Executive Summary (General Publication)

Defence Housing Australia (DHA) purchased from the Department of Defence the Fort Wallace and Stockton Rifle Range sites to facilitate the development of the properties for residential use by Australian Defence Force personnel and private individuals. . It is proposed to rezone the project area (comprising Lots 100 and 101 DP1152115) from the current Infrastructure (SP2 Defence) to Low Density Residential and E3 Environmental Management under the Newcastle Local Environmental Plan (LEP) 2012 to allow for the residential subdivision. Should the rezoning be approved, subsequent residential development of the project area will be subject to approval in accordance with the provisions of the *Environmental Protection and Assessment Act 1979* (EP&A Act).

DHA has an ongoing requirement for additional housing in the Newcastle area to cater for Newcastle-based Defence members and their families and to replace existing DHA dwellings that do not meet current standards. The proposed Master Plan is prepared to demonstrate how the site could appropriately facilitate a residential development and includes a mix of residential typologies primarily placed within the former Fort Wallace clearance footprint. The Master Plan has sought to retain the Fort Wallace landscape and focus development within the previously disturbed areas of the site.

Umwelt (Australia) Pty Limited (Umwelt) has been commissioned by DHA to prepare an Aboriginal Cultural Heritage and Archaeological Assessment to inform the rezoning application and any subsequent proposals under the EP&A Act. In accordance with the wishes of the registered Aboriginal parties, the full assessment report is not provided to the general public but the outcomes are summarised in this document to ensure important cultural information is managed appropriately.

Aboriginal party consultation was conducted in accordance with the Office of Environment and Heritage's Aboriginal Cultural Heritage Consultation Requirements for Proponents (Office of Environment and Heritage 2010). Five Aboriginal organisations registered for consultation for the Project. These parties have been consulted regarding the assessment strategy and draft assessment report and four groups who registered early in the process were invited to participate in a field survey for the Project.

The proposed development area is located within the Fern Bay Site complex (38-4-0895) and a further ten sites (Aboriginal Resource and Gathering, artefact scatters and burials) are located within the Fort Wallace property boundary outside of areas of proposed impact. The Fern Bay Complex site consists of middens, artefact scatters and isolated finds. The site card noted traditional knowledge records the presence of ceremonial sites and traditional burials within the site area. On this basis, it was predicted that further artefacts and shell are likely to be present within the project area. The extent of historical disturbance associated with the establishment and ongoing use of the Fort has impacted much of the project area and is likely to have also impacted any sub-surface deposits that may be present within the disturbed areas. However, outside the disturbance footprint (that is, where sub-surface disturbance does not extend to the depth of deposits), it is possible that intact or partially intact deposits may be present.

A field survey was conducted on the 21 September 2016 of the areas of pedestrian accessibility. In the southern portion of the site many of the previously recorded sites were inaccessible due to dense vegetation. Five new sites were recorded. Areas of archaeological potential were identified within the less disturbed areas of the site adjoining the parade ground and the western dune parallel to Fullerton Street. These areas of archaeological potential were identified due to the presence of the newly identified sites and the archaeological pattern for the areas which indicates the potential for archaeological deposits within the dune profiles in areas of low previous disturbance. The central portion of the site has been subject to substantial disturbance as a result of the construction of the Fort and as a result lacks archaeological potential.

Registered Aboriginal parties also identified a burial site (referred to as the Burial Hill) as an area of cultural sensitivity and specified that no impacts should occur in this area.

The recommendations presented below were provided by registered Aboriginal party representatives participating in the survey.

- Undertake inspection of areas where buildings currently stand after their removal and salvage any artefacts found.

- The Burial Hill should be well marked and demarcated as a no go zone so there is no access (machinery or foot traffic) during any works.

- Excavation of test pits across entire impact footprint with focus on the western dune which has been identified as a midden.

The following recommendations have been developed in light of the archaeological context of the region, the findings of the survey, the archaeological assessment of the project area , the cultural assessment of the area by Aboriginal parties; the potential impacts of the project and current cultural heritage legislation.

- DHA should ensure that its employees and contractors are aware that it is an offence under Section 86 of the NPW Act to harm or desecrate an Aboriginal object unless that harm or desecration is the subject of an Aboriginal Heritage Impact Permit (AHIP).

- The project area is suitable for rezoning for an Aboriginal cultural heritage and archaeological perspective, provided that any subsequent proposal for redevelopment of the project area is undertaken in accordance with the recommendations of the Aboriginal cultural heritage assessment.

- DHA should apply to the Director-General of OEH for an AHIP in accordance with Section 90 of the NPW Act, with this AHIP to cover the entirety of the impact area on the finalised master plan. The need to cover the entirety of the impact area is in recognition that archaeological material has been identified and/or predicted throughout the project area as a result of the movement and redistribution of the former dunes throughout the site. The AHIP should include provision for surface collection across the entirety of the project area (where Aboriginal objects are identified) and for the completion of sub-surface investigations where the project will involve impacts within the areas of low to moderate and moderate archaeological potential. All salvage works should be conducted in accordance with the methodology specified in the assessment and will be subject to ongoing consultation with the registered Aboriginal parties as part of the AHIP application process.

- Should the proposed impacts change such that it is proposed to impact in the immediate vicinity of the areas of previously recorded sites to the south of the current proposed impacts or the active seaward dune further survey and the provision of additional recommendations would be required.

- The AHIP should specifically exclude impacts to recorded burial sites. In the event that suspected human skeletal material is identified within the other portions of the project area, all works should cease immediately and the NSW Police Department, OEH and the registered Aboriginal parties should be contacted so that appropriate management strategies can be identified.

HERITAGE IMPACT STATEMENT

FORT WALLACE, FULLERTON STREET, STOCKTON

31 OCTOBER 2017
SH810
PREPARED FOR DEFENCE HOUSING AUSTRALIA

URBIS

URBIS STAFF RESPONSIBLE FOR THIS REPORT WERE:

Director	Stephen Davies, B Arts Dip. Ed., Dip. T&CP, Dip. Cons. Studies
Senior Consultant	Alexandria Barnier, B Des (Architecture), Grad. Cert. Hert. Cons.
	1 – Draft report issued 07.10.2016
	2 – Draft report issued 02.12.2016
	3 – Draft report issued 12.12.2016
	4 – Final report issued 14.12.2016
Report Number	5 – Amended report issued 31.10.2017

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EXECUTIVE SUMMARY

Urbis has been engaged by Defence Housing Australia (hereafter DHA) to prepare the following Heritage Impact Statement to assess the heritage impact of a planning proposal for Fort Wallace, Stockton.

Fort Wallace is listed on the Commonwealth Heritage List (ID 105335), the Department of Defence Heritage Register and the non-statutory Register of the National Estate (ID 18957).

This heritage assessment is part of a suite of specialist assessments of the site that have informed consideration of the site's potential for redevelopment. Separate indigenous heritage and archaeology reports have been prepared for the site, provided as part of the planning proposal package. These assessments have been used as the basis of master plan options and the development of a recommended master plan, which has subsequently informed proposed revised planning controls for the site with respect to land use and height of buildings.

It is intended that a planning proposal will be lodged with Newcastle City Council, seeking support of the strategic merit of the proposal to proceed to a Gateway Determination by the Department of Planning and Environment (DPE). It is intended that the planning proposal, if supported by both Council and DPE, would then proceed to public exhibition and finalisation through an amendment to the LEP. Key outcomes of the master plan are intended to be established in a Stage 1 DA or adopted master plan. Where relevant to heritage impact, development principles for the DCP have been set out in this report. Appropriate approvals will then be sought for the subdivision and development of the site under the amended planning controls.

The master plan has been used as a demonstration of how the site could appropriately accommodate residential uses in response to best practice urban design and planning principles. Where appropriate, this report has considered the likely impacts of the master plan on the heritage of the site to enable as detailed an assessment as possible. However, it is acknowledged that further detailed work will be undertaken and consideration given to potential heritage impacts at subdivision and detailed design stage.

A set of planning proposal aims and principles have been set down by Architectus which will be submitted with the planning proposal. The principles would ensure the retention of the heritage values of the place in terms of views and setting. Specifically, the principles stipulate that a development buffer should be retained around the significant heritage items not located within the 'heritage park' and that key views from significant areas should be identified and conserved (refer section 1.3.1 for full principles).

In summary, the planning proposal is supported as it would facilitate the ongoing use and maintenance of the site, including its significant heritage features. The following key observations have been summarised from the full assessment set out in Section 5 of this report in relation to the planning proposal:

- It is proposed to conserve the coastal ridge top, the highly significant items on the coastal ridge top and the beach in the eastern portion of the site as these areas will be zoned for Environmental Management. The planning proposal facilitates minimal development in a highly significant area and would conserve the seaward outlook from significant heritage items including the gun emplacements.
- The Environmental Management zone would encompass the heritage items atop the escarpment as well as the Plotting Room and the Administration Building. Any future residential development on the site which is confined to the areas proposed for low density residential would therefore maintain an appropriate setback from the significant items and facilitate ongoing understanding of the original setting of the items and the relationship between them.
- The principles of the site specific DCP stipulate implementation of development buffers around the highly significant heritage items which are located within the residential zoned area. These include the Admin Building and the Plotting Room. This would ensure that the curtilage of these items is appropriately respected and appreciation of them is facilitated. It is intended that development buffers would be mapped in a site specific DCP to ensure an appropriate separation between development and heritage item.
- The DCP will also formally identify key views and provide guidance on retention of these views. As such, the planning proposal would ensure that identified significant views including those east to the ocean and that west from the observation tower to the river would be formally recognised and maintained.

- The residential development of part of the site would generate pedestrian traffic around the heritage items in the vicinity which would encourage appreciation and continued maintenance of the items. It would also facilitate casual surveillance of the items which are currently subject to repeated vandalism despite measures taken by the owners to prevent this.
- The 1994 CMP generally recommends that appropriate height on the site is 2-3 storeys which is lower than that facilitated by the planning proposal. However, the following should be considered in regards to the type of development that could be facilitated by the planning proposal:
    - Larger buildings are not unprecedented on the site. The 1974 barracks building which has since been removed in the southern portion of the site was of three storeys and had an additional pitched roof form (refer Figure 6). This building was distinctive as part of a later phase of development, as the development facilitated by the planning proposal would be;
    - The CMP document was prepared when there was no clear view as to what kind of development would characterise the future of the site. It is appreciated that to achieve a meaningful development on the site that a degree of density on the site is required;
    - The larger allowable height facilitates some higher density elements which are required as the site has a number of environmental constraints, lessening the amount of developable land. They would also allow a greater curtilage around the heritage items on the ground plane;
    - The CMP references maintaining key views as a key objective of the stated appropriate height and notes that increase in the height may be appropriate. As an outcome of detailed site testing, it is considered that the stated objective can be achieved without limiting the height to 2-3 storeys; and
    - Development to 14m on the entrance knoll would be subject to the principles of a site specific DCP which would stipulate the maintenance of key views from the site.

It is recognised that there is an opportunity to formally recognise the significance of the site through listing as a local item on the LEP despite the existing Commonwealth listing of the place. After consultation with council it is proposed to apply a local heritage listing to four items on the site (item 696 – item 699). It is also proposed to define the Gunnar Hoban Memorial Tree as a landscape item (100) and the entire site as an Archaeological item (A21). This will ensure that the protection of the place is facilitated if parts of the place are divested in the future.

A preliminary assessment of the indicative master plan has been set out in Section 5.2.3. This assessment serves to demonstrate how the application of development facilitated by the planning proposal could be sympathetic to the heritage significance of the place. It is considered that the indicative master plan conserves the heritage significance of the site, maintaining the highly significant elements in terms of their fabric and setting. Future development of the indicative master plan is supported from a heritage perspective.

The following recommendations have been set down to guide the design development of the proposed master plan as part of a future stage of works:

- Further consideration must be given to the options for adaptive reuse of the Admin Building, Observation Tower and Plotting Room. There is an option to retain the buildings as landscape items only with no internal access; however genuine adaptive reuse of appropriate elements will ensure that the structures are maintained to the highest level;
- If any items are proposed to be maintained as remnant evidence only, with no assigned adaptive reuse, they should be properly managed to ensure that public safety requirements are met; and
- It is recommended that as part of any future application for development on the site, a Base Heritage Interpretation Strategy and full Heritage Interpretation Plan including fabrication and execution should be prepared. These documents should be prepared in consultation with Council and local historical societies.

1. INTRODUCTION

1.1. BACKGROUND

Urbis has been engaged by Defence Housing Australia (hereafter DHA) to prepare the following Heritage Impact Statement to accompany a planning proposal for Fort Wallace, Stockton.

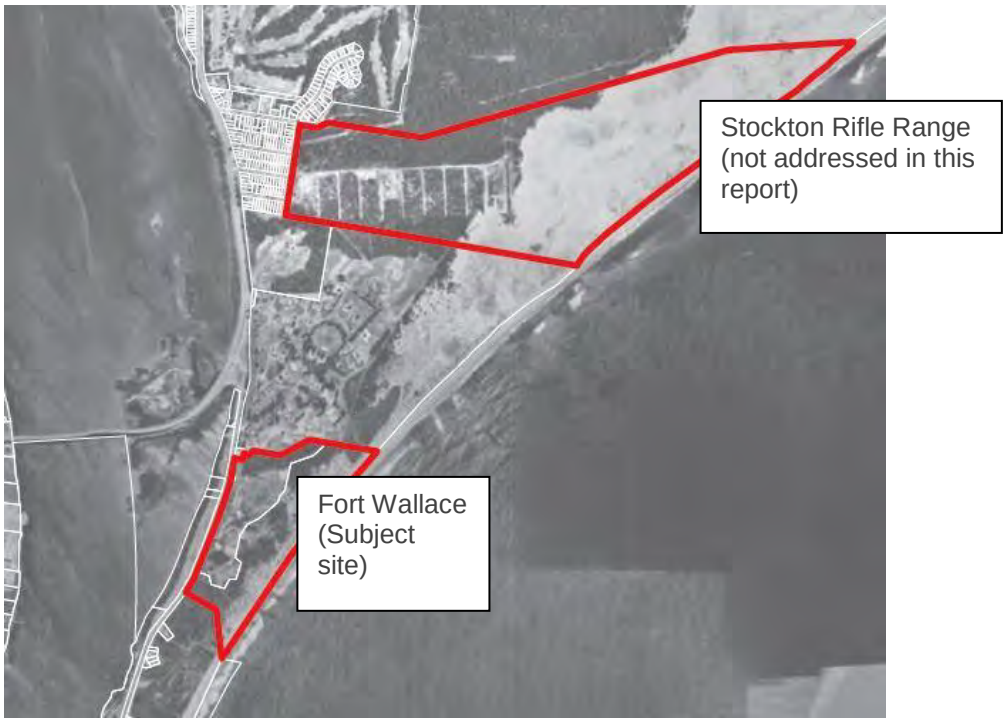
As part of a consultant team appointed to develop a master plan for the subject site, Urbis has provided ongoing heritage advice to DHA including an initial Opportunities and Constraints Analysis, and a summary working report assessing the developing concept master plan design.

The site subject comprises a number of significant built heritage items and is listed on the Commonwealth Heritage List (ID 105335), the Department of Defence Heritage Register and the non-statutory Register of the National Estate (ID 18957). As such, this report considers the impact of the planning proposal on the heritage significance of the site. It also generally considers the heritage impact of the concept master plan as an example of the development that could be facilitated by the planning proposal.

1.2. SITE LOCATION

The entire site which is located at 338 Fullerton Street, Stockton (Figure 1) borders Stockton Beach to the east. The heritage listed curtilage comprises the entire site. Fort Wallace and Stockton Rifle Range located to the north in Port Stephens LGA were transferred to DHA ownership in 2015 as the sites were no longer required for defence purposes. The planning proposal for Stockton Rifle Range is not assessed in this report.

Figure 1 – Map indicating the location of the subject site (Fort Wallace) and Stockton Rifle Range to the north.



Source – Architectus Draft Masterplan Report

1.3. METHODOLOGY

This Heritage Impact Statement has been prepared in accordance with the NSW Heritage Branch guideline 'Assessing Heritage Significance' (2001). The philosophy and process adopted is that guided by the *Australia ICOMOS Burra Charter* 1999 (revised 2013).

Stockton Rifle Range is located to the north of Fort Wallace and is also planned for redevelopment. The heritage impact of the redevelopment of the Rifle Range will be addressed in a separate assessment. For the purposes of this report the “subject site” refers only to Fort Wallace.

The history of the Fort Wallace site has been previously addressed in detail in the Fort Wallace Heritage Management Strategy prepared by Godden Mackay Logan May 2008. As such, the historical overview set out in Section 3 of this report has been sourced from that document. A full review of any newly available historic information will be undertaken as part of the future required updates of the Heritage Management Strategy and the Conservation Management Plan.

All constraints related to Aboriginal Archaeological are addressed under separate in document prepared by Umwelt.

1.3.1. The Proposal

Planning Proposal

This report provides an assessment of the heritage impact of the planning proposal for the land known as Fort Wallace, located at 338 Fullerton Street, Stockton.

The application proposes to amend the land use zoning and height of buildings control that relates to the site. It proposes that the whole site be listed as an item – Archaeological (A21), the Gunnar Hoban Memorial Tree be listed as an item – Landscape (I100) and that the following items are individually listed as heritage items:

- I696
- I697
- I698
- I699

Sections of the western portion of the site are proposed to be zoned R2-Low Density Residential. A small section is proposed to be zoned RE2 – Private Recreation and the remainder of the site including the highly significant items surmounting the escarpment would be zoned E3 – Environmental Management.

The proposed maximum building height across the majority of the site is 8.5m. However two small areas near the centre of the site are proposed to be zoned 11m and 14m.

The planning proposal has been assessed herein against the relevant policies in the Heritage Management Strategy (HMS) for the site prepared by GML in 2008 and the existing CMP for the subject site prepared in 1994 by Suters Architects Snell.

This report has been written in reference to the proposed LEP Height of Buildings Map and the proposed LEP Land Zoning Map prepared by Architectus and received by Urbis in October 2017.

Intended DCP Aims and Principles

In addition to the planning proposal maps, Architectus has set out the intended aims and principles of the site specific DCP which will accompany the planning proposal. The intended aim pertinent to this report is number (3.) *Ensure that development of the site is sensitive to the heritage and ecological significance of the site*.

The intended principles of the DCP which are pertinent to this report are set out below. Refer to the document prepared by Architectus for a full list of the intended aims and principles of the site specific DCP.

- *Key views, including those from the observation tower to the west towards the river and to the east to the ocean; views between the observation tower and the gun emplacements; and views from within public spaces on the site to the observation tower. These views would be mapped and a key objective of the control would be to maintain these views with no obstruction from development.*
- *The relationship of development and heritage items. An appropriate development curtilage would be defined to ensure that new development respects the heritage significance of the site. A map of key heritage and archaeological items will be included in the DCP and development locations as defined in the concept masterplan.*

The above principles have been addressed in Section 5 of this report.

Concept Master Plan

The concept master plan received by Urbis October 2017 has also been addressed briefly herein. Although there are no works proposed under this application, this master plan constitutes an illustration of one way that the site could be redeveloped for residential and community use incorporating the heritage items. The preliminary assessment is included only to demonstrate how the application of development facilitated by the planning proposal could be sympathetic to the heritage significance of the place.

The concept Master Plan has been assessed herein with reference to the obligations arising from heritage significance set down by Urbis in June 2016.

1.4. LIMITATIONS

This report is limited to a consideration of the built heritage and cultural landscape at Fort Wallace and does not address impacts to archaeological resources, or natural landscape or vegetation.

1.5. AUTHOR IDENTIFICATION

The following report has been prepared by Alexandria Barnier (Senior Heritage Consultant).

Unless otherwise stated, all drawings, illustrations and photographs are the work of Urbis.

The authors of the previous HMS and CMP (listed below) are acknowledged with thanks.

The following documents have been referenced in the preparation of this document:

- Fort Wallace Heritage Management Strategy prepared by Godden Mackay Logan in May 2008;
- Fort Wallace Conservation Management Plan prepared by Suters Architects Snell in 1994;
- Fort Wallace, Stockton NSW. Department of Defence Disposal Study. Non-Indigenous Heritage Assessment prepared by South East Archaeology for GHD services in 2004; and
- Fort Wallace Infrastructure Report prepared for Department of Defence 2007 (SKM - Sinclair Knight Merz).

2. SITE DESCRIPTION

Fort Wallace is located on the Stockton Peninsula, 5 kilometres northeast of the Newcastle CBD. The fort is 31.78 hectares in area and is bounded by Fullerton Street to the west and Stockton Bight to the east. The site is generally flat but is higher to the east with a knoll in the southern which connects to an escarpment running north up the beach. The sand dunes to the east of the site vary in stability in accordance with the level of ground cover. The only structures on the eastern sand dunes constitute four searchlight positions which are badly dilapidated.

Picture 1 – View south east across outer fort towards the escarpment.

Despite the recent removal of some items (including the 1974 barracks building) which have been previously deemed to be of low significance there is still a substantial amount of remaining infrastructure which demonstrates the key phases of development on the site. The remaining buildings on the site largely relate to the WWII use of the site with some remnant guns and searchlights from WWI.

The most notable and intact structures on the site constitute the partly sub surface Plotting Room towards the south west corner of the site, the three gun emplacements which are located along the western boundary of the dunes and the Observation Tower and tunnel system which are located to the west of the gun emplacements. There are also a number of support structures located to the west of these. The emplacements and the Observation Tower are located within the inner fort precinct on an escarpment which runs along the eastern boundary of the developed land on the site.

Until it was overgrown, the Plotting Room (building 23) was the centre of a number of support structures. It now remains as one of the most significant structures on the site however it is largely obscured by unkempt vegetation.

The entrance area from Fullerton Street to the west of the site now comprises only the WWI engine room and the Guard House after the removal of the Married Quarters and the Tuckeroo Tree.

The outer part of the fort is located on the flat land to the west of the primary structures. The buildings in this area are generally more contemporary than those above and were used primarily during WWII and after. The drill hall, transport naval stores and Junior Sailors Accommodation are still extant. The transport naval stores and the drill hall are the most visible from Fullerton Street.

Four searchlights, two each for the 6 inch and 9.2 inch guns are located down the eastern boundary of the site along the boundary of the developed land and the beach. These are in very poor condition and are currently surrounded by temporary security fences.

Picture 2 – View east from the Observation Tower towards No.2 Gun Emplacement.

2.1. LANDSCAPE, VIEWS AND VISTAS

The views analysis below has been largely sourced from the existing HMS.

The landscape of Fort Wallace is based on coastal dune formations. Remnant natural vegetation survives on the site which is heavily overgrown with invasive bitou bush. The site is divided by a distinct change in elevation between Fullerton Street to the west and the high ground where the gun emplacements and observation tower were constructed to take advantage of the panoramic, 360 degree views of the surrounding ocean and land, provided by the high natural dunes.

Today these views include the dramatic Stockton Bridge, Kooragang Island, Stockton Bight and Nobbys Head reflecting the earlier strategic importance of the location of the fort. The dunal landscape and panoramic views therefore constitute an important aspect of the cultural significance of the site, contributing to both its historical and aesthetic heritage values.

There are limited views towards the inner fort structures from Fullerton Street due to the topography of the land and the later structures in between.

Picture 3 – View towards the escarpment from Fullerton Street with the guardhouse in the foreground.

Picture 4 – View towards the site from Fullerton Street with the Transport Naval Stores and Drill Hall in the foreground.

2.2. VISUAL SURVEY OF THE SIGNIFICANT STRUCTURES

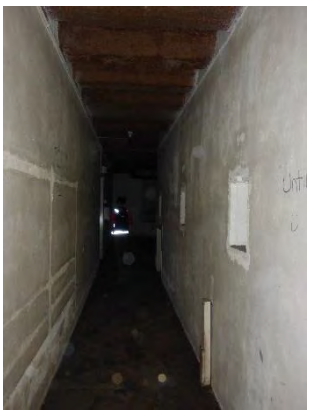
General images of the significant structures and their setting have been reproduced below. For a detailed record of the extant state of the site, refer to the Photographic Archival Recording prepared by Urbis in 2015 which Defence Housing Australia (DHA) have a copy of (contact Gulliver Coote). These photos can be cross referenced to the plan at Figure 2 which shows the location of the elements.

Picture 5 – View west from the gun emplacement towards the Observation Tower (item A0036) and Stockton Bridge behind.

Picture 6 – General view south across the subject site towards the Casualty Station (item 13) at the base of the escarpment.

Picture 7 – View towards the entrance to the tunnels and the Observation Tower (items A0036 and A0037) above.

Picture 8 – View north west towards the Observation Tower (item A0036).



Picture 9 – View through tunnels which run through the escarpment (item A0037).

Picture 10 – View south east towards escarpment with Observation Tower on top. Junior Sailors accommodation (item A0017) in the foreground.

Picture 11 – View towards the badly dilapidated Northern Searchlight – 9.2 inch guns (item 102).

Picture 12 – No. 2 Gun Emplacement 6 inch Guns (item 16).

Picture 13 – No. 2 Gun Emplacement 6 inch Guns (item 16).

Picture 14 – No. 1 Gun Emplacement 9.2 inch Guns (item 18).

Picture 15 – No. 2 Gun Emplacement 9.2 inch Guns (item 27).

Picture 16 – No. 2 Gun Emplacement 9.2 inch Guns (item 27).

Picture 17 – Western façade of the Casualty Station (item 13).

Picture 18 – Western façade of the Admin Building (item A0007).

Picture 19 – Northern façade of the radio wireless room (item A0035).

Picture 20 – View towards the engine room – northern searchlight (item 15).

Picture 21 – View towards the Plotting Room entrance (item 23).

Picture 22 – View south towards the Plotting Room (red arrow).

Picture 23 – View towards the Plotting Room (item 23) from Fullerton Street.

Picture 24 – Original plotting table in Plotting Room.

2.3. VISUAL SURVEY OF THE LATE 20TH CENTURY BUILDINGS

Below is a record of the late 20th century buildings in the outer fort which are proposed to be removed to facilitate the development of the site (except for the Drill Hall) in the indicative master plan option assessed in Section 5.

Picture 25 – View north towards the Transport Naval Stores (item A0030).

Picture 26 – View of the transport Naval Stores (item A0030).

Picture 27 – View south west towards the Transport Naval Stores (item A0030).

Picture 28 – View south towards the Junior Sailors Accommodation (items A0013-A0017).

Picture 29 – Detail of the Junior Sailors Accommodation.

Picture 30 –Junior Sailors Accommodation (A0015).

Picture 31 –Junior Sailors Accommodation.

Picture 32 –Junior Sailors Accommodation.

Picture 33 –South east corner of the Drill Hall (item A0008).

Picture 34 –Northern façade of the Junior Sailors Accommodation (item A0008).

Picture 35 –Interior view of the Drill Hall (item A0008).

Condition

This condition description was prepared subsequent to the site inspection in November 2015.

The physical condition of the buildings is generally poor to fair. Generally, the most significant buildings are among those in the poorest condition including the Observation Tower and the four searchlights. These are dilapidated to such an extent that they are not watertight and security of the structures is not possible without independent surrounding fences.

Later 20th century buildings of little significance including the Jnr Sailor's Accommodation and the Transport Naval Stores are in fair condition, and stabilisation works require only ensuring that the structures are secure from vandals.

Various structures are so overgrown that it is not possible at present to determine the extent of their condition. These structures include the Northern and Southern Searchlights 6-inch guns and the Engine Room – Southern Searchlight.

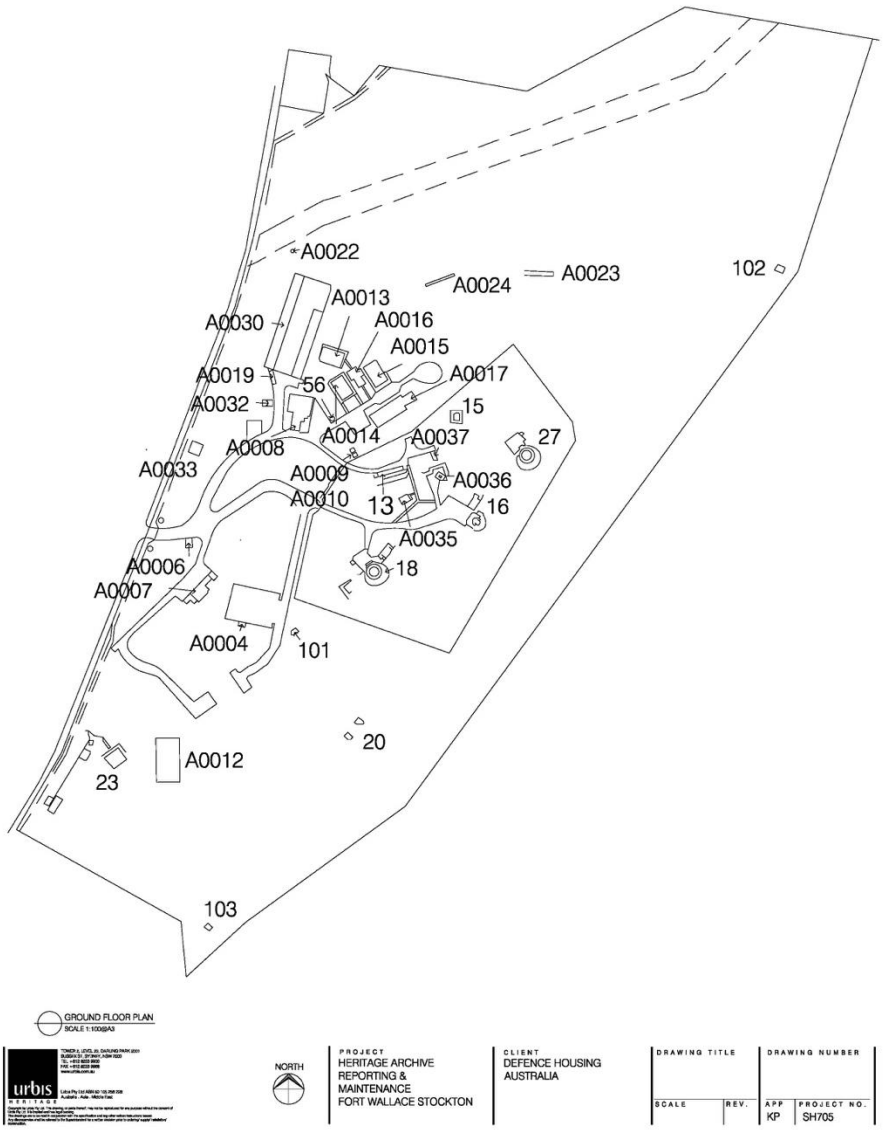
In response to the above described condition of the site Urbis prepared a Heritage Maintenance Schedule in 2015 which scheduled maintenance and urgent stabilisation works to prevent further deterioration of the heritage fabric; provisions for future urgent works that may arise; and ongoing maintenance works to ensure the continued stability of the site. A schedule of conservation works is required to ensure the ongoing integrity of the significant structures on the site.

Picture 36 – Overgrown Engine Room – Southern Searchlight (item 101).

Picture 37 – Ruined BBQ and Shed (items A0009 and A0010).

2.4. LOCATION OF ELEMENTS ON THE SITE

Figure 2 – Key map indicating the location of the remnant elements on the site.



Source – Urbis 2015.

Table 1 – Reference numbers for items on the site.

Reference	Item
102	Northern Searchlight 9.2- inch guns
20	Northern Searchlight 6- inch guns Southern Searchlight 6- inch guns
103	Southern Searchlight 9.2- inch guns
A0023	Practice Cricket Nets
A0024	Cricket Pitch

Reference	Item
A0022	Pump House No.1
A0030	Transport Naval Stores, Transport Compound
A0016	Common Room
A0013	Jnr Sailor’s Accommodation, Lecture Room
A0015	Jnr Sailor’s Accommodation, Tech Maintenance
A0017	Jnr Sailor’s Accommodation, Q store
A0019	Car Pit
56	Hoban Commemorative tree
A0008	Gymnasium, Drill Hall
A0014	Jnr Sailor’s Accommodation, Admin Office
A0009	BBQ
A0010	Shed
A0033	Fire Pump House No. 2 Pump House
15	Engine Room, Northern Searchlight – 9.2 inch guns
A0037	Tunnels
13	Casualty Station
A0035	Radio Room, Wireless Room
A0036	Watch Tower, Observation Tower
27	No. 2 Gun Emplacement – 9.2 inch guns
16	No.2 Gun emplacement – 6 inch guns
18	No. 1 Gun emplacement – 9.2 inch guns
A0007	Admin Building, Engine House 6 inch guns
A0006	Security Office, Guard House
A0004	Bus Shelter
101	Engine Room, Southern Searchlight – 9.2 inch guns
A0012	Tennis Court
23	Plotting Room

3. HISTORICAL OVERVIEW

The below history of Fort Wallace has been sourced from the Fort Wallace Heritage Management Strategy prepared by Godden Mackay Logan May 2008. Where relevant to the proposed master plan this history has been variously augmented.

3.1. SITE HISTORY

By the late 1870s, when NSW was re-examining its coastal defences, Newcastle's port was handling more than a million tons of coal a year, supplying Sydney and Melbourne and exporting to Asia and North and South America. As coal was also the fuel for steamships and naval vessels in this period, the possibility that enemy warships would target Newcastle, if Great Britain became involved in a major conflict, was regarded as high.

Fort Wallace was the third fort constructed for the defence of Newcastle. Fort Scratchley was constructed in the early 1880s and the Shephard's Hill Battery was installed in 1896. In 1910, Britain's most famous soldier, Lord Kitchener, was in Australia to advise the new nation on defence issues. Kitchener inspected several sites at Stockton before finally approving the current site of Fort Wallace.

Prior Use of the Site

In the 1870s, before the selection of the Fort Wallace site for military purposes, the area was the location of the No.2 Rocket Brigades storage shed. The shed contained the heavy rocket propulsion gear and cables used to carry life lines to ships in distress. The Stockton Rocket Brigade was involved in several notable rescues. The station was subsequently demolished to make way for the new fort.

Original Construction

Constructed in 1912-13, the main objective of Fort Wallace was the cover the 'blind spot' of Fort Scratchley created by Nobby's Head, primarily the dead sea area in front of Stockton. It replaced the gun emplacement located on Shepard's Hill to the south of the site, which was deemed unsafe due to earth subsidence.

The fort was originally equipped with two Mark VII 6-inch guns on pivotal mountings in gun pits. The site infrastructure included a magazine, barracks and quarters for non-commissioned officers. Originally name Fort Stockton, the name was changed to Fort Wallace in November 1915, in memory of Colonel Robert Wallace, Chief of Ordinance and Commanding Officer, Royal Australian Garrison Artillery. There were many similar 6-inch gun installations around Australia. Similar guns are now in place at Fort Scratchley, having been relocated there from King Edward Park Battery.

World War I

Although functional once its guns were proved, the course of World War I made the fort redundant as the German Navy was restricted to home waters in the latter stages of the war. During World War I, Fort Wallace was fully manned for only one month, from April to May 1918. It then reverted to minimum maintenance status. A section of the 13th Heavy Battery of the Royal Australian Artillery, based at Fort Scratchley, was trained to man the 6-inch guns at Fort Wallace. These militia-men were part time citizen soldiers. The command post for the battery and associated light defence controls were installed in 1919, however neither the engines for the lights were installed at this time.

World War II

In the 1930s, the Australian Government looked to upgrade its coastal defences in response to rising tension in the Europe and Pacific regions. Fort Wallace was redesigned to play a counter bombardment role against any attack by ship from the sea. The 6-inch guns were removed and replaced before the end of 1940 with 9.2 inch guns, with a range of 17 miles (the old 6-inch guns were relocated to Rabaul, in Papua New Guinea). Fort Wallace was the only one of the 9.2 inch batteries constructed in this period to re-use a 6-inch gun emplacement, reinforcing the ongoing strategic importance of the Fort Wallace site.

New gun pits were required for these weapons. Extensive site changes included new gun sites, plotting room, magazine, engine rooms, new drill hall, officers' quarters, mess and casualty rooms. Some demolition was required including the original command post and expansion of the No.1 gun pit. The new guns could also traverse 360 degrees to allow inland firing in case of sea-borne invasion. Anti-aircraft defences, blast

walls and a three pounder quick-firing battery were also installed in and around the fort for close defence in case of attack.

Newcastle Fortress

In World War II batteries from Wollongong through to Sydney and Newcastle defended NSW's major ports and coastline. While the strategic importance of coal had lessened, due to changes in technology since World War I, the steelworks at Waratah and the State Dockyard at Walsh Island meant that Newcastle remained an important potential target in wartime.

Fort Wallace was an integrated aspect of the broader Newcastle defensive system in this period. The fort was the primary counter bombardment facility within the Newcastle Fortress Area. The operation of the fort required the transmittal of target information from the installations at Shephards Hill, Wipers Flats and Port Stephens (however coastal radar was only available from 1943, so visual information must have been used initially). This information was transmitted from these installations to Shephards Hill, which in turn transmitted to the plotting room at Fort Wallace.

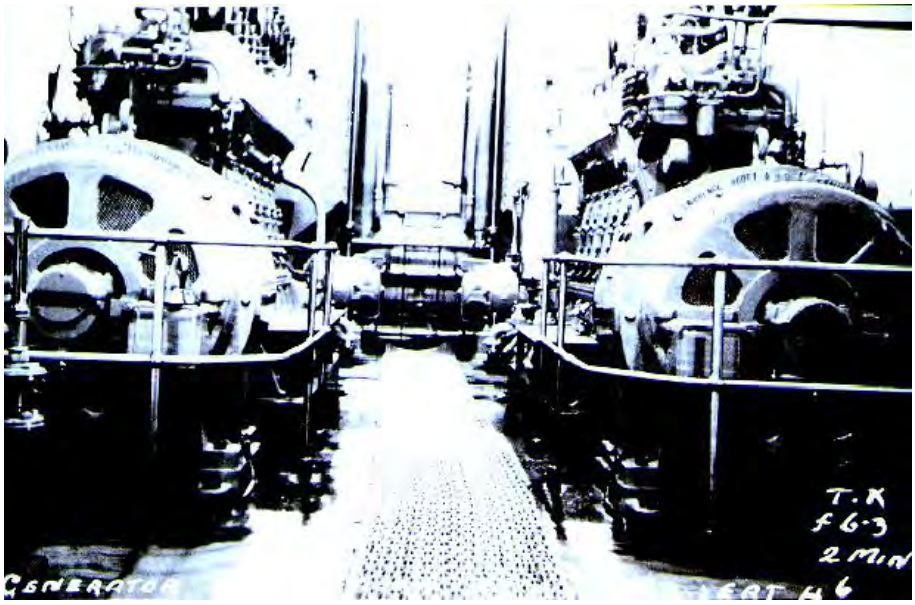
During WWI Fort Wallace has been a subsidiary installation to Fort Scratchley and Shepherds Hill. While overall command remained at Fort Scratchley and Shepherds Hill in WWII, the local importance of Fort Wallace, as the principal counter bombardment installation, was much increased in the later period.

Post War Uses

After WWII Fort Wallace was scaled back again. However, a skeleton staff was maintained at the fort and anti-aircraft battery until 1951. The 9.2inch guns were removed in 1963 for scrap but some oral sources claim the barrels were buried intact on site. In 1949 Gunner Hoban was killed when crushed by a rotating 9.2inch gun. A tree planted in his memory, near the drill hall, remains on the site today.

The fort was used as a training site until 1967 when it reopened to house the Army's 130 Signal Squadron, the Tactical Air Support Signal Squadron. The unit was to provide communication facilities to support air offensive support and co-ordinate air transport. The Fort Wallace site was chosen for its proximity to RAAF Williamtown, the ground attack aircraft base. A new barracks for 69 men was erected in 1972-74. In 1980 the fort was chosen as Flag Station for the district. This choice reflects the earlier closure of Fort Scratchley, the site of the previous Flag Station. 130 Squadron remained at Fort Wallace until 1993 when the site was closed.

Figure 3 – 1987. Fort Wallace: Generator and Engine Room for 9.2 guns.



Source – Newcastle City Council (Reg. number 037 000024).

Restoration Works

In 1986 the restoration of the fort was initiated by a group of enthusiasts, mostly ex-artillerymen, led by Colonel Mort. In 1994 the group was known as the Fort Wallace Restoration Association. Although small in number the group received considerable support from a range of local industries and community groups.

Figure 4 – 2003. View of the Plotting Room from Fullerton Street. The three storey barracks (1974) behind have since been demolished.

Source – http://www.ozatwar.com/bunkers/fortwallace.htm

3.2. PHASES OF DEVELOPMENT

The Fort Wallace site demonstrates three key phases of development which are represented by the physical evidence on the site and suggested through the historical and documentary analysis. These phases are described below. The description below refers to the Defence Estate Management System (DEMS) asset numbers and the reference number given to each item in the comprehensive 1995 Conservation Management Plan by Suters Architects.

Phase 1 – The 6-inch guns 1912-1919

As set out above, The Fort Stockton site was selected in 1910 and construction began in 1912. The fort was original equipped with two Mark VII 6 inch guns on pivotal mountings in gun pits. The site infrastructure also included a magazine, barracks and quarters for non-commissioned officers. Key site infrastructure surviving from this period includes:

- The no. 2 6 inch gun emplacement (SKM/DEMS 16, Suters 51) – while the No. 1 6 inch gun emplacement was demolished in order to construct the No. 1 9.2 inch gun emplacement, the No.2 6 inch gun emplacement was left intact;
- The magazines and casualty rooms attached to the 6-inch guns (SKM/DEMS 16, Suters 51)- the magazines and casualty rooms attached to the 6-inch guns were reused for the 9.2 inch guns as gun floor shelters. The outer chamber of the No 2 6-inch gun magazine has been left intact and re used as a Gun Relief Station for the No 2 9.2 inch gun emplacement. The 'Cartridge Issue Hatch' sign remains visible;
- The engine house for the 6 inch guns (SKM/DEMS 7, Suters 7) – survives, although heavily modified by its later re-use;
- The 6 inch gun searchlights (SKM/DEMS 20, Suters 18 and 19) – survive in poor condition on the sand dunes to the east of the gun emplacements.

Phase 2 – The 9.2 – inch guns 1930-1963

Extensive evidence of this phase survives on the site. The need to upgrade Fort Wallace's guns was identified as early as 1930, while the emplacements and associated infrastructure (plotting room, tunnels, observation tower and power houses) were under construction by 1938/9. Also constructed were new searchlight positions and their associated engine rooms. These replaced the World War I infrastructure. Support structures, including the residences and the drill hall were also built at this time. While Wallace reverted to a minimum maintenance facility in 1945 the guns were not scrapped until 1963. Importantly, these structures retain some remnants of World War II equipment including the ammunition hoists found in the gun emplacements and the de gassing plant located next to the plotting room. Key site infrastructure surviving from this period includes:

- No. 1 Gun emplacement – 9.2 inch (SKM/DEMS 18, Suters 41);
- N. 2 Gun emplacement – 9.2 inch (SKM/DEMS 27, Suters 45);
- Observation Tower (SKM/DEMS 36, Suters 28);
- Tunnels (SKM/DEMS 37, Suters 40);
- Northern and Southern Searchlights (SKM/DEMS 102, 103 Suters 16,21);
- Plotting Room and De – gassing Plant Chamber (SKM/DEMS 13, Suters 13);
- Casualty Station (SKM/DEMS 13, Suters 13);
- Northern and Southern Searchlight Engine Rooms (SKM/DEMS 15, 101, Suters 15,21);
- Drill Hall (SKM/DEMS 8, Suters 8);
- Tree (Norfolk Island pine planted to commemorate the death of Gunner Mervyn Hoban on 30 March 1949 during operation of one of the 9.2 inch guns. (Suters 56)

Figure 5 – 1939. View west over the site towards the newly completed drill hall.

Source: Newcastle Region Library

Phase 3 – Tactical Air Support 1963 – 1993

Fort Wallace was chosen as the site for a new facility in 1967. By this time fixed guns for coastal defences were well and truly obsolete. However, unlike many forts, Wallace continued in use as the base for 130 Signal Squadron, the Tactical Air Support Signal Squadron, which was located at Wallace due to the sites proximity to RAAF Williamtown. In this period of use a barracks for 69 men was constructed (1972-74) and an administration compound was constructed in 1985. Key site infrastructure from this period includes:

- Transport Compound (SKM/DEMS 30, Suters 30);
- Lecture Room, Junior Sailors (SKM/DEMS 13, Suters 35);
- Administration Building, Junior Sailors (SKM/DEMS 14, Suters 36);
- Technical Maintenance, Junior Sailors (SKM/DEMS 15, Suters 37);
- Q Store, Junior Sailors (SKM/DEMS 17, Suters 38);
- Barracks, 1974
- Guard House, Security Office (SKM/DEMS 6, Suters 39).

Figure 6 – ND. Aerial view south west showing 1974 barracks building (red arrow).

Source: environment.gov.au

3.3. DEVELOPMENT CHRONOLOGY

Where available, the date of construction of the major buildings on the site is set in the table below. The information for this table has been sourced from Fort Wallace Heritage Management Plan prepared by GML in 2008.

Table 2 – Construction dates for remnant buildings within Fort Wallace.

Key Ref no.	Item	Date of Construction
Phase 1 – The 6-inch guns 1912-1919		
A0007	Admin Building, Engine House 6” Guns	1917
20	Northern Searchlight 6” Guns Southern Searchlight 6” Guns	1917
16	No. 2 Gun Emplacement 6” Guns	WWI (dated unkown)
Phase 2 – The 9.2 – inch guns 1930-1963		
13	Casualty Station	1937
15	Engine Room Northern Searchlight 9.2” Guns	1937
23	Plotting Room	1937
A0035	Radio Wireless Room	1937
18	No.1 Gun Emplacement 9.2” Guns	1939
A0008	Drill Hall	1939

Key Ref no.	Item	Date of Construction
A0037	Tunnel Complex	1939
27	No. 2 Gun Emplacement 9.2” Guns	c1939
102	Northern Searchlight 9.2”Guns	c1939
103	Southern Searchlight 9.2” Guns	c1939
101	Engine Room Southern Searchlight 9.2” Guns	c1939
A0036	Battery Observation Post	c1939
56	Tree in memory of Gunner Hoban	1949

4. HERITAGE SIGNIFICANCE

4.1. WHAT IS HERITAGE SIGNIFICANCE?

Before making decisions to change a heritage item, an item within a heritage conservation area, or an item located in proximity to a heritage listed item, it is important to understand its values and the values of its context. This leads to decisions that will retain these values in the future. Statements of heritage significance summarise a place's heritage values – why it is important, why a statutory listing was made to protect these values.

4.2. COMMONWEALTH AND NSW HERITAGE CRITERIA

The Commonwealth Heritage Criteria of the EPBC Regulations and their correlating NSW criteria have been set out below. The following assessments of heritage significance set out below in this section have been prepared with reference to the Commonwealth Heritage Criteria or the Heritage Brand Criteria where relevant.

Commonwealth Heritage Criteria	Equivalent NSW Heritage Branch Criteria
A: The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history	**A – Historical Significance** *An item is important in the course or pattern of the local area's cultural or natural history.*
B: The place has significant heritage value because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history	**F – Rarity** *An item possesses uncommon, rare or endangered aspects of the local area's cultural or natural history.*
C: The place has significant heritage value because of the place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history	**E – Research Potential** *An item has potential to yield information that will contribute to an understanding of the local area's cultural or natural history.*
D: The place has significant heritage value because of the place's importance in demonstrating the principal characteristics of: -a class of Australia's natural or cultural places; or -a class of Australia's natural or cultural environments;	**G – Representative** *An item is important in demonstrating the principal characteristics of a class of NSWs (or the local area's):* *cultural or natural places; or* *cultural or natural environments.*
E: The place has significant heritage value because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group	**C – Aesthetic Significance** *An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area.*

Commonwealth Heritage Criteria	Equivalent NSW Heritage Branch Criteria
F: The place has significant heritage value because of the place's importance in demonstrating a high degree of creative or technical achievement at a particular period	**C – Aesthetic Significance** *An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area.*
G: The place has significant heritage value because of the place's strong or special association with a particular community or cultural group for social, cultural or spiritual reasons	**D – Social Significance** *An item has strong or special association with a particular community or cultural group in the local area for social, cultural or spiritual reasons.*
H: The place has significant heritage value because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history	**B – Associative Significance** *An item has strong or special associations with the life or works of a person, or group of persons, of importance in the local area's cultural or natural history.*
I: The place has significant heritage value because of the place's importance as part of Indigenous tradition	Covered by the NPW Act.

4.3. ASSESSMENT OF HERITAGE SIGNIFICANCE – COMMONWEALTH VALUES

The below assessment of significance has been soured from the Australian Heritage Database (Place ID 105335).

Criteria	Significant Assessment
A – Processes	Fort Wallace is nationally significant as a major component of the integrated system of defence for the Newcastle Fortress Area. Its prime purpose was protection of Newcastle Harbour and its industries. During World War One Newcastle was an important coal export centre, not only for Australia, but for the Allied Nations generally, and during World War Two it was also a major steel producing centre. The importance of the Fort increased during World War Two with the installation of the 9.2 inch guns, when it became the primary counter bombardment facility within the Newcastle Fortress Area. In terms of the fort's operational equipment and function, it represents three distinct and consecutive phases in the development of coastal defence tactics and military technology: Phase One. The 6 inch guns remnant defence technology from the late nineteenth/early twentieth centuries. This relies on the use of a separate explosive charge to fire the projectile, operated and directed by purely manual resources. Phase Two. The 9.2 inch guns. While the firing of the projectile remained basically unchanged, the operation and direction of the gun had made use

Criteria	Significant Assessment
	of advanced technology in the form of hydraulic and electrical power, radar, aeroplanes and computers to plot target positions, and radio and direct landline to relay target information to the guns. Phase Three. Tactical Air Support Land based fixed guns for coastal defence were recognised as obsolescent as early as the 1950s, particularly with the development of airborne defences. Aircraft could be used to attack both ground and sea positions, and to transport troops and equipment to required locations. This relied on the relay of information between Army and Air Force through a variety of sources. Attributes: All of the fabric associated with the operation use of the site as a defence and military facility from 1907 until its closure in 1993.
B – Rarity	Fort Wallace is a relatively rare example of three consecutive defence phases on the one site. In respect of the first two phases, it is the only defence installation in Australia to have been the site of both 6 inch and 9.2 inch guns, as well as the range of associated items, such as plotting rooms and observation towers. In respect of the third phase, it is one of only a few military installations to have remained as an active defence site post World War Two, most either closing completely or being used for training or administration purposes only. The Inner Fort Precinct and the Plotting Room Precinct within the Fort are of particular importance, and within these precincts are specific items of significance. Attributes All of the fabric associated with the operational use of the site from 1907 until its closure in 1993.
C – Research	Many of the precincts and items are significant for the way they contribute to an understanding of the general operation of the fort during the three phases of its operation. Attributes All of the fabric associated with the operational use of the site from 1907 until its closure in 1993.

4.4. FORT WALLACE (SITE GENERALLY) SUMMARY STATEMENT OF SIGNIFICANCE

The following statement of heritage significance has been soured from the Australian Heritage Database (Place ID 105335).

Fort Wallace is nationally significant as a major component of the integrated system of defence for the Newcastle Fortress Area. Its prime purpose was protection of Newcastle Harbour and its industries. During

World War One Newcastle was an important coal export centre, not only for Australia, but for the Allied Nations generally, and during World War Two it was also a major steel producing centre. The importance of the Fort increased during World War Two with the installation of the 9.2 inch guns, when it became the primary counter bombardment facility within the Newcastle Fortress Area. In terms of the fort's operational equipment and function, it represents three distinct and consecutive phases in the development of coastal defence tactics and military technology: Phase One. The 6 inch guns remnant defence technology from the late nineteenth/early twentieth centuries. This relies on the use of a separate explosive charge to fire the projectile, operated and directed by purely manual resources. Phase Two. The 9.2 inch guns. While the firing of the projectile remained basically unchanged, the operation and direction of the gun had made use of advanced technology in the form of hydraulic and electrical power, radar, aeroplanes and computers to plot target positions, and radio and direct landline to relay target information to the guns. Phase Three. Tactical Air Support Land based fixed guns for coastal defence were recognised as obsolescent as early as the 1950s, particularly with the development of airborne defences. Aircraft could be used to attack both ground and sea positions, and to transport troops and equipment to required locations. This relied on the relay of information between Army and Air Force through a variety of sources. Fort Wallace is a relatively rare example of three such consecutive phases on the one site. In respect of the first two phases, it is the only defence installation in Australia to have been the site of both 6 inch and 9.2 inch guns, as well as the range of associated items, such as plotting rooms and observation towers. In respect of the third phase, it is one of only a few military installations to have remained as an active defence site post World War Two, most either closing completely or being used for training or administration purposes only. The Inner Fort Precinct and the Plotting Room Precinct within the Fort are of particular importance, and within these precincts are specific items of significance. Many of the other precincts and items are also significant for the way they contribute to an understanding of the general operation of the fort during the three phases of its operation (Criteria A.4, B.2 and C.2).

4.5. SCHEDULE OF SIGNIFICANT ELEMENTS

All remnant elements have been assigned a grading of significance in Table 4 below. The thresholds for significance have been set out in Table 3.

Table 3 – Thresholds for levels of significance.

Level of Significance	Definition	Threshold
A	Element of high significance or heritage value that embodies Commonwealth values and State heritage significance in its own right and make an irreplaceable contribution to the significance/heritage value of the place as a whole.	Meets the threshold for entry in the Commonwealth Heritage List. Fulfils criteria for state or local listing.
B	Element of significance or heritage value that embodies Commonwealth values and State or local heritage significance in its own right and makes a significant contribution to the overall significance of the place.	Meets the threshold for entry in the Commonwealth Heritage List. Fulfils criteria for state or local listing.
C	Element that demonstrates some heritage values and makes a contribution to the overall significance of the place.	Makes a contribution to the Commonwealth Heritage values of the place as a whole/ Fulfils criteria for local

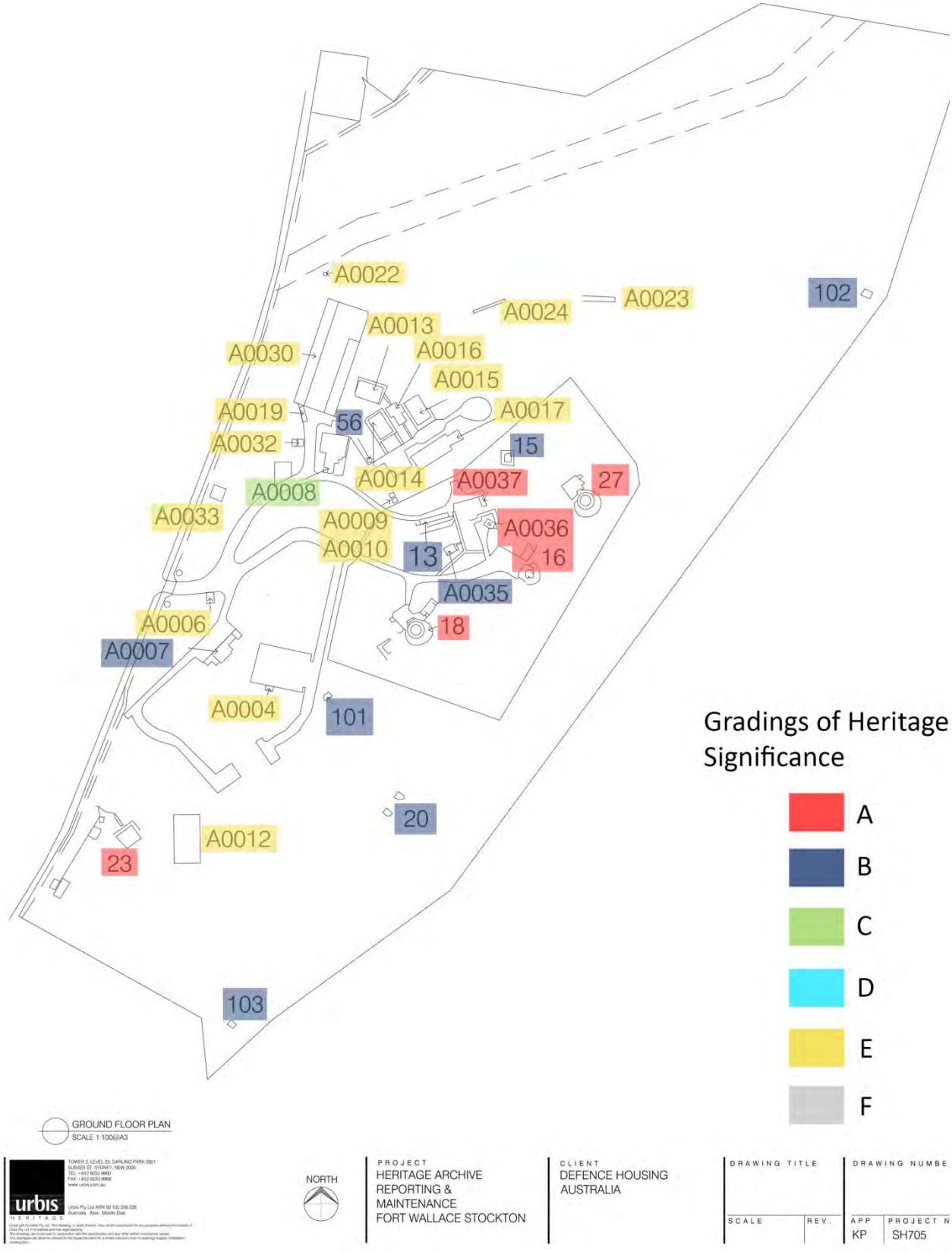
Level of Significance	Definition	Threshold
		listing.
D	Element that has low level of significance and makes some contribution to the overall heritage values of the place.	May have some significance within the context of the site, but individually does not fulfil criteria for State or Local listing.
E	Element with little or no heritage value.	Does not meet the threshold for entry in the Commonwealth Heritage List or for State or local listing.
F	Intrusive element which detracts from the significance of the place.	Detracts from the heritage values of the place and does not meet the threshold for entry in the Commonwealth Heritage List or for State or local listing.

Table 4 – Level of significance for each element.

Item	Assessed Level of Significance
A0037 – Tunnels	A
23 – Plotting Room	A
A0036 – Watch Tower, Observation Tower	A
27 – No. 2 Gun Emplacement – 9.2 inch guns	A
16 – No.2 Gun emplacement – 6 inch guns	A
18 – No. 1 Gun emplacement – 9.2 inch guns	A
15 – Engine Room, Northern Searchlight – 9.2 inch guns	B
13 – Casualty Station	B
A0035 – Radio Room, Wireless Room	B
A0007 – Admin Building, Engine House 6 inch guns	B
102 – Northern Searchlight 9.2- inch guns	B
20 – Northern Searchlight 6- inch guns	B
Southern Searchlight 6- inch guns	B

Item	Assessed Level of Significance
103 – Southern Searchlight 9.2- inch guns	B
56 – Hoban Commemorative tree	B
101 – Engine Room, Southern Searchlight – 9.2 inch guns	B
A0008 - Gymnasium, Drill Hall	C
A0023 – Practice Cricket Nets (any remnants)	E
A0024 – Cricket Pitch (any remnants)	E
A0022 – Pump House No.1	E
A0030 – Transport Naval Stores, Transport Compound	E
A0016 – Common Room	E
A0013 – Jnr Sailor's Accommodation, Lecture Room	E
A0015 – Jnr Sailor's Accommodation, Tech Maintenance	E
A0017 – Jnr Sailor's Accommodation, Q store	E
A0019 – Car Pit (any remnants)	E
A0014 - Jnr Sailor's Accommodation, Admin Office	E
A0033 – Fire Pump House No. 2 Pump House	E
A0006 – Security Office, Guard House	E
A0004 – Bus Shelter	E
A0012 – Tennis Court (any remnants)	E
A0009 - BBQ (Ruinous)	F
A0010 – Shed (Ruinous)	F

Figure 7 – Graphic representation of the grading of heritage significance attributed to each item.



Source: Urbis 2016

5. IMPACT ASSESSMENT

5.1. HERITAGE LISTING

Fort Wallace is listed on the Commonwealth Heritage List and on the Department of Defence Section 170 Heritage Register and the elements comprised therein are variously identified as being of State or National significance.

None of the heritage registers associated with the Heritage Act are applicable to the subject site. As the Act is NSW state legislation, none of the heritage registers apply to the property which is owned by a Commonwealth Government Agency.

The subject site is also listed on the Register of the National Estate (ID18957) which has ceased to be a statutory list.

5.2. NON-STATUTORY CONTROLS

5.2.1. Heritage Management Strategy 2008

The planning proposal is assessed in the table below in relation to the relevant principles which are set out in the Heritage Management Strategy prepared by GML in 2008.

Table 5 – Assessment against policies set down in the Heritage Management Strategy 2008.

CLAUSE	DISCUSSION
Conserve, manage and interpret the heritage values of the significance historic built fabric, Aboriginal cultural and archaeological significance.	The planning proposal would encourage the ongoing use and maintenance of not only the developable parts of the site, but the existing heritage items. It is proposed to conserve the coastal ridge top, the highly significant items atop on the coastal ridge top and the beach in the eastern portion of the site as these areas will be zoned for public recreation. The planning proposal therefore facilitates minimal development in a highly significant area and would conserve the seaward outlook from significant heritage items including the gun emplacements. The Environmental Management zoning would encompass the heritage items atop the escarpment as well as the Plotting Room and Administration Building. Any future residential development on the site would therefore maintain a setback from the significant items and facilitate ongoing understanding of the original setting of the items and the relationship between them. Adaptive reuse of some items may be appropriate. Key criteria in a merit assessment of proposed adaptive reuse in later stages should consider the heritage value of the item, its physical state, financial feasibility, relationships between items and the value

	to the community of a potential reuse. The principles of the site specific DCP stipulate implementation of development buffers around the highly significant heritage items which are located within the residential zoned area. These include the Admin Building and the Plotting Room. This would ensure that the curtilage of these items is appropriately respected and appreciation of them is facilitated. It is recognised that there is an opportunity to formally recognise the significance of the site through listing as a local item on the LEP despite the existing Commonwealth listing of the place. After consultation with council it is proposed to apply a local heritage listing to four items on the site (item 696 – item 699). It is also proposed to define the Gunnar Hoban Memorial Tree as a landscape item (100) and the entire site as an Archaeological item (A21). This will ensure that the protection of the place is facilitated if parts of the place are divested in the future.
Consider the provision of information, interpretation, visitor and picnic facilities, parking and other appropriate infill development within the curtilage.	It is recommended that as part of any future application for development on the site, a Base Heritage Interpretation Strategy and full Heritage Interpretation Plan including fabrication and execution should be prepared. These documents should be prepared in consultation with Council and local historical societies.
No further development should occur along the coastal ridge top where the gun emplacements are located and the 360 degree views from the ridge top should be protected.	It is proposed that the coastal ridge top be zoned E3 - Environmental Management. This zoning would ensure that development in this area would be minimal and it would facilitate of all views eastward from the ridge top. This is considered to be sympathetic to the highly significant site and is supported from a heritage perspective. The proposed zoning includes an 11m and 14m allowable height in the vicinity of two significant items. However, cognisant of the significance of these items the DCP principles stipulate that a development curtilage would be defined around these items and mapped in the DCP such that the intention to maintain a sympathetic setback from the items, as demonstrated in the concept master plan, is formalised. The DCP provides guidance on retention of key external and internal view corridors through formal recongnition of significant views (refer images

	below). As such, the planning proposal would ensure that identified significant views including those east to the ocean and that west from the observation tower to the river would be formally recognised and maintained. Figure 8 – External view corridors  *Source: Architectus* Figure 9 – Internal view corridors  *Source: Architectus*
Any new development should be set well back from the battery complex so that the relationship between structures can be understood.	The application of Environmental Management zoning around the battery complex would ensure a setback of residential development from the complex. It is appreciated that the indicative master plan demonstrates a development setback from the complex.
Areas on the site with good potential for redevelopment include the sites of the Junior Sailors Accommodation and the parade ground.	The planning proposal primarily facilitates development in this area through the concentration of low density zoning. Further, note that the indicative master plan shows that development is concentrated in this area.
Compatible uses for the site may include hostel accommodation, convention centre, educational facility, tourism/heritage interpretation and community facilities. A mix of uses may be appropriate; so that hospitality and retail uses	It is considered that the proposed residential use of the western section of the site would not be incompatible with its heritage significance subject to sympathetic design of future development and given the DCP principles which stipulate that a

could be combined with the previously mentioned uses.	development buffer would be established around the highly significant items. It is appreciated that the residential development of part of the site would generate pedestrian traffic around the heritage items in the vicinity which would encourage appreciation and continued maintenance of the items. It would also facilitate casual surveillance of the items which are currently subject to vandalism despite measures taken by the owners to prevent this.
While in Commonwealth ownership, manage Fort Wallace in accordance with the Commonwealth heritage management principles *Schedule 7B EPBC Regulations 2000).	The site Fort Wallace is subject to the Fort Wallace Heritage Management Strategy prepared for the Department of Defence by Godden Mackay Logan in May 2008. The 2008 Heritage Management Strategy primarily defines significance of the entire site and provides recommendations and policy to assist in conserving and managing that identified significance. Under Section 341X of the EPBC Act the existing HMS requires review. Further, a Heritage Management Plan or Conservation Management Plan is required to be prepared for the site which sets out more specific guidelines for the management of the place. The timing for the update of these document is being determined in consultation with the Department of the Environment and Newcastle City Council.
The future owner of Fort Wallace site shall provide access to the Indigenous and non-Indigenous heritage values of the site by: • Providing public access to the heritage curtilage; and • Providing access to the heritage values of the place through appropriate interpretation.	A large portion of the site is proposed to be zoned for Environmental Management. This zoning would ensure that the highly significant items on the coastal ridge are accessible to the public. Provisions should be made to ensure that public access to the items from Fullerton Street is maintained. It is recommended that as part of any future application for development on the site, a Base Heritage Interpretation Strategy and full Heritage Interpretation Plan including fabrication and execution should be prepared. These documents should be prepared in consultation with Council and local historical societies.

5.2.2. Conservation Management Plan 1994

The planning proposal is assessed in the table below in relation to the relevant principles which are set out in the Heritage Management Strategy prepared by GML in 2008.

Table 6 – Assessment against obligations arising from heritage significance.

PROVISION	DISCUSSION
6.1.1 Any future development should not diminish the significance of the site as a whole. This particularly implies that work on the most significant heritage features, such as the gun emplacement and the plotting room, or works within their definable curtilage should be restricted to preservation, restoration or reconstruction.	There are no works proposed to the most significant heritage features as part of this application. However, the application of Environmental Management zoning on the site and the identification of four new locally listed items would ensure that there would be no residential development within the definable curtilage of the highly significant items on the coastal ridge top. The DCP principles further aim to ensure that there are no works in the curtilage of the Admin Building and Plotting Room through the application of a development buffer around these items.
Any future development, including landscaping works should respect the existing landforms and vegetation on the site, and maintain available views from the site. The chief purpose here is to limit the height of any new developments.	The CMP references maintaining key views as a key objective of the stated appropriate height and notes that increase in the height may be appropriate. As an outcome of detailed site testing, it is considered that the stated objective can be achieved without limiting the height to 2-3 storeys. Views westward from the coastal ridge top as defined in the DCP would not be obstructed by development facilitated by the planning proposal in the outer fort area as it is understood that the top of a 14m building in the area would be essentially in line with the ground of the ridge top. The DCP principles would provide guidance on retention of key views from the site. As such, the planning proposal would ensure that identified significant views including those east to the ocean and that west from the observation tower to the river would be formally recognised and maintained.
No new development should be in the area of the inner fort.	The planning proposal does not facilitate development in the area of the inner fort.
6.1.2 The design of any new development in the outer fort should be controlled so as to be sympathetic	The planning proposal ensures that the buildings on the outer fort would be restricted to a maximum of 14m. This maximum height is restricted to a

to the significance of the site overall. Existing structures and roadways should be retained where feasible.	small area, most of the site would be subject to a 8.5m height, so to be at the same, or lower height than the coastal ridge top. The application of Environmental Management zoning would further ensure that residential development maintains a setback from the significant ridge top. Therefore, it is appreciated that the planning proposal facilitates the ongoing use of the site while restricting development to areas of lesser significance and conserving fully the inner fort. It is appreciated that the indicative master plan shows a concentration of development in the outer fort area and that the existing layout of the road network is largely retained. There are no works proposed as part of this application however it is appreciated that the only buildings marked for removal in the concept master plan are those identified as having a significance grading of E or less. Refer to Section 2.3 for a visual record of these buildings. The Drill Hall is intended to be retained, conserved and adaptively reused.
No new development should be permitted within the sand dunes precinct.	It is understood that development in this area would not be facilitated by the planning proposal.
The design of any new development in the entrance area should be controlled so as to be sympathetic to the significance of the site overall	As above, the planning proposal does facilitate development on the knoll. It is considered that development in this area could be sympathetic to the significance of the place subject to the retention of key views from the inner fort as defined in the DCP. The retention of key views including those west from the observation tower to the river is stipulated in the DCP principles.
7.1 The following recommendations arise from the assessed significance of the site, and refer to site specific tasks: The site should be retained as a single entity	There is no proposed subdivision or disposal of the site planned at this stage.
No work other than restoration/interpretation work should be permitted within the inner fort and the plotting room precincts which have been assessed as the most significant areas on the site.	As discussed above, it is appreciated that the planning proposal would not facilitate development in the inner fort precinct. The DCP principles stipulate the maintenance of a development buffer around the admin building and the plotting room despite the residential zoning in their vicinity. It is considered that development in the general vicinity of these items would maintain

	the significance of these items subject to sympathetic design resolution.
Significant buildings within the remaining precincts should be considered for retention in any development and removed only where it is shown to be unfeasible to retain them.	There is no demolition proposed at this stage. However, the indicative master plan demonstrates an intention to keep all remnant significant buildings on the site (significance gradings of C and above).
7.3.1 Inner Fort Precinct No new development should be permitted, with the exception of works that aid in interpretation at the place.	As above, the planning proposal does not facilitate development in the inner fort precinct.
7.3.2 Plotting Room Precinct No New development should be permitted with the exception of works that aid in interpretation at the place.	The planning proposal does facilitate development in this area. However, the DCP principles would ensure that an appropriate development buffer is established around the plotting room such that its setting is retained.
7.3.3.1 Height Limitations The height of any new development should be restricted so as to avoid any obstruction to the panoramic views available from the site, particularly from the Observation Tower. While no specific dimension is considered an appropriate height limit for the whole site, in terms of actual built structures 2 storeys rising to 3 storeys in part would seem generally acceptable. Some isolated structures could even be taller than this, such as masts or lookout towers, particularly the further away from the existing observation tower they are located and hence the less the obstruction to the view.	Although the corresponding provision generally recommends that appropriate heights on the site are 2-3 storeys, the following should be considered in regards to the type of development that could be facilitated by the planning proposal: • Larger buildings are not unprecedented on the site. The 1974 barracks building which has since been removed in the southern portion of the site was of three storeys and had an additional pitched roof form (refer Figure 6). This building was distinctive as part of a later phase of development, as the development facilitated by the planning proposal would be; • The CMP document was prepared when there was no clear view as to what kind of development would characterise the future of the site. It is appreciated that to achieve a meaningful development on the site that a degree of density on the site is required; • The larger allowable height facilitates some higher density elements which are required as the site has a number of environmental constraints, lessening the amount of developable land. They would also allow a greater curtilage around the heritage items on the ground plane; • The CMP references maintaining key views as a key objective of the stated appropriate height and notes that increase in the height may be appropriate. As an outcome of detailed site testing, it is considered that the stated objective can be achieved without limiting the height to 2-3

	storeys; • Development to 14m on the entrance knoll would be subject to the principles of the site specific DCP which stipulates the maintenance of key views from the site; and • The planning proposal facilitates development of up to 4 storeys. However, it is acknowledged that the indicative masterplan proposes building typologies which are largely less than 3 storeys.
7.3.3.3 Design Style The design style of any future development will of course be largely dependent on the nature of that development. However, in general terms the buildings should be subservient in their visual prominence to the significant features of the site, and should be obviously "new" buildings to avoid confusion with the significant features of the site and the phases of development they represent. Deign mimicking historic style such as the current "Federation" trend would not be appropriate, nor would overly ornamental features.	See discussion under 7.3.3.1 above. Design development with regard for this control will be undertaken at master planning stage.
7.5.5 Views The unimpeded panoramic views available from the site, particularly from the Observation Tower should be retained and maintained. Views corridors within the site should also be retained and maintained. This particularly includes the line-of-sight contact between the gun emplacements and searchlight positions with the Observation Tower.	See discussion under 7.3.3.1 above.
7.7.7 Inappropriate Uses There are various uses which could be accommodated on the site in practical terms, however would be inappropriate for other reasons: • The development of isolated houses, that is single residences within separate allotments of land, would not utilise the significant features of the site to advantage and would provide no basis for funding their continued maintenance. It would also create management problems in terms of controlling development within each separate	The application of an Environmental zoning across most of the site including the 'heritage park' is considered to be appropriate in that it facilitates uses which would not detract from the significance of the place. The zoning would ensure public access and appreciation of the elements. It is acknowledged that the development of isolated houses and the application of a residential zoning across the entire site would not be an appropriate use given the high significance of the inner fort and the importance of retaining its public accessibility. However, it is considered that the application of a residential zoning across the remainder of the site as proposed is appropriate (pending detail design) given the DCP principles which stipulates

allotment. Some form of strata title arrangement may however be appropriate, so that control of development remains under the control of a single body in the form of the Strata Managers.	development buffers around the significant items located within the area zoned residential. Further, as discussed above, the zoning would also facilitate casual surveillance of the items which are currently subject to vandalism despite measures taken by the owners to prevent this.

5.2.3. Obligations arising from Heritage Significance

The indicative master plan has been assessed briefly below with reference to the obligations arising from heritage significance set down by Urbis in June 2016. This is a preliminary assessment only to demonstrate how the application of development facilitated by the planning proposal could be sympathetic to the heritage significance of the place. There are no works proposed at this stage.

Table 7 – Assessment against obligations arising from heritage significance.

PROVISION	DISCUSSION
Structures with the significance grading of 'E' are those which have little or no heritage value and are generally those which are not associated with the significant WWI or WWII history of the site. Although the significance of the site is party vested in its rare evocation of three phases of development on the site, the removal of these structures would be supported from a heritage perspective given their individual identified significance.	The indicative master plan removes a number of items with a grading of "E". This is considered acceptable from a heritage perspective however the phases from which they are a product should be represented in future interpretation for the site as a whole. Refer to the images at Section 2.3 for a visual survey of the fabric to be removed.
All buildings with a heritage significance grading of C and above have been identified as those, which should be retained, conserved and incorporated thoughtfully into the master plan.	The indicative master plan retains all structures with a significance grading of C and above.
The treatment of the elements (Significance Grading D and above) should be considered as they are features of overall site which has Commonwealth Heritage significance	Further consideration will be given to the options for adaptive reuse of the significant elements on the site as part of the development of the master plan. This may include retaining in situ as interpretive landscape elements.
The new residential development should aim to enhance and not diminish the historic and aesthetic character of the precinct. The master plan presents an opportunity to intensify development in a manner which considers the site holistically as well as the setting of the	As discussed above, the restriction of the residential zoning to the western part of the site would confine development to areas of lesser significance and ensure an appropriate curtilage around the items on the coastal ridge top.

heritage items.	Further, it is considered that the concept master plan acknowledges the significance of the site holistically as development is confined to the outer fort precinct.
It is recognised that development may be achieved in the western half of the site.	Cognisant of the significance of the military items surmounting the escarpment, all new development in the indicative master plan option is confined to the western portion of the site.
Views to and from significant items and elements should be considered in the master plan for the site, including the opportunity to retain views towards the Heritage Park from around the Outer Fort Precinct. This should be achieved through the appropriate application of massing and height.	See discussion under 7.3.3.1 above.
The development in the Outer Fort area should be set back from the escarpment to east. This would distinguish the Heritage Park and ensure the visual prominence of the significant fabric comprised within it from around the site and from Fullerton Street.	The application of the Environmental Management across the coastal ridge top would ensure a setback of residential development from it.
The interface between the two sections of the Heritage Park (i.e. atop the escarpment and at the western base of the escarpment) should be thoughtfully resolved such that the relationship between the significant elements comprised therein is legible.	The indicative master plan shows development setback from the escarpment which ensures the retention of the relationship between the items atop the escarpment and those at the base. This is supported in principle pending further design development.
Significant views from inside the Observation Tower eastward to sea currently comprise only the landscape with the historic items comprised within the Heritage Park in the foreground. No new residential developments should obscure or dominate these views.	There is no new residential development to the east of the Tower in the indicative master plan in line with the planning proposal.
The Admin Building is one of few on the site, which is visible from Fullerton Street. The element constitutes a key identifier of the site and is highly visible at the entrance to the fort. Further, it is associated with a key period of development in the history of the site (constructed in 1917) and has a functional relationship with the searchlights on the beach. It is advised that it should be retained in situ.	The indicative master plan retains the significant Admin Building. Further consideration of its adaptive reuse will be given at master planning stage.
Any buildings built on the escarpment behind (east and north east of) the Admin Building should be set back from it and of an appropriate	Buildings on the escarpment behind the Admin Building as shown in the indicative master plan are set back from the Admin Building. Development of

scale such that the new development is not visually dominant when the Admin Building is viewed from Fullerton Street.	buildings in this area would be subject to the site specific DCP which would specify retention of key views and as such would be supported in principle subject to further design development. As discussed above, the DCP identifies key views in the vicinity of the escarpment to ensure that they are maintained with no obstruction by development.
The high attributed significance of the Gun Emplacements and Plotting Room places an obligation for owners, occupiers and users of the heritage item and any other stakeholders responsible for or involved in the maintenance and management of the place, to conserve the items and their associated significant elements.	These highly significant elements are intended to be retained in the indicative master plan.
There should be no works within the definable curtilage of any of the Gun Emplacements or Plotting Room	The indicative master plan maintains the definable curtilage of all three gun emplacements in line with the planning proposal. Specifically, there are no new zones of development between the gun emplacements and the additional military structures atop the escarpment. It is considered that the open setting of the Plotting Room to the south is important in an appreciation of the item which is largely sub surface. The indicative typology and setback of the homes indicated in the vicinity of the Plotting Room are supported in principle pending further design development. It is appreciated that the DCP principles stipulate the retention of a development buffer around this item and it is proposed to identify this item as an item of environmental heritage in the LEP.

6. CONCLUSION AND RECOMMENDATIONS

The planning proposal is supported as it would facilitate the ongoing use and maintenance of the site, including its significant heritage features.

The planning proposal conserves the coastal ridge top and the beach for Environmental Management. It therefore facilitates minimal development in a highly significant area and would conserve the seaward outlook from significant heritage items including the gun emplacements. The application of land use zoning on the site DCP also ensures that there is a setback of residential development from this coastal ridge top which would facilitate the ongoing legibility of the relationship between the highly significant heritage items.

A site specific DCP is being developed by Architectus. The DCP will ensure the retention of the heritage values of the place in terms of views and setting. Specifically, the principles stipulate that a development buffer should be retained around the significant items not within the 'heritage park' and formally identifies significant views which should be identified and conserved.

It is recognised that there is an opportunity to formally recognise the significance of the site through listing as a local item on the LEP despite the existing Commonwealth listing of the place. After consultation with council it is proposed to apply a local heritage listing to four items on the site (item 696 – item 699). It is also proposed to define the Gunnar Hoban Memorial Tree as a landscape item (100) and the entire site as an Archaeological item (A21). This will ensure that the protection of the place is facilitated if parts of the place are divested in the future.

The indicative master plan addressed herein has been developed to illustrate a potential product of the planning proposal. In summary, it is considered that the indicative master plan conserves the heritage significance of the site, maintaining the highly significant elements in terms of their fabric and setting. Future development of the indicative master plan is supported from a heritage perspective.

The following recommendations have been set down to guide the design development of a proposed master plan as part of a future stage of works:

- Further consideration should be given to the options for adaptive reuse of the Admin Building, Observation Tower and Plotting Room. There is an option to retain the buildings as landscape items only with no internal access; however genuine adaptive reuse of appropriate elements will ensure that the structures are maintained to the highest level;
- If any items are proposed to be maintained as remnant evidence only, with no assigned adaptive reuse, they should be properly managed to ensure that public safety requirements are met; and
- It is recommended that as part of any future application for development on the site, a Base Heritage Interpretation Strategy and full Heritage Interpretation Plan including fabrication and execution should be prepared. These documents should be prepared in consultation with Council and local historical societies.

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[Note: Some government departments have changed their names over time and the above publications state the name at the time of publication.]

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BETTER TRANSPORT FUTURES
MARK WAUGH

Proposed Stockton Fort Wallace Site Planning Proposal

Defence Housing Australia

Transport Study Report
October 2017

Mark Waugh Pty Ltd

ABN 67 106 169 180

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Contents

1 Executive Summary

1.1 Background

DHA has an ongoing requirement for additional housing in the Newcastle area to cater for Newcastle based Defence members and their families and to replace existing DHA dwellings that do not meet current standards. DHA has recently purchased two surplus Defence sites at Stockton with the objective of obtaining the necessary planning approvals and developing them for a mix of housing for ADF personnel and the private market. These two sites (Fort Wallace and the Stockton Rifle Range) are located just a few kilometres north of the Newcastle CBD across the Hunter River on the Stockton Peninsula. As such the sites are comparatively close to Williamtown RAAF Base (approx. 11 to 12 km by road).

This report present the transport investigations into the Fort Wallace Range site in support of the rezoning proposal.

Site details are:

	Fort Wallace
Title	Lots 100 & 101 DP1152115
Area	31.75ha
Council	Newcastle
Existing Land use Zoning	SP2 Infrastructure

A number of earlier assessments of the site have been prepared over a number of years. As part of this work, notional development yields were prepared indicating around 100 development lots may be achievable on the Fort Wallace site. This yield is being tested as part of the current investigations and is noted here for the purpose of forming a notional understanding of what the impacts may be and what development levels may be possible.

1.2 Summary

The following observations have been made in relation to the assessment of the transport system in the vicinity of the Rifle Range sites at Fern Bay:

a. **Location** – Stockton is a suburb of Newcastle located on the north side of the Hunter River, and adjacent to the Pacific Ocean. It is a narrow peninsula with road access available from the north. Fern Bay is a small village at the northern end of the Stockton peninsula, between the Hunter River north arm, and the Pacific Ocean.

b. **Transport Network** –

   a. **Road Network** – Access to Fern Bay is provided by road from the north and south, via Nelson Bay Road (B63 Route). The Fern Bay road network is a series of local streets on the eastern side of Nelson Bay Road. Access to the wider Newcastle area is provided via the Stockton Bridge to Kooragang Island and on to Tourle Street and Industrial Drive. Access north to Williamtown Airport is via the B63 Nelson Bay Road.

   b. **Ferry Service** – The Newcastle to Stockton Ferry connects Stockton at its southern end, on the Hunter River, to Queens Wharf in the Newcastle CDB

   c. **Bus Services** – Newcastle Buses Bus operates Route 118 serving Fern Bay and Stockton, although the route is quite circuitous. Buses to Williamtown are also available, operated by Port Stephens Coaches.

   d. **Cycle ways** – The Stockton Cycle way was opened in 2013, connecting the peninsula from Stockton Bridge in the north to the Stockton Ferry terminal in the south.

c. Road Network performance

   a. **Peak Periods** – Traffic Movement surveys were conducted on 8 June 2016 at the following locations:

      i. Nelson Bay Road and Fullerton Street roundabout

      ii. Nelson Bay Road and Taylor Road (priority control)

   b. AADT flow data is also available for traffic crossing the Stockton Bridge.

c. Observed flows were well within the technical mid-block capacity of the various roads under review.

d. The offset roundabout at the junction of Nelson Bay Road and Fullerton Street has been tested as operating at a very good level of service.

e. The priority junctions of Nelson Bay Road with Taylor Road and Vardon Road operate with minimal levels of delay on the main road, but with some delay for right turn movements.

d. **Land Use Proposals** – The notional development yield of 100 lots on the Fort Wallace site has been used for initial testing of traffic generation levels form the subject site.

e. **Traffic Generation** – Forecast traffic flows would be in the order of 156 trips AM and 172 trips PM for the Fort Wallace site. The external road network is more than capable of absorbing these levels of additional trips, while remaining at a very good operational level of service.

f. **Initial Site Access Considerations** –

a. **Fort Wallace** – The existing flow levels on Fullerton Street coupled with the initial predictions of site traffic flows suggest the site will need an intersection configuration with an Auxiliary Left (AUL) turn lane, and a CHannelised Right (CHR[S]) short turn slot to cater for predicted site movements onto and from Fullerton Street**.**

b. Two site access points are shown on the Fort Wallace Draft Indicative Master Plan. While one access is technically acceptable from a traffic capacity perspective, the second access is of benefit in terms of redundancy, allowing emergency vehicle access or evacuation should one access point be blocked.

g. **Road Capacity** – Existing traffic flow levels suggest the mid-block two lane two way capacity of the surrounding road network is very satisfactory and has ample spare capacity to cater for the subject development proposals.

h. **Access Strategy** – Single site entrance on Fullerton Street developed with a southbound Auxiliary Left lane (AUL), and a CHannelised Right Short turn slot (CHR[S])

i. **Other Considerations** –

j. Internal road design – to meet Council road design standards. Carriageways at Local Street, Access Street, Access Place standard.

k. North extension of Stockton cycleway, or possible cycle connection between the two sites lining to the exiting cycleway.

1.3 Conclusion and Next Steps

This report presents the findings of the traffic and transport investigations for the Fort Wallace development site as additional housing in the Newcastle area to cater for Newcastle based Defence members and their families and to replace existing DHA dwellings that do not meet current standards.

The investigations have found that subject to road and intersection improvements as outlined in these investigations the site is able to be accommodated on the surrounding transport (road) network. The potential works of significance are:

1. Provision of one site access intersection with Fullerton Street (second access is optional) to provide turning facilities for the subject site.
2. A second site access is proposed which will provide a level of redundancy that is of benefit for emergency vehicle and evacuation access.

The overall conclusion is that given the potential level of future development proposed for the Fort Wallace site at Stockton, the strategy focussing on one site access to Fullerton Street would be technically sufficient to meet Austroads Guidelines, and a two access strategy would provide superior access within minimal impact on the external road system.

The next steps recommended are to seek more detailed engineering advice from The City of Newcastle as to the most appropriate form of road and intersection improvements to service the site.

2 Introduction and Background

2.1 Background

DHA has an ongoing requirement for additional housing in the Newcastle area to cater for Newcastle based Defence members and their families and to replace existing DHA dwellings that do not meet current standards. DHA has recently purchased two surplus Defence sites at Stockton with the objective of obtaining the necessary planning approvals and developing them for a mix of housing for ADF personnel and the private market. The subject site (Stockton Fort Wallace) is located just a few kilometres north of the Newcastle CBD across the Hunter River on the Stockton Peninsula. The site is comparatively close to Williamtown RAAF Base (approx. 11 to 12 Km by road).

The details of the two sites are:

	Fort Wallace
Title	Lots 100 & 101 DP1152115
Area	31.75ha
Council	Newcastle
Existing Land use Zoning	SP2 Infrastructure

A series of earlier assessments of the site has been prepared over a number of years. As part of this work, notional yields were prepared indicating around 100 development lots may be achievable on the Fort Wallace site. This yield has been tested as part of the current investigations and are noted here for the purpose of forming a notional understanding of what the impacts may be and what development levels may be possible. An Illustrative Masterplan for the Fort Wallace site is included at **Appendix A** of this report.

2.2 Site Context

The subject site under consideration by DHA for housing for Newcastle based defence members and their families is located at Fern Bay just north of Newcastle. The close proximity to the RAAF Williamtown base which is about 12 kms to the north of the sites, and the closeness to the regional centre of Newcastle make these sites attractively located for the purposes of housing defence families.

The sites are shown in **Figure 1 – Regional Context** below.

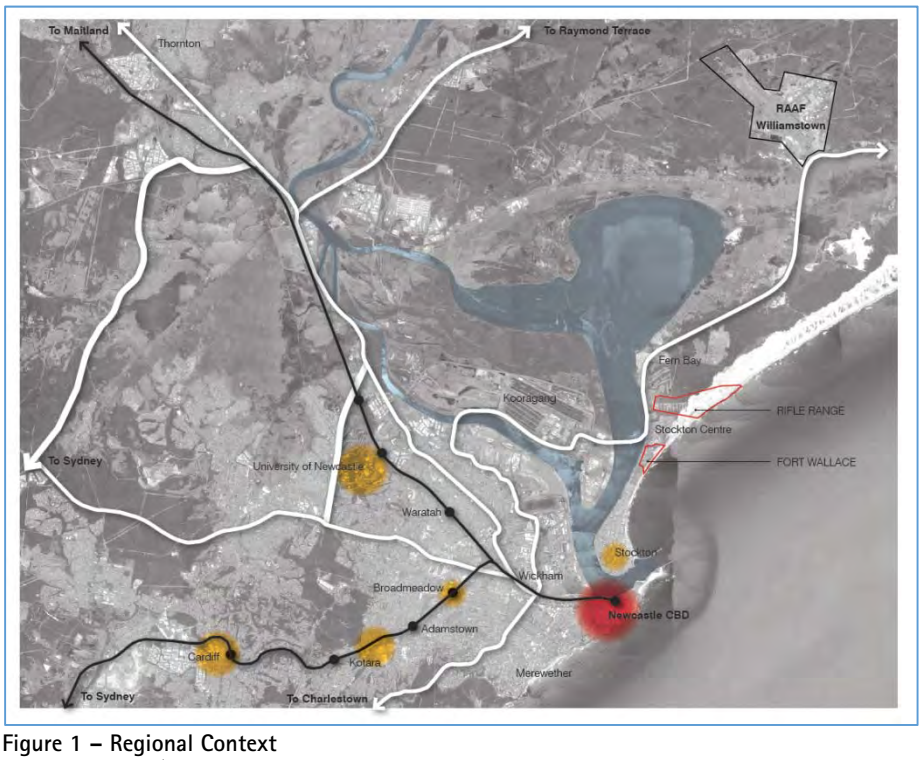


Figure 1 – Regional Context
Source: architectus™ 2016

The local context of the site is shown in **Figure 2 – Local Context** below.

Figure 2 – Local Context
Source: architectus™ 2016

2.3 Objectives of Traffic Investigation

The Traffic/Transport investigations have assessed the constraints and opportunities of the subject site, as a contribution to the design development of the preferred scheme for inclusion in the sites Planning Proposal. Specific work tasks have included:

- Site visits the two sites,
- Review existing information on the sites and surrounding transport network,
- Review any Council Plans, Policies or Strategies relevant to the sites and local area,
- Undertake assessments (traffic, transport, pedestrian, cycleways) to develop a sufficient understanding of the sites and their constraints and opportunities to inform the subsequent Planning Proposal and Development Application(s),
- Liaise with the urban design team on matters relating to the traffic/transport constraints and opportunities of the two sites,
- Contribute to the options development for the two sites,
- Prepare the following reports covering the traffic/transport constraints, opportunities and proposals to support the development and planning proposals:

    1. Initial review of the development options (Summary Working Report),
    2. Supporting summary report for the preferred development option,
    3. Supporting report for the Planning Proposal,
    4. Supporting report for the Development Application,

    This report forms the supporting report for the Fort Wallace Planning Proposal.

It should be noted that a comparable report has been prepared for the second site under consideration, and that both pieces of work have taken into account the traffic generation and impacts of the other proposal.

3 Existing Conditions

3.1 Road Network

External Roads

The Fort Wallace site is accessed directly from Fullerton Street to the south of the roundabout controlled intersection with Nelson Bay Road.

Nelson Bay Road (B63)

Nelson Bay Road (B63) is the main road connection from Newcastle via Kooragang Island to the Port Stephens area, including the nearby airport and Defence base at RAAF Williamtown. It is built to a 4 lane dual carriageway arterial standard with sealed shoulders in the vicinity if the subject sites. At its southern end it connects to Fullerton Street via an offset roundabout junction. The western leg of this roundabout connects Nelson Bay Road to Kooragang Island via the Stockton Bridge.

Nelson Bay Road is used as a bus route for regular and for school services. (A copy of the Newcastle Buses bus network map is included in **Appendix B** for reference). Buses serve Stockton and Fern Bay, and complete a loop via Vardon Road Popplewell Road and Rankin Rod to access Nelson Bay Road for the return journey to Newcastle.

Photo Plate 1 – Nelson Bay Road (B63) looking south from near Vardon Road (on the left of photo)

Photo Plate 2 – Nelson Bay Road (B63) looking north from Taylor Road

Photo Plate 3 – Nelson Bay Road (B63) looking south from Taylor Road (on the left of photo)

Photo Plate 4 – Nelson Bay Road (B63) / Fullerton Street roundabout

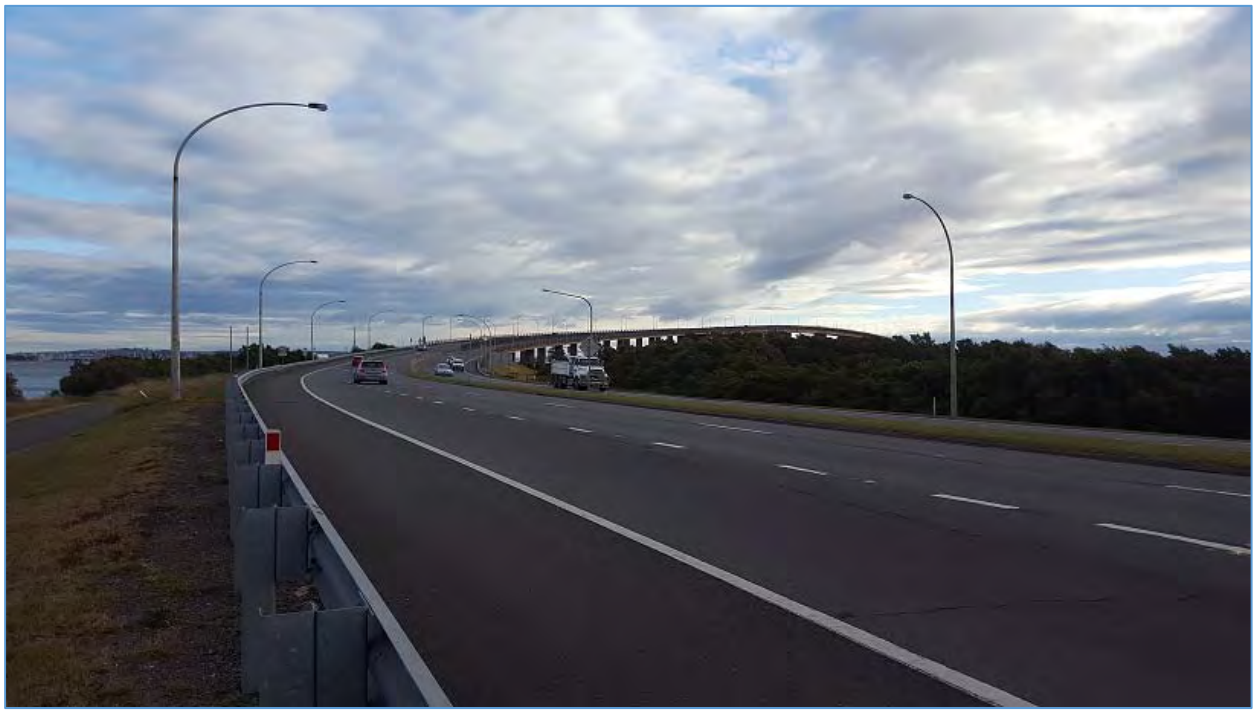


Photo Plate 5 – Nelson Bay Road (B63) looking south and west toward Stockton Bridge

Fullerton Street

Fullerton Street is the main north south sub-arterial route that connects the Stockton Peninsula to Nelson Bay Road. It is the only road connection for the locality. It is built to a two lane two way 'rural' standard in the vicinity of the Fort Wallace site, with sealed shoulders and no kerb and gutter. It is approximately 11 metres width on its approach to the Nelson Bay Road intersection, and narrows to around 9 metres adjacent to the Fort Wallace Gate.

Photo Plate 6 – Fullerton Street– Looking south from the Nelson Bay Road (B63) roundabout

Photo Plate 7 – Existing Fort Wallace Gate – viewed from Fullerton Street

Photo Plate 8 – Fullerton Street– Looking north toward Nelson Bay Road from near Fort Wallace existing entrance

Photo Plate 9 – Fullerton Street– Looking south from near Fort Wallace existing entrance

Photo Plate 10 – Existing dual use path along the Hunter River and running parallel and to the west of Fullerton Street

3.2 Traffic Surveys and Site Observations

Traffic Surveys

In considering the appropriate times for analysis of the impacts of future site activities it is important to ensure all periods of significant on road activity are captured.

Monitoring of traffic movements was conducted over an AM and PM peak for a typical weekday. The traffic surveys were conducted on Wednesday 8 June 2016. The surveys utilise video and automated data capture techniques with the ability to monitor both pedestrian and vehicle movements and accumulations at the nominated locations.

Traffic Survey data was collected at two locations on Nelson Bay Road, at Fullerton Street and Taylor Road. The survey data is included in **Appendix C – Traffic Survey Data**.

General Site Observations

The most significant observations from a traffic movement efficiency and road safety perspective that were observed from the data monitoring and site observations Wednesday 8th June 2016 were:

1. Traffic flows along Nelson Bay Road are well within the technical capacity of this 4 lane dual carriageway arterial road.
2. Traffic flows along Fullerton Street were also observed as being well within the technical capacity of this 2 way 2 lane sub arterial (truck collector/) road.
3. Operation of the Nelson Bay Road / Fullerton Road Roundabout is very good, with SIDRA intersection modelling indicating an very high Level of Service (Los) of 'A' on the Austroads scale of 'A' to 'F'.
4. Parking is minimal on the main traffic routes approaching the subject site.
5. Bus movements along the local street network were observed, on Fullerton Street, and on Nelson Bay Road, Vardon Road and Rankin Road to the north of the subject site. .

The above observations have been taken into account when considering the development proposals.

3.3 Cycling Facilities

The road network in the vicinity of the subject site includes generous sealed shoulders along Nelson Bay Road, and Fullerton Street. These are available for use by cyclists.

The Stockton Cycle way, which runs parallel to Fullerton Street from near the Stockton Bridge, was opened by Council in 2013, connecting the peninsula from Stockton Bridge in the north to the Stockton Ferry terminal in the south. It is constructed as high standard concrete pavement dual use path.

The City of Newcastle Council has actively promoted cycling as a mode of transport as well as a recreational activity for many years. This is not without its challenges, including some topography challenges, but with much of the local Stockton area quite flat, it lends itself to the promotion of cycling in the local area.

Appendix B - Newcastle Cycling Map illustrates the existing and planned network of cycleways being development by Council.

3.4 Public Transport Services

The locality is well service by bus public transport, and is also linked to the Newcastle CBD by the Newcastle to Stockton Ferry Service. Scheduled bus and ferry services are operated By Newcastle Buses and Ferries, a State Government owned corporation. Bus services operated by Port Stephens Coaches also serve to area, linking to locations in the north such as Newcastle Airport at Williamtown. The networks, bus and ferry, are illustrated in Appendix C.

3.5 Road Authority Liaison

Liaison has been undertaken with officers of both the City of Newcastle and NSW Roads and Maritime. No specific issues were raised from a traffic and transport perspective by either authority although it is noted here that NSW RMS are currently conducting a route development strategy for Nelson Bay Road. It is understood that RMS has a requirement to deliver 20 year strategies on all roads under its jurisdiction. Date of completion was not known at the time of publishing this report.

3.6 Crash History

Data has been sourced for review for the NSW RMS Crash Database. Summary information is provided in Appendix D to this report.

The data covers the period from 1st July 2010 to 30th June 2015, and is focussed on the Stockton Bridge, Nelson Bay Road, and Fullerton Street Fern Bay location. Over the period of review there were 20 recorded crashes with 9 casualties. NO fatalities were recorded in this vicinity. Of the casualties 4 incidents involved serious injuries. 75% of the incidents occurred on non-intersection locations, with a third involving hitting objects when leaving the (straight) carriageway. 45% of recorded incidents involved single vehicles. Contributing factors were noted as speed (15% and fatigue (10%)

Further to the north and approaching the Newcastle (Williamtown) Airport precinct there were 10 recorded incidents with 13 casualties, in the vicinity of Cabbage Tree Rod and Williamtown Drive. In this area speed was noted as a significant contributing factor (40%) and fatigue also but to a lesser extent (20%).

At the key intersections on approaches to the subject site, there have been 2 incidents, one involving a moderate injury in 2011, at the Nelson Bay Road / Fullerton Street intersection. The roundabout control at this junction was upgrade some years ago, with the northbound lanes able to bypass the offset roundabout layout that controls southbound movements and the Fullerton Street approach to the junction. It is understood these changes have had a positive impact on the number type and severity of incidents since that time.

Of note from the crash data is that there were no recorded incidents involving traffic pulling out of local roads onto Nelson Bay Road.

This information has been taken into consideration in developing the access strategy for the subject site.

4 Development Proposals

A number of earlier assessments of the subject site have been prepared over several years. As part of this work, a notional development yield was prepared indicating some 220 development lots may be achievable on the Rifle Range site. This yield is being tested as part of the current investigations and are noted here for the purpose of forming a notional understanding of what the impacts may be and what development levels may be possible. The Stockton Fort Wallace Indicative Master Plan is illustrated in **Appendix A**.
Key access features include road connections to both Vardon Road and Taylor Road.

4.1 Fort Wallace

The details of the Fort Wallace Site are:

Table 4-1 Fort Wallace Site Description

	Fort Wallace
Title	Lots 100 & 101 DP1152115
Area	31.75ha
Council	Newcastle
Existing Land use Zoning	SP2 Infrastructure
Potential Residential Dwellings	100 lots
Proposed Site Access	Via direct connection to Fullerton Street

A series of earlier assessments of the site were prepared over a number of years. As part of this work, notional yields were prepared indicating around 100 lots may be achievable on the Fort Wallace. This yield is being tested as part of the current investigations and are noted here for the purpose of forming a notional understanding of what the impacts may be and what development levels may be possible.
It should be noted also that a comparable report has been prepared for the second site under consideration, and that both pieces of work have taken into account the traffic generation and impacts of the other proposal.

4.2 Access, Trip Distribution and Assignment Assumptions

It is proposed to access the Fort Wallace site point using the existing site access location on Fullerton Street, and with a second access point to Fullerton Street to the north between the existing site entrance and the Nelson Bay Road Roundabout. The fundamental assignment and distribution of trips irrespective of the local road assignments has been assumed as follows:

Fort Wallace
Assignment of Trips

a. AM – 10% IN, 90% OUT
b. PM – 90% IN, 10% OUT

Directional Distribution

a. 80% northbound via Fullerton Road
    a. 50% northbound via Nelson Bay Road
    b. 50% westbound via Stockton Bridge
b. 20% southbound via Fullerton Street

4.3 Traffic Generation

Table 4-3 - Applied Traffic Generation Rates presents the traffic generation characteristics of the two sites under consideration.

Table 4-3 – Future Traffic Generation Assumptions

Masterplan Component	AM Peak Generation Rate (vph)	AM Peak Trips (vph)	PM Peak Generation Rate (vph)	PM Peak Trips (vph)	Comments
Fort Wallace	0.71	7 IN 64 OUT	0.78	70 IN 8 OUT	

Notes: All peak trip rates are expressed in vehicles per hour (vph)

5 Existing Network Performance

5.1 Road Network

Traffic volume data for the project has been collected during a 1 day survey of intersection traffic volumes as outlined in Section 3.2 of this report. These surveys were completed on a typical weekday. The surveys were completed using video monitoring and data capture techniques, and allow post survey viewing of video footage for review of characteristics such as queuing, driver behaviour and so on. Data reduction has been completed that focusses on the typical peak periods for commuters (and school based activity) at the start and end of the business day, i.e. 7.00 AM to 9.30 AM, and 2.00PM to 4.30PM. The results of this monitoring are provided in **Appendix E** of this report.

AM Operations

The results from the traffic survey indicate that during the surveyed morning AM peak commute period (7.00 to 8.00 AM) the two-way traffic flow along Nelson Bay Road north of Fullerton Street was in the order of 1900 vph (864 NB +1060 SB). These flows are well within the technical capacity of a dual carriageway 4 lane urban arterial road at Level of Service (LoS) 'A' northbound, and 'B' southbound.

PM Operations

The corresponding results from the PM survey at Nelson Bay Road north of Fullerton Street between 3.30 PM and 4.30 PM (peak PM activity) show flows of a similar magnitude to the AM peak period. The PM data set indicates that during the surveyed afternoon peak period the two-way traffic flow along Nelson Bay Road was in the order of 2000 vph (1284 NB +720 SB), slightly more than the morning peak observed. These flows are again well within the technical capacity of urban traffic lanes at LoS 'B' northbound and LoS 'B' southbound.

A summary of the Wednesday 8th June 2016 traffic data is presented in **Table 5.1 – Existing Traffic Volumes** below.

Table 5.1 – Existing Traffic Volumes

Road	Location	Peak Period	Peak flow(1)	Mid-Block Road Capacity	Level of Service
Nelson Bay Road	North of Taylor Road	AM peak	861 N/B 1055 S/B	900 (one-way) (3) 1400 (one-way) (4)	A B
		PM peak	1260 N/B 714 S/B	900 (one-way) (4) 1400 (one-way) (4)	B A
Nelson Bay Road	North of Fullerton Street	AM peak	864 N/B 1060 S/B	900 (one-way) (4) 1400 (one-way) (4)	A B
		PM peak	1284 N/B 720 S/B	1400 (one-way) (4) 900 (one-way) (4)	B A
Nelson Bay Road	West of Fullerton Street	AM peak	761 E/B 1388 W/B	900 (one-way) (4) 1400 (one-way) (4)	A B
		PM peak	1502 E/B 807W/B	1400 (one-way) (4) 900 (one-way) (4)	C A
Fullerton Street	South of Nelson Bay Rd	AM peak	299 N/B 268 S/B	380 (one-way) (2) 600 (one-way) (2)	B B
		PM peak	324 N/B 445 S/B	380 (one-way) (2) 600 (one-way) (2)	B C

Notes: 1. Peak flow from 8th June 2016 traffic survey results by Mark Waugh Pty Ltd
2. RTA 2002, Urban Road Conditions, One Lane, Level of Service (Refer Table 5.2 below)
3. RTA 2002, Urban Road Conditions, Two Lanes, Level of Service (Refer Table 5.2 below)

Table 5.1 demonstrates that the roads serving as the main access routes for the subject site will operate well within their technical and functional lane capacity levels as described by Austroads and NSW RMS guidelines.

The results above are drawn from the urban flow conditions Levels of Service definitions as presented in the Guide to Traffic Generating Developments ((NSW ART October 2002) Theses are reproduced here as Table 2.2 - Urban Road peak hour flows per direction, overleaf. It can be seen that the ultimate capacity for Taylor Road for example in this location is 900 vph at the limit of acceptable flow conditions under urban conditions Level of Service 'D', and possibly up to 1400 vehicles per hour in one direction for LoS 'E'. . For the current observed traffic flows along Fullerton Street it can be seen that the level of service for road users is 'A'.

Table 5.2 - Urban Road peak hour flows per direction

Level of service	One Lane (vph)	Two Lanes (vph)
A	200	900
B	380	1400
C	600	1800
D	900	2200
E	1400	2800

Source: RTA Guide to Traffic Generating Developments, version 2.2 dated October 2002.

The conclusion drawn from this data is that the technical lane capacity of the road system adjacent to the subject sites is high and the performance is very good.

5.2 Intersection Performance

Local Intersections

As discussed above the Fort Wallace site is proposed to maintain its existing access onto Fullerton Street, and possibly a second access also to Fullerton Street to the north and closer to the roundabout controlled intersection with Nelson Bay Road.

For the assessment of intersection performance it is useful to firstly consider the Austroads threshold levels for intersection capacity under uninterrupted flow conditions. Table 5.3 Intersection Capacity – Uninterrupted Flow Conditions below presents these thresholds. Where traffic flows fall within these limits intersection performance is essentially operating with little or no delay for approaching drivers other than to obey the requisite road rules.

Table 5.3 Intersection Capacity – Uninterrupted Flow Conditions

Road Type	Light Crossing or turning volumes Maximum Design Hour Volumes, Two-way (vph)		
Two Lane through Roadway	400	500	650
Cross Road	250	200	100
Four Lane through roadway	1000	1500	2000
Cross road	100	50	25

Source: Austroads Guide to Traffic Engineering Practice - Part 5, 1988

For both the morning and afternoon peak periