclers Pty Ltd (No 2)* [2011] NSWSC 1286. The matter was appealed in the NSW Court of Appeal in *Moorebank Recyclers Pty Ltd v Tanlane Pty Ltd* [2012] NSWCA 445. The judgment granted an easement for the purposes of construction, maintenance, repair and use over the access handle associated with Lot 6 DP 1065574 with an additional order in relation to compensation to the owner of Lot 6 for the imposition of that easement.



Figure 1.4 Location of easement on Lot 6 DP 1065574

Source: LCC (2014)

NSW Land and Environment Court proceedings (NSW LEC 30141, 2013) approved an intersection design prepared by Cardno (2013a) for the link road intersection on Brickmakers Drive. This included the potential for traffic signals as detailed in a plan of the intersection prepared by McLaren (2013). The proposed link road and its intersection with Brickmakers Road will be physically identical to that approved by the NSW Land and Environment Court (ie the layout prepared by Cardno).

A Voluntary Planning Agreement (VPA) pursuant to Section 93F of the EP&A Act was agreed between Liverpool City Council and Tanlane Pty Ltd on 11 June 2008. The VPA applies to the marina site and contains a series of contributions/works which are summarised in Section 3.5.

1.5 Previous Georges Cove Marina development application

1.5.1 Previous determination

A previous application for the proposed Georges Cove Marina by Benedict Industries (acting for the owner, Tanlane Pty Ltd) was made to Liverpool City Council (Development Application DA-846/2012). The environmental impact statement (EIS) supporting this application was prepared in accordance with Director General's Environment Assessment Requirements (DGR 563) received on 29 July 2011.

An EIS (Benedict 2012) and application for development of the marina was submitted to Liverpool City Council and the Department of Planning in January 2012.

The assessment of the proposal included public exhibition of the Georges Cove Marina EIS (Benedict Industries 2012). The development application was placed on public exhibition on three separate occasions from 28 March 2012 to 3 May 2012, 9 May 2012 to 8 June 2012 and from 3 July 2013 to 2 August 2013. Each exhibition period observed a minimum 30 day public exhibition period in accordance with the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) and the DCP. A total of six separate submissions were received. Four expressed support for the proposal and two submissions, from the same author (Moorebank Recyclers) raised specific objection to vehicular access arrangements.

Consent for the Georges Cove Marina was granted to Tanlane Pty Ltd by the Sydney West JRPP on 22 August 2014 (JRPP Reference Number 2012SYW035) with support from Liverpool City Council.

1.5.2 NSW Land and Environment Court ruling

The validity of the consent was challenged by the proposal's sole objector, Moorebank Recyclers, in the NSW Land and Environment Court. This was on the basis that Benedict (acting for the owner, Tanlane Pty Ltd) did not technically comply with cl 7 (2) of State Environmental Planning Policy No 55—Remediation of Land (SEPP No 55) as described below.

In his 18 March 2015 judgement, Justice Preston CJ ruled in favour of the objector, declaring that the Consent was invalid because the application did not include a "Preliminary Investigation" of contamination and, therefore, that the JRPP could not have, in the judge's view, properly considered the application. The judge ruled that Tanlane should commission a Preliminary Investigation, reapply for a consent and supply the Preliminary Investigation to the JRPP as part of the application.

As a result of this ruling, Benedict is re-applying for consent for the proposed Georges Cove Marina, 146 Newbridge Road, Moorebank. The proposal is unchanged from that approved by the JRPP on 22 August 2014 and includes a Preliminary Investigation of Contamination (see Appendix B).

1.6 Proposal overview

The proposed development includes the construction and operation of the following main elements (Figure 1.5):

1. a Maritime Building;
2. a wet berth facility predominately for small craft (ie boats less than 15 m long) and some vessels up to 20 m long;
3. three external carparks and two basement carparks providing a total of 637 car spaces;
4. a Private Marina Clubhouse; and
5. support infrastructure, including power, water and sewerage services.

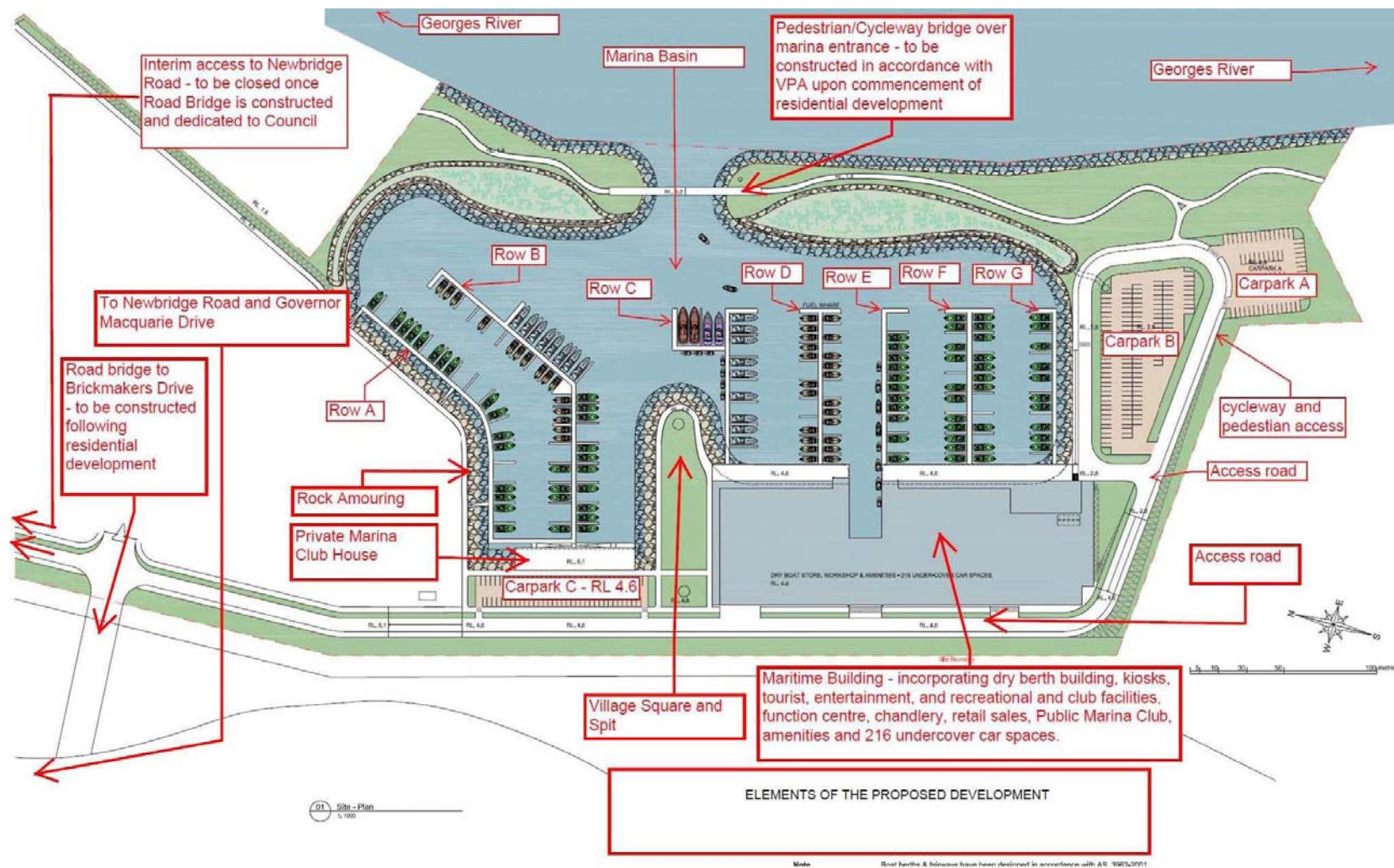


Figure 1.5 Georges Cove Marina - key elements

1.7 Benefits of the proposal

The proposed development will greatly improve the existing visual amenity of the local area by facilitating the cessation of quarrying and recycling activities and by the removal of associated infrastructure which is rapidly becoming an incompatible land use given the development of adjoining residential precincts. In particular, the proposed development will provide recreational facilities for the neighbouring Georges Fair residential estate (960 residences) and the Mirvac Georges Cove residential estate residential precinct earmarked for the northern portion of Lot 7.

The proposed development has the following objectives:

1. to embellish and stabilise the foreshore and former quarry dredge site in accordance with the objectives of the RE1 (public recreation) and RE2 (private recreation) zones which are set out in the LEP as follows:
 - a) to enable land to be used for public open space or recreational purposes (RE1 and RE2);
 - b) to provide a range of recreational settings and activities and compatible land uses (RE1 and RE2);
 - c) to protect and enhance the natural environment for recreational purposes (RE1 and RE2);
 - d) to provide sufficient and equitable distribution of public open space to meet the needs of residents (RE1 only);
 - e) to ensure the suitable preservation and maintenance of environmentally significant or environmentally sensitive land (RE1 only); and
 - f) to enable land uses that are compatible with, and complimentary to, recreational uses (RE2 only).
2. to develop recreational facilities to cater for the population in the western part of Sydney as well as people moving into the area with the development of the Georges Fair and future Georges Cove residential precincts;
3. to provide recreational and ancillary facilities for the growing population of boat owners and users in the western part of Sydney;
4. to address the demand for wet (floating) berths and dry berths;
5. to provide a range of public benefits including:
 - a) a land/water interface for the local community to enjoy the Georges River;
 - b) casual public berths for boats and water taxis to pick-up and drop-off passengers, and to access the marina facilities, including a function centre, kiosk, commercial, tourist and club facilities;
 - c) public access to fuel and sewage pumpout facilities which are currently unavailable in the upper reaches of the Georges River; and
 - d) access to recreational facilities for persons with disabilities.

6. to provide temporary emergency berth access for Marine Area Command (Water Police), NSW Maritime (RMS), medical evacuation and other emergency services; and
7. to improve the amenity and environmental quality in the upper reaches of the Georges River. In particular, the reconnection of the community with the Georges River foreshore.

The proposed development will reconnect the community with the Georges River foreshore which is currently inaccessible to the public and in a degraded state.

The RE1 zoned lands, once rock protected and regenerated, are to be dedicated to the Council and held in public ownership in perpetuity in accordance with the VPA already executed with Liverpool City Council (see Section 3.5). The proposed development will accelerate this process.

1.8 Environmental impact statement preparation

This EIS has been prepared by EMGA Mitchell McLennan Pty Ltd (EMM) in accordance with the *Guideline for Marinas and Related Facilities* (DUAP 1996), Clause 71 and 72 of the Environmental Planning and Assessment Regulation 2000 and the Secretary's Environmental Assessment Requirements (SEAR 912) for the proposal (received on 27 April 2015).

Given that the proposed development is unchanged from that previously approved by the JRPP, the original technical assessments appended to the original EIS (Benedict 2012) generally remain valid. This EIS draws predominantly on these assessments, although they have been reviewed and revised where required to ensure that the assessment methods and findings remain current. Some additional assessment has also been undertaken. The EIS also uses the information prepared by Liverpool City Council as attached to the 22 August 2014 Project Approval (LCC 2014).

The SEARs, and where they are addressed in this EIS, are summarised in Table 1.1.

Table 1.1 Secretary's Environmental Assessment Requirements

Assessment requirement	Reference in EIS
The EIS must include an assessment of all potential impacts of the proposed development on the existing environment (including cumulative impacts if necessary) and develop appropriate measures to avoid, minimise, mitigate and/or manage these potential impacts. As part of the EIS assessment, the following matters must also be addressed.	
Strategic context – including:	
– a detailed justification for the proposal and suitability of the site for the development;	Chapter 8
– a demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, development control plans (DCPs), or justification for any inconsistencies; and	Chapter 3
– a list of any approvals that must be obtained under any other Act or law before the development may lawfully be carried out.	Chapter 3
Air quality and odour – including:	
– a description of all potential sources of air emissions and odour;	Section 6.8 , Appendix H
– an air quality impact assessment in accordance with relevant Environmental Protection Authority Guidelines; and	Appendix H
– a description and appraisal of air quality impact mitigation and monitoring measures.	Appendix H

Table 1.1 Secretary's Environmental Assessment Requirements

Assessment requirement	Reference in EIS
Noise and vibration – including:	
– a description of all potential noise and vibration sources during construction and operation, including road traffic noise;	Section 6.6, Appendix G
– a noise and vibration assessment in accordance with the relevant Environmental Protection Authority Guidelines; and	Appendix G
– a description and appraisal of noise and vibration mitigation and monitoring measures.	Section 6.7.3, Appendix G
Soil and water – including:	
– a description of local soils, topography, drainage and landscapes;	Section 1.2.1, Section 6.2
– the details of stormwater and wastewater management;	Sections 2.8.2–2.8.3
– the details of sediment and erosion controls;	Section 2.10.9
– the details of water usage including water supply and licences;	Section 2.8.2
– impacts associated with dredging, reclamation and seawall construction and operation;	Section 6.1 Section 6.4.3
– an assessment of impacts to surface and groundwater resources, flooding impacts, and impacts to groundwater dependant ecosystems; and	Section 6.1, Appendix B
– a description and appraisal of impact mitigation and monitoring measures.	Section 2.10.3, Section 6.1.7
Traffic and transport – including:	
– details of road transport routes and access to the site;	Section 2.7, Section 6.5.2
– road traffic predictions for the development during construction and operation; and	Section 6.5, Appendix E
– an assessment of impacts to the safety and function of the road network; and the details of any road upgrades required for the development.	Section 6.5, Appendix E
Contamination – including a contamination investigation in accordance with <i>State Environmental Planning Policy No. 55 – Remediation of Land</i> .	Section 6.3, Appendix C
Marine safety – including a Navigational Assessment of the impacts of additional vessels within the waterway.	Section 6.1.6, Section 6.8
Biodiversity – including:	
– accurate predictions of any vegetation clearing on-site or for any road upgrades;	Section 6.3.1, Appendix D
– a detailed assessment of the potential impacts on any threatened species, populations, endangered ecological communities, impacts on any aquatic species, protected species, threatened species or their habitats, groundwater dependent ecosystems and marine vegetation;	Section 6.3.1
– a detailed description of potential impacts to fish stocks and fish habitat; and	Section 6.4.3, Appendix D
– a detailed description of the measures to avoid, minimise, mitigate and offset biodiversity impacts.	Appendix D
Visual – including an impact assessment at private receptors and public vantage points.	Section 6.6, Appendix F
Heritage – including Aboriginal and non-Aboriginal cultural heritage.	Section 6.9, Appendix I, Appendix J
The EIS must assess the proposal against the relevant environmental planning instruments, including but not limited to:	Chapter 3
• <i>Liverpool Local Environmental Plan 2008;</i> • <i>Greater Metropolitan Regional Environment Plan No. 2 – Georges River Catchment;</i> • <i>State Environmental Planning Policy No. 33 – Hazardous and Offensive Development;</i> • <i>State Environmental Planning Policy 55 – Remediation of Land;</i> • <i>State Environmental Planning Policy (Infrastructure) 2007; and</i> • <i>Relevant development control plans and section 94 plans.</i>	

Table 1.1 Secretary's Environmental Assessment Requirements

Assessment requirement	Reference in EIS
During the preparation of the EIS you should consult the Department's Register of Development Assessment Guidelines which is available on the Department's website at planning.nsw.gov.au under Development Proposals/Register of Development Assessment Guidelines. Whilst not exhaustive, this Register contains some of the guidelines, policies, and plans that must be taken into account in the environmental assessment of the proposed development.	This list has been consulted
During the preparation of the EIS, you must consult the relevant local, State and Commonwealth government authorities, service providers and community groups, and address any issues they may raise in the EIS. In particular, you should consult with the: • Environment Protection Authority; • Office of Environment and Heritage; • Department of Primary Industries; • New South Wales Office of Water; • Roads and Maritime Services; • Liverpool City Council; and • The surrounding landowners and occupiers that are likely to be impacted by the proposal. Details of the consultation carried out and issues raised must be included in the EIS.	Chapter 4

The technical assessments and reviews completed for this EIS, and the consultants engaged to prepare these assessments, are listed in Table 1.2.

Table 1.2 Technical assessments

Aspect	Consultant (2012)	Consultant (2015)
Marina design and hydrology, structural engineering	Worley Parsons (see Appendix B1) Cardno (NSW/ACT) Pty Ltd* National Project Consultants Pty Ltd (NPC)*	The original Worley Parsons assessment of tidal hydrodynamics, water quality and navigation remains current. NPC has reviewed and collated the relevant hydrological and flood assessments (Appendix B2).
Terrestrial ecology	Total Earth Care Pty Ltd (Appendix D2)	EMM reviewed the original assessment and prepared a letter confirming its findings remain relevant (Appendix D1).
Aquatic ecology	Marine Pollution Research Pty Ltd (Appendix D3)	Marine Pollution Research visited the site in April 2015 and updated the assessment (Appendix D4).
Traffic and parking	Colston Budd Hunt & Kafes Pty Ltd	EMM prepared an updated the traffic and parking assessment (Appendix E) considering changes to arrangements between submission of the EIS (January 2012) and the JRPP approval (August 2014) and to consider development occurring around the site since the completion of the original assessment.

Table 1.2 Technical assessments

Aspect	Consultant (2012)	Consultant (2015)
Noise	Parson Brinkerhoff Australia Pty Limited	EMM prepared an updated noise assessment based on updated background noise monitoring and to consider a greater range of noise criteria (Appendix G).
Air quality	Todoroski Air Sciences Pty Ltd (see Appendix H2)	Todoroski Air Sciences reviewed the original assessment and prepared a letter confirming its findings remain relevant (Appendix H1).
Visual	Richard Lamb & Associates Pty Ltd (Appendix F2) EcoHort Pty Ltd - projection of plant heights (Appendix F3)	Richard Lamb & Associates prepared an addendum visual assessment review (Appendix F1).
Aboriginal heritage	Mary Dallas Consulting Archaeologists (Appendix I2)	EMM reviewed the original assessment and prepared a letter confirming its findings remain relevant (Appendix I1).
Non-Aboriginal heritage	Heritech Consulting (Appendix J2)	EMM reviewed the original assessment and prepared a letter confirming its findings remain relevant (Appendix J1).
Architectural design	Michael Fountain Architects	Michael Fountain Architects plans are presented in Appendix M.
Contamination	-	A preliminary investigation of contamination was prepared by EMM (Appendix C).

Note: * Assessments completed between completion of the 2012 EIS (January 2012) and JRPP determination (August 2014).

2 Project description

2.1 Proposal elements

The proposed development includes the construction and operation of the following main elements:

1. the Maritime Building located near the western boundary of the marina site. This structure will house:
 - a dry berth facility providing 250 berths for small craft;
 - a function centre;
 - tourist, entertainment and recreational and club facilities; and
 - a petrol tank (about 60,000 L) and a diesel tank (about 60,000 L).
2. a wet berth facility for 186 small craft (including casual berths) which will consist of:
 - a marina basin (layout provided in Appendix M);
 - rock protection of the basin and foreshore including embellishment and revegetation of the river foreshore;
 - construction of public recreational facilities on the foreshore including bike paths, barbeque facilities and shelters;
 - floating berths and walkways;
 - fuel pumping facilities;
 - sewage pumpout facilities; and
 - emergency berth access.
3. three external carparking areas and basement carparking providing a total of 637 car spaces;
4. a Private Marina Clubhouse on the northern portion of the RE2 (private recreation) zoned land; and
5. support infrastructure - power, water and sewerage.

Each of the main elements are discussed further below.

2.2 Maritime Building

2.2.1 Overview

The Maritime Building will include the areas listed in Table 2.1.

Table 2.1 Maritime Building areas

Maritime Building area	Area (m²)¹
Dry berth store	5,946
Circulation	3,119
Hardstand storage	1,848
Small craft display	1,606
Function centre	1,355
Kiosks, commercial, tourist and recreational and club facilities	1,202
Undercroft - kiosks, commercial, tourist and recreational and club facilities	543
Public marina club lounge	450
Amenities	271
Workshops	249
Marina office	151
Function centre - kitchen	110
Function centre - bar/servery	96
Sub-total (gross floor area)	16,946
Carparking	11,994
Function centre - terrace	1,059
Public marina club lounge - terrace	127
Total	30,127

Note: 1. Areas are preliminarily based on the initial concept stage and may vary depending on the final mix of use determined in the internal fit out and designs to be undertaken at construction certificate stage.

The Maritime Building will comprise a concrete slab, steel framing, and colourbond cladding and has been architecturally designed to minimise visual impacts. The building will have a maximum height of 24.4 m AHD (from FFL 4.6 m AHD). The colours of the cladding (light greys and other suitable colours) were determined in consultation with visual assessment expert, Richard Lamb to minimise visual impact (see Appendix F2). In addition, panelling on the outside of the building will include a large component of translucent panels to maximise the use of natural light within the interior of the dry store building.

Blade walls will be a prominent architectural feature of the Maritime Building, seeking to create significant visual articulation of the building elevation when viewed from the public domain. The blade walls will traverse from ground level and will protrude past ridge height to create visual interest, which in combination with the substantial surface area and glazing, will create a modern appearance.

Significant attention has been paid to ensure that the design and implementation of the project maximises the connectivity between the marina/maritime precinct as well as the kiosks, tourist, entertainment, recreational and club facilities and function centre to provide the best outcome for the entire development and the planned Mirvac Georges Cove residential development to the north.

Roof water will be harvested and stored in a large tank for irrigation and ground maintenance purposes as well as for use in grey water applications such as toilet flushing (see Section 2.8.2).

2.2.2 Dry berth facility

The dry berth facility has been designed to accommodate approximately 250 small craft between 4 m and 8 m long (Table 2.2) ('Small craft' are boats less than 15 m long).

Table 2.2 Dry berth capacity

Type	Boat length	Number of dry berths
Small craft	≥4 m to <6 m	125
Small craft	≥6 m to <8 m	125
Total		250

Boat launching and retrieval from the facility will be undertaken by a lifting device assisted by a large forklift or internal gantry crane which will operate on the ground floor of the dry berth facility. The forklift/gantry crane will remove small craft from the vertical lift for placement into the racking system in the building.

Dry berth facilities provide significant advantages over wet berths including:

- reduced maintenance and repair costs due to reduced exposure to the weather and the effects of saltwater corrosion;
- reduced environmental impact from the effects of anti-foul on boats' hulls as the small craft will be stored out of the water and so will not require anti-foul;
- reduced costs for owners from savings due to not having to use anti-foul; and
- quick and easy launching and retrieval, eliminating the need for trailering and storing on residential premises and removing the inconvenience and stress associated with towing and parking trailers as part of the normal launching and retrieval of small craft. Normal operations in such facilities involve the booking of launching and retrieval times in a similar fashion to booking tee off times for a round of casual golf.

2.2.3 Function centre

The function centre will include shared amenities and marina offices. These will cater for corporate events, weddings, celebrations and the like, in a similar fashion to traditional function centres.

2.2.4 Kiosk, commercial, tourist, recreational and club facilities

The kiosk, commercial, tourist, recreational and club facilities will be in the northern and eastern portion of the Maritime Building and will service casual visitors using the wider marina, including the Marina Spit Park between the main Maritime Building and the Private Marina Clubhouse (see Section 2.2.5).

2.2.5 Public Marina Clubhouse

The Public Marina Clubhouse portion of the Maritime Building will incorporate a public marina club lounge and a terrace for public marina members. This will be a separate clubhouse to the Private Marina Clubhouse (see Section 2.4). The Public Marina Club facilities will include male and female showers, change and locker rooms, bar and servery facilities and a dining space.

2.2.6 Chandlery, retail area and small craft sale showroom

The chandlery, retail area and small craft sale showroom will be split into two main areas within the Maritime Building:

- the chandlery and retail area that will provide for all the maritime, hardware and supplies required for day-to-day boat maintenance along the lines of a traditional “Whitworths” style store; and
- the small craft sales showroom and sales administration.

2.2.7 Workshop

A workshop will provide service and maintenance facilities for marina club members. The workshop will only be able to accommodate up to four small craft (ie craft less than 15 m long).

2.2.8 Fuel storage

Separate tanks storing about 60,000 L of diesel and about 60,000 L of petrol will be installed on the hardstand at RL 7.3 and well above 1:100 year flood levels.

2.3 Wet berth (floating) facility

The wet (floating) berth facility is described below. The wet berth facility design was guided by the Australian Standard (AS) 3962-2001, Guidelines for Design of Marinas.

2.3.1 Marina basin

The marina basin will be about 150 m wide east to west and 350 m long north to south. The basin will open to the Georges River with a short entrance channel that will be 40 m to 50 m wide.

The marina basin will provide wet berths for small craft and vessels as listed in Table 2.3.

Table 2.3 Marina wet berth capacity

Type	Boat length	Number of wet berths
Small craft	≥8 m to <10 m	52
Small craft	≥10 m to <12 m	110
Small craft	≥12 m to <15 m	20
Vessels	≥15 m to <18 m	2
Vessels	<20 m	2
Vessels	≥20 m	0
Total wet berths		186

The marina basin has been designed to alleviate the potential for the formation of poorly flushed corners and will assist to maintain good water quality and visual appearance.

The marina basin will be located on a relatively straight section of the Georges River. These sections are generally more stable and less prone to the significant variations in flow velocity at bends in the river. These velocity variations typically result in sediment deposition on the inside of the bend and significant erosion on the outside of the bend. The location of the marina will provide more stable bank and bed conditions and less potential for sedimentation in the marina basin or entrance.

As described in Section 2.10.3, the marina basin will be formed by filling parts of the existing quarry basin to shape it to the final landform.

2.3.2 Floating berths and walkways

A floating berthing system is proposed rather than fixed jetties because it will be more convenient to users (including people with a disability) and will minimise the visual impact of the berths, particularly at low tide.

The marina berths will comprise a floating system of walkways, with finger units branching off at right angles to the walkways, creating the berthing pens and providing access alongside the moored boats. The floating berths will be held in place by flexible lines that extend to the basin bed which will stretch when flood loads occur, or will be attached to pylons (of a sufficient height to allow for floods) driven into the base of the basin.

The walkway widths will satisfy the requirements of AS 3962-2001, ie:

- walkways less than 100 m long will be at least 1.5 m wide;
- walkways 100 m to 200 m long will be at least 1.8 m wide; and
- walkways more than 200 m long will be at least 2.4 m wide.

The fingers leading from the walkways will be from 0.9 to 2 m wide. This will be dependent on the nominated size of the boat that the berth is servicing. These finger widths will comply with the AS 3962-2001 requirement for the purposes of safe embarkation and disembarkation. The finger length will equal the length of the longest boat that may use the berth.

The final widths of walkways and fingers may vary to a minor degree depending on the proprietary flotation system adopted for the marina, of which there are a number to select from, and the final detailed design.

2.3.3 Casual public berths

In addition to permanent berths, the marina will be accessible to the public who are generally making use of the marina facilities to pick-up and drop-off passengers during marina business hours.

2.3.4 Channel and fairways

A navigation channel at least 40 m wide will be created. This is well in excess of the minimum channel width required for safe navigation.

Adequate widths will be provided for boat manoeuvring at the fuel and sewage pumpout facilities and so that the berths are visually aesthetic. No mooring or anchoring will be allowed within the navigation channel or within the marina basin other than in the berths.

The width of internal channels ('fairways') within the marina will vary depending on the size of the craft in the adjoining berths. As a minimum, and as recommended by AS 3962-2001, fairways will be 1.5 times the length of the longest boat using that fairway.

2.3.5 Foreshore embellishment and rock armouring

An important component of development will be foreshore embellishment and rock armouring for protection. These works will include:

- removal of surface waste and fill on the foreshore;
- removal of noxious weeds; and
- restoration and enhancement of vegetation in keeping with indigenous species.

The photomontage developed as part of the visual impact assessment (Appendices F1 and F2) included modelling of the revegetated foreshores based on a species list recommended by Echohort Pty Ltd consultants (Appendix F3). The list includes species from Council's recommended species list.

The foreshore works will be protected by rock revetment to protect the stretch of the river foreshore from the effects of flooding and erosion. These works will be carried out in accordance with the VPA agreed between Liverpool City Council and Tanlane Pty Limited on 11 June 2008 (see Section 3.5). The VPA requires a detailed vegetation management plan (VMP) to be submitted to Council. There is already a financial security mechanism and legally binding agreement in place to procure these works prior to the dedication of this embellished foreshore zone back to Council once they are completed.

2.3.6 Signage

The details and locations of proposed signage will be confirmed at construction certificate stage. The signage will include:

- individual marina berths including restricted berths where applicable;
- casual public berthing;
- maintenance holding area;
- no berthing or tie up;
- fuel/pumpout berths and safety instructions on usage;
- fire/safety notices; and
- placarding of fuel storage facilities.

2.3.7 Provision of services to berths

The wet berths will be supplied with potable water, power, lighting and communications (telephone, internet and cable television). These services will be available to the berths via low service pedestals (approximately 900 mm tall) (see example in Photograph 2.1). The service pedestals will be located at the junctions between fingers and the walkway. On the longer runs of the walkway, where there are no fingers, pedestals with lights only will be provided at a spacing of about 10 m.

Services to the pedestals will be supplied from the land-based infrastructure via pipework and conduits which will run down the access gangway (incorporating flexible couplings). These will be fitted under the floating walkway deck and will be out-of-view but accessible for inspection and maintenance.

Provision of services to the marina is described in Section 2.8.



Photograph 2.1 Services pedestal similar to that proposed for Georges Cove Marina (photographed at Jones Bay Wharf in November 2010)

2.3.8 Fire fighting

Fire fighting equipment will be provided to the wet berths and surrounds in accordance with AS 3962-2001 and to the requirements of relevant authorities. This will include the provision of fire hose reels, fire hydrants booster, fire extinguishers and signage as described below.

i Fire hose reels

Marina fire hose reels will be located to meet the following AS 3962-2001 requirements:

- the length of hose on any hose reel should be at least 36 m;
- at least one hose reel should be located on the shoreline side of the first berth;
- at least one hose reel should be located on the seaward end of each walkway;

- the maximum distance between any two reels should be 30 m;
- at least two reels should be accessible from each berth; and
- a fire hydrant should be located at the head of each access gangway.

The fire hose reels will be connected to the domestic water supply whereas the fire hydrants (see Section 2.8.2) will be connected to a special hydrant service.

2.3.9 Fire extinguishers

Fire extinguishers will be provided at appropriate locations (as noted in AS 3962-2001) that will be agreed upon with the relevant authorities. At least two extinguishers will be provided at each fuel and pumpout berth.

Extinguishers will be selected that are suitable for fire hazards which are not able to be contained by water from hose reels. These are likely to be a dry powder type and/or CO₂ type extinguishers. The holding capacity for each extinguisher will be approximately 9 L or 9 kg. Examples of fire extinguisher and hose reel facilities are shown in Photograph 2.2.



Photograph 2.2 **Example fire extinguisher and hose**

2.3.10 Security gates

The main walkways of the marina will be available to the public during marina opening hours. Access control gates will be located at the walkways leading to the marina berths. These will control access 24 hours a day. Access control gates will also be located at the base of each gangway (Photograph 2.3). These will be locked at night to provide security, particularly against vandalism, property damage and theft.

A key card system (or similar) will be available to boat owners and marina staff to operate the security gates.



Photograph 2.3 **Example of main access control gate (proposed at base of gangways)**

2.3.11 Fuel wharf

Fuel bowzers will be located on the dedicated fuel wharf on the end of berth row D (see Drawing DA-003 in Appendix M). Fuel bowzers will be installed in accordance with the requirements of relevant authorities. In particular, the following requirements will be met:

- at least two fire extinguishers will be provided, selected from the following type and minimum size:
 - 9 kg dry chemical type;
 - 9 kg halogenated hydrocarbon type; and
 - 9 L foam type.
- drip trays will be provided under and around the bowzers. Trays will be of sufficient size to hold any jerry cans being filled;

- a holding tank will be provided onsite to collect and retain the wastes from the drip trays;
- provision will be made for regular emptying and disposal of the holding tank contents to a licensed system or site;
- oil/fuel booms will be provided to contain any accidental fuel spillage; and
- oil absorbent material will be provided to absorb petroleum products spilt on the water surface.

AS 3962-2001 notes the need for particular precautions when supplying fuel over water, such as use of double containment lines. All of these precautions will be adopted in the design and installation of relocated facilities.

An example of a floating fuel berth and safety and environmental equipment including fire fighting equipment and spill kits is shown in Photograph 2.4.



Photograph 2.4 **Example of a floating fuel berth (Empire Bay Marina, Bobbin Head)**

2.3.12 Sewage pumpout

The facility will incorporate a water supply for rinsing. The sewage pumpout system will not have holding tanks in order to prevent an odour problem and normal cleaning and maintenance will ensure that there will be no other odour problems associated with the facility.

A sewage pumpout facility will be located adjacent to the fuel facilities to facilitate and encourage proper sewage disposal from boats. The pumpout facility will discharge into the existing sewer connections on Lot 7. The co-location of the sewage pumpout facilities with fuel facilities will result in high utilisation rates.

There are various proprietary pumpout systems available with a choice of pump size. Due to the number of connection points, and the pumping distance from the furthest berths to shore, the pump will be a vacuum type, enclosed and appropriately acoustically shielded to meet the project sound goals. A vacuum pump moves sewage by creating a vacuum between the hose nozzle and an accumulator tank. When the accumulator tank is full, the vacuum is reversed, sending pressurised air into the tank and pushing the sewage out to the sewer for disposal.

The sewage pumpout unit will incorporate a pump and accumulator tank located on the marina walkway adjacent to the pumpout berths. The pumpout unit will be approximately 1.5 m long by 1 m wide by 1.3 m tall (dependant on the system selected), and enclosed within a cabinet. When not in use, the pumpout nozzle will be stored in a receptacle incorporating a drip tray. Only one user can be pumped out at any one time and marina staff will activate and manage pumpout of all vessels.

The sewage pumpout facilities will be for the use of all boats at the marina. The NSW Government has a policy requiring sewage holding tanks in all recreational boats fitted with a toilet so boats are generally expected to be fitted with an on-board holding tank allowing the sewage pumpout to be used.

No discharge of any nature from toilets or holding tanks will be tolerated in the marina or at the berths. This will be strictly enforced.

As the entire lot at 146 Newbridge Road will be connected to the sewerage main prior to development, the marina will be connected onto that upgraded connection. Based on consultation with Sydney Water, it is understood that sewage from the pumpout facility can be discharged to the main sewers, as long as the discharge does not exceed 2 L/s. This far exceeds the anticipated discharge from the pumpout facility.

2.3.13 Bilge water pumpout

All marina berth holders will be inducted and supplied with a complimentary bilge water absorbing pad as part of the rules and regulations of the marina. Bilge absorbing pads will absorb any oil from the bilges. The bilge water will be disposed appropriately.

The discharge of bilge water within the marina basin will be prohibited. Signage to this effect will be displayed throughout the marina. A floating boom will be maintained at the site to contain any surface pollutants in the event of an accidental leakage of bilge water.

2.4 Private Marina Clubhouse

The Private Marina Clubhouse will include the areas listed in Table 2.4.

Table 2.4 Private Marina Clubhouse

Private Marina Clubhouse area	Area (m²)¹
Private Marina Clubhouse	216
Circulation	216
Kiosk	123
Amenities	108
Brokerage	72
Marina office	36
Sub-total (gross floor area)	771
Private Marina Clubhouse - terrace	194
Small craft store	117
Small craft circulation and ramp	278
Circulation on pontoons	221
Barbeque area	392
Kiosk - terrace	150
Total	2,124

Note: 1. Areas are preliminarily based on the initial concept stage and may vary depending on the final mix of use determined in the internal fit out and designs to be undertaken at construction certificate stage.

The Private Marina Clubhouse will provide the cornerstone for the marina precinct and will provide the waterfront access for the future Mirvac Georges Cove residential development on the northern portion of Lot 7 (subject to separate development applications and approvals). The Private Marina Clubhouse will include office space, dining areas, amenities and access to the wet berths.

The Private Marina Clubhouse will use steel and Colourbond materials to create a modern, outdoor lifestyle feel. It will incorporate large glassed areas to utilise natural light wherever possible. It will have a maximum height of 13.1 m AHD from a FFL 2.8 m AHD.

As with the Maritime Building (see Section 2.2), all of the roof water from the clubhouse will be harvested and stored in a large tank for irrigation and ground maintenance purposes, as well as use in grey water applications such as toilet flushing.

2.5 Marina Spit Park

The Marina Spit Park will be between the main Maritime Building and the Private Marina Clubhouse facilities. It will be a grassed area with some plantings that will be accessible to the public and will be surrounded by a path, including a section facing the marina basin.

2.6 Public recreation facilities on the foreshore

The following public recreation facilities will be constructed on the river foreshore and, once complete, will be dedicated back to Council under the terms of the VPA (see Section 3.5):

- a bike/pedestrian path through the river foreshore land; and
- passive recreation facilities (eg picnic tables).

An access easement will be dedicated over land on the marina site to allow Council to undertake maintenance of the foreshore land.

2.7 Access and parking

2.7.1 Public access

Public access to the marina (by car, bicycle and on foot) will be provided during normal operating hours from Brickmakers Drive.

Access to the wet berths will be controlled by access control gates (see Section 2.3.10).

Equipment and products to the marina will be delivered by road during normal working hours, Monday to Friday. Given that public use of the marina will be highest on weekends, no significant access conflicts are envisaged (see Section 6.10).

The Maritime Building, Private Marina Clubhouse and wet berth walkways design will comply with relevant disability access standards through the extensive use of ramps and the floating berth configuration. While further details will be included at the construction certificate stage, the relevant access guidelines that will be used to develop the detailed designs will include:

- Australian Standard AS 1428.1 – 2009/Amendment 1 - 2010, Design for Access and Mobility, Part 1 General requirements for access – New Building Work;
- Australian Standard AS 1428.2 – 1992, Design for Access and Mobility, Part 2 Enhanced and additional requirements – Buildings and Facilities;
- Commonwealth Government 2002 – Disability Standards for Accessible Public Transport Guidelines; and
- relevant NSW Maritime Guidelines.

2.7.2 Site access

Vehicular access from Brickmakers Drive to the proposed marina will be provided (see Appendix E). The design, construction and use of the link road have been approved by Liverpool City Council (DA-61/2014 and DA 1552/2006/B). The construction of this bridge and associated works will meet the VPA requirement for the construction and dedication of a road bridge over the drainage channel, embankment and road to Brickmakers Drive.

A combined pedestrian and cycle access path from Brickmakers Drive will be constructed along the northern side of the link road. This will be the primary pedestrian and cycle access route between the marina site and Newbridge Road, where the existing traffic signals allow pedestrians to cross at the Governor Macquarie Drive and Brickmakers Drive intersection.

As previously agreed with Liverpool City Council, the path along the link road will extend to the Georges River foreshore. In combination with the foreshore path within the Flower Power site (also agreed with the Council), these paths will provide public access to the Georges River foreshore from the marina site to the recreation area on Davy Robinson Drive.

2.7.3 Carparks

Many marina facilities in the Sydney basin contend with parking, traffic and congestion problems associated with the lack of access and appropriate parking. Therefore, the provision of ample carparking was an important consideration in the Georges Cove Marina design. The development will incorporate about 637 car spaces which will easily accommodate the parking demands for the development (see Section 6.5.3i). These will be provided in a series of three external parking areas and in basement carparks.

2.7.4 Emergency access

The marina site is conveniently located for access to ambulance and local hospitals.

The areas allocated for casual public berthing will be available to Marine Area Command (Water Police), NSW Maritime (RMS), medical evacuation and other emergency services. The main walkway width will provide ample space for emergency evacuation.

2.8 Support infrastructure

The marina site is currently serviced by electricity, water supply and sewerage connections which will be upgraded as part of the overall redevelopment from rural/extractive industry to private recreation, public recreation, medium density residential and business enterprise.

2.8.1 Electricity

Endeavour Energy supplies power along Newbridge Road. There is currently a 600 kVA electricity substation on the site that is used to supply the sand extraction plant.

Consultation with Integral Energy (now part of Endeavour Energy) has established that the substation will meet the predicted power demand for Georges Cove Marina. Integral Energy was prepared to allow the proposed development to become a high voltage customer and install, operate and manage its own substations.

2.8.2 Water supply

The site has an existing Sydney Water connection with a 40 mm hydrant service and a 20 mm domestic service. This will be upgraded to a 100 mm hydrant service and a 50 mm domestic service (fire hose reels will be connected to the domestic service). This will be completed as part of the upgrading of services to Lot 7 DP 1065574. It is understood that the pressure within the upgraded Sydney Water supply system will be sufficient to meet fire fighting requirements (see Section 2.3.8) without the need for additional booster pumps.

It is proposed to store about 50,000 L of rainwater from the Maritime Building and Private Marina Clubhouse roofs.

2.8.3 Stormwater

Sydney Water has indicated that there is sufficient capacity in the existing stormwater infrastructure to cater for the needs of the marina. The marina basin will incorporate a large constructed wetland for polishing and treatment of storm water runoff from the development.

2.8.4 Sewerage

Sydney Water has indicated that there is sufficient capacity in the existing sewerage network to cater for the needs of the marina.

Sewage pumpout facilities will be installed as part of the development and will be connected to the mains sewer (see Section 2.3.12).

2.8.5 Telecommunications

A Telstra main telecommunications cable extends along Newbridge Road. A local cable network supplies telephone/data services to the site already.

2.9 Hours of operation

The proposed hours of the marina berthing operations are as follows:

- Summer (daylight saving): seven days a week, 7.00 am to 10.00 pm; and
- Winter (non-daylight saving): seven days a week, 7.00 am to 10.00 pm.

It is proposed that the Private Marina clubhouse, Marina Function Centre and associated venues be permitted to operate from 7 am to 12 midnight, as previously approved by the JRPP.

2.10 Site preparation and construction

2.10.1 General

Construction activities will involve a range of different types of construction methods and equipment. The main activities will be the construction of the hardstands, installation of piling, installation of the pontoon units, installation of services and access gangways, and building construction.

There are no existing structures on the marina site to be removed.

2.10.2 Indicative construction program

Construction will commence once the quarrying activities on the marina site have been completed and development approval is granted. Construction is expected to take about 22 to 36 weeks.

2.10.3 Marina basin and entrance construction

The marina basin will be formed by filling parts of the existing quarry basin to shape it to the final landform using the existing quarry dredge and land-based earth moving machinery. This has been largely completed as part of recent quarry operations although final rehabilitation of the basin has not yet started.

Excavated sand and other suitable materials will be used to form the entrance channel and associated land areas required for the marina. As described in Section 1.3, some VENM (but no other waste materials) and rock will be imported to assist with shaping the marina basin.

Modification of the quarry basin to form the marina basin and entrance channel will commence on the landward (eastern) side of the basin wall prior to breaking through the banks to the river. The breakthrough to the river will be undertaken as the last activity in the construction of the marina basin after the water quality in the basin has stabilised and is suitable for discharge to the river. In this way, works in the basin will not impact on river water quality.

Ongoing water quality testing of the quarry pond and the river area adjacent to the marina site has demonstrated that the water in the pond is generally similar to that of the Georges River (see Section 6.1.3).

2.10.4 Pile installation

Steel piles may be installed for the floating berths (as considered in the acoustic assessment – Appendix G).

2.10.5 Installation of pontoon units

All pontoon units and ramps will be manufactured offsite, brought in by truck and craned onto the water for installation.

2.10.6 Installation of services and access ramp

Access ramps will be delivered to the site by truck as one unit and installed by crane. Installation of service pedestals, fire fighting equipment and the like, including services cables and pipework, will essentially be a manual task.

2.10.7 Concrete works

In situ concrete works using concrete trucks and pumping units will be required for the various stages of building the Martime Building and Private Marina Clubhouse.

2.10.8 Timber work

Timber for use as headstocks, girders and decking for the boardwalk/jetty will be delivered to the site by truck, and installed from the land.

2.10.9 Erosion and sediment control

A range of well accepted erosion prevention and sediment control measures (eg those described in the Managing Urban Stormwater: Soils & Construction (Landcom 2004), the 'Blue Book') will be implemented during construction works to minimise sediment generation and control dispersal.

As described in Section 2.10.3, all marina basin construction will be completed prior to the opening of the basin to the Georges River ensuring any construction-related runoff is captured within the enclosed basin.

2.10.10 Construction hours

Construction will be restricted to the following hours:

- Monday to Friday: 7.00 am to 5.00 pm; and
- Saturday: 7.00 am to 1.00 pm.

No construction will take place on Sundays or public holidays.

2.11 Consideration of alternatives

This is a site-specific project. Consideration of the development of other sites is neither applicable nor realistic. In reality, the site will be developed to accommodate a modern, well designed marina that could not be developed in the same manner on another site.

The proposed land use as a marina was selected because it presented the best outcome in terms of highest and best value land use. In addition, the site was selected for a marina development because it met the critical location criteria which are discussed below.

2.11.1 Location of existing and proposed marinas

The *Guidelines for Marinas and Related Facilities EIS Guideline* (DUAP 1996) require that, where applicable, the proponent outlines:

- the nature of any past or existing marinas or other facilities on the proposed site or other sites within the immediate locality;
- past environmental performance, including the impacts of the operation on the environment and the effectiveness of any impact mitigation; and
- the relationship of the proposed development to previous or existing operations.

These issues are addressed below.

i Existing marinas on the site

There are no existing or proposed marinas on the site. No proposed marinas nearby have been identified.

ii Existing marinas in the locality

The inner sections of Botany Bay and the upper reaches of the Georges River are poorly serviced by maritime facilities such as those proposed at the Georges Cove Marina. The nearest marina with a level of service (eg berthing, fuel supply, slipping and chandlery) comparable to that of the proposed development is at Lugarno, about 15 km downstream of the Georges Cove Marina site. This EIS considers the proposed environmental impacts of the operation of the proposed Georges Cove Marina, including the proposed management measures.

iii Relationship of proposed development to existing operations

The proposed development (and associated development of the residential and business enterprise zoned lands in the north of the marina site) will replace the existing sand extraction, processing, and waste recycling operations currently undertaken by the proponent.

2.11.2 Proposed location

The location of the proposed development is driven by a range of factors, including the following:

- the location of existing marinas (see Section 2.11.1);
- boat navigatability:
 - the required depth of water in berths and fairways;
 - required width of fairways; and
 - surface area required for the berthing facility.
- the surrounding environment and the ability to avoid or manage environmental impacts, including:
 - visual impacts;
 - aquatic ecology impacts; and
 - noise impacts.
- site access – most critically carparking; and
- site ownership.

As described in this EIS, the proposed development is ideally located based on these factors.

The proposed development is wholly on private land. No structures are required on public land or existing waterways.

2.11.3 Marina demand

The Georges River is spanned by a number of bridges downstream of the marina site (clearances are at average mean high tide as specified by RMS):

- Tom Uglys Bridge: 5.7 m clearance;
- M5 Motorway Overpass: 7.5 m clearance; and
- Como Rail Bridge: 7.0 m clearance.

Accordingly, very few (if any) sail craft are expected to use the marina which will be predominantly used by small craft (ie powerboats). Data obtained from NSW Maritime (now RMS) indicate that there are in excess of 15,000 small craft registered within a 10 km radius of the proposed development.

The berth size distribution proposed has been developed with reference to data provided by NSW Maritime as well as logistic and engineering constraints relating to the facility.

2.11.4 Fuel capacity

It is proposed to install fuel storage for unleaded petrol (60,000 L) and marine diesel (60,000 L) based on typical fuel storage capacities of marinas of a similar size. The fuel storage capacity of marinas of a similar size to the proposed development are summarised in Table 2.5.

Table 2.5 Marina fuel storage in NSW

Marina	Location	Date installed	Fuel capacity (L)
Rushcutters Bay	Sydney Harbour	1979	60,000
The Spit	Middle Harbour	1982	40,000
Akuna Bay	Ku-Ring-Gai Chase National Park	1986	75,000
Nelson Bay	Port Stephens	1988	60,000

2.11.5 'No project' alternative

Should the proposed development not proceed, the objectives listed in Section 1.7 will not be achieved. Further, a suitable alternative economic final land use for the quarry would need to be identified. This would need to be developed, designed and approved. No such alternatives have been identified.

3 Statutory framework

This chapter provides an overview of the statutory framework relevant to the proposal including State and Commonwealth legislation, and State, regional and local plans, policies and guidelines.

3.1 NSW and Commonwealth legislation

An overview of the relevant legislative framework is provided in Table 3.1.

Table 3.1 **NSW and Commonwealth legislation**

Legislation	Summary
Environmental Planning and Assessment Act 1979 (NSW)	
Type of development and development consent required	Development consent is required under Part 4 of the EP&A Act, pursuant to the provisions of the Liverpool LEP, relevant EPIs and the DCP. Liverpool Council is the consent authority and the Sydney West JRPP is the determining authority.
Environmental impact statement	An EIS is required to allow the consent authority to have regard to the environmental impacts of development and assess development in accordance with the requirements of the SEARs, relevant EPIs, DCPs and policies. It is required to include the information specified in Schedule 2 of the EP&A Regulation.
Integrated development	Pursuant to Section 91 of the EP&A Act, the application is defined as ‘Integrated Development. The proposal is identified as ‘Integrated Development’ as: • it requires a Controlled Activity Approval pursuant to Section 91 of the <i>Water Management Act 2000</i>; • it may require a licence, or licences, for scheduled development work and/or scheduled activities pursuant to Part 3.2 of the <i>Protection of the Environment Operations Act 1997</i> where ‘Marinas and boat repairs’ are listed as a Scheduled Activity pursuant to Schedule 1 of the Act; and • it will need to obtain a permit to cover harm of marine vegetation pursuant to Section 205 of the <i>Fisheries Management Act 1994</i>. Concurrence pursuant to the applicable legislation will need to be sought from the following authorities: • NSW Office of Water – <i>Water Management Act 2000</i>; • Environmental Protection Authority – <i>Protection of the Environment Operations Act 1997</i>; and • Fisheries NSW – <i>Fisheries Management Act 1994</i>. The previous development application (DA-846/2012) was referred to each of these agencies, who issued their General Terms of Approval for the proposed development.

Table 3.1 **NSW and Commonwealth legislation**

Legislation	Summary
Designated development	The proposed development has been identified as ‘Designated Development’ pursuant to Section 77A of the EP&A Act and Schedule 3 of the EP&A Regulation, which includes “Marinas or other related land and water shoreline facilities.” (Clause 23), defined as: (1) Marinas or other related land or water shoreline facilities that moor, park or store vessels (excluding rowing boats, dinghies or other small craft) at fixed or floating berths, at freestanding moorings, alongside jetties or pontoons, within dry storage stacks or on cradles on hardstand areas: (a) that have an intended capacity of 15 or more vessels having a length of 20 m or more; or (b) that have an intended capacity of 30 or more vessels of any length; and (i) are located in non-tidal waters, or within 100 m of a wetland or aquatic reserve; or (ii) require the construction of a groyne or annual maintenance dredging; or (iii) the ratio of carpark spaces to vessels is less than 0.5:1; or (c) that have an intended capacity of 80 or more vessels of any size. (2) Facilities that repair or maintain vessels out of the water (including slipways, hoists or other facilities) that have an intended capacity of: (a) one or more vessels having a length of 25 m or more, or (b) 5 or more vessels of any length at any one time.” The proposed development has an intended capacity exceeding 80 vessels of any size and therefore, the application is considered to be Designated Development.
Construction certificate	A construction certificate (or certificates) will need to be obtained for all works associated with the proposed development.
Voluntary Planning Agreement (VPA)	Liverpool City Council’s Strategic Planning Division has been consulted over a number of years regarding this development. The landowner and Council have executed a VPA to facilitate the marina development. This includes an easement for boats to pass through the foreshore RE1 (public recreation) land that the proponent is bound to dedicate to Council upon the development of the R3 (medium density residential) land on the marina site.
Clause 6C Certificate	The previous application was for a development described in Schedule 1 of the Major Development SEPP, being a marina facility, and would have been, without the issue of a Clause 6C Certificate, a development to be dealt with under Part 3A of the EP&A Act, for which the Minister for Planning was the consent authority. However, a Clause 6C Certificate was issued allowing the development application to be dealt with under Part 4 of the EP&A Act where Liverpool City Council was the consent authority. The State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP) now specifies what types of development are State Significant development pursuant where the Minister for Planning is the consent authority. Marinas are not a type of development specified under the SRD SEPP and are assessed under Part 4 of the EP&A Act where the local council is the consent authority. Accordingly, the development application for the proposal will be assessed under Part 4 of the EP&A Act and Liverpool Council is the consent authority.

Table 3.1 **NSW and Commonwealth legislation**

Legislation	Summary
<i>Threatened Species Conservation Act 1995 (NSW)</i>	
Threatened animal or plant species	The <i>Threatened Species Conservation Act 1995</i>: - identifies and protects threatened, endangered, species, populations and ecological communities; critical habitat; key threatening processes; - sets out requirements for preparation of a Species Impact Statement (SIS) where development is likely to have a significant effect on the above; and - requires a license to be obtained to harm threatened species, populations or ecological communities unless authorised via a development consent granted under Part 4 of the EP&A Act. There are no threatened animal or plant species located in the marina site. The site is not a significant part of the habitat threatened animal or plant species. No significant impacts to threatened species, populations and communities are anticipated from the construction and operation of the marina (see Section 6.4.1). Therefore, a species impact statement is not required.
<i>Fisheries Management Act 1994 (NSW)</i>	
Harm of marine vegetation	The <i>Fisheries Management Act 1994</i> aims to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. The proposal will be referred to Fisheries NSW pursuant to Section 205 of the Act to obtain a permit to harm of marine vegetation during construction of the marina entrances and embellishment of the banks of the Georges River.
<i>Water Management Act 2000 (NSW)</i>	
Controlled Activity Approval	A Controlled Activity Approval under the <i>Water Management Act 2000</i> and the Water Management Amendment (Controlled Activities) Regulation 2008 is required for works carried out on waterfront land. The proposed works are deemed to be on waterfront lands and a Controlled Activity Approval will be required.

Table 3.1 **NSW and Commonwealth legislation**

Legislation	Summary
<i>Protection of the Environment Operations Act 1997 (NSW)</i>	
Environmental Protection Licence	The <i>Protection of the Environment Operations Act 1997</i> includes statutory provisions for the management and prevention of environmental harm from pollution. An Environment Protection Licence (EPL) is required to authorise the carrying out of ‘scheduled’ activities or development work (as specified in Schedule 1 of the Act). The proposed development will not include: • boat construction/maintenance (dry/floating docks): capacity to handle vessels 25 m or longer; or • boat construction/maintenance (general): capacity to handle more than 5 vessels longer than 5 m (excluding rowing boats, dinghies and other small craft) at any time; or • boat moorings and storage: capacity to handle more than 80 vessels (excluding rowing boats, dinghies and other small craft) at any time. Therefore, it is understood that the marina will not be a scheduled facility and will not require an EPL. However, this will be confirmed with the EPA.
<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>	
EPBC Act referral	The <i>Commonwealth Environmental and Biodiversity Conservation Act 1999</i> provides an assessment and approvals system for actions that have significant impact on matters of national environmental significance, on the environment of Commonwealth land and actions carried out by the Commonwealth Government. The proposed development will not have a significant impact on matters of national environmental significance as listed in the EBPC Act and, accordingly, a referral to the Commonwealth Minister for the Environment is not required.

3.2 State environmental planning policies, other policies and guidelines

The key State environmental planning policies, other policies and guidelines that are relevant to the marina development are summarised in Table 3.2. Further details are provided in Section 3.3.

Table 3.2 **Key planning instruments and guidelines**

Planning instrument/guideline	Summary
State Environmental Planning Policy No 19 – Bushland in Urban Areas	SEPP No 19 aims to protect and preserve bushland within the urban areas and maintain its value to the community as part of the natural heritage and its aesthetic value and recreational, educational and scientific resource. As described in Section 3.3.1, the proposed development is considered to comply with the provisions of SEPP No 19.
State Environmental Planning Policy No 33 – Hazardous and Offensive Development	SEPP No 33 identifies potentially hazardous and offensive development and provides for risk threshold screening and preliminary hazard analysis to determine site suitability and potential impacts. The proposed development has been assessed and it has been determined that the development is not potentially hazardous (see Section 5.1.1) or offensive (see Section 5.5).
State Environmental Planning Policy No 55 – Remediation of Land	SEPP No 55 provides that a consent authority must consider contamination and remediation in determining the determining development application. A preliminary investigation of contamination (Appendix C) has been undertaken. The marina site is suitable for the proposed future land use (the marina development) or will be suitable for this use with minor remediation that may be the outcome of the recommended investigations (see Section 6.3.5).
State Environmental Planning Policy No 71 – Coastal Protection	SEPP No 71 aims to ensure a consistent and strategic approach to coastal planning and management and to ensure there is a clear development assessment framework for the coastal zone. It requires a consent authority to take into account specified matters in the determination of development applications including public access to and along the coastal foreshore, site suitability, impact on the amenity of the coastal foreshore, scenic qualities, coastal processes and hazards, water quality, Aboriginal and non-Aboriginal heritage, flora and fauna issues, and cumulative impacts. The proposed development is not within the area mapped as coastal zone maps so SEPP No 71 does not apply.
State Environmental Planning Policy (Infrastructure) 2007	Schedule 3 Clause 104 of this SEPP identifies traffic generating development that requires referral to the RMS for comment. As described in Section 3.3.3, Liverpool City Council officers considered traffic impacts associated with the previous application and concluded that vehicular access to the proposed development is satisfactory and will be unlikely to have an adverse traffic impact on the surrounding street network (LCC 2014). These elements have been formally addressed in a separate Development Application DA-61/2014 which was approved on 8 August 2014. In this respect, the proposed development has satisfied the requirements of State Environmental Planning Policy (Infrastructure) 2007.

Table 3.2 **Key planning instruments and guidelines**

Planning instrument/guideline	Summary
NSW Sea Level Rise Policy Statement Flood Prone Land Policy Floodplain Development Manual Coastline Management Manual Coastal Design Guidelines for NSW Georges River Coastal Zone Management Plan	The <i>Coastline Management Manual</i> (1990) and the <i>Floodplain Development Manual</i> (2005) – require consideration of climate change in the preparation of coastal hazard and flood studies and management plans. Section 117 Direction 2.2 – Coastal Protection – directs that a draft LEP includes provisions that give effect to and are consistent with the <i>NSW Coastal Policy</i>, the <i>Coastal Design Guidelines for NSW</i> and the <i>Coastline Management Manual</i>. Section 117 Direction 4.3 – Flood Prone Land – requires that a draft LEP includes provisions that give effect to and are consistent with the <i>Floodplain Development Manual</i> and the <i>NSW Flood Prone Land Policy</i>. Liverpool City Council has considered all these issues in the making of the Liverpool LEP which was considered by the Minister for Planning and Gazetted on 28 August 2008. The LEP included the rezoning of the marina site for medium density residential development and the determination of the 1:100 flood levels. The proposed marina has been designed to accommodate potential flood impacts in accordance with these policies. The Georges River Coastal Zone Management Plan aims to “preserve and enhance the environmental values of the estuary amid the burgeoning urban development across the catchment, which presently accommodates more than 1.2 million people.” The primary goal of this document has been defined as “to conserve and improve the existing natural environment of the Georges River Estuary, and to improve the water quality of the estuary through targeted pollution reduction”. The proposed development would meet these aims and objectives for the future management of the Georges River estuary.
Australian Standard AS3962-2001: <i>Guidelines for Design of Marinas</i>	This standard provides designers, manufacturers and operators of marina and berthing facilities with a guidelines for recreational marinas and small commercial vessels up to 50 m long. Guidance is also given for onshore facilities such as dry berth storage, boatlifts, boat ramps and associated parking facilities. Michael Fountain Architects considered the standard in designing the marina and the proposed development to ensure that it complies with the standards requirements.

Table 3.2 **Key planning instruments and guidelines**

Planning instrument/guideline	Summary
Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment Biodiversity of the Georges River Catchment Georges River Catchment Built Environment and Foreshore Access Study Georges River Catchment: Better Practice Guidelines for Foreshore Works	The Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment specifies the types of development which significant impacts on water quality and river flows in the Georges River and its tributaries. It sets out general principles and planning controls in relation to the developments specified. Associated reports include: • <i>Georges River Catchment Built Environment and Foreshore Access Study</i> – provides planning and management measures to improve of the scenic environment and access to the waterways; • <i>Biodiversity of the Georges River Catchment</i> – provides a regional context for biodiversity planning guidelines for biodiversity management; and • <i>Georges River Catchment: Better Practice Guidelines for Foreshore Works</i> – provides guidelines to assist practitioners during the planning and implementation of works on the foreshores of the Georges River and its tributaries. An assessment against the principles of the Regional Environmental Plan and associated documents is provided in Section 3.3.4. The proposed development will comply with this Regional Environmental Plan.

3.3 Additional information regarding relevant legislation

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

State Environmental Planning Policy No 19 – Bushland in Urban Areas aims to protect and preserve bushland within the urban areas and maintain its value to the community as part of the natural heritage and its aesthetic value and recreational, educational and scientific resource.

The SEPP includes the following relevant definition:

bushland means land on which there is vegetation which is either a remainder of the natural vegetation of the land or, if altered, is still representative of the structure and floristics of the natural vegetation.

The marina site both adjoins and contains land zoned RE1 Public Recreation under the LEP. Accordingly, a merit assessment of the proposed development against Clause 9 “Land adjoining land zoned or reserved for public open space” has been undertaken. The following table summarises the matters for consideration in determining development application and compliance.

Table 3.3 Consideration of SEPP No 19

Clause 9 Land adjoining land zoned or reserved for public open space	Comment
This clause applies to land which adjoins bushland zoned or reserved for public open space purposes.	The marina site adjoins and contains RE1 Public Recreation land.
Where a public authority: • proposes to carry out development on land to which this clause applies; or • proposes to grant approval or development consent in relation to development on land to which this clause applies; and • the public authority shall not carry out that development or grant the approval or development consent unless it has taken into account.	The application involves granting of development consent on land to which this clause applies.
The need to retain any bushland on the land.	A VPA has been executed with the property owner and Liverpool City Council and contains work which requires the property owner to re-vegetate the river foreshore in accordance with a VMP to be submitted in accordance with the agreement. The VMP needs to demonstrate how weeds will be removed and how the remediated marina site will be managed in the future.
The effect of the proposed development on bushland zoned or reserved for public open space purposes and, in particular, on the erosion of soils, the siltation of streams and waterways and the spread of weeds and exotic plants within the bushland.	A VMP is to be prepared as mandated by the VPA. The conditions issued for the previous development application considered the general terms of approval issued from the NSW Office of Water; Fisheries NSW and Environment Protection Authority (EPA). The VMP and other approvals required to carry out work will sufficiently address these matters.
Any other matters which, in the opinion of the approving or consent authority, are relevant to the protection and preservation of bushland zoned or reserved for public open space purposes.	The VMP is considered to be sufficient in preserving and embellishing bushland areas with the intent to enhance these areas for public benefit.

The proposed development is, therefore, considered to comply with the provisions of SEPP No 19.

3.3.2 State Environmental Planning Policy No 55 – Remediation of Land

State Environmental Planning Policy No 55 – Remediation of Land (SEPP No 55) provide aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment.

A preliminary investigation of contamination prepared in accordance with the *Guidelines for Consultants Reporting on Contaminated* (OEH 2011) is provided in Appendix C.

The contamination and remediation to be considered in determining development application as described in clause 7(2) of SEPP No 55 and the related investigation findings are summarised in Table 3.4.

Table 3.4 SEPP 55 Clause 7: Contamination and remediation to be considered in determining development application

	Clause	Preliminary investigation finding
(1)	A consent authority must not consent to the carrying out of any development on land unless:	
(a)	it has considered whether the land is contaminated, and	There is minor soil contamination of the land and there are elevated ammonia concentrations in the groundwater.
(b)	if the land is contaminated, it is 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, and	The marina site is suitable for the proposed future land use as a proposed marina development as well as for use for high-density residential dwellings with minimal opportunities for soil access in its contaminated state, or will be suitable for these uses with minor remediation that may be the outcome of the recommended investigations.
(c)	if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.	Implementation of the measures recommended in Section 10.2 (including remediation if required), will ensure that the land will be suitable for the proposed uses.
(2)	Before determining an application for consent to carry out development that would involve a change of use on any of the land specified in subclause (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines.	This report describes the findings of the PI and was prepared in accordance with the contaminated land planning guidelines.
(3)	The applicant for development consent must carry out the investigation required by subclause (2) and must provide a report on it to the consent authority. The consent authority may require the applicant to carry out, and provide a report on, a detailed investigation (as referred to in the contaminated land planning guidelines) if it considers that the findings of the preliminary investigation warrant such an investigation.	This report will be provided to Liverpool City Council and the consent authority, the Sydney West Joint Regional Planning Panel. While further investigations regarding ammonia in groundwater are recommended in Section 10.2, a “Detailed Contamination Assessment” of the marina site as a whole has not been recommended.

Table 3.4 SEPP 55 Clause 7: Contamination and remediation to be considered in determining development application

	Clause	Preliminary investigation finding
(4)	The land concerned is:	
(a)	land that is within an investigation area,	This PI considers the whole of the marina site as the land concerned.
(b)	land on which development for a purpose referred to in Table 1 to the contaminated land planning guidelines is being, or is known to have been, carried out,	Extractive industry (as listed in Table 1 to the contaminated land planning guidelines) has been conducted at the marina site since approximately 1993.
(c)	to the extent to which it is proposed to carry out development on it for residential, educational, recreational or child care purposes, or for the purposes of a hospital—land:	The proposed uses of the site includes recreational land and may, in the future, include residential.
(i)	in relation to which there is no knowledge (or incomplete knowledge) as to whether development for a purpose referred to in Table 1 to the contaminated land planning guidelines has been carried out, and	See 4(b).
(ii)	on which it would have been lawful to carry out such development during any period in respect of which there is no knowledge (or incomplete knowledge).	See 4(b).

3.3.3 State Environmental Planning Policy (Infrastructure) 2007

The proposal includes a club and recreational facilities and parking for in excess of 200 vehicles; which is identified in Schedule 3 of State Environmental Planning Policy (Infrastructure) 2007 as a traffic generating development.

Pursuant to Clause 104, the previous application was referred to the Sydney Regional Development Advisory Committee (SRDAC) at RMS at its meeting on 11 April 2012.

The SRDAC raised the issue of vehicular access arrangements to the marina site and associated intersection treatment with Brickmakers Drive. It was noted that the vehicular access and intersection design to Brickmakers Drive did not form part of the subject application. However, information with respect to road and intersection design and traffic modelling to allow an assessment of traffic impact as part of the subject application has been submitted as part of the proposal. There is no change to the proposed intersection, other than to signalise the intersection.

It is proposed to install the traffic signals during construction of the intersection. While these are not required immediately for the Georges Cove Marina alone, the intersection is likely to require traffic signals in the longer term due to background traffic growth on Brickmakers Drive and future developments, such as the Mirvac Georges Cove residential development that will use the link road. Installing these signals during the initial intersection construction will provide greater certainty regarding the adequacy of the intersection to cater for traffic from future developments and will be less disruptive than installing signals at a later date when the link road is opened to traffic.

In regard to the previous application, Liverpool City Council officers considered traffic impacts and concluded that vehicular access to the proposed development is satisfactory and will be unlikely to have an adverse traffic impact on the surrounding street network (LCC 2014). These elements have been formally addressed in a separate Development Application DA-61/2014 which was approved on 8 August 2014.

3.3.4 Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment

The Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment (GMREP No2) aims to maintain and improve the water quality and river flows of the Georges River and its tributaries. The plan (Part 2, Clause 7) provides planning principles to be applied by a consent authority when determining a development application. Compliance with the general and specific planning principles provided in Part 2, clauses 8 and 9, is summarised in Table 3.5.

Table 3.5 Greater Metropolitan Regional Environmental Plan No 2 principles

Principles	Compliance
Clause 8 General Principles	
(a) the aims, objectives and planning principles of this plan	The proposed development seeks to maintain and improve the water quality of the Georges River.
(b) the likely effect of the proposed plan, development or activity on adjacent or downstream local government areas	The proposal will provide soil and erosion control measures; embellish river foreshore land; and provide site drainage. Therefore, it will improve the environmental performance of the marina site. The proposed development will not impact the eastern bank foreshore of the Georges River which is part of Bankstown LGA. There will be no downstream hydrological or water quality impacts so downstream LGAs will not be impacted.
(c) the cumulative impact of the proposed development or activity on the Georges River or its tributaries	The VMP will describe embellishment of the river foreshore. Conditions recommended by the EPA, NOW and Fisheries NSW in response to the previous application contain requirements which will address acid sulfate soils, contamination, vegetation, aquatic impact, erosion and sediment control and existing basin water. These requirements will be addressed prior to construction.
(d) any relevant plans of management including any River and Water Management Plans approved by the Minister for Environment and the Minister for Land and Water Conservation and best practice guidelines approved by the Department of Urban Affairs and Planning (all of which are available from the respective offices of those Departments)	Biodiversity of the Georges River Catchment The development will assist biodiversity in the Georges River catchment by restoring the existing extractive industry site to provide habitat in the RE1 foreshore zone. The foreshore area will be embellished and stabilised with a rockwall and be revegetated with native species in accordance with the VMP. Georges River Catchment Built Environment and Foreshore Access Study This study identified planning and management measures to improve of the scenic environment and access to the waterways. In a specific local context it is noted that the Boat ramp on Davey Robinson Drive was identified as demonstration site for future development and enhancement. The demonstration sites are intended to illustrate the widest range of development and design opportunities for foreshore improvements, to consider access, recreation, built form, environment, cultural heritage and scenic quality. The proposed marina development meets the main criteria for future development as reflected in the suggested demonstration sites as it will:

Table 3.5 Greater Metropolitan Regional Environmental Plan No 2 principles

Principles	Compliance
	- provide a range of levels of access to the river; - enhance the natural values and recreational amenity of the foreshore areas and reduces adverse impacts on the waterway; - provide existing or potential links between access points and recreation areas; - link existing open space with foreshore bushland and enhance the riparian zone; - build on existing programs and projects in the area; - enhance the focus on the river; - improve the ecological environment by controlling access; and - have significant scenic amenity values. Georges River Catchment: Better Practice Guidelines for Foreshore Works Construction of the river bank rock unmooring and foreshore embellishments will be conducted in a manner consistent with the principles set out in these guidelines.
(e) the Georges River Catchment Regional Planning Strategy (prepared by, and available from the offices of, the Department of Urban Affairs and Planning)	The proposal will meet the initiatives of this strategy.
(f) all relevant State Government policies, manuals and guidelines of which the council, consent authority, public authority or person has notice	The previous application was provided to EPA, NOW and Fisheries NSW which issued general terms of approval.
(g) whether there are any feasible alternatives to the development or other proposal concerned	The marina site currently accommodates an extractive industry. The locality has been rezoned to accommodate for residential, business and recreational uses which is in keeping with the surrounding residential area. Alternative land-uses are discussed in Section 2.11.
Clause 9 specific principles:	
(1) acid sulfate soils	The marina site has been identified on the LEP Acid Sulfate Soils map. An acid sulfate soil management plan is provided in Appendix K.
(2) bank disturbance	No disturbance of the bank or foreshore along the Georges River and its tributaries is proposed other than during construction when the marina entrance will be opened (see Section 2.10.3) and rock armouring that will be installed as part of foreshore embellishment (see Section 2.3.5).
(3) flooding	The marina site contains flood prone land. Flooding risk is addressed in Section 3.4.3.
(4) industrial discharges	There will be no industrial discharges from the marina site.
(5) land degradation	The proposed development will provide a stable landform with appropriate drainage, including along the foreshore. Erosion prevention and sediment control measures will be implemented during construction (see Section 2.10.9).
(6) onsite sewage management	The marina site will be connected to the sewer mains (see Section 2.8.4).

Table 3.5 Greater Metropolitan Regional Environmental Plan No 2 principles

Principles	Compliance
(7) river-related uses	River foreshore land to be embellished as per the VPA.
(8) sewer overflows	Onsite sewerage will be designed to prevent sewage discharge to the river in the event of an overflow.
(9) urban/stormwater runoff	Drainage details will be provided with the Construction Certificate application.
(10) urban development areas	Flooding controls to be implemented. The provision of pumpout facilities will reduce nutrients and pathogens entering the river from boats.
(11) vegetated buffer areas	River foreshore land to be embellished as per the VPA which will include vegetation enhancement.
(12) water quality and river flows	The development is unlikely to impact on water quality.
(13) wetlands	River foreshore land will be embellished as per the VPA.
Clause 10 Consultation	
(1) Required consultation	The Liverpool City Council will consult with the authorities listed in Clause 11 'marinas and slipways'.
(2) Consultation procedure	The Council will consult in accordance with this clause.
Clause 11 Planning control table	
(a) marinas and slipways	A VMP will be prepared for the site which aims to embellish the river foreshore land along the Georges River. The previous application was provided to EPA, NOW and Fisheries NSW which issued general terms of approval regarding acid sulfate soils, contamination, vegetation, aquatic impact, erosion and sediment control and existing basin water. This EIS addresses: • potential impacts on the aquatic environment (see Section 6.4.3); • onsite sewage management (Section 2.8.4); • management of fuels and other chemicals (Section 5); • navigation (Section 6.10.2); • bank stability (Section 6.1.2); and • acid sulfate soils (Section 6.2.1).

In regard to the previous application Liverpool City Council (2014) concluded that "[i]t is considered that the proposal satisfies the provisions of the GMREP No2 and would have minimal impact on the Georges River Catchment."

3.4 Liverpool Local Environmental Plan and Development Control Plan

3.4.1 Liverpool Local Environmental Plan zoning

Lot 7 DP 1065574 is part zoned B6 Enterprise Corridor, R3 Medium Density Residential, SP2 Infrastructure, Public Recreation RE1 and Private Recreation RE2 pursuant to the LEP.

The LEP states that marinas are permissible with consent within the RE1 and RE2 zones.

The LEP further provides that:

marina means a permanent boat storage facility (whether located wholly on land, wholly on a waterway or partly on land and partly on a waterway), and includes any of the following associated facilities:

- a) any facility for the construction, repair, maintenance, storage, sale or hire of boats;
- b) any facility for providing fuelling, sewage pump-out or other services for boats;
- c) any facility for launching or landing boats, such as slipways or hoists;
- d) any carparking or commercial, tourist or recreational or club facility that is ancillary to the boat storage facility; and
- e) any berthing or mooring facilities.

The proposal involves the short- and long-term storage of vessels on land adjoining the Georges River. Functions carried out at the marina site will be consistent with the facilities detailed in the land use definition. Accordingly, the proposal is permitted in the applicable zones with Development Consent.

3.4.2 Liverpool Local Environmental Plan Principle Development Standards

There are a number of applicable principle development standards within the LEP as described below.

i Clause 4.3: height of buildings

Clause 4.3(2) - Height of buildings-states the following:

The height of a building on any land is not to exceed the maximum height shown for the land on the Height of Buildings Map.

The marina site contains a partial maximum height requirement of 15 m and 21 m. The majority of the proposed buildings at the marina site are to be located on land identified within the maximum height requirement of 21 m.

The proposed Maritime Building will be the largest built form (see Appendix M, Drawing DA-020). At basin level of 2.8 m AHD, the Maritime Building will have a maximum ridge height of 23.8 m AHD. With consideration of architectural blade walls, the Maritime Building will have a maximum height of 24.4 m AHD which represents a maximum building height of 21.6 m.

The proposal will exceed the maximum building height of 0.6 m. Notwithstanding, consideration of architectural roof features is outlined LEP and enables such roof features to exceed 0.6 m.

Clause 5.6 Architectural roof features are prescribed in part as follows:

Architectural roof features.

.....

(2) Development that includes an architectural roof feature that exceeds, or causes a building to exceed, the height limits set by clause 4.3 may be carried out, but only with development consent.

(3) Development consent must not be granted to any such development unless the consent authority is satisfied that:

(a) the architectural roof feature:

(i) comprises a decorative element on the uppermost portion of a building, and

(ii) is not an advertising structure, and

(iii) does not include floor space area and is not reasonably capable of modification to include floor space area, and

(iv) will cause minimal overshadowing, and

(b) any building identification signage or equipment for servicing the building (such as plant, lift motor rooms, fire stairs and the like) contained in or supported by the roof feature is fully integrated into the design of the roof feature”

The portion of the building that exceeds the maximum building height meets this criterion.

As described in Section 2.2.1, blade walls will be a prominent architectural feature of the Maritime Building, seeking to create significant visual articulation of the building elevation when viewed from the public domain. The blade walls traverse from ground level with protrusion past ridge height to create visual interest with the combination of substantial surface area for glazing to create a modern appearance.

In regard to the previous application Liverpool City Council (2014) concluded that:

It is considered that the increase in building height is relatively minor and seeks to create visual distinction having regard to the bulk and scale of the proposed development. Accordingly, the use of the architectural roof feature is supported in this instance.

ii [Clause 4.4: floor space ratio](#)

Clause 4.4(2) - Floor space ratio states “the maximum floor space ratio for a building on any land is not to exceed the floor space ratio shown for the land on the Floor Space Ratio Map”. The minimum floor space ratio applicable to the marina site is 0.25:1.

The proposal has a development footprint of 131,470 m² and has a gross floor area of 17,717 m² (ie excluding carparking and terraces and balconies with outer walls less than 1.4 m high). It, therefore, will have a floor space ratio of 0.13:1 which will meet the minimum floor space ratio applicable to the marina site requirement.

3.4.3 [Liverpool Local Environmental Plan Miscellaneous Provisions](#)

i [Clause 5.1: relevant acquisition authority](#)

Portions of the subject property are zoned SP2 Drainage and RE1 Public Recreation under the LEP. Liverpool City Council is required to acquire these portions of land once a subdivision is registered creating separate Lots in a DP. The acquisition of these Lots would be financed through the Section 94 Contribution fund within that area.

These types of acquisitions fall under the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991*. In regard to the previous application LCC (2014) states that “[t]he issue of acquisition is properly dealt with at a later stage as a part of the redevelopment of the site as per the Voluntary Planning Agreement which is in place between the land owner and Council”.

ii **Clause 5.1A: development on land intended to be acquired for a public purpose**

Land zoned RE1 Public Recreation is identified as per Clause 5.1 of the LEP to be acquired by Council. The acquisition process would commence once the subdivision of those portions of land is granted consent (LCC 2014). Until such time that this process commences, earthworks and recreation areas are permitted only on that portion of RE1 land.

The proposal involves earthworks to enable the rehabilitation of the marina site and establishment of a seawall which is consistent with Clause 5.1A. Moreover, recreation areas are proposed along this portion of land comprising of grassed open space, footpaths and a pedestrian bridge for connectivity. In regard to the previous application LCC (2014) found “it is considered that that the proposal has met these requirements”.

iii **Clause 5.7: development below mean high water mark**

Clause 5.7 of the LEP prescribes the following:

- the objective of this clause is to ensure appropriate environmental assessment for development carried out on land covered by tidal waters; and
- development consent is required to carry out development on any land below the mean high water mark of any body of water subject to tidal influence (including the bed of any such water).

The river foreshore is to be embellished for the purposes of public land and will provide for a basin entry of approximately 40 to 50 m wide leading into the marina.

A tidal hydrodynamic model for tidal movements in the Georges River from Picnic Point, downstream of the marina site, to Lansvale upstream of the Chipping Norton lakes system (and upstream of the marina site) was developed by Worley Parsons. The Worley Parsons assessment report (Appendix B1) found that:

The model results indicated that a high degree of exchange will occur between the river and the marina, due to the relatively wide marina entrance. The river is approximately 80 m wide in this location, while the entrance is at least 40 m wide. The water levels in the marina mimic those in the river, indicating that the entrance does not control flows entering and leaving the marina basin.

The model indicated that flow velocities due to tidal flows were low. Velocities in the marina basin were below 0.05 m/s and velocities in the river adjacent to the proposed marina were generally less than 0.3 m/s.

Although the tidal flow velocities are low, other factors also affect bank stability. The 1.5 year ARI flow is considered to be the “bank forming” flow, during which velocities will likely be higher than those during tidal flow conditions. Waves generated by boats on the river also affect bank stability. The bank protection will be designed to withstand these forces.

iv [Clause 5.89: preservation of trees](#)

A series of ecological assessments have been completed for the marina site (Section 6.4.1). While the proposal will require the removal and modification of small areas of terrestrial habitat, it will result in an overall improvement in the quality and amount of available habitat within the site, in part due to the implementation of the VPA and associated VMP.

v [Clause 7.6: environmentally significant land](#)

The marina site has environmentally significant land shown on the environmentally sensitive land map in the LEP (the RE1 Public Recreation). However, the development proposed to this land is mandated by the VPA.

vi [Clause 7.7: acid sulfate soils](#)

The marina site has been identified on the LEP Acid Sulfate Soils map. An acid sulfate soil management plan is provided in Appendix K. The site is currently licensed by EPA for the disposal of acid sulfate soils as well as VENM. LCC (2014) included conditions recommended by EPA in regard to acid sulfate soils. In regard to the previous application LCC (2014) found “[t]he provisions of Clause 7.7 have therefore been met”.

vii [Clause 7.8: Flood planning](#)

An extensive flood assessment as well as detailed hydraulic modelling has been undertaken by Worley Parsons, Cardno and NPC (Appendix B).

During the assessment of the proposal, minor amendments were made to the development to permit the passage for flood flows onto Council reserve to ensure flood storage areas are fully utilised during flood events. The flood reports confirmed that the proposed development will have a negligible impact on the behaviour of flooding in the flood storage area located south-west of the proposed marina and nil or negligible impacts on any other adjacent properties. In regard to the previous application LCC (2014) found “[t]he proposal therefore has satisfied the provisions of Clause 7.8.”

viii [Clause 7.9: Foreshore building line](#)

The marina site is affected by a foreshore building line as set out in the LEP maps. This provision applies to the land that is zoned RE1 – Public Recreation. The only works within the RE1 – Public Recreation zone will be associated with the restoration of the river foreshore and recreational facilities such as paths, picnic shelters, bike paths as prescribed in the VPA. Consequently, the development will comply with this requirement.

ix [Clause 7.31: earthworks](#)

The marina site has been subject to extractive industry for a number of years and in its current state is highly degraded. As part of the original development consent granted for extractive industry activities at the site, the rehabilitation of the land was also approved in ensuring that the marina site be returned to a restored landform. The proposed development utilises part of the existing landform to create the marina basins as well as some works to accommodate the proposed development of both the natural and built environment.

Concurrence approvals issued by NOW, EPA and Fisheries NSW for the previous application contained numerous requirements for vegetation, earthworks and water quality. In regard to the previous application LCC (2014) stated, “Moreover, matters relating to relics of both aboriginal and European cultural heritage can be conditioned given the current operations of the site and the need to allow for the cessation of all works prior to further investigation. Such matters can be conditioned to ensure that should any relics be discovered, that these be left in-situ while further investigation is made.”

3.4.4 Section 79C(1)(a)(ii): any draft environmental planning instrument

No draft planning instruments apply to the marina site.

3.4.5 Liverpool Development Control Plan

Liverpool City Council determined (LCC 2014) that the previously proposed development (DA-846/2012) complied with all relevant sections of the DCP. The proposed development is unchanged.

The following parts of DCP are applicable to the proposed development:

- Part 1.1 – General Controls for all Development;
- Part 1.2 – Additional General Controls for Development; and
- Part 2.10 – Moorebank East (Benedict Sands).

Each of the are addressed in detail below.

3.4.6 Liverpool Development Control Plan - Part 1.1: General Controls

i Tree preservation

Tree preservation is addressed in Section 3.4.3. The development will comply with this DCP requirement.

ii Landscaping and incorporation of existing trees

Where possible, all of the mature trees on-site will be preserved. The location of the marina entrance has been designed to avoid existing trees. However, it is noted that the revegetation of the river foreshore will be carried out in accordance with the VMP. Accordingly, the development will comply with this DCP requirement.

iii Bushland and fauna habitat protection

Bushland and fauna habitat protection is addressed in Section 3.3.1. Accordingly, the development will comply with this DCP requirement.

iv Bushfire risk

Part of the marina site is identified as bushfire prone land on the LEP Bushfire Prone Land Map. A bushfire assessment report was prepared as part of the original zoning proposal (Total Earth Care 2006). The report found that development can be undertaken on the site subject to:

- all buildings constructed with adoption of appropriate construction standards;

- provision of Asset Protection Zones where appropriate;
- construction of a perimeter road for access for fire fighting vehicles;
- provision of services; and
- landscaping.

These issues will be addressed as part of the detailed design to be undertaken at Construction Certificate stage. Accordingly, the development will comply with this DCP requirement.

v Water cycle management

The Maritime Building and the Private Marina Clubhouse (being the major built forms on the marina site) will harvest roof water for storage and use. Additionally, the design of the marina basin has incorporated the construction of large wetlands for polishing and treatment of storm water run-off from the development. However, most storm water runoff from the marina site will be directed to the large storm water channel running along the eastern boundary of the site. Accordingly, the development will comply with this DCP requirement.

vi Development near creeks and rivers

The development near creeks and rivers control applies to the marina site as works are occurring within 40 m of a watercourse, creek or river.

The proposed development is identified as Integrated Development under Section 91 of the EP&A Act as it requires a Controlled Activity Approval under the *Water Management Act 2000*.

The previous application was referred to NOW, which issued general terms of approval for the purposes of a Controlled Activity Approval on matters relating to the:

- VMP;
- works schedule;
- erosion and sediment control plan; and
- soil and water management plan.

In addition, conditions recommended by EPA and Fisheries NSW included vegetation, water quality and erosion and sediment control requirements.

Embellishment of foreshore land is required as part of the VMP.

The VMP will be prepared in accordance with the general terms of approval and the applicable controls in this clause. Accordingly, the development will comply with this requirement of the DCP.

vii Erosion and sediment control

Erosion and sediment control measures will be implemented during construction (see Section 2.10.9).

There will be no discharges to natural watercourses prior to thorough testing and certification of the water quality of the marina basin prior to the opening of the marina basin to the Georges River as detailed in the Worley Parsons Report (Appendix B1).

Accordingly, the development will comply with this requirement of the DCP.

viii **Flooding risk**

Flooding risk is addressed in Section 3.4.3. The development will comply with this DCP requirement.

ix **Contaminated land risk**

Contaminated land risk is addressed in Section 3.3.2. The development will comply with this DCP requirement.

x **Salinity risk**

An assessment of salinity risk has been undertaken by Douglas Partners with a view to determining the need to undertake an investigation in accordance with the NSW Department of Natural Resources Guidelines (Western Sydney Salinity Code of Practice, 2003 (Amended January 2004)). Douglas Partners advised that:

The site is not within high salinity potential area as evidenced by the DIPNR Western Sydney Salinity Hazard Map. The site is in an area as identified on this plan only as a moderate salinity potential area. However, given the location of the site on a flood plain it is inappropriate to undertake any investigation; as such an investigation will serve no purpose. This is because salinity is a function of rising water tables. This site is clearly in the flood plain and the water table is naturally high in this environment. More importantly, the water table will remain high for as long as the site remains in the flood plain.

In light of the above, a detailed salinity assessment had not been carried out as the groundwater conditions are noted to be dictated by the marina site being in a flood plain and directly adjacent to the Georges River. In regard to the previous application, LCC (2014) stated that a condition was to be imposed requiring further assessment of salinity prior to the issue of a Construction Certificate.

xi **Acid sulfate soils risk**

Acid sulfate soils are addressed in Section 3.4.3. The development will comply with this DCP requirement.

xii **Weeds**

Noxious weeds have not been identified on-site. Removal of noxious weeds (if found) is required as part of the VPA. These works will be detailed in the VMP and the development will comply with this DCP requirement.

xiii **Demolition of existing developments**

No demolition of any existing buildings is proposed as part of this development application so the development will comply with this DCP requirement.

xiv [Aboriginal archaeology](#)

The Aboriginal heritage assessment and review (Appendix I) found that there are no Aboriginal archaeology items or sites on the marina site so the development will comply with this DCP requirement.

xv [Heritage and archaeological sites](#)

The historic heritage assessment and review (Appendix J) found that there are no heritage or archaeology items or sites on the marina site so the development will comply with this DCP requirement.

3.4.7 [Development Control Plan – Part 1.2: Additional General Controls for Development](#)

i [Car parking and access](#)

It is proposed that 637 car parking spaces will be provided as part of the development. In regard to the previous application, LCC (2014) stated that:

A total of 560 parking spaces are provided. Council's Traffic Engineering Department has reviewed the proposal and notes that sufficient demonstration has been made that the total contingent of parking is sufficient for the needs of the proposed development would raise no objection.

The marina site access has been previously approved.

ii [Water and energy conservation](#)

The development proposal includes the use of the roofs of the proposed Maritime Building and the Private Marina Clubhouse to harvest water for reuse on-site. In addition, the Maritime Building in particular will incorporate significant use of translucent/clear panels to provide the maximum amount of natural light to use inside the structure. Additional energy saving features will be detailed in the construction certificate and detailed design stage.

iii [Landfill](#)

The landfill section of the DCP does not apply to land where cut and fill occurs in conjunction with a development application for a building(s).

iv [Waste management](#)

Benedict is one of the largest recyclers of construction and demolition materials in Sydney. Benedict has a 3.2 ha facility on Riverside Road, Chipping Norton. This facility will receive all the construction generated from the redevelopment proposed in this EIS. It is expected that the recycling rate achieved from these materials will be approximately 88% based on the performance of the recycling facility to date. A Waste Management Plan – Construction will be appended to the development application form.

There will be no demolition of existing structures or residential development so waste management plans for these activities are not required.

v [Outdoor advertising](#)

No advertising structures are proposed as part of the application.

3.4.8 Development Control Plan – Part 2.10: Moorebank East

It is noted that Part 2.10 of the DCP relates primarily to residential development. However, the proposed development complies with this part of the DCP, in particular the road network planned for the precinct.

i Street network

Vehicular access from Brickmakers Drive to the proposed marina will be provided (see Appendix E) that is consistent with the DCP. The design, construction and use of the link road have been approved by Liverpool City Council (DA-61/2014 and DA 1552/2006/B).

ii Pedestrian and cyclist amenity

In accordance with the VPA, pedestrian/bicycle access will be provided throughout the marina site, including:

- on the future link road bridge from Brickmakers Drive; and
- along the river foreshore area.

iii Open space

Access to public open space areas with frontage to the Georges River will be provided by the embellishment of the river foreshore and construction of a pedestrian/cycleway and dedicated for public use as required by the VPA.

iv Foreshore access

Access to the Georges River foreshore will be provided by with the embellishment of the river foreshore and construction of a pedestrian/cycleway and dedicated for public use as required by the VPA.

v Drainage

A drainage channel to service the development will be provided as required by the VPA.

3.5 Voluntary planning agreement

A VPA pursuant to Section 93F of the EP&A Act was executed between Liverpool City Council and Tanlane Pty Ltd on 11 June 2008. The VPA applies to the marina site and, in summary, requires the following contributions/works:

1. embellishment of river foreshore land;
2. dedication of river foreshore land to the Council subject to a 50 m wide easement for maritime vessel access as well as two easements for the drainage of water;
3. development of a VMP;
4. completion of works described in the VMP;
5. conducting maintenance works described in the VMP;

6. construction of a bike/pedestrian path through the river foreshore land;
7. construction of passive recreation facilities on the river foreshore land;
8. dedication of a drainage channel;
9. construction and dedication of a road bridge over the drainage channel, embankment and road to Brickmakers Drive;
10. construction and dedication of pedestrian access to Newbridge Road and a pedestrian path within the public verge along the entire length of the land frontage to Newbridge Road; and
11. dedication of an easement over land for access for the purpose of allowing Council to undertake maintenance to the river foreshore land.

The VPA contains the timeframes for completion of the various items and are noted to be activated either by the registration of subdivision of residential land or on completion of embellishment of river foreshore land.

It is likely that the items outlined in the VPA will be carried out in conjunction with the construction of the proposed development, which will include:

- removal of waste and fill, visible surface waste on foreshore, and any contamination;
- stabilisation of the river bank/wall;
- removal of noxious weeds if identified;
- restoration and enhancement of vegetation in keeping with indigenous species;
- construction of the pathway along the entire length of the river foreshore area;
- installation of street furniture comprising of benches and covered areas; and
- provision of flood free vehicular access.

The VPA contains the timeframes for completion of the various items and are noted to be activated either by the registration of subdivision of residential land or on completion of embellishment of river foreshore land.

4 Consultation

4.1 Overview

This chapter provides an overview of stakeholder engagement for the proposal, a description of the engagement activities undertaken, and a summary of the findings that have been incorporated into this EIS.

Stakeholder engagement and consultation forms a key platform for the preparation of environmental impact assessments such as EISs and is a requirement of the SEARs for the project.

Consultation was undertaken during the preparation and assessment of the original EIS (Benedict 2012). Matters raised during the consultation process are detailed in the following sections. Further consultation was undertaken during the preparation of this updated EIS.

The previous development application and EIS were placed on public exhibition on three separate occasions from 28 March 2012 to 3 May 2012, 9 May 2012 to 8 June 2012 and from 3 July 2013 to 2 August 2013. Each exhibition period observed a minimum 30 day public exhibition period in accordance with the Environmental Planning and Assessment Regulation 2000 and the DCP. A total of six separate submissions were received. Four expressed support for the proposal; and two submissions from the same author raised specific objection to vehicular access arrangements.

Unlike most other marinas, this project is unique as the entire development will take place on the proponent's own land. Therefore there was no requirement for detailed commercial consultation and negotiation with authorities such as the Land and Property Management Authority (LPMA) and RMS as they do not own the maritime precinct upon which the marina will be constructed.

4.2 Commonwealth government

The proposal is not predicted to have a significant impact on a matter of national environmental significance listed in the EPBC Act. Therefore, the Commonwealth Department of the Environment was not consulted regarding the proposal.

4.3 State and local government

State government agencies were consulted during the preparation of the original EIS. Consultation outcomes and comments from these agencies are summarised in Table 4.1.

Table 4.1 Agency consultation

Agency	Method	Issues raised
DPE	Submission in relation to development	Provided Director General's Environmental Assessment Guidelines (DGR 563).
Liverpool City Council	Pre-lodgement meeting	Concept plans were discussed with the Director of Planning as well as representatives from Council's Strategic Planning Department.
	Meeting	Confirmed the applicability of the existing flood data and published 1:100 year flood levels.
	Voluntary planning agreement	A VPA was agreed to between Liverpool City Council and Tanlane Pty Ltd on 11 June 2008.
	Submission in relation to development	No objections were raised, subject to conditions. The general terms of approval issued by the EPA, NOW and Fisheries NSW provided sufficient opportunity to address matters relating to aquatic ecology and vegetation.
Department of Lands	Meeting	Confirmation that beyond the boundary of the site, the LPMA is the owner of the riverbed. There will be no structures or any other type of building structures or encroachments upon the riverbed. LPMA indicated that they had no comments or inputs into this development process.
EPA	Submission in relation to development	General terms of approval issued.
NOW	Submission in relation to development	General terms of approval issued.
Fisheries NSW	Submission in relation to development	General terms of approval issued.
RMS	Submission in relation to development	No objections raised subject to vehicular access arrangement being confirmed.
Maritime services/ RMS	Submission in relation to development	No objections subject to a condition relating to a boating management plan.
Liverpool Local Area Command	Submission in relation to development	No objections raised subject to conditions.
Integral Energy (now part of Endeavour Energy)	Meeting	Established that the existing 600 kVA electricity substation will satisfy the predicted power demand. Integral Energy would be prepared to allow the proposed development to become a high voltage customer and install, operate and manage its own substations.
Sydney Water	Meeting	Sydney Water had no objection to the proposal discharging to sewerage mains, so long as the discharge into the existing sewers does not exceed 2 L/s which is easily achievable.

During the preparation of this EIS, EMM wrote to DPE requesting SEARs for the project on 19 March 2015. In turn, DPE requested input from EPA, OEH, DPI, NOW, and RMS regarding the SEARs. Each of these agencies, with the exception of OEH, provided information on the issues that require consideration in the EIS. These matters have been considered in the preparation of this EIS.

The SEARs were issued on 24 April 2015 and the agency letters were received by EMM on 28 April 2015. During the preparation of this EIS, EMM wrote to EPA, OEH, DPI, NOW, and RMS asking if there were any further matters that we should address in the EIS or if there are other matters for discussion. No additional matters were raised.

Benedict Industries met with Liverpool City Council in March 2015 to discuss reapplying for approval for the Georges Cove Marina.

Moorebank Recyclers were the only party to submit an objection to the previous application and initiated the Land and Environment Court proceedings, leading to the consent being invalidated. A letter was sent to Moorebank Recyclers on 6 May 2015 informing them of the intent to re-submit the application and asking whether there were any new issues that they wished to raise regarding the assessment of the proposal. Moorebank Recyclers replied on 12 May 2015 that they required all of the documents to be lodged in support of the application in order to provide any response. Given that the documents, including this EIS, were not completed until immediately prior to the submission of the application, Moorebank Recyclers will be able to provide a submission during the exhibition of the full application.

4.4 Community

Extensive consultation has been undertaken with the local residents in the Moorebank Residents Action Group. In a letter to Benedict Industries (28 November 2011), Moorebank Residents Action Group stated:

The Moorebank Residents Action Group has inspected the plans for the development and note the layout of the proposal as depicted in the attached document marked as Key Elements of the Proposal. Based on these documents we support the development which we understand will replace the existing quarrying and recycling activities which are currently undertaken on the site. Our support is based on the undertakings set out in the application that if the development is approved then:

- the existing quarrying and recycling facilities which are currently undertaken on the site will cease;
- the development will provide public access to the Georges River foreshore via pedestrian and bike paths as well as sections of the marina itself; and
- the river foreshore will be embellished and restored and eventually dedicated back to the Council.

Overall we believe the development will considerably improve the local amenity and provide attractive community recreational infrastructure which will directly benefit the Georges Fair precinct as well as the Liverpool and Western Sydney Region.

A representative of Benedict Industries visited residences along Brickmakers Drive adjacent to the site on 29 June 2015 to introduce (or reintroduce) the project and to provide contact details for further details or to address any questions. Issues raised during this community consultation included:

- other construction works currently occurring in the area – these are not associated with the proposed Georges Cove Marina;
- if Benedict Industries is associated with the proponent for the proposed Materials Recycling Facility, Moorebank (Moorebank Recyclers) – no;

- the road access to the proposed Materials Recycling Facility – if approved, the Materials Recycling Facility would use the new intersection off Brickmakers Drive; and
- anticipated timeframes for the completion of the marina – two to three years.

4.5 Proposed consultation

This EIS will be placed on public exhibition by Liverpool City Council. Benedict will respond to any submissions regarding the proposal. This may also highlight the need to consult with any individuals or groups with a particular interest in the proposal.

Ongoing consultation is planned with the following:

- Liverpool City Council, including regarding this EIS, development approval and subsequent consents;
- NOW – including regarding the requirement for a Controlled Activity Approval;
- Fisheries NSW regarding a permit to harm marine vegetation;
- EPA for comment on this EIS and regarding licensing requirements;
- RMS for comment on this EIS;
- other agencies providing comment on this EIS;
- the Moorebank Residents Action Group;
- neighbours – ongoing one-on-one consultation regarding the EIS and upcoming activities at the site; and
- utilities (water, sewerage and power) regarding services to the site.

5 Hazards

5.1 Fuel and hazardous material storage

5.1.1 SEPP No 33 hazard assessment

As described in Section 2.2.8, separate tanks storing 60,000 L of diesel and 60,000 L of petrol will be installed on the Maritime Building hardstand at RL 7.3 m and well above 1:100 year flood levels. The proposal does not include storage of any significant quantities of other types of fuels or of hazardous chemicals on the marina site although small quantities may be used in the workshop and for facility maintenance.

The fuel tanks will be approximately 50 m from the western boundary of the marina site. Petrol is a dangerous good as it is classified as a Class 3 Flammable Liquid under the *Australian Code for the Transport of Dangerous Goods by Road and Rail Edition 7.3* (Commonwealth of Australia 2014). Diesel is not listed in the code and is, therefore, not regarded as a dangerous good.

Facilities which store petrol could qualify as potentially hazardous development. This is determined by comparing the quantities stored and the distance of the storage from the facility boundary using figures 8 and 9 of *Applying SEPP 33 – Hazardous and Offensive Development* (NSW Department of Planning 2011). The proposed facility does not qualify as a potentially hazardous development as storage of 60,000 L (about 45 tonnes) of petrol 50 m from the facility boundary does not fall in the “potentially hazardous region” in the above figures. Therefore the facility is not considered to be “potentially hazardous” and a preliminary hazard analysis (PHA) for the proposed facility is not required.

The previous application was considered by the NSW EPA which provided conditions for roofing and bunding to be installed for the fuel loading and unloading facility at the marina site (LCC 2014). This will ensure that any leaks or spills are contained as well as isolated from the stormwater system. The Council recommended that should any chemicals or flammable liquids listed in the Australian Dangerous Goods Code be stored at the site in excess of relevant requirements, then further approval will be required.

Notwithstanding, the storage of petrol and diesel could be hazardous to employees and customers of the facility if there is a spill and/or fire. Fuel storages and dispensing equipment will be constructed and operated in accordance with relevant Australian standards and NSW work health and safety legislation.

5.1.2 Fuel storage and dispensing safeguards

The specific safeguards which have been incorporated into the development to reduce hazards relating to refuelling facilities include:

- portable fire extinguishers will be provided, selected from dry chemical, halogenated hydrocarbon and foam types;
- drip trays will be provided under and around the bowsers. Trays will be of sufficient size to hold any jerry cans being filled;
- a holding tray will be provided on-site to collect and retain the wastes from the drip trays;
- provision will be made for regular emptying and disposal of the holding tray to an approved system or site;

- oil/fuel booms will be provided to contain any accidental fuel spillage; and
- an oil absorbent material will be provided to absorb petroleum products spilt on the water surface.

All fuel systems will be secured and operated only by marina employees.

AS 3962-2001 notes the need for particular precautions when supplying fuel over water such as the use of double containment lines. All of these precautions have been adopted in the design and installation of the facilities.

5.1.3 Fire prevention and response

i General

All components of the marina development will be designed to meet all required fire standards and will also have specific emergency procedures. Fire fighting equipment will be provided in accordance with AS 3962-2001 and to the requirements of relevant authorities. The equipment provided will include fire hose reels, hydrants and fire extinguishers. Fire fighting equipment will be provided with the aim of rapidly extinguishing any fire in its initial stages.

Advisory notices outlining safety procedures will be prominently displayed at a number of strategic locations around the development.

A safety committee will be formed and appropriate emergency procedures will be developed in consultation with the local fire brigade. Staff will be familiar with:

- the procedures to follow in the event of a fire;
- the layout of the installation;
- the location of fire fighting equipment; and
- the principles of fire fighting, the use of extinguishers and fire fighting appliances.

These procedures will be reinforced on a regular basis. Boats using the marina will be required to have handheld extinguishers onboard.

ii Refuelling area

The risk of fire at the marina will be primarily associated with the refuelling area. Specific procedures will be enforced in this area. These will include the following procedures that will be provided on a notice at the refuelling berth:

- contact marina staff for fuel;
- before fuelling:
 - a) put all passengers ashore;
 - b) close all hatches etc, to prevent fumes entering the hull and lying in the bilges;
 - c) ensure no naked flames or sparks;

- d) turn off the pilot light to a gas refrigerator; and
 - e) cut off any electric supply at the main switch.
- during fuelling:
 - a) maintain contact between the hose nozzle and filler pipe to prevent static sparks;
 - b) carefully clean up any spilled fuel; and
 - c) ensure correct breather operation and absorbent cloth is on hand.
- after fuelling:
 - a) open all hatches and ventilate the boat;
 - b) sniff in the bilges for traces of fumes;
 - c) if fuel is spilt, soak up with oil absorbent material and leave boat wide open for at least 30 minutes; and
 - d) when satisfied that the boat is free of fumes start engine before bringing the passengers aboard.

5.2 Chemical storage

All other chemicals (eg paints and cleaning products) will be stored securely in accordance with all WorkCover and other legislated requirements.

Should any chemicals or flammable liquids listed in the Australian Dangerous Goods Code be stored at the marina site in excess of relevant requirements, further approval will be required.

5.3 Other risks and safeguards

5.3.1 Personal accidents

The risk of personal accidents, in particular drowning or injury, is a hazard that can be significantly reduced by the incorporation of the following safeguards into the design and operation of the marina and associated facilities:

- limiting public access to daylight hours;
- implementation of a regular safety awareness program;
- provision of a suitable first aid kit that is readily accessible;
- provision of rescue equipment such as rescue buoys (life rings) and life preservers;
- illumination of all walkways and waterfront structures and provision of non-slip surfaces where practicable on all structures to prevent accidents and to facilitate rescue; and
- provision of hand railing on ramps and gangways.

5.3.2 Collisions

The risk of collisions between boats using the marina will be minimised through the implementation of the following safeguards:

- training and induction of all marina users;
- provision of suitable signs and other forms of advice to users regarding operating measures to be adopted to avoid interference with passing traffic;
- provision of weather information on an appropriate noticeboard;
- enforcement of maximum speed regulations within the berthing area; and
- provision of channels, fairways and berths of appropriate dimensions.

5.3.3 Sewage, grey water or oil spills

The risk of sewage, grey water or oil spills (accidental or deliberate discharge) from holding tanks or bilges into the waterway impacting water quality, biota and visual aesthetics will be minimised through the implementation of the following safeguards:

- a sewage pumpout facility will be incorporated at the marina refuelling facility;
- marina staff will be trained to inspect all holding tanks during fuelling. As this pumpout service will be free there is no incentive to dump or illegally dispose of these wastes in the marina basin or elsewhere;
- appropriate conditions will be included in the Marina Occupation Agreement to prohibit direct discharge of sewage; and
- all customers will be inducted and supplied with a complimentary bilge absorbing pad.

5.3.4 Wastes

Waste materials and rubbish will be generated during operation of the marina. The risk that waste is released into the surrounding environment will be minimised through the implementation of the following safeguards:

- rubbish receptacles will be strategically located and emptied at regular intervals; and
- a waste oil storage facility will be provided for the use of patrons of the marina and associated facilities to dispose of containers of waste oils, bilge absorbing pads, etc. The collection drums will be serviced periodically by a commercial waste collector.

5.4 Marina occupation agreement – incorporating key safeguards

The risks associated with boats using the marina will be minimised through the implementation of Marina Occupation Agreements between the marina owner and the marina members. The agreements will apply to every small craft and vessel berthed at the marina and will include the general marina rules. This agreement will include a number of specific obligations which will be enforced through a compliance bond system and specific inspections and monitoring. The marina manager will be able to levy penalties and charges in accordance with the Marina Occupation Agreements in relation to breaches of key obligations such as:

- no flushing of heads at moorings;
- no pumping of bilges at moorings;
- no excessive speed and wash creation;
- inappropriate waste storage and management;
- storage of dangerous substances on vessels;
- unauthorised operation of sewage and fuel pumping equipment;
- unacceptable creation of noise;
- unauthorised work being undertaken on vessels;
- non-compliance with emergency procedures in respect of spills and hazardous materials; and
- failure to attend a compulsory induction program.

Compliance will be enforced by implementing a range of fines, using termination of the agreement as a final deterrent. However, an incentive system will be put in place with discounts for occupiers who comply with key obligations (eg an extra month of free rental to reward compliance).

5.5 Potentially offensive industry

The air, noise, and water emissions from the proposal have been assessed to determine if it is classified as a potentially offensive industry. In summary:

- air quality: the assessment (Section 6.8) found that air quality will comply with the relevant criteria at sensitive receptors and will not lead to any unacceptable impacts on the amenity of the area;
- noise: the assessment (Section 0) found that noise levels will not exceed the relevant criteria and will not lead to any unacceptable impacts on the amenity of the area; and
- water: the assessment (Section 6.1) found that with the implementation of the proposed environmental management measures, the proposed marina will not degrade water quality of the Georges River.

Therefore, the proposal will not result in unacceptable levels of pollution that will impact the amenity of the area and is not a potentially offensive industry.

6 Impact assessment

This chapter provides an assessment of the likely environmental impacts of the proposal as required by Section 79C(1b) of the EP&A Act.

6.1 Water

Worley Parsons (2010) assessed impacts of sediment transport, tidal flow, water levels, water quality and flooding for the project area and proposed development (Appendix B1). In 2013 and 2014, Cardno was engaged to re-evaluate the flood impact assessment for the proposed development (Appendix B2) for the link road bridge. The potential for existing contamination at the marina site to contaminate surface water and groundwater is discussed in Section 0.

6.1.1 Flooding

i Assessment

The Cardno (2013b) flood impact assessment (Appendix B2) assessed flooding for the 20 year and 100 year ARI floods. The following existing flood data for the Georges River were estimated from the *Georges River Floodplain Risk Management Study* (Bewsher 2004) to be:

- 20 year ARI: RL 4.6 m AHD;
- 100 year ARI: RL 5.6 m AHD; and
- probable maximum flood (PMF): RL 10.2 m AHD.

A two dimensional hydraulic model covering 744 ha upstream and downstream of the project area was developed by Worley Parsons (2010). The model incorporated digital elevation with 2 m by 2 m grids of surface roughness, boundary conditions and three inflows: the Georges River, Milperra drain and Newbridge Road drain. The model was calibrated against the Bewsher (2004) study. Pre-development and post-development scenarios were modelled for the flood impact assessment.

The results of the flood modelling were used to conclude that:

- in a 20 year ARI flood, the impact of the planned development on flood hazard will be negligible except on the western side of the marina site where the proposed development will increase the ground level eliminating the flood hazard;
- in a 100 year ARI flood, the impact of the planned development on flood hazard will be negligible; and
- the proposed development will have a negligible impact on the behaviour of flooding in the flood storage area in the south-west of the marina site and nil or negligible impacts on other adjacent properties.

ii Supplementary assessment

Subsequent to the Worley Parsons (2010) assessment, a further assessment specifically addressed flooding impacts of the link road bridge in the north of the development (Cardno 2014). The following scenarios were modelled with and without the bridge:

- a 100 year ARI flood in the Georges River;
- a 100 year ARI local storm event in combination with two Georges River flooding scenarios:
 - a 20 year ARI Georges River flood; and
 - a Georges River base flow of 200 m³/s.

The impact of the bridge on the 100 year ARI flood is predicted to be negligible (<0.01 m), with minor peak velocity increases (<0.05 m/s) in the vicinity of the bridge, with decreases in velocity south of the bridge.

The bridge would reduce some flood storage compared to the original assessment (Worley Parsons 2010). However, the assessment showed that this will have no impact.

A review of the assessments in 2015 (NPC 2015) found the flood modelling remains contemporary and flood impacts are unchanged and negligible (Appendix B2).

6.1.2 Tidal flow and bank stability

Comprehensive modelling of tidal hydrodynamics by Worley Parsons (Appendix B1) incorporating the tidal exchange and flow velocities, determined the flushing characteristics of the marina basin. Bank stability was also assessed.

The model indicated that tidal exchange was high due to the relatively wide proposed development entrance to the Georges River. Flow velocities are predicted to be low. Banks can and will be designed to withstand waves generated by boats, this will include the installation of rock armouring.

6.1.3 Water quality

A water quality assessment was completed for the marina site and proposed development (Worley Parsons 2010) (Appendix B1). The Georges River encompasses a large part of the Sydney urban area catchment and, therefore, receives pollutant loads from urban runoff and sewage overflows/discharges from the sewerage system and sewage treatment works.

Other than the Georges River or groundwater inflow (see below), potential pollutant sources in the marina will be from runoff from the land, copper from antifouling paints on the hulls and uncontrolled discharge of sewage from craft while at the marina berths (discharge of sewage will be banned). Therefore, the key pollutants considered in the water quality assessment were copper, suspended solids, nitrogen and phosphorus. Water quality in the marina was modelled for these parameters. Particular attention was paid to stormwater quality as well as the impact of copper leaching from antifouling. Water quality trigger values were identified with reference to the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ 2000). A summary of the modelled loads of key pollutants is provided in Table 6.1.

Table 6.1 **Modelled pollutant loads**

Pollutant	Load (kg/year)
From stormwater	
Total nitrogen	103
Total phosphorus	12.4
Total suspended solids	1,864
Total copper	4.1
Discharged from water craft	
Total nitrogen	1,094
Total phosphorus	175
Suspended solids	52.3
Copper	0.005
Copper from antifouling	123
Total copper	127

‘Flushing’ is the exchange of water between a marina and the river, and it is an important mechanism for removal of pollutants from marinas. Natural flushing is driven by tidal flows, wind, density currents, stormwater inflows and diffusion. The impact of these discharges at Georges Cove Marina will depend upon the extent of flushing of the marina basin. Tidal and stormwater flows will be the most important flushing processes for the proposed marina. The hydrodynamic modelling indicated that the marina basin, layout and entrance configuration will not constrain tidal flushing (Appendix B1).

Based on the conservative (effectively, worst-case) modelling, the labile copper concentration in the marina basin is predicted to meet the ANZECC/ARMCANZ (2000) trigger value for the protection of 90% of marine species and to be just above the trigger value for the protection of 95% of marine species. It is predicted that the copper concentrations in the marina basin will be slightly lower than the concentrations recorded in the Georges River close to the marina site. The conservative analysis shows the development of the marina would not have a significant impact on the existing copper concentrations in the Georges River.

With the implementation of the proposed environmental management measures, the proposed marina will not degrade water quality of the Georges River through discharges of copper from antifouling paints or from uncontrolled discharge of sewage.

The preliminary investigation of contamination (Appendix C) found that current ammonia concentrations in groundwater and the dredge pond water are elevated and are considered to be a potential ecological risk regardless of whether the marina is developed. The source (or sources) of ammonia are uncertain although one or more off-site sources are likely. The source(s) of ammonia causing enrichment in the groundwater and dredge pond water will be investigated (see Section 6.3.5). Once further information regarding the ammonia source is obtained then suitable remediation actions will be implemented if required.

Works undertaken as part of the development, such as bank stabilisation, will improve the aquatic environment.

6.1.4 Groundwater

Six groundwater monitoring wells were installed in 1994 around the marina site. Four monitoring wells are located along the riparian buffer between the project area and the river, one well is on the western side of the project area and one has been destroyed. The wells in the riparian buffer zone are less than 10 m from the river.

The bank of the Georges River at the marina site is made up of a sequence of silty and sandy alluvial sediments with thin gravels and overlaying shale bedrock. The thickness of the sediments ranges from 11 to 17 m thinning towards the north and west (Dames and Moore 1994).

Medium and coarse sands predominate in the riparian zone. Measured permeability ranges from 12 to 47 m/day averaging 30 m/day. Groundwater levels in the wells were closely correlated with, and slightly above, the river tidal levels. Dames and Moore (1994) inferred that there was an overall flow of groundwater in a south-easterly direction towards the Georges River and the unnamed creek to the south of the marina site. Dames and Moore (1994) concluded that groundwater flows in the zone adjacent to the river were likely to be influenced by intrusion of brackish/saline river water at depth in the aquifer, with fresh water flows towards the river concentrated in the shallow zone at approximately 5 to 6 m depth.

As described in Section 6.1.3, the preliminary investigation of contamination (Appendix C) considers water quality in groundwater.

6.1.5 Sedimentation

Sand-size sediments transported along the bed of the river by tidal and flood processes may be deposited in the marina basin, while fine sediments may be deposited from floodwaters (Appendix B2).

The depth of sediment deposited in the marina basin over 100 years was estimated using the following parameters:

- an average suspended solids concentration of 30 mg/L;
- an average particle size of 2 μm (clay);
- a fluid density of 1,000 kg/m^3 ;
- a sediment density of 2,500 kg/m^3 ; and
- a fluid viscosity of 0.01 Pa.s.

The depth of sediment accumulation was estimated to be 120 mm over 100 years. The required basin depth will be increased by 300 mm during quarry operations so maintenance dredging will not be required within the marina basin.

6.1.6 Navigation and safety

The marina basin will be recessed into the riverbank with a short entrance channel (approximately 50 m long). Sufficient water depth will be provided at low water for the types and size of vessels likely to use the marina so the entrance will be navigable at all tide states (see Section 6.9).

6.1.7 Water management measures

The proposed development has incorporated the following measures to address flooding, tidal hydrodynamics, water quality and navigation issues:

- floor levels of the building and marina facilities have been determined using the 100 year ARI flood levels produced in the Georges River Flood Study (adopted by Liverpool City Council) and incorporate the appropriate freeboard;
- tidal hydrodynamics have been assessed through hydraulic modelling to ensure there is a high degree of tidal exchange between the marina and the river;
- water quality in the dredge basin will be tested during construction prior to breaking through the banks to the river. The bank will only be opened if the water quality in the basin is similar to, or better than, that in the Georges River;
- water sensitive urban design elements will be incorporated into the design (including the provision of wetlands) to provide stormwater treatment to reduce nitrogen, phosphorus, total suspended solids and heavy metals concentrations;
- bilge and sewage pump-out facilities will be provided in the marina;
- the marina entrance channel will be navigable available in all tide states;
- safety measures will be implemented outside the marina entrance channel; and
- bank stabilisation will be undertaken as part of the development.

6.2 Soils

The *Soil Landscape Map of Penrith, Soil Landscape Series Sheet 9030*, Scale 1:100,000 prepared by the Soil Conservation Service of NSW (Hazelton et al. 1989), indicates that the marina site is located within the “Richmond Landscape Area” and typically consists of clays, clay loams, sands and ironstone nodules. During the borehole drilling program undertaken in 1994 (Dames and Moore 1994), sequences of fine to coarse sands, silty sands, silts and sandy silts with thin gravel lenses overlying shale bedrock were recorded.

Nine testpits were excavated as part of the *Preliminary Investigation of Contamination*, (Appendix C). The soil excavated from each testpit typically comprised fill overlying brown to light grey, moderate plasticity clay and dark sandy loam. The presence of anthropogenic fill is consistent with historic land filling practices on the marina site (see Section 6.3). Road base and debris, including plastic and pipe fragments, were present in places in the fill layer as well as light brown organic matter. The location and thickness of fill and organic matter appears to vary widely across the site.

A small quantity of virgin excavated natural material (VENM) was used to assist in restoring landforms on the marina site. The source and the exact location of fill is unknown. It is understood that one to two metres of topsoil has also been stripped and sold from the site.

6.2.1 Acid sulfate soils

The project area has been identified on the Liverpool LEP (2008) Acid Sulfate Soils map, and reference to the Atlas of ASS indicates there is a high probability for ASS to occur. Approximately 1,000 tonnes of potential ASS has been disposed of on-site (pers comms Mark Morris, Production Manager, 29 May 2015).

Excavation of the channel between the dredge pond and the Georges River will require the removal of the existing soils. These are likely to be acid sulfate soils and will be tested and managed appropriately (see Section 6.2.2).

6.2.2 Management measures

An acid sulfate soils management plan has been prepared (Appendix K). This includes methods for the characterisation and management of potential and actual acid sulfate soils. The marina site is currently licensed for the disposal of ASS as well as virgin excavated natural materials (VENM).

The main acid sulfate soils mitigation measure will entail over-excavation and treatment or replacement of soils immediately adjacent to the proposed channel (see Appendix K). This will aim to prevent long-term drainage of acid from the adjacent, potentially impacted soils. Surface features such as drains will be designed to avoid areas of acid sulfate soils.

6.3 Contamination

6.3.1 Preliminary investigation of marina site

A preliminary investigation of contamination (PI) was completed by EMM for the marina site (Appendix C) to satisfy the requirements of cl 7(2) of SEPP 55. The PI was undertaken in May to July 2015, and encompassed a desktop review of all available historic information, a site inspection and a field investigation program assessing soil, dredge pond sediment and dredge pond surface water.

The PI was undertaken in accordance with contaminated land planning guidelines, and was performed in accordance with relevant guidelines made or endorsed under Section 105 of the *Contaminated Land Management Act 1997* (CLM Act) including:

- *Guidelines for Consultants Reporting on Contaminated Sites* (OEH 2011); and
- *National Environment Protection (Assessment of Site Contamination) Measure (NEPM)*, Schedule B2 *Guideline on Site Characterisation* (NEPC 2013).

6.3.2 Site history

Two known potentially contaminating activities have been undertaken at the site historically: extractive industries and land filling. Land filling has also occurred on the northern portion of Lot 7 to the immediate north and on the property to the south of the marina site. The EPA contaminated lands registers and WorkCover database do not indicate any site contamination. No asbestos has been recorded onsite, nor are there any contamination issues noted on the planning certificate.

There is the potential for site contamination based on the land use history.

6.3.3 Review of site contamination

i Soil

The PI identified a layer of fill material in parts of the marina site (notably, adjacent to material recycling activities on the northern site boundary, along the western site boundary and to the immediate south of the dredge pond). The fill averages about 0.5 m thick, and some observations of anthropogenic debris were reported in the fill profile.

The soil analytical results indicated only a single exceedance of the soil assessment criteria, which was a marginal exceedance of the NEPM ESL for benzo(a)pyrene in the fill sample collected from TP-3 (Figure 6.1). Low concentrations of non-volatile range TRH and PAHs were also reported in fill samples from three locations (TP-3, TP-5 and TP-6). However, aside from the marginal ESL exceedance at TP-3 (0.8 mg/kg) all concentrations were below the relevant health and ecological assessment criteria for the proposed land use. The ecological values are considered to be of low relevance in areas that will be beneath sealed surfaces with the future development.

Similarly, the potential aesthetic soil impacts posed by anthropogenic debris in the fill material are considered to be of limited relevance as the majority of the existing fill will either be below sealed surfaces or building footprints, or will be removed from site to prepare the landform for development.

ii Dredge pond sediments

The analytical results for the dredge pond sediments indicated exceedances of *Interim Sediment Quality Guidelines* (ISQG) (ANZECC/ARMCANZ 2000) low trigger values for two or more metals at two locations (SD-1 and SD-5), with the lead concentration at SD-5 also exceeding the ISQG-high trigger value. While the source of the metals in these locations can not be confirmed, the results are consistent with metals accumulating as a result of the surrounding fill material being washed into the pond during rain events.

The location of SD-5 will be beneath a building footprint. Accordingly, it is presumed that this area will be filled to accommodate the future construction, and the ecological exposure and bioavailability assumptions upon which the ISQG were derived will no longer be relevant in this location. Given it is in an urban catchment adjacent to a historic landfill and material recycling facility, when location SD-5 is excluded, the sediment quality results generally reflect limited chemical impact and thus contamination potential.

Ammonia concentrations in the sediment were elevated in samples SD-1 and SD-5 relative to the other locations in the pond, as were the TOC concentrations. Ammonia in sediments is typically from bacterial decomposition of natural and anthropogenic organic matter accumulated in sediment. However, it is also commonly associated with landfill leachate and leaching of fertilisers.



Preliminary investigation sampling locations

Georges Core Marina
Environmental Impact Statement

Figure 6.1

iii Dredge pond water

The PI dredge pond water analytical results indicated that water quality generally met the assessment criteria. All organic analyte concentrations were below the laboratory LORs and metals concentrations were generally below the LOR or below the assessment criteria.

Electrical conductivities (EC) in the dredge pond water samples were relatively consistent at approximately 7300 $\mu\text{S}/\text{cm}$, which is similar to the lower range EC values from historical monitoring of Georges River. It is likely that a strong hydraulic connection exists between the Georges River and the adjacent alluvial deposits, and that the salinity of water in the dredge pond will generally represent a mixture of river water and fresher groundwater discharge.

The only notable issue identified from the PI surface water analytical results were elevated ammonia concentrations. The dredge pond water ammonia concentrations have been generally increasing since 2009. The dredge pond ammonia concentrations are similar to groundwater concentrations indicating groundwater discharge to the dredge pond.

In the weeks preceding the PI, a suction dredge was operating in the pond to remove the accumulated fines in anticipation of the marina development. It is likely that the disturbance caused by the continuous suction dredging in the pond had resulted in a significant load of suspended fines in the water column. This may have included ammonia-enriched sediments. Another potentially contributing ammonia source considered was the former landfill in the vicinity of the marina site, mobilised via groundwater.

iv Groundwater

Groundwater sampling indicates variable EC conditions and low dissolved metal concentrations, such that there were no metal exceedances of the ANZECC/ARMCANZ (2000) trigger values for the protection of 95% freshwater and marine species in recent sampling events during 2014.

Groundwater monitoring found total petroleum hydrocarbons (TPH) (medium fraction) concentrations were frequently above the laboratory limits of reporting. However since 2011, these TPH concentrations have been below the laboratory limits of reporting. Hydrocarbon impacted groundwater is likely to have originated from offsite sources as there are no site activities or practices associated with TPH contamination. As there has been no groundwater TPH detected in groundwater since 2011, it is not a potential contamination issue of concern.

Sampling indicates that groundwater is enriched with ammonia and concentrations typically exceed the ANZECC/ARMCANZ (2000) trigger values for the protection of 95% of freshwater and marine species. Since 2002 concentrations of ammonia results at MP5 have fluctuated, while at the other monitoring wells, ammonia concentrations have increased since 2009. The source of the high ammonia concentrations is unknown, but is likely to be offsite, with possibly a separate source influencing MP5.

6.3.4 Summary of site contamination

The PI (Appendix C) did not identify contamination issues that are considered to present an unacceptable risk to human and/or environmental health in the context of the proposed future land use. Recent sampling did not identify any exceedances of the NEPM (2013) human health based guideline values. A small number of exceedances of ecological assessment criteria were identified, that were either considered to be irrelevant, or present a low and acceptable risk, in the context of the proposed future land use.

The elevated ammonia concentrations in the groundwater and dredge pond are not considered to represent a risk to human health at the proposed marina development based on the lack of health-based assessment criteria for ammonia in water, and the limited exposure scenarios associated with the proposed future land use (ie ingestion of groundwater and pond water is unlikely in the context of a commercial marina).

The marina site is suitable for the proposed future land use (the marina development) or will be suitable for this use with minor remediation that may be the outcome of the recommended investigations (see Section 6.3.5).

6.3.5 Management measures

All of the recommendations in the PI report will be implemented:

- Any material in the stockpiles or fill mound present at the marina site that is proposed for on-site reuse should be characterised for land use suitability relative to the appropriate land use criteria in the NEPM.

Any material proposed for off-site disposal or reuse should be characterised for waste classification in accordance with the EPA *Waste Classification Guidelines, Part 1: Classifying Waste* (2014), or with regard to a relevant resource recovery order and exemption issued under the POEO Act. Upon removal, validation sampling of the footprints of the stockpiles and fill mound should be performed to confirm the suitability of the underlying soils for the proposed land use.

- Given the inherent heterogeneity of fill material present at the marina site, the construction environmental management plan (CEMP) for the development should include an unexpected finds protocol with clear instructions for identifying and managing potential undiscovered contamination issues during development. In particular, although no evidence of asbestos containing material (ACM) was encountered during the PI, ACM is commonly associated with uncontrolled fill material in Australia and the potential presence of ACM should be proactively assessed during any civil works involving disturbance of fill material at the marina site.
- Current ammonia concentrations in groundwater and the dredge pond water are considered to be an ecological risk. The source(s) of ammonia causing enrichment in the groundwater and dredge pond water should be investigated. This could comprise additional field works and/or data requests from Council. Once further information regarding the ammonia source is obtained then suitable remediation actions should be implemented.
- It is understood that modification of the dredge pond to form the marina basin and entrance channel will commence on the landward (western) side of the basin wall prior to breaking through the banks to the river. In consideration of the elevated ammonia concentrations encountered in the dredge pond water during the PI, the following recommendations are proposed for the marina entrance channel construction:
 - Testing of the water quality in the basin prior to breaking through the banks to the river. The bank should only be opened if the water quality in the basin is similar to, or better than, that in the Georges River.
 - The inclusion of sediment booms (standard sediment measures) across the interface between the dredge pond and Georges River when the bank is finally opened.

- If required, the soils immediately adjacent to the proposed channel and any soils displaying potential for ASS should be treated for ASS or replaced to prevent the long-term drainage of acid from soils. Management would typically be applied to river banks and possibly stockpiles, and could comprise covering soil to reduce oxygen availability, controlling water movement, and/or increasing alkalinity via the introduction of lime (as described in the *Guidelines: Site Contamination–Acid Sulfate Soil Materials* (EPA 2007)).
- The groundwater flow direction should be confirmed from the collection of groundwater level data.
- Construction phase water quality monitoring should be undertaken, including for ammonia and dissolved metal concentrations, in the dredge pond surface water, dredge pond sediment and Georges River surface water.

6.4 Ecology

6.4.1 Terrestrial ecology

i Assessment

A flora and fauna assessment was completed in 2004 by Total Earth Care as part of the 2006 rezoning application. This information was incorporated and updated in the flora and fauna assessment (Appendix D2) undertaken for the Georges Cove Marina EIS in 2011.

Desktop ecological searches were completed within a 5 km radius from the project area in 2004 and 2011. Three field surveys (23 August 2004, 11 January 2005 and 5 September 2011) were also undertaken.

The 2011 assessment (Appendix D2) recorded 87 plant species, including 49 introduced species. Four plant communities were identified. Of the four, two met the description of endangered ecological communities (EECs) listed under the TSC Act: River Flat Eucalypt Forest and Swamp Oak Floodplain Forest. An assessment of significance under Section 5A of the EP&A Act was not completed for the EECs as only a small area of each occurs within the project area and these areas are degraded.

Four plant species of regional significance were identified: Blue Blue Box (*Eucalyptus baueriana*), River Peppermint (*Eucalyptus elata*), Fringed Wattle (*Acacia fimbriata*) and Gosford Wattle (*Acacia prominens*). These occurred along the western and southern drainage channels. None of these are listed as Rare or Threatened Australian Plants (ROTAP) species or threatened species under the TSC Act or the EPBC Act.

No threatened fauna species were identified during the surveys. However, the riparian woodland along the Georges River was considered to provide potential habitat for number of species recorded in the adjacent Boral site (ERM 2002):

- Cumberland Plain Land Snail (*Meridolum corneovirens*);
- Eastern Bentwing Bat (*Miniopterus schreibersii oceansis*);
- Southern Myotis (*Myotis macropus*);
- Eastern Freetail-bat (*Mormopterus norfolkensis*);
- Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*); and

- Grey-headed Flying Fox (*Pteropus poliocephalus*).

An assessment of significance under Section 5A of the EP&A Act was completed for potential impacts on the Eastern Freetail-bat and Yellow-bellied Sheathtail Bat. The assessment concluded that potential impacts would not be significant on these species.

The 2011 assessment concluded that the proposed marina is unlikely to have a significant impact on native flora and fauna in the marina site. However, a number of recommendations were made to reduce the potential impacts of the proposal.

ii [Supplementary assessment](#)

EMM completed updated ecological searches on 8 April 2015 and prepared a supplementary flora and fauna assessment (Appendix D1). An additional eight threatened species that could occur in the area were identified during the searches, which had not been considered in the previous assessments:

- Australasian Bittern (*Botaurus poiciloptilus*);
- Eastern Osprey (*Pandion cristatus*);
- Koala (*Phascolarctos cinereus*);
- *Marsdenia viridiflora* R. Br. subsp. *viridiflora* population;
- Netted Bottle Brush (*Callistemon linearifolius*);
- Scarlet Robin (*Petroica boodang*);
- Spotted Harrier (*Circus assimilis*); and
- Tadgell's Bluebell (*Wahlenbergia multicaulis*) population.

All the species listed above were considered to have low potential or are unlikely to be impacted by the proposed development.

Recent records also occur in proximity to the project area for the following species:

- Little Lorikeet (*Glossopsitta pusilla*) – recorded adjacent to the marina site;
- Varied Sittella (*Daphoenositta chrysoptera*) – recorded on the other side of the Georges River; and
- Little Eagle (*Hieraaetus morphnoides*) – recorded adjacent to the marina site.

As these species are highly mobile and habitat is available in areas adjacent to where they were recorded, the impacts of the proposed development on these species will be minimal.

Site surveys completed for the earlier assessments were not adequate to identify some of the threatened flora and fauna species that could occur. To compensate for this, and as no nocturnal surveys were completed, the assessment assumed that threatened microbats would occur at the marina site. It is considered that all threatened species that have the potential to occur at the site have now been adequately assessed (Appendix D1) and impacts are unlikely to be significant.

No significant impacts to threatened species, populations and communities are anticipated from the construction and operation of the marina. Therefore, an SIS is not required.

6.4.2 Terrestrial ecology management measures

As described in the VPA (see Section 3.5), the foreshore vegetation will be embellished and a vegetation management plan will be prepared and implemented. As a result, the proposed development will result in an increase in vegetation quality and quantity (and hence habitat quality) along the Georges River foreshore.

Overall, while the proposal will require the removal and modification of small areas of terrestrial habitat, it will result in an overall improvement in the quality and amount of available habitat within the marina site.

6.4.3 Aquatic ecology

An aquatic ecology assessment was completed by Marine Pollution Research in (2010) (Appendix D3). The assessment included a review of literature and water quality monitoring data as well as field studies to identify the aquatic ecological attributes of the marina site and surrounds. The work conducted in 2010 was reviewed in April 2014 (Appendix D4) to determine if there have been any changes to the aquatic environment that would change the findings of the original assessment. The preliminary investigation of contamination (Appendix C) also considered potential ecological risks, particularly to the aquatic and marine environment.

The aquatic ecology field surveys included:

- a preliminary survey on 11 August 2004;
- a detailed survey of aquatic habitats on 30 April 2007;
- an aquatic ecology survey of the quarry pond on 30 May 2007; and
- a short site visit on 14 April 2015 to inspect the current state of the aquatic ecology habitats.

Aquatic habitats identified at the marina site include:

- earth banks and masonry intertidal banks on the Georges River edge which support small stands of Grey Mangrove (*Avicennia marina*) and River Mangrove (*Aegiceras corniculatum*);
- intermittent shallow sub-tidal banks along the toe of the intertidal bank which support small patches of seagrass (*Zostera capricorni*);
- riparian cover along the unnamed creek to the south of the marina site which is freshwater for most of its length, with grassy banks; and
- three drainage ponds (these ponds have now been combined to form a single pond) which contains benthic sediment, water pools and pond riparian edge habitats.

One of the quarry ponds was brackish and supported vigorous growth of *Ruppia* spp. The quarry ponds also support a number of fish species including the Dusky Flathead (*Platycephalus fuscus*), Mullet (*Mugil cephalus*) and introduced species including the European Carp (*Cyprinus carpio*) and Mosquito Fish (*Gambusia affinis*) that also occur in the Georges River.

No species listed under the FM Act or the EPBC Act were noted or observed during the field surveys. Given the aquatic habitats available, none are considered likely to occur. While individual saltmarsh plants were identified along the margins of the internal waterways, these were not considered to form a viable saltmarsh community, which would meet the description of the EEC listed under the TSC Act.

While the Georges River once supported a thriving oyster farming industry there are now no aquaculture activities in the Georges River. The closest aquaculture operations are located in Botany Bay - native Sydney Rock and triploid Pacific oyster farming in Woollooware Bay and Mulloway farming off Silver Beach.

It was concluded in 2010 that the marina can be constructed and operated without any significant impact on river water quality. This was confirmed by the 2014 review. There may be some impacts from the construction of the marina to aquatic ecosystems and species, particularly from opening the pool to the river. However, the proposal will result in an overall increase in the area and diversity of aquatic habitat in the locality.

Potential ecological risks as a result of currently elevated ammonia concentrations in groundwater and the dredge pond water are discussed in Section 6.1.3.

6.4.4 Aquatic ecology management measures

A range of mitigation measures are provided in Appendix D3 to prevent or minimise potential impacts to aquatic ecology during construction and operation of the marina.

Marina design measures included the following:

- use of hydrodynamic modelling to design the marina basin so that it is regularly flushed and so that sediment accumulation is minimised;
- incorporation of freshwater wetlands in the design to treat stormwater from the marina site; and
- locating the marina entrance channel so that it avoids direct loss of existing seagrass patches or mangrove trees.

Construction mitigation measures will include the following:

- harvesting aquatic plant resources where appropriate for later use in riparian or aquatic remediation or enhancement works;
- testing for PASS/ASS, and management of ASS during construction (see Section 6.1.6);
- staging of the marina entrance construction and water quality monitoring during construction to prevent short-term water quality degradation in the Georges River (see Section 2.10.3);
- provision of natural, or near-natural, intertidal to riparian zone habitats that support local native vegetation and linking these habitats through:
 - the provision of rock revetments planted with intertidal marine vegetation such as reeds, saltmarsh or mangroves;
 - enhancement of the existing riparian foreshore land by planting of suitable local littoral species;

- rehabilitation of the creek bank vegetation between the marina and the un-named southern creek to provide a native vegetated barrier between the marina and creek; and
- rehabilitation of the levee bank vegetation between the marina and western stormwater drain to provide a native vegetated barrier between the marina and drain.

Operations mitigation measures will include the following:

- implementation of marina occupation agreements to prohibit activities such as direct discharge of sewage from boats using the marina (see Section 5.3.3);
- implementation of measures to prevent spills occurring within the marina site and if they occur to prevent any spilled materials (eg fuel) from entering the environment (see Chapter 5);
- not undertaking traditional “slipway” activities that can result in chemicals (including anti-foul chemicals) entering the environment - all environmentally sensitive maintenance works will be undertaken on a dedicated hardstand area fully under cover and within the marina building; and
- storage of boats in the dry berths so that these boats will not need anti-foul paint.

6.5 Traffic and parking

EMM were engaged in 2015 to assess traffic and parking impacts of the proposed development (Appendix E) given that there has been ongoing development in the area, including construction of houses in the Georges Fair residential estate.

6.5.1 Existing access

Newbridge Road is adjacent to the northern boundary of Lot 7. It provides an east-west arterial road past the proposed development. At present, access to the quarry site is via a left-in, left-out access at Newbridge Road. This incorporates an RMS approved deceleration and turn-in lane.

There is adequate space onsite to enable heavy vehicle manoeuvring and parking for all quarry staff and visitors. No traffic issues have been identified in relation to the existing operations.

6.5.2 Site access and traffic circulation

Access to the marina site will be via the approved link road and bridge (see Section 2.7.2) which will be constructed between the site and Brickmakers Drive. The intersection between the link road and Brickmakers Drive will be about 300 m south of Newbridge Road.

All internal site roads will comply with the Council’s design standards (DCP 2008 Part 2.10) and *Parking Facilities - Off-street Car Parking* AS 2890.1. Therefore, internal site access arrangements will be efficient and safe.

6.5.3 Impacts on road traffic

i Current traffic volumes

The current (June 2015) background traffic volumes on Brickmakers Drive, Newbridge Road and Governor Macquarie Drive are approximately:

- 54,000 vehicle movements daily for Newbridge Road east of Governor Macquarie Drive;
- 40,000 vehicle movements daily for Newbridge Road west of Governor Macquarie Drive;
- 16,000 vehicle movements daily for Governor Macquarie Drive north of Newbridge Road; and
- 12,500 vehicle movements daily for Brickmakers Drive south of Newbridge Road.

ii Traffic generation

There will be a total of 637 car parking spaces at the marina site. This parking will be a combination of 267 surface level car parking spaces located in parking areas A, B and C and 370 undercover car parking spaces located in two basement car park levels within the Maritime Building.

The proposed development of the marina site boat storage, boat showroom, function centre, cafe, clubhouse and boat repair workshop uses will generate approximately 1,289 additional daily traffic movements. It is estimated that there will be approximately 98 additional car traffic movements during the weekday morning peak hours and 197 additional car traffic movements during the weekday afternoon peak hours. During the later evening peak periods on both Friday and Saturday evenings, there may be higher peak hour traffic movements. These will primarily be generated by the site club/restaurant and function centre uses which may generate up to 220 hourly car traffic movements.

iii Future traffic volumes

The proposed Georges Cove Marina development will increase traffic volumes by about 1% on Newbridge Road, Governor Macquarie Drive and the section of Brickmakers Drive south of the link road intersection. This will have a negligible impact on traffic flows, traffic safety and residential amenity along these routes.

The proposed development will increase traffic volume by about 9.3% on the 300 m section of Brickmakers Drive north of the link road intersection. However, the traffic increases will remain well within the typical daily traffic capacity for Brickmakers Drive as a continuous two lane road. Brickmakers Drive will not require additional traffic calming or other traffic management measures.

6.5.4 Impacts on intersections

NSW Land and Environment Court proceedings (NSW LEC 30141, 2013) approved an intersection design prepared by Cardno (2013a) for the link road intersection on Brickmakers Drive. This included the potential as detailed in a plan of the intersection prepared by McLaren (2013). The proposed link road and its intersection with Brickmakers Road will be physically identical to that approved by the NSW Land and Environment Court (ie the layout prepared by Cardno).

It is proposed to install the traffic signals during construction of the intersection. While these are not required for the Georges Cove Marina, the intersection is likely to require traffic signals in the longer term due to background traffic growth on Brickmakers Drive and future developments, such as the Mirvac Georges Cove residential development and a potential materials recycling facility that would use the link road. Installing these signals during the initial intersection construction will provide greater certainty regarding the adequacy of the intersection to cater for traffic from future developments and will be less disruptive than installing signals at a later date when the link road is opened to traffic.

The locations of the traffic signal posts, intersection signage and line markings will be determined as part of detailed design of the intersection.

The impacts of additional traffic on the link road and Brickmakers Drive intersection have been assessed using estimated hourly development traffic volumes for the normal weekday morning and afternoon traffic peak periods and the Friday and Saturday evening peak recreational traffic flows. The assessment included the additional traffic flows which would be using Brickmakers Drive from the completion of the Georges Fair residential development (967 dwellings) and the residential and clubhouse traffic from the recently approved New Brighton Golf Course development.

The intersection traffic assessments for the marina development showed that the intersection will operate at Level of Service A for the morning peak hour, afternoon peak hours and Saturday late evening peaks (with the average intersection traffic delay for all movements of 5.4, 10.1 and 1.5 seconds respectively).

The future intersection weekday peak hour degrees of saturation will be between 0.588 and 0.674 during the morning and afternoon peak hours and will be lower during the late evening peaks.

The assessments of the potential cumulative impacts of the Georges Cove Marina, Georges Cove residential development and the potential materials recycling facility found that the intersection will operate at Level of Service A but with marginally higher degrees of saturation and marginally longer queues.

6.5.5 Car parking

The 637 car parking spaces will be approximately 20% higher than the amount of car parking which was considered to be necessary (530) spaces in the formal assessment of the required car parking supply for the previously approved marina development (LCC 2014).

The detailed design of the car parks will consider the accessible car parking requirements of AS 2890.1.

6.5.6 Pedestrian and cycling access

The marina site footpaths along the main site link road way will comply with the DCP requirements and will be adequate for the anticipated volumes of pedestrian movement and circulation within the marina site.

Cyclists will be able to use the proposed link road pedestrian/cycle path and the riverfront pedestrian/cycle path. These paths will be 2.5 m or 3.0 m wide and will meet the DCP design width standard (2.5 m) to permit use by both pedestrians and cyclists. Bicycle parking will be provided in accordance with Liverpool City Council and AS 2890.1 requirements.

6.5.7 Public transport

There is appropriate public transport access available to and from the development for the future employees, customers and other visitors.

6.6 Visual

6.6.1 Existing environment

The marina site is located on a broad, low-lying floodplain of the Georges River. Currently, the northern portion of Lot 7 is used for processing and recycling activities and the southern portion (ie the marina development site) is used for sand extraction. The marina site has been cleared of vegetation except along the site boundaries. As a result, the landform of the marina site has been extensively modified and has low visual amenity as a result of clearing and existing land uses.

The marina site has low external visibility due to the relatively level landscape in which it is located, as well as the presence of screening vegetation along the property boundaries and the river. This screening prevents views to the site from surrounding land uses and the river.

A visual impact assessment was undertaken by Richard Lamb and Associates in 2010 (Appendix F1). The assessment included the development of computer generated photomontages using the design drawings and plans for the marina site. The photomontages were used to assess the potential visual impacts of the proposed development. Given the recent residential development to the west of the site, an Addendum Visual Impact Review was prepared by Richard Lamb and Associates in 2015 (Appendix F2). This included re-visiting the marina site and the locality and assessing the potential for change in impact on views from the selected locations.

6.6.2 Visual assessment

The following potentially impacted vistas were identified:

- the Georges River itself or from the banks of the river directly to the east of the development; and
- from the Georges Fair residential development directly to the west of the marina site.

The visual assessment concluded that the overall visibility of the structures and activities on the project area would be minimal based on the heights of the proposed buildings. Mitigation of these minor impacts will include screen planting using appropriate tree species on the eastern boundary of the marina site adjacent to the river as part of foreshore embellishment and the use of appropriate colours and materials for the Maritime Building and Private Marina Clubhouse.

Overall, the proposed development will result in an improvement to the vista when viewed from the river. In this regard, it is considered that the development would have a positive effect on the visual qualities compared to the site's current use.

The 2015 review of the visual assessment (Appendix F2) found that project area and proposed development remain the same as assessed in 2010, aside from minor changes as a result of continued quarrying activity. The only significant change in the visual environment has been the development of the Georges Fair residential estate to the west, the residential component of which is nearing completion.

The review confirmed that the proposed development will have minimal external visibility. The Maritime Building will be partly visible over the trees on the boundary between the Georges Fair residential estate and the proposed development. However, the overall visibility from this area will be lower than had been assessed in 2010 as a result of predominantly two-storey residential development on the Georges Fair residential estate which minimises potential views and confines them to the fringe along a short section of Brickmakers Drive.

The continued development of Georges Fair will further reduce the visual exposure of the proposed development compared to the 2010 assessment. Therefore the visual impacts of the proposed development remain low to moderate.

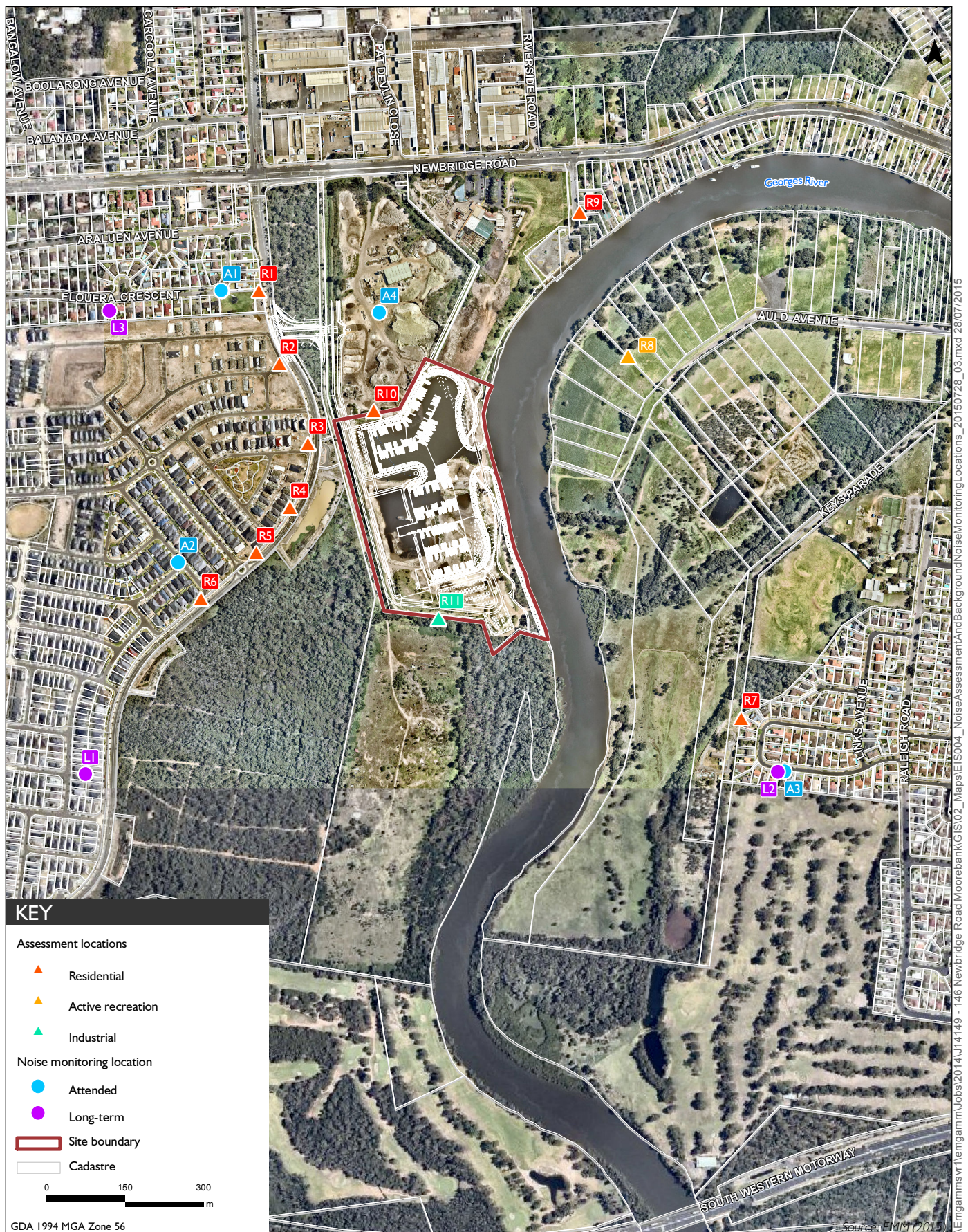
6.7 Noise

EMM prepared a noise assessment for the proposed development in 2015 (Appendix G) in accordance with the SEARs and contemporary guidelines and standards. The assessment is summarised in the following sections.

6.7.1 Existing environment

The marina site is surrounded by noise sensitive land uses including residential properties and recreational land (Figure 1.1). The Georges Cove residential estate is planned for the area immediately north of the marina.

EMM conducted unattended and short-term operator attended noise surveys (Figure 6.2) to validate previous noise assessments of the area and to provide background noise levels for the assessment. It was noted during operator attended monitoring that noise levels in the area were dominated by distant and local traffic, typical suburban noise occasional aircraft noise and natural noise sources such as birds and wind in trees. The monitoring shows that background noise levels during the day decrease as distance from Newbridge Road increases. Background noise levels during the night stay consistent irrespective of the distance from Newbridge Road.



Assessment and background noise monitoring locations

Georges Cove Marina
Environmental Impact Statement

Figure 6.2

6.7.2 Noise impact assessment

Noise levels were assessed at representative locations for residential, future residential and active recreation uses.

i Criteria

a. Industrial noise

The *Industrial Noise Policy* (EPA 2000) provides criteria for assessing operational noise generated by industrial sites and processes based on the existing amenity and background noise levels. The policy describes amenity criteria and intrusiveness criteria and requires that both are satisfied. However, the more limiting of the two becomes the project-specific noise level (PSNL) or operational criteria. The adopted PSNLs are provided in Table 6.2.

Table 6.2 Project specific noise levels

Location	Period ¹	Intrusive criteria dB(A), $L_{eq(15-min)}$	Amenity criteria dB(A), $L_{eq,period}$	Project specific noise level (PSNL), dB(A)
R1, R9	Day	47	55	47 $L_{eq(15-min)}$
	Evening	45	45	45 $L_{eq(15-min)}$
	Night	40	40	40 $L_{eq(15-min)}$
R2-R7, R10	Day	44	55	44 $L_{eq(15-min)}$
	Evening	44	45	44 $L_{eq(15-min)}$
	Night	39	40	39 $L_{eq(15-min)}$
Milpera sports fields	When in use	n/a	55	55 $L_{eq,period}$
Future industrial	When in use	n/a	70	70 $L_{eq,period}$

Note: 1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; evening: 6 pm to 10 pm; night is the remaining periods.

An approval application for the Materials Recycling Facility south of the marina site is being determined. However, the facility (if approved and developed) would not influence the amenity criteria used in the marina noise assessment as only daytime operations are proposed for the materials recycling facility.

b. Sleep disturbance

The marina site will operate during the night-time period from 10 pm to 12 am. Therefore, assessment of sleep disturbance was undertaken in accordance with the *Industrial Noise Policy* and associated application notes. The adopted sleep disturbance criteria are provided in Table 6.3.

Table 6.3 Sleep disturbance criteria, residential assessment locations

Assessment location	Adopted RBL, dB(A) ¹	Sleep disturbance criteria dB(A), L_{max}
R1, R9	35	50
R2-R7, R10	34	49

Notes: 1. Night-time RBLs adopted.

c. Music and people noise

Noise from licensed venues is governed by the Office of Liquor, Gaming and Racing (OLGR). The adopted OLGR music and patron noise criteria are provided in Table 6.4.

Table 6.4 OLGR music and patron noise criteria

ID	Period	Octave band centre frequency (Hz) noise criteria (L _{10,15minute})								
		31.5	63	125	250	500	1k	2k	4k	8k
R1, R9 (A2 Spectra)	Day	12	31	37	37	41	44	35	22	19
	Evening	10	29	35	35	39	42	33	20	17
	Night	8	27	33	33	37	40	31	18	15
R2-R7, R10 (A3 Spectra)	Day	11	27	34	37	38	39	29	20	19
	Evening	11	27	34	37	38	39	29	20	19
	Night	10	26	33	36	37	38	28	19	18

Notes: 1. For the OLGR assessment, a daytime period of 7 am to 6 pm, evening period of 6 pm to 10 pm and night period of 10 pm to 12 am has been adopted.
2. Night time L90 octave band noise spectra has been adopted for all periods and offset to the respective day, evening and night RBL. For the night period the RBL from 10 pm to 12 am has been adopted to align with the proposed operating hours and the OLGR assessment periods.

d. Construction noise

The noise assessment adopted the quantitative assessment approach in the *Interim Construction Noise Guidelines* (DECC 2009). The construction noise management levels provided in Table 6.5 have been adopted.

Table 6.5 Construction noise management levels

Location	Day-time RBL, dB(A)	Noise criterion, L _{Aeq, 15min} , dB
R1, R9	42	52
R2-R7, R10	39	49
Active recreation	n/a	65

e. Road traffic noise

The potential impacts of traffic noise from construction and operational related traffic on public roads are assessed against criteria in the *Road Noise Policy* (DECCW 2011). The DECCW (2011) road noise assessment criteria for residential land uses are provided in Table 6.6.

Table 6.6 Road traffic noise assessment criteria for residential land uses

Road Category	Type of project/development	Assessment criteria dB(A)	
		Day (7 am – 22 pm)	Night (10 pm – 7 am)
Freeway/arterial/sub-arterial roads	Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors.	$L_{eq,15hr}$ 60 (external)	$L_{eq,9hr}$ 55 (external)
	Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors.		
	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments.		
Local Roads	Existing residences affected by noise from new local road corridors.	$L_{eq,1hr}$ 55 (external)	$L_{eq,1hr}$ 50 (external)
	Existing residences affected by noise from redevelopment of existing local roads.		
	Existing residences affected by additional traffic on existing local roads generated by land use developments.		

Additionally, DECCW (2011) states where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2 dB.

The $L_{eq,1hr}$ is the traffic noise level associated with the peak one hour traffic period of interest, day or night.

ii Modelling method

Construction, operations and traffic noise levels were modelled using Brüel and Kjær Predictor software. Predictor calculates total noise levels at assessment locations from the concurrent operation of multiple noise sources. Noise levels were calculated using meteorological parameters for the area based on weather data from the Holsworthy Control Range. These calculations considered temperature inversions that are a feature of the area during winter.

iii Assessment results

a. INP and sleep disturbance

Predicted $L_{Aeq(15-min)}$ noise levels from the marina site at the assessment locations based on calm and adverse meteorological conditions are presented in Table 6.7.

Table 6.7 INP and sleep disturbance operational noise level predictions

Assessment location	Period	Predicted $L_{Aeq,15min}$ noise level, dB		Predicted L_{Amax} noise level, dB		Criteria	
		Calm	Adverse	Calm	Adverse	PSNL, $L_{Aeq,15min}$	Sleep disturbance, L_{Amax}
R1	Day	38	n/a	n/a	n/a	47	n/a
	Evening	37	39	n/a	n/a	45	n/a
	Night	33	35	41	43	40	50
R2	Day	41	n/a	n/a	n/a	44	n/a
	Evening	41	42	n/a	n/a	44	n/a
	Night	38	39	46	47	39	49
R3	Day	43	n/a	n/a	n/a	44	n/a
	Evening	41	42	n/a	n/a	44	n/a
	Night	38	39	45	47	39	49
R4	Day	42	41	n/a	n/a	44	n/a
	Evening	39	41	n/a	n/a	44	n/a
	Night	37	38	44	46	39	49
R5	Day	34	n/a	n/a	n/a	44	n/a
	Evening	32	34	n/a	n/a	44	n/a
	Night	31	33	37	39	39	49
R6	Day	34	32	n/a	n/a	44	n/a
	Evening	31	34	n/a	n/a	44	n/a
	Night	30	33	38	40	39	49
R7	Day	34	37	n/a	n/a	44	n/a
	Evening	34	37	n/a	n/a	44	n/a
	Night	25	28	33	36	39	49
R8	When in use	39	41	n/a	n/a	55	n/a
R9	Day	36	38	n/a	n/a	47	n/a
	Evening	36	38	n/a	n/a	45	n/a
	Night	24	26	31	34	40	50
R10	Day	54	54	n/a	n/a	44	n/a
	Evening	54	54	n/a	n/a	44	n/a
	Night	37	38	45	46	39	49

Notes: 1. Predicted noise level shown in bold with grey shading indicated exceedance of the PSNL.

Predicted noise levels satisfy the sleep disturbance criteria at all assessment locations.

Predicted noise levels satisfy the PSNLs at all assessment locations during all periods, with the exception of at R10 (the closest planned residence in the Georges Cove residential estate) during the day and evening periods for calm and adverse weather conditions.

The noise level at R10 is caused by boat movements directly south of this location. It is anticipated that noise controls (eg buffers and architectural noise screening) would be incorporated in the future Georges Cove residential development which would mitigate marina noise activity. Purchasers of dwellings adjacent to the marina will be made aware of the marina development (it will be a selling point) and the associated noise generation. This development of dwellings near entertainment areas is common, and being 'close to the action' is valued by many purchasers, for example in Darling Harbour.

b. Music and patron noise

Predicted music and patron noise levels from the marina site at the nearest boundaries of assessment locations are in Table 6.8.

Table 6.8 Predicted music and patron octave band centre frequency noise levels

Description	Period	Predicted noise level above OLGR criteria ($L_{A10,15\text{minute}}$), Hz, dB									Overall dBA
		31.5	63	125	250	500	1k	2k	4k	8k	
R1	Day	2	0	0	0	0	0	0	0	0	31
	Evening	6	0	0	0	0	0	0	0	0	
	Night	8	0	0	0	0	0	0	0	0	
R2	Day	6	0	0	0	0	0	0	0	0	33
	Evening	8	0	0	0	0	0	0	0	0	
	Night	9	0	0	0	0	0	0	0	0	
R3	Day	10	0	0	0	0	0	0	0	0	38
	Evening	11	2	0	0	0	0	0	0	0	
	Night	12	3	0	0	0	0	0	0	0	
R4	Day	10	0	0	0	0	0	0	0	0	35
	Evening	11	1	0	0	0	0	0	0	0	
	Night	12	2	0	0	0	0	0	0	0	
R5	Day	2	0	0	0	0	0	0	0	0	25
	Evening	3	0	0	0	0	0	0	0	0	
	Night	4	0	0	0	0	0	0	0	0	
R6	Day	0	0	0	0	0	0	0	0	0	21
	Evening	1	0	0	0	0	0	0	0	0	
	Night	2	0	0	0	0	0	0	0	0	
R7	Day	8	0	0	0	0	0	0	0	0	36
	Evening	8	0	0	0	0	0	0	0	0	
	Night	9	0	0	0	0	0	0	0	0	
R9	Day	8	0	0	0	0	0	0	0	0	38
	Evening	10	0	0	0	0	0	0	0	0	
	Night	12	0	0	0	0	0	0	0	0	
R10	Day	13	8	8	4	10	12	15	15	0	54
	Evening	13	8	8	4	10	12	15	15	0	
	Night	14	9	9	5	11	13	16	16	0	

Notes: 1. Blue highlight indicates exceedance predominantly generated by music noise; orange highlight indicates exceedance predominantly generated by patron noise.

2. The predictions represent the level of noise above the OLGR criteria; compliance is indicated by a zero.

Noise level predictions indicate that energy in 31.5 and 63 Hz octave band centre frequencies will exceed the OLGR criteria at all assessment locations for the majority of periods. This exceedance is generated by music noise in function areas.

The predicted noise level above the OLGR criteria at R10 is predominantly generated by patron noise at the marina clubhouse external balconies. It is noted that the assessment assumes all function centre balconies at capacity and utilises a conservative patron noise sound power level.

Management measures to prevent adverse noise impacts are provided in Section 6.7.3.

c. Cumulative operations noise

The highest noise levels from industrial and marina-based activity are likely to occur during the day and early evening period (ie during daylight hours). The highest noise levels from music and patron noise are more likely to occur during the evening and night periods, most likely on Friday and Saturdays. The likelihood of highest noise levels from the two activities coinciding is therefore low, and on this basis, cumulate noise from the marina site will unlikely be materially above noise already predicted for these activities in isolation.

d. Construction noise

Predicted $L_{Aeq(15-min)}$ noise levels from construction at all assessment locations are provided in Table 6.9.

Table 6.9 Predicted construction noise levels

Assessment location	Predicted $L_{Aeq,15min}$ noise level, dB						NML, dB(A)	Highly affected NML, dB(A)
	Excavation		Road works		Building construction			
	Calm	Adverse	Calm	Adverse	Calm	Adverse		
R1	55	n/a	55	n/a	43	n/a	52	75
R2	58	n/a	60	n/a	46	n/a	49	75
R3	62	n/a	61	n/a	50	n/a	49	75
R4	61	n/a	57	n/a	51	n/a	49	75
R5	57	n/a	51	n/a	46	n/a	49	75
R6	54	n/a	48	n/a	46	n/a	49	75
R7	51	54	48	50	40	43	49	75
R8	56	58	50	52	43	45	65	n/a
R9	53	68	48	51	40	43	52	75

Notes: 1. Predicted noise level shown in bold with grey shading indicated exceedance of the NML.
2. n/a indicates that the calm condition represents the worst case, or adverse, weather condition.
3. NML: noise management level.

Predicted construction noise levels are:

- below the ICNG highly affected noise management level (NML) at all residential assessment locations for all construction activities;
- above the ICNG NMLs at all residential assessment locations for calm and adverse weather conditions during excavation/earthworks stage;

- above the ICNG NMLs at all residential assessment locations for calm and adverse weather conditions during road works;
- below the ICNG NMLs at most residential assessment locations for calm and adverse weather conditions during building construction, the exception being locations R3, R4 and R10 where marginal noise levels above the NMLs are predicted; and
- below the DECC (2009) NML for non-residential assessment locations.

Given the above, construction noise will have to be managed. The primary method of managing noise is to limit construction to standard hours, which is proposed. Additional noise management and mitigation measures are provided in Section 6.7.3.

e. Road traffic noise

Road traffic noise modelling results are summarised in Table 6.10 and Table 6.11 for weekday and weekend traffic volumes respectively. Night-time traffic noise criteria are shown in the event that peak movements occur from the proposed marina outside of 7 am to 10 pm.

Table 6.10 Predicted traffic noise modelling results – weekday

Receiver		Criteria, dB(A)		Predicted $L_{eq,1\text{ hour}}$, peak traffic noise level dB(A)		
Name	Number	Daytime	Night-time	Existing ¹ (Brickmakers Dr)	Marina local road	Total (future)
Georges Fair residences west of Brickmakers Drive (existing and future)	T1	55	50	64	51	64
	T2	55	50	51	47	52
	T3	55	50	64	48	64
	T4	55	50	68	51	68

Notes: 1. Brickmakers Drive existing weekday traffic noise shown.
2. 197 vehicles per hour for marina to southern carparks..

Table 6.11 Predicted traffic noise modelling results – weekend

Receiver		Criteria, dB(A)		Predicted $L_{eq,1\text{ hour}}$, peak traffic noise level dB(A)		
Name	Number	Daytime	Night-time	Existing ¹ (Brickmakers Dr)	Marina local road	Total (future)
Georges Fair residences west of Brickmakers Drive (existing and future)	T1	55	50	61	51	61
				60		60
	T2	55	50	48	44	49
				46		48
	T3	55	50	62	47	62
				60		61
	T4	55	50	65	51	65
				64		64

Notes: 1. Friday and Saturday evening Brickmakers Drive existing traffic noise shown.
2. 220 vehicles per hour for marina to northern carparks.

The proposed development's weekday and weekend peak hour traffic noise contributions are relatively minor in comparison to existing noise levels from Brickmakers Drive for all assessment locations. Total future road traffic noise levels for Georges Fair residences are shown to be similar to existing levels. Predicted traffic noise levels from vehicles accessing the marina will satisfy the *Road Noise Policy* criterion of no more than 2 dB increase where existing traffic noise is above acceptable levels.

6.7.3 Management and mitigation

Mitigation measures to minimise potential noise impacts are provided in Appendix G, these include:

- a 2 m high acoustic barrier will be constructed to the west of the marina clubhouse carpark;
- partial acoustic screening (eg louvres) will be installed on the north balconies of the marina clubhouse and marina building. The screening will be operable to allow additional acoustic screening during large functions when the respective function centres are in use;
- music noise from the function centres will be managed and/or mitigated to limit low frequency noise in 31.5 and 63 Hz octave band centre frequencies so that the criteria in Table 6.4 are met. This can be achieved by fitting the public address system with a noise limiter or increasing the glazing thickness at function centres, or a combination of both measures. This and other alternate measures will be detailed in the project design stage; and
- a noise management plan will be prepared and implemented, outlining procedures for patron management, paying attention to more sensitive evening and night-time periods.

Noise management measures for the construction phase are provided in Appendix G.

6.8 Air quality

6.8.1 Air quality assessment

Todoroski Air Sciences conducted an air quality and greenhouse gas assessment in 2011 (Appendix H2). The assessment found that airborne emissions (particulates, odour and toxic substances) from the proposed operation will comply with NSW guidelines to prevent amenity and health impacts.

Todoroski Air Sciences reviewed the air quality assessment in 2015 (Appendix H1) and confirmed that the project will comply with the relevant guidelines for amenity and health.

6.8.2 Management measures

Mitigation measures to minimise potential impacts are provided in Appendix H2, these include:

- installation of vapour recovery systems to minimise the volatile emissions from petrol sales;
- implementation of measures to avoid potential odour nuisance regarding sewerage;
- implementation of measures to minimise the potential dust emission from boat maintenance operations; and
- the use of a paint booth with a small stack for the release of volatile organic compounds from paint operations.

6.9 Heritage

6.9.1 Aboriginal heritage

i Aboriginal heritage assessment

In 2004, Mary Dallas Consulting Archaeologists undertook an Aboriginal archaeological assessment and field survey (Appendix I2) of the project area accompanied by a site officer from the Gandangara Local Aboriginal Land Council (GLALC). No Aboriginal archaeological sites were identified in the project area during background research or the survey. Due to past land use disturbances and major sub-surface destruction on the project area, it was concluded that there was little to no potential for buried deposits.

EMM reviewed the 2004 assessment in April 2015 and completed an updated search of the Aboriginal Heritage Information Management System (AHIMS) register (Appendix I1). The search of AHIMS register covered a 1 by 2 km area. This confirmed that Aboriginal sites have not been recorded, and are not likely to exist, in the project area. No further field survey was required because the project area is the same as that surveyed for the 2004 assessment.

The 2004 assessment and updated AHIMS register search fulfil the requirements of the due diligence guidelines. Therefore, no further investigation is required for the project area.

ii Aboriginal heritage management measures

Although no Aboriginal objects are expected to occur in the project area, the following procedures will be implemented to avoid harming any unknown Aboriginal objects.

- If during the course of construction, Benedict or any subcontractors become aware of any previously unidentified Aboriginal object(s), all work likely to affect the object(s) will cease immediately and the GLALC and an archaeologist will be contacted for further advice.
- If suspected human skeletal remains are identified, all work likely to affect the remains will cease immediately. The find will be reported to the police (as required for all human remains discoveries) and the OEH contacted for advice on the identification of the skeletal material as Aboriginal and management of the material. If the remains are Aboriginal ancestral remains, the GLALC will be contacted and consultative arrangements will be made to discuss ongoing care of the remains.
- Heritage awareness training will be part of the induction program for all on-site personnel.

6.9.2 Non-Aboriginal heritage

i Non-Aboriginal heritage assessment

A non-Aboriginal heritage assessment was undertaken by Heritech Consulting in 2003 (Appendix J2). The assessment involved historical research and a field survey of the project area. The marina site was noted to be extensively disturbed by previous operations on the north of the marina site and sand processing operations on the south of the marina site. No historic items or areas of archaeological potential were identified in the project area.

EMM reviewed the 2003 assessment in April 2015 (Appendix J1). This included searching relevant statutory historic heritage databases to determine if protected heritage items have been listed in the project area. Aerial imagery from 1943 was referenced to identify any historic items or potential archaeological deposits. No historical items were identified within the project area.

No listed historic heritage items will be impacted by the project. It is unlikely to have archaeological potential as the project area has been highly disturbed. Therefore, no further investigation or field surveys are required.

ii Non-Aboriginal heritage management measures

Although historic items are not expected to occur in the project area, the following procedures will be implemented to avoid harming any unknown historic items:

- If during the course of construction, Benedict or any subcontractors become aware of any previously unidentified historic structures or archaeological deposits, all work likely to affect the object(s) will cease immediately and an archaeologist will be contacted for further advice.
- Heritage awareness training will be part of the induction program for all on-site personnel.

6.10 Recreational boating

Use of Georges River for recreational boating and the potential impacts of boats stored at the proposed marina on river navigation are described below.

6.10.1 Current boat use

While no formal river traffic usage statistics are available from authorities such as RMS, research on Georges River traffic on weekends during peak summer usage has indicated surprisingly low levels of river traffic. Aerial photos taken on Saturdays in summer on days where the temperature was more than 30°C indicate that there were:

- 3 to 4 vehicles parked in the Davey Robinson Boat Ramp and Park carpark to the north of the marina site; and
- 4 to 5 small craft on the river over a 15 km stretch of the river downstream of Newbridge Road Bridge.

The Deep Water Motorboat Club has non-exclusive aquatic licences for boat racing events on the Georges River on five Sundays over summer.

6.10.2 River navigation

The physical development of the marina will have very little impact on river navigation as the entire development will be on land owned by Benedict and will be outside of the Georges River channel. No structures of any kind will be erected in the river channel.

Currently, boats are launched backwards at Davey Robinson boat ramp. These craft either remain at idle in the river channel while the trailers are parked or manoeuvre across to the public jetty where they are tied up to await the return of the driver after parking the vehicle and boat trailer. In either case, a considerable portion of the channel can be occupied with boats manoeuvring at low speed, often in reverse. These boats present safety risks in the river channel.

Boats entering the river from the marina will do so via an entrance about 40 m wide. They will be travelling forward, will not need to wait in the river for the car driver to return, and will quickly integrate with any other boat traffic on the river (subject to speed limits).

Modelling based on internationally recognised survey data for general marina usage rates indicate that:

- up to 60% of vessels leave their berth very rarely or never; and
- recreational craft will be in their berths 95% of the time.

Peak berth usage has been predicted by calculating a weighted average of about 16.8% usage in peak summer periods contrasting with 0.16% during winter periods. This is based on survey data from other marinas in Sydney in publically available studies.

On the busiest days, Christmas, New Year, Easter, October Long Weekend and Australia Day, a maximum of only 73 boats are expected to leave the marina. As at least half of these small craft movements will occur on a pre-booked departure time (and pre-booked retrieval times upon return) for the dry berth facility, small craft traffic flows into the river will be easily managed. This will be assisted by the overall marina basin design, with generous widths provided for general small craft movement including manoeuvring at the fuel and pumpout facilities. No mooring or anchoring will be permitted in the marina and a no-wash zone (4 knots) will be implemented within the marina. This will be policed with the marina facility tender/retrieval vessel which will be responsible for implementing nowash rules and retrieving small craft owned by marina members that have experienced engine or other mechanical failure.

During the previous application determination period, RMS Maritime Division raised concern that boats entering/exiting the proposed marina could potentially impact vessel navigation safety in respect to the operation and efficiency of users of along the Georges River. In regard to the previous application, LCC (2014) stated that:

While the proposed marina and such operations will be on the side of the Georges River, the entry and exit channel to the river is of concern. It is noted that this stretch of the river is not speed restricted and historically, is popular for towing activities such as water-skiing, wakeboarding and aquaplaning. Moreover, the entrance could have issues relating to lack of vision due to the riverbank and seawalls and the advent of upgraded pontoon facilities downstream, the area will experience an increase in vessel use.

It was noted that the existing speed limit along the stretch of the river is unlikely to change in the near future and therefore, the operation of the proposed marina will need to be managed so as to not cause an adverse impact to all boat users.

In order to address the RMS' concerns on this matter, it is considered appropriate that a 'Boating Management Plan' be conditioned as part of any consent which will address, but not be limited to:

- internal speed limits within the marina basin;
- identification of laneways for navigation throughout marina basin with respect to type of size of watercraft; and
- identify appropriate means of access/egress from the marina basin to the Georges River as well as speed and the like.

The above list is not exhaustive and it was agreed with the RMS, that the condition will need to direct the applicant to directly consult with the RMS on the appropriate matters to be addressed.

A boating management plan will be prepared accordingly.

In regard to the previous application, LCC (2014) concluded that “[i]t is considered that the proposed marina will operate satisfactorily with appropriate measures in place which address river navigation as well as management practices within the basin for safety of all users”.

6.10.3 Davy Robinson Boat Ramp and Park

The Davey Robinson Boat Ramp and Park was specifically identified as a potential demonstration site as part of the *Georges River Catchment Built Environment Foreshore Access Study* (DIPNR 2004) (referred to the report as the ‘Newbridge Boat Ramp’). The access criteria for selecting demonstration sites included:

- provides a range of levels of access to the river;
- enhances the natural values and recreational amenity of the foreshore area and reduces adverse impacts on the waterway;
- provides existing or potential links between access points and recreational areas;
- exhibits the potential to provide a physical link/crossing of the river or tributary. A potential to promote an integrated cross Council approach to management;
- enhances the focus on the river;
- improves the ecological environment by controlling access;
- has significant amenity values, and community values; and
- exhibits high visibility from the river and from surrounding roads.

The access study report notes that “it is not intended that the choice of these demonstration sites should supersede other important foreshore improvements already in train or planned for the Georges River. Rather, the intention is to illustrate typical opportunities and a project that could be applied at these and other sites”.

The proposed marina precisely meets the design goals and strategy for river access and foreshore accessibility.

6.10.4 Deepwater motorboat club

The Deepwater Motorboat Club on these occasions race days typically occur on approximately Sunday of the year. The Club does not have any exclusive aquatic licences for use of the river. Given such infrequent use there is not expected to be any conflict of river use or traffic.

6.10.5 Management measures

The scheduling of departures and retrievals during peak periods, along with the operation of a marina tender/retrieval vessel, will ensure that there will be no adverse impacts on the existing recreational boating community.

6.11 Site accessibility

6.11.1 Access and amenity for residents in neighbouring areas

The development will provide a recreational precinct of high scenic and recreational value within easy walking distance of about 1,200 current and future households in the Georges Fair development and the Mirvac Georges Cove residential development on the northern portion of Lot 7. Currently, no river or recreational access is possible or available due to the extractive and recycling operations that occur on Lot 7. Hence, the impact of the development will be to provide an essential quality recreational precinct for adjoining residential developments and the region.

6.11.2 Disabled access

The use of floating berths and a ramp system will allow a high level of disabled access. The need for specialised hoists will be assessed as part of the detailed design undertaken at construction stage with reference to Australian Standard:1428-2003 (*Design for Access and Mobility*), Part D3 of the Building Code of Australia and the Commonwealth *Disability Discrimination Act 1992*.

It is expected that full compliance with disability access standards will be implemented at the facility.

6.12 Economic impacts

6.12.1 General

The development, while an important local facility, does not warrant a full economic impact assessment. The new marina and related facilities will provide:

- small craft storage and boat berthing facilities;
- fuel and sewage pumpout services which are currently not available to the general boating public in the area;
- maintenance and chandlery facilities;
- sales and brokerage services; and
- recreational facilities including a function centre and other amenities (eg kiosks).

While the development is not expected to have a major positive impact on regional economic activity, the local impacts will provide a significant economic boost and underpin a vibrant and attractive river foreshore precinct for the community.

Economic for the development include:

- current market demand for services being offered;
- construction and operational employment;
- the potential impact on land values; and
- the impact of the proposed development on other marinas.

These are addressed below.

6.12.2 Demand for infrastructure and associated services

The facility will cater for the demand for marina and associated services that are not met in the area. Small craft storage is a significant problem for the tens of thousands of boat owners across Sydney with many trailered craft being stored in streets and backyards. There are 17,000 small craft (5 to 10 m long) alone registered to owners within a 10 km radius of the marina site (based on RMS data).

In addition, specialist boat brokerage and other maritime services for boat owners who live locally are in short supply.

6.12.3 Employment

i Operational employment

It is expected that employment will be generated from the development as follows:

- 1 Marina Precinct Manager (full time);
- 3 administration staff (full time);
- 1 brokerage sales staff (full time);
- 1 chandlery sales staff (full time);
- 3 chandlery sales staff (part time);
- 6 marina staff (casual part time);
- 2 workshop manager/staff (full time);
- 1 function centre manager (full time);
- 15 casual function centre staff (part time);
- 3 kiosk operators (full time); and
- 9 kiosk operators (part time).

As business patronage grows, additional staff will be required. There is ample on-site parking to accommodate additional staff.

ii Construction employment

The number of construction employees will vary over the duration of the project, dependant on the particular activities taking place at any one time. It is expected that between 20 and 35 equivalent full time construction jobs will be created over the construction period of 22 to 36 weeks.

6.12.4 Land values

The replacement of the existing extractive and recycling industry and removal of heavy vehicle movements alone from the precinct will result in greatly improved local amenity for adjoining residential lands. Given that these industries will be replaced with a recreational precinct designed to reconnect the community with the river foreshore, it is expected that the development will have a significant positive impact on adjoining land values.

6.12.5 Other marinas

It is not expected that the Georges Cove Marina will have any significant impact on the operation of other marinas given the considerable distances separating these facilities (to the next facility is almost 15 km downstream).

7 Statement of commitments

7.1 Previous application conditions

The JRPP issued development consent (subject to conditions) for the Georges Cove Marina to Tanlane Pty Ltd on 22 August 2014. It is proposed to construct and operate the marina development, if approved, generally in accordance with these previous conditions as modified by the consent authority.

7.2 Environmental management plan

An environmental management plan (EMP) will be prepared during the detailed design of the marina based on project approval conditions. The EMP will be prepared prior to commencement of the development to ensure that the commitments in this EIS and Project Approval conditions are fully implemented.

The EMP will include:

- a summary of the proposed development;
- a summary of required licenses;
- the environmental management strategy for the marina; and
- the environmental management measures in this EIS.

As described in this EIS, the EMP will include the following plans:

- Vegetation Management Plan;
- Acid Sulfate Management Plan;
- Noise Management Plan; and
- Boating Management Plan.

7.3 Commitments

The key commitments described in this EIS are summarised in Table 7.1.

Table 7.1 Key commitments

No.	Commitment	Reference
Water		
1	Floor levels of the building and marina facilities have been determined using the 100 year ARI flood levels produced in the Georges River Flood Study (adopted by Liverpool City Council) and will incorporate the appropriate freeboard.	Section 6.1.7
2	Water quality in the dredge basin will be tested during construction prior to breaking through the banks to the river. The bank will only be opened if the water quality in the basin is similar to, or better than, that in the Georges River.	Section 6.1.7

Table 7.1 **Key commitments**

No.	Commitment	Reference
3	Water sensitive urban design elements will be incorporated into the design (including the provision of wetlands) to provide stormwater treatment to reduce nitrogen, phosphorus, total suspended solids and heavy metals concentrations.	Section 6.1.7
4	Bilge and sewage pump-out facilities will be provided in the marina and discharge of sewage from boats using the marina will be prohibited.	Section 6.1.7
5	Bank stabilisation will be undertaken as part of the development.	Section 6.1.7
Soils		
6	The acid sulfate soils management plan (Appendix K) will be implemented.	Section 6.2.2
Contamination		
7	The recommendations of the Preliminary Investigation of Contamination (Appendix C) will be implemented.	Section 6.3.5
Ecology		
8	The foreshore vegetation will be embellished and a vegetation management plan will be prepared and implemented.	Section 6.4.2
9	The marina basin will be constructed in a manner that ensures that it is regularly flushed, that sediment accumulation is minimised, and that the entrance channel location avoids direct loss of existing seagrass patches or mangrove trees.	Section 6.4.4
10	Natural, or near-natural, intertidal to riparian zone habitats will be provided that that support local native vegetation and link these habitats.	Section 6.4.4
Noise		
11	A 2 m high acoustic barrier will be constructed to the west of the marina clubhouse carpark.	Section 6.7.3
12	Partial acoustic screening (eg louvres) will be installed on the north balconies of the Private Marina Clubhouse and Maritime Building.	Section 6.7.3
13	Music noise from the function centres will be managed and/or mitigated to limit low frequency noise in 31.5 and 63 Hz octave band centre frequencies.	Section 6.7.3
Recreational boating		
14	The scheduling of departures and retrievals during peak periods, along with the operation of a marina tender/retrieval vessel, will ensure that there will be no adverse impacts on the existing recreational boating community.	Section 6.10.5

8 Conclusion and justification

8.1 Introduction

This chapter provides justification for the carrying out of the proposal against the principles of ecologically sustainable development (ESD). It also discusses the suitability of the marina site, any submissions made and whether the proposal is in the public interest as required by Section 79C(1)(c)–(e) of the EP&A Act.

8.2 Principles of ecologically sustainable development

The principles of ESD are defined in Clause 7(4) of Schedule 2 to the EP&A Regulation and include the following:

- (a) the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:
 - (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and
 - (ii) an assessment of the risk-weighted consequences of various options.
- (b) inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations;
- (c) conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration; and
- (d) improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:
 - (i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement;
 - (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and
 - (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

Consideration of the proposal against the four principles of ESD is given below.

8.2.1 The precautionary principle

The precautionary principle states that “if there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.”

Consideration of the precautionary principle requires two things. First, that the proponent properly assesses all potential impacts using plausible worst-case assumptions and, either, avoids them in project planning or incorporates effective safeguards into the project design. Second, that the relevant authorities make a well-informed decision about the project based on a sound knowledge of the project's implications and impacts, including any limitations on the accuracy of impact predictions.

The redevelopment of the marina site will have a beneficial outcome and there are no significant risks arising to community health.

No "threats of serious or irreversible damage" from the proposal have been identified and the project's planning and design meets the first test above. These design and management measures are described in Chapters 2 and 6 this EIS. The Statement of Commitments (Chapter 7), highlights the main measures that will be implemented under the proposal to avoid, manage or mitigate predicted environmental impacts.

The second test will be satisfied by the comprehensive decision-making processes to be followed by the government, including the JRPP.

8.2.2 Inter-generational equity

Inter-generational equity requires that the "present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for benefit of future generations". The requirement for equity between generations binds or integrates the other principles of ecologically sustainable development.

Inter-generational equity implies that the present generation should ensure that its local environment is maintained or enhanced for the benefit of future generations.

The marina redevelopment, which will provide boat storage facilities and services to meet demand, and incorporate best practice environmental controls, is consistent with the objective of social equity including inter-generational equity. In particular, the development aims to ensure that the riverine environment of the Georges River is maintained or enhanced for the benefit of future generations.

8.2.3 Conservation of biological diversity and ecological integrity

Biological diversity refers to the diversity of genes, species, populations, communities and ecosystems and the linkages between them. Biological resources provide food, many medicines, fibres and industrial products. Maintenance of biological diversity will ensure life support functions and can be considered a 'minimal' requirement for inter-generational equity.

The impact of the proposal on flora and fauna species and communities is addressed in detail in Section 6.3.1. These impacts will be minimal. The proposed marina will provide a number of benefits to biological diversity and ecological integrity, as it will stabilise the banks of Georges River, enhance foreshore vegetation, allow the possible removal of river swing moorings on seagrasses and provide additional fish habitat such as floating pontoon structures.

8.2.4 Improved valuation, pricing and incentive mechanisms

The principle of improved valuation, pricing and incentive mechanisms is a component of "inter-generational equity" and establishes the need to determine economic values for services provided by the natural environment, such as the atmosphere's ability to receive emissions, the cultural values of a site and its visual amenity.

The value of the environmental resources affected by the proposal has been acknowledged and provided for through the examination of environmental consequences of the proposal and identification of mitigation measures to address potential impacts, including any short-term construction impacts.

8.2.5 The suitability of the site for the development

The proposal negates the need for large amounts of filling material to be imported to undertake the restoration of the quarry void and the attendant impacts relating to noise and traffic that this would entail. As described in Section 1.7, the marina provides the highest and best value use for the completed site and returns a highly degraded site back to the economy.

In regard to the previous application, LCC (2014) found:

The land is zoned for open space both in public and private recreation. The proposed development is in keeping with the vision of the site as anticipated in the zoning of the land and support and complements the surrounding uses identified for the Moorebank East precinct.

The proposed development has demonstrated that the potential impacts have been addressed and a number of measures and safeguard are to be implemented to manage any impacts. The development would seek to embellish the area both in terms of the natural and built environment through the agreement of Council and the property owner with works that would see the land return to the community with a high quality outcome.

The proposed development represents an opportunity to rehabilitate the highly degraded site which is currently used for extractive industry. The cessation of this industrial use and expedition of the rehabilitation of the site is a significant benefit for the land and would fast track the use of the land for the benefit of the community.

Accordingly, it is considered that the proposed development is suitable for the site.

There has been no substantial change to the development since this time so it is believed the Council's statement remains current.

8.3 Submissions

Submissions on the previous application for the marina development are described in Chapter 4.

The EIS for the proposal will be placed on public exhibition for a determined period of time. During this period, the public will be invited to provide submissions on the proposal. These submissions will be considered by the Council in its assessment report and the JRPP in their determination of the proposal.

8.4 Public interest

In regard to the previous application, LCC (2014) found that:

The proposed development is considered to provide for substantial social benefit. These benefits include:

- The proposal will see the cessation of extractive industries on the subject [marina] site which has degraded the land and rendered it inaccessible to the public for a number of years. The current use is incompatible with the surrounding context of the area which is predominantly characterised with residential development and natural vegetation. The current impact of traffic generation from heavy vehicles and noise, dust and air emanation will cease on conclusion of extractive industry activities at the site.

- The approval granted for the site enables the rehabilitation of the land with waste material to facilitate the formation and return of the land to its natural landform. Waste management uses will not be carried out as a result of the proposed development and will therefore remove the continued environmental impact of what is essentially an industrial use.
- The proposal is considered to be a significant project for Liverpool and will exhibit a high quality design benchmark and be an iconic development for the local area and the greater region.
- The proposed development represents a significant opportunity to reactivate an inaccessible and highly degraded stretch of the Georges River and will seek to return the natural landscape to the community through a development.
- The development will provide for numerous active and passive forms of recreation that represents substantial economic and social benefits for the Liverpool and the greater community.
- The development encourages a new recreational facility to the area with casual public berths for small craft and water taxis to pick-up and drop-off passengers and access provisions from the marina facilities. Public access to fuel and sewage pumpout facilities will be made available to boat users and thereby encourage patronage to the area.
- The development will be made accessible for all people and those with a disability.
- The development will increase the environment quality of the area through managed revegetation with species endemic to the area. The ongoing management of these areas along the river foreshore coupled with the provision of embellished public open space in the form of pedestrian and cycleway, bridge and street furniture will provide a sense of place for the area and create ownership of residents and users of the development.
- The proposed development is anticipated to increase economic activity of retail sales of marine equipment, leisure activities and recreational uses by way of function/receptions spaces, food and beverage option both casual and high-end and storage of vessels.
- The number of construction employees will vary over the duration of the project dependant on the particular activities taking place at any one time. It is expected that between and 35 equivalent full time construction jobs will be created over the construction period of 22 weeks.
- The proposed will increase local employment opportunities in management, brokerage and chandlery sales, marine staff, workshop, function centre and food and beverage operators.

There has been no substantial change to the development since this time so it is believed the Council's assessment remains current.

8.5 Justification and conclusion

Justification for the proposal based on biophysical, economic and social considerations is provided in Section 1.7.

This EIS has been prepared in accordance with the SEARs, Clauses 71 and 72 of the EP&A Regulation and advice provided by the Council and other stakeholders. It describes the existing environment, the proposal, the legislative and policy context, proposed environmental management measures and the impacts of the project.

Having regard to the overall environmental impacts determined as part of this EIS, the proposed redevelopment is not considered likely to give rise to any significant adverse cumulative impacts on the environment. The assessment has demonstrated that any environmental impacts during construction or operation of the marina can be mitigated through normal operating procedures.

Overall, the proposed Georges Cove Marina will have biophysical, social and economic benefits. The development satisfies the four principles of ecologically sustainable development.

It is, therefore, recommended that the proposed Georges Cove Marina is approved, subject to the mitigation measures outlined in this EIS.

Abbreviations

AHD	Australian height datum
AHIMS	Aboriginal Heritage Information Management System
ARI	Average reoccurrence interval
ASS	Acid Sulfate Soils
Benedict	Benedict Industries Pty Ltd
CNVMP	Construction noise and vibration management plan
DA	Development Application
DCP	Development Control Plan
DECCW	Department of Environment, Climate Change and Water
DIPNR	Department of Infrastructure, Planning and Natural Resources
DPE	Department of Planning and Environment
DPI	Department of Primary Industries
EBPC Act	<i>Environmental and Biodiversity Conservation Act 1999</i>
EECs	Endangered ecological communities
EIS	Environmental impact statement
EMM	EMGA Mitchell McLennan Pty Ltd
EMP	Environmental Management Plan
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPA	Environment Protection Authority
EPL	Environment protection license
ESD	Ecologically sustainable development
FM Act	<i>Fisheries Management Act 1994</i>
GLALC	Gandangara Local Aboriginal Land Council
GMREP	Greater Metropolitan Regional Environmental Plan
JRPP	Joint Regional Planning Panel
LCC	Liverpool City Council
LEP	Local Environmental Plan
LGA	Local Government Area
MOAs	Marina Occupation Agreements
NOW	NSW Office of Water
NPC	National Project Consultants Pty Ltd
NSW	New South Wales
NSWCA	NSW Court of Appeal
NSWLEC	NSW Land and Environment Court
OEH	Office of Environment and Heritage
PHA	Preliminary hazard analysis
PMF	Probable maximum flood
RMS	Roads and Maritime Service
ROPAP	Rare or Threatened Australian Plants
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SIS	Species Impact Statement

SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SRDAC	Sydney Regional Development Advisory Committee
TSC Act	<i>Threatened Species Conservation Act 1995</i>
VENM	Virgin excavated natural material
VMP	Vegetation management plan
VPA	Voluntary Planning Agreement

References

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