Asset protection zones

Georges Cove Marina
Bushfire Assessment

Figure 3.1

3.1.1 Maintenance of APZs

The APZs will be maintained in a manner that prevents accumulation of fine flammable debris on the ground so that fuel quantities are reduced, thus lessening flame heights and potential crowning. General maintenance guidelines are described in Appendix 2 of the PBP.

The IPAs will be maintained as follows:

- canopy cover kept at less than 15% of total surface area and at least 2 m from the roof line of a building;
- garden beds and shrubs not to be located under trees and sited at least 10 m from any exposed windows or doors; and
- lower limbs of trees up to 2 m above the ground are removed.

The OPAs will be maintained as follows:

- canopy cover kept at less than 30% of total surface area; and
- understorey mowed annually before the fire season (usually September) to remove shrubs and long grasses.

3.2 Services

Water, gas and electricity services will be located and installed in a manner that reduces the potential for them to contribute to fire hazard. Detailed design has not taken place for the project. However, the specifications given below will be incorporated into the detailed project design.

3.2.1 Water

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 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.

3.2.2 Electricity and gas

Electricity and gas services will be located so they do not contribute to the risk of fire to a building. The following guidelines will be followed during detailed project design (from Chapter 4 of the PBP):

- it is preferable to place electrical transmission lines underground. However, if overhead electrical transmission lines are to be used, they will be installed and managed in accordance with Ausgrid 2010 *NS179 Vegetation Safety Clearances*;
- *AS/NZS 1596:2008 The storage and handling of LP gas* will be followed for bottled gas installation and maintenance. Metal piping will be used;

- there will be minimum 10 m distance between fixed gas cylinders and flammable materials and shielding will be placed on the hazard side of the cylinders; and
- release valves on gas cylinders close to buildings will be directed away from the building and minimum 2 m from combustible material. Metal connections will be used.

3.3 Access

The project is proposed to be accessed from Brickmakers Drive via a new sealed, two-way link road which has been approved by Liverpool City Council.

Internal roads to buildings will be designed in accordance with the Austroads 2009 *Guide to Road Design* and the following PBP guidelines:

- a minimum vertical clearance of 4 m to any overhead obstructions including branches; and
- bridges and pavements capable of carrying more than 15 tonnes.

3.4 Marina operations

A fire or explosion in the infrastructure areas could initiate a bushfire. The risk of this occurring will be reduced if the following measures are implemented:

- refuelling will be undertaken in designated refuelling areas (there will not be any vegetation in these areas), especially when the fire danger rating is very high or above;
- fire extinguishers will be maintained in buildings, and marina and refuelling areas;
- water will be made available to assist with fire fighting when required; and
- spill response kits will be available should there be a spill of flammable substances.

4 Bushfire construction levels

Section A4.1 of the PBP requires an assessment of whether specified non industrial buildings are capable of complying with the bushfire construction levels described in *Australian Standard 3959 – 2009 Construction of buildings in bushfire prone areas* (AS 3959 – 2009). The specified buildings are classified by the *Building Code of Australia* (2011) as class 1, 2, 3, and 4 buildings; and some class 9 and 10 buildings.

The project buildings are industrial and commercial and, therefore, do not have bushfire construction levels specified in AS 3959 – 2009. Notwithstanding, the PBP requires that such buildings comply with the general bushfire construction requirements in section 3 of AS 3959 – 2009. The buildings for the project will be constructed to comply with these requirements.

5 Conclusion

The project will be on mapped bushfire prone land and this assessment describes measures to enable the project to comply with the objectives of the PBP. Specifically, APZs will be provided and managed to enable fire fighting vehicle access and to distance project buildings from vegetation which represents a fire hazard. The risk of the project initiating a bushfire will be minimised through the implementation of management measures.

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Appendix F

Traffic study

EMM
EMGA Mitchell McLennan

Georges Cove Marina Development

Planning Proposal | Transport Planning Assessment

Prepared for Tanlane Pty Ltd | 9 January 2015



Planning + Environment + Acoustics

Georges Cove Marina Development

Planning Proposal | Transport Planning Assessment

Prepared for Tanlane Pty Ltd | 9 January 2015

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Georges Cove Marina Development

Draft Report

Report J14149RP1T | Prepared for Tanlane Pty Ltd | 9 January 2015

Prepared by	**Tim Brooker**	Approved by	**Philip Towler**
Position	Associate – Transport Planner	Position	Associate Director
Signature		Signature	
Date	9 January 2015	Date	9 January 2015

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at or under the times and conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

Document Control

Version	Date	Prepared by	Reviewed by
V1	8 January 2015	Tim Brooker	Philip Towler
V2	9 January 2015	Tim Brooker	Philip Towler

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Appendices

Tables

Figures

1 Introduction

1.1 Introduction

EMGA Mitchell McLennan Pty Ltd (EMM) has been appointed by Tanlane Pty Ltd (owned by Benedict Industries Pty Ltd) to assess the traffic and parking impacts to allow residential development within the approved Georges Cove Marina site (the Marina site) at 146 Newbridge Road (Figure 1.1).

The Georges Cove Marina site development plans, extracts of which relating to vehicular access and car parking, are shown in Appendix A. The plans have been prepared by Michael Fountain Architects and include a residential component of 108 apartments and 17 terraced townhouses in addition to the currently approved development mix of marina wet and dry storage berths, clubhouse and bar, function centre with cafe/kiosk/restaurant uses, boat sales showroom and workshop area.

The locations of the residential buildings within the Marina site are shown in Figure 1.2 and Figure 1.3. The residential apartments will be located above ground level with car parking provided in the two basement levels below with the residential vehicular access to be provided from the upper (flood free) level access roadway. The 17 residential 'terrace' townhouses will be located in a separate building from the remainder of the development.

Access to the Marina development from Newbridge Road will be via Brickmakers Drive and a new link road.

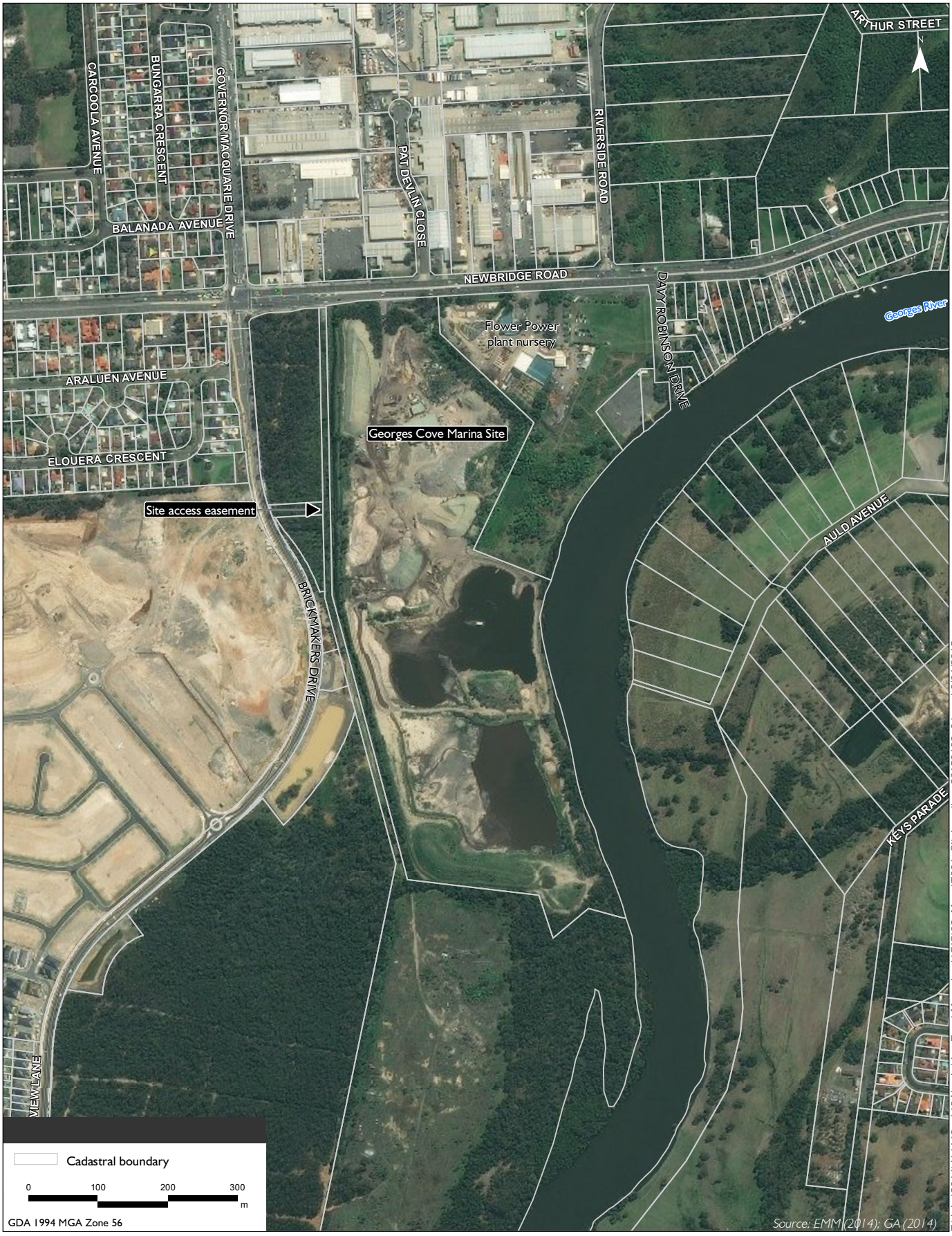
There will be a total of 851 car parking at the Marina development site. This parking will be provided as a combination of 201 residential parking spaces (34 for the terrace townhouses and 167 for the apartments) with 650 additional visitor car parking spaces located in the two level basement car park, the two ground level public car parking areas A and B, and within the forecourt area of the terrace townhouse building. The residential parking spaces will be effectively above the 1 in 100 year flood level (NPC 2015).

This report reviews the likely effect of the marina development traffic movements (including residential traffic) on weekdays and during the weekday morning and afternoon traffic peak hours on the following local area roads:

- the link road to Brickmakers Drive that will be constructed as part of the development;
- Brickmakers Drive; and
- the external major roads, which include Newbridge Road and Governor Macquarie Drive.

The report also assesses:

- compliance of the proposed site car parking spaces with the capacity and safety requirements of the Australian Standards (AS) 2890.1 and Liverpool City Council Development Control Plan (DCP) requirements;
- public transport accessibility; and
- cycle and pedestrian movement.



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EMM
EMGA Mitchell McLennan

Site layout plan showing access from Newbridge Road and Brickmakers Drive

Georges Core Marina Development
Planning Proposal - Transport Planning Assessment
Figure 1.1

Figure 1.2 Marina development aerial view to the east

Figure 1.3 Marina development aerial view to the south-west showing the proposed terrace building and apartments located above the ground floor cafes and restaurants

1.2 Background

The Georges Cove Marina development was approved by the Sydney West Joint Regional Planning Panel on 12 August 2014.

The land in which the development site is situated has an area of approximately 22 hectares and is located on the southern side of Newbridge Road. The site also includes a frontage of approximately 480 m to the Georges River.

The approved development has not been constructed. However, there has been extensive consultation between Tanlane, the Liverpool City Council and the potential developers of other nearby sites, in relation to the construction of the future shared access road (the link road to Brickmakers Drive) which will carry traffic from other developments, including from at least 180 dwellings on an adjacent future Mirvac residential development.

A DCP (Part 2.10) for the local road network has been prepared by Liverpool City Council that shows local roads within the Mirvac development site (Figure 1.4).

1.3 History of the site and adjoining properties

The 146 Newbridge Road site was formerly used for extractive industry and concrete recycling operations which have recently ceased or, in some cases, will continue until Georges Cove Marina construction is complete.

Subject to an approved development application, a Mirvac residential estate containing at least 180 dwellings is planned to the north of the Marina. The Mirvac development, when it proceeds, will not have any vehicular access to Newbridge Road and will rely on the link road to Brickmakers Drive, as the primary vehicular traffic access.

There is currently a plant nursery (Flower Power) on the north-east of the site. This has frontage on Newbridge Road. This area has the potential to be developed for a range of other land uses including commercial, retail and/or residential land uses. These uses may generate significant future traffic volumes on the link road.

On the land to the west of Brickmakers Drive (which was formerly a Boral extractive industry site), a large residential estate of 967 dwellings is nearing completion. The future residential traffic from this development will be a major component of the future total locality traffic usage of Brickmakers Drive. This traffic will generally define the future base traffic flows on Brickmakers Drive, which will influence the type of intersection (eg signalised) required to be accommodated at the Brickmakers Drive and link road intersection.

Land south of the Marina site is currently zoned for open space recreation but has been proposed to be used for a concrete recycling facility. A concrete recycling facility, if approved, would also generate traffic volumes (mainly truck traffic) using additional ramp connections to Brickmakers Drive and the link road. The potential traffic movements from this development using the future link road intersection with Brickmakers Drive are not known.

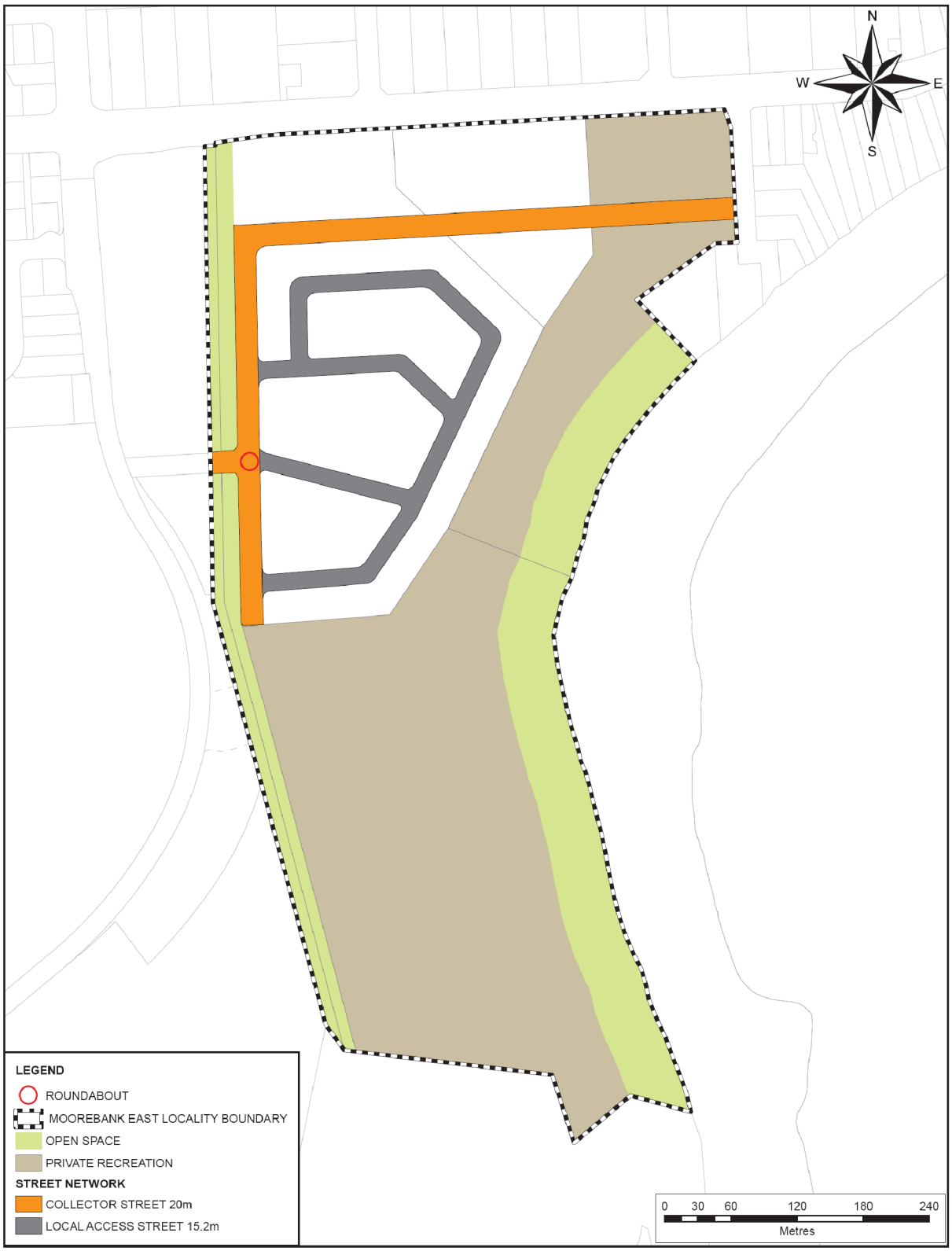

Figure 1.4 Liverpool DCP extract showing future local road network

1.4 The scope of this report

Brickmakers Drive will provide the primary access route for the Marina site and other locality residential traffic. It is the primary traffic route where existing and future traffic conditions are assessed in this report, namely:

- at the intersection of the link road with Brickmakers Drive; and
- on Brickmakers Drive, to the north and south of the intersection with the link road.

This traffic and parking assessment is based on 2013 morning and afternoon peak hour traffic survey data at the intersection of Newbridge Road with Governor Macquarie Drive and Brickmakers Drive. These have been adjusted to account for the additional residential traffic movements using Brickmakers Drive from the completion of the Georges Fair residential estate development (967 dwellings).

The existing traffic usage of the major roads and intersections (including the intersection of Newbridge Road and Governor Macquarie Drive) is already high and the additional peak hourly traffic volumes from the proposed Marina site are likely to be minimal in comparison to current traffic. Marina site traffic would not have any noticeable effect on either the peak hourly traffic volumes or the traffic delays at these intersections.

The recently completed M5 West Motorway between Liverpool and King Georges Road is a parallel arterial traffic route to Newbridge Road in the Moorebank area. It will reduce high existing peak hourly traffic volumes on Newbridge Road and other parallel traffic routes. These traffic reductions will provide additional traffic capacity for Newbridge Road and other major traffic routes in the area and will accommodate additional locally based development traffic from the Marina site.

2 Existing traffic conditions

2.1 Location

The Marina site is on the southern portion of the land at 146 Newbridge Road, Moorebank, and the future vehicular access will be via Brickmakers Drive and the link road (Figure 4.1).

2.2 Site access

The existing Benedict recycling facility operation is accessed by vehicles from Newbridge Road. This vehicular access will not be used for the Marina development, which would use Brickmakers Drive and the new link road. The intersection of these roads will be approximately 300 m south of Newbridge Road (Figure 1.1).

2.3 Road network

The major roads and existing and proposed future local roads are shown in Figure 1.1 and Figure 1.4. The future roads to access the Marina site and other development sites on the eastern side of Brickmakers Drive would have a typical sealed width of 8 m.

Brickmakers Drive is sufficiently wide for four traffic lanes north of the link road intersection location. South of the link road intersection location, Brickmakers Drive is narrower, which can be marked as a three lane road or a two lane road with wide sealed shoulders. This section of Brickmakers Drive has various traffic management devices and roundabouts installed which limit the future potential use of the route by truck traffic and other heavy vehicles.

Newbridge Road is typically at least six lanes wide, both to the east and the west of the intersection with Governor Macquarie Drive. Governor Macquarie Drive is typically at least four lanes wide in this locality. The additional Marina site generated traffic, including the residential component, travelling to local and regional traffic destinations will be dispersed with minimal potential traffic impact, including on Newbridge Road and Governor Macquarie Drive.

Davy Robinson Drive provides access to a boat ramp and recreation area north of the Marina site.

2.4 Traffic volumes

The existing daily traffic volumes on the major roads in the Moorebank area (Newbridge Road and Governor Macquarie Drive) have not been surveyed but are estimated from the surveyed morning and afternoon peak hourly traffic volumes in March 2013 as follows:

- Newbridge Road east of Governor Macquarie Drive has about 54,000 vehicle movements daily which corresponds to 4,930 vehicles during the morning peak hour and 4,843 vehicles during the afternoon peak hour;
- Newbridge Road west of Governor Macquarie Drive has about 40,000 vehicle movements daily which corresponds to 3,568 vehicles during the morning peak hour and 3,606 vehicles during the afternoon peak hour;

- Governor Macquarie Drive north of Newbridge Road has about 16,000 vehicle movements daily which corresponds to 1,441 vehicles during the morning peak hour and 1,529 vehicles during the afternoon peak hour; and

- Brickmakers Drive south of Newbridge Road has about 9,000 vehicle movements daily which corresponds to 761 vehicles during the morning peak hour and 876 vehicles during the afternoon peak hour.

2.5 Intersections

There is no intersection currently at the future location of the Brickmakers Drive and link road intersection. There are no existing traffic delays for the traffic which is using Brickmakers Drive at this location.

2.6 Car parking

On-street car parking is generally not available on most of the existing roads in the locality, eg Newbridge Road and Brickmakers Drive, due to the typical road configurations and the peak hour vehicular traffic capacity requirements for these roads.

Vacant on-street car parking will not generally be available for users of the Marina site. The proposed site design therefore includes off-street car parking to fully accommodate all the anticipated future car parking demand from the proposed development, including for all the potential resident and residential visitor car parking.

2.7 Pedestrian and cycling access

Existing pedestrian and cycling access routes are not well defined in the locality. However, pedestrian and cycle access to the Georges River foreshore is feasible via Davy Johnson Drive.

2.8 Public transport access and services

The Moorebank area is relatively well served by the M90 high frequency bus route, which travels via Newbridge Road. It provides connections to other bus routes and rail services via Liverpool, Bankstown, Padstow or Revesby train stations.

The most accessible eastbound and westbound bus stops to the site are located on Newbridge Road, about 100 m west of the Brickmakers Drive intersection. Bus stops are also located in the vicinity of Flower Power, approximately 400 m east of the intersection.

2.9 Other developments in the locality

Residential and other developments in the locality are:

- completion of the Georges Fair residential development (approximately 967 dwellings) to the west of Brickmakers Drive;
- development of a residential estate by Mirvac containing a minimum of 180 dwellings to the north of the Marina site;
- development of the Flower Power nursery site for a range of more intensive commercial, retail and potential residential land uses to the north-east of the Marina site; and
- development of a concrete recycling facility on the adjoining land to the south of the Marina site.

3 Proposed development

3.1 Site layout

The development plans, including the site layout, were prepared by Michael Fountain Architects (revision G, 19 December 2014. The overall site layout plan and plans showing the proposed building car parking areas are provided in Appendix A.

The main buildings containing the proposed 125 residential dwellings (108 apartments and 17 terraces) will be located along a 6.5 m wide access roadway, with landscaped verges and footpaths on both sides. This roadway will extend about 600 m from the roundabout located at the eastern end of the link road, past the marina buildings, to the car parking areas at the southern end of the site.

This roadway, which will be dedicated as a public road, will have a split level roadway section with upper and lower levels along the section which is adjacent to the main marina building. This will provide entry driveways to both the upper and lower levels of the main marina and residential apartment building car park.

3.2 Access road

Recent NSW Land and Environment Court proceedings (No 30141 of 2013) approved an intersection design prepared by Cardno (2013) for the link road intersection on Brickmakers Drive. This included the potential provision of traffic signals as detailed in a plan of the intersection prepared by McLaren (2013). The proposed access to the Georges Cove Marina (ie the link road and its intersection with Brickmakers Road) will be physically identical as 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 (including the proposed dwellings), 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 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.

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

3.3 Driveways and parking

The car parking within the site will be a combination of basement car parks for the residential buildings and some other buildings and on street parking for visitors (Table 3.1). There will be about 851 car parking spaces within the Marina site. This will be 201 designated residential car parking spaces and 650 other car parking spaces for use by site employees, customers and other visitors.

Table 3.1 Car parking

Car park	Residents	Visitors (including to residents)
Car park A	-	73
Car park B	-	136
Marina terraces	34	14
Marina building	167	427
Total parking	201	650

A resident/visitor parking area for the marina terrace townhouse building will be provided at ground level with a separate 'drive through' area parallel to the main site access roadway.

Separate resident and employee/visitor/customer car parking areas (each with a separate driveway and interconnecting ramps between each level) will be provided underneath the main site building for the main residential apartment, marina and cafe/function centre building.

Additional surface car parking areas for the marina users and other site visitors will be provided in two visitor car parks with capacity for 73 and 136 vehicles respectively to the south of the main marina and residential apartment building.

In addition to the 201 designated residential 'resident' car parking spaces, a minimum of 49 of the 650 site visitor car parking spaces will be designated as residential 'visitor' car parking spaces.

The widths and gradients of the site driveways and car park ramps will meet the requirements of the AS 2890.1 for building car park access driveways and ramps for both residential and commercial uses.

Detailed residential development design will consider accessible car parking, designated car wash bays and bicycle parking.

3.4 Traffic circulation

A vehicle turnaround area for delivery trucks will be provided by the internal site roadway. Trucks and other vehicles larger than a normal car will be able to turn around here when making deliveries to the site.

The vehicle turnaround area will permit the required site service vehicles, up to a large rigid truck, 12.5 m long, to enter and leave the site while travelling forwards.

3.5 Pedestrian and cycling access

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 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.

3.6 Access to public transport

The residential buildings will be within 600 to 800 m walking distance of the nearest existing bus stops on Newbridge Road which are used by the M90 bus route. This route provides a high frequency bus services to the Moorebank area. It provides weekday service frequencies of up to 10 minutes during the peak hours and weekend service frequencies of 20 minutes typically throughout the daytime on Saturdays, Sundays and Public Holidays.

This accessibility of the site to public transport is good given the frequent M90 bus service, which provides connections via other bus routes and rail services to reach destinations in other parts of the Sydney metropolitan area, including Sydney central business district (CBD).

The typical journey times for peak hour peak direction bus-rail journeys between the bus stops on Newbridge Road and the Sydney CBD (Town Hall Station) is between 1 hour and 1 hour 20 minutes during the morning and afternoon peak hours.

4 Traffic and parking impact assessment

4.1 Traffic generation and distribution

The proposed Marina site residential uses will generate similar vehicular traffic volumes on weekdays and weekends, although the morning peak traffic periods on the weekends will typically occur later in the morning such that they will effectively be closer to mid-morning peak periods.

The Marina site' vehicular traffic generation for both daily and peak hour periods, has been calculated according to standard RMS traffic generation rates for the proposed development land uses and is summarised in Table 4.1 and Table 4.2.

The RTA Traffic Generation Rates (RTA 2002) have been used in this traffic impact assessment as they provide traffic generation rates for a wider range of development types, including marina uses, than the more recent traffic survey information published by RMS in August 2013. The earlier metropolitan traffic survey rates (from 2002) are still considered to be representative of the likely future residential and commercial traffic generating characteristics of these land uses in this locality, which is within the Sydney Metropolitan area.

The RTA (2002) general commercial traffic generation rates were used to calculate weekday peak hourly and daily traffic generation volumes for the various commercial buildings which will house the boat sales, boat repair, other recreation-based functions, and clubhouse/cafe land uses at the Marina site. The RTA (2002) standard traffic generation rates were also used for the marina wet and dry storage berths.

Table 4.1 Daily site traffic generation

Land Use	Daily traffic generation rate*	Proposed development land use units and floor areas	Daily vehicle movements
Penthouse suites: 4/5 bedrooms	9.0 per dwelling	6	54
3 bedroom dwellings	5.75 per dwelling	17	98
2 bedroom dwellings	4.5 per dwelling	52	234
1 bedroom and studio dwellings	3.0 per dwelling	50	150
Dry boat storage	1.4 per berth	263	368
Wet berth marina	1.4 per berth	188	263
Function centre Kiosks and cafes	10 per 100 m^2 GFA	2,234 m^2	223
Boat sales showroom	10 per 100 m^2 GFA	415 m^2	42
Boat repair workshops	10 per 100 m^2 GFA	415 m^2	42
Total for all site buildings			**1,472**

*Notes: * Traffic Generation Rates are determined from the RTA (now RMS) Guide to Traffic Generating Developments, 2002.*

Table 4.2 Hourly site traffic generation

Land Use	Hourly traffic generation rate*	Proposed development land use units and floor areas	Hourly vehicle movements
Penthouse suites: 4/5 bedrooms	0.9 per dwelling	6	5
3 bedroom dwellings	0.6 per dwelling	17	10
2 bedroom dwellings	0.5 per dwelling	52	26
1 bedroom and studio dwellings	0.3 per dwelling	50	15
Dry boat storage	0.14 per berth	263	37
Wet berth marina	0.14 per berth	188	26
Function centre kiosks and cafes	2 per 100 m^2 GFA	2,234 m^2	45
Boat sales showroom	2 per 100 m^2 GFA	415 m^2	8
Boat repair workshops	2 per 100 m^2 GFA	415 m^2	8
Total for all site developments (am peak hour)	**Total**	**(excluding function centre, kiosks and cafes*)**	**135**
Total for all site developments (pm peak hour)	**Total**	**All**	**180**

Notes: **Afternoon peak hour only. Traffic Generation Rates are determined from the RTA (now RMS) Guide to Traffic Generating Developments, 2002.*

The daily locality traffic changes with the proposed development (Table 4.1) will result in an increase of approximately 1,472 daily vehicle traffic movements compared to the traffic volume without the Marina development.

There will be approximately 135 additional peak hourly vehicle movements during the morning traffic peak hours as this will not include function centre, kiosks and cafe traffic (Table 4.2). There will be approximately 180 additional peak hourly vehicle movements during the afternoon traffic peak hours.

The future traffic distribution of the daily and peak hour traffic movements has previously been assessed as comparable to the Liverpool LGA residential traffic distribution, which gives the following typical geographic traffic distribution:

- 40% to and from the east;
- 20% to and from the north;
- 30% to and from the west; and
- 10% to and from the south.

The peak hourly site generated traffic movements for the four main traffic distribution routes, east, north, south and west, for the Marina site are summarised in Table 4.3.

Table 4.3 Summary of the site development generated peak hour traffic increases

Direction	Approach route	Morning peak hour vehicles for proposed development	Afternoon peak hour vehicles for amended development
East	Newbridge Road (east)	54	72
North	Governor Macquarie Drive	27	36
West	Newbridge Road (west)	40	54
South	Brickmakers Drive (south)	14	18
Total	All routes	135	180

4.2 Impacts to the road network and traffic safety

The existing daily traffic usage of Newbridge Road, Governor Macquarie Drive and Brickmakers Drive is summarised in Section 2.4 from the peak hourly intersection traffic counts which were undertaken in March 2013. These daily traffic volumes and the corresponding daily Marina site generated traffic increases are summarised in Table 4.4.

Table 4.4 Summary of project generated traffic increases on the surrounding local roads

Route	Existing daily traffic (vehicles)	Daily traffic (vehicles) for proposed development	Increase to existing traffic for proposed development
Newbridge Road (east)	54,000	589	1.1%
Governor Macquarie Drive	16,000	294	1.9%
Newbridge Road (west)	40,000	442	1.1%
Brickmakers Drive (to Newbridge Road)	9,000	1,325	14.7%
Brickmakers Drive (south)	9,000	147	1.6%

On Newbridge Road, Governor Macquarie Drive and the section of Brickmakers Drive south of the link road intersection, the Marina site traffic increases (Table 4.4) would be minimal compared to existing traffic (+1% to +2%). These traffic increases would have minimal impacts on the vehicular traffic flow, traffic safety or residential amenity of these routes.

On the 300 m section of Brickmakers Drive north of the link road intersection, the Marina site daily traffic increases would be more noticeable, about +15% compared to the current base daily traffic volumes. The future daily traffic usage of Brickmakers Drive, with these daily traffic increases, would remain within the general daily traffic capacity for an urban road such as Brickmakers Drive with a continuous two lane road carriageway (up to 20,000 vehicle movements daily). The future daily traffic usage would not affect either the traffic flow, traffic safety or residential amenity to the extent that additional route traffic calming or other traffic management measures would be required for the road.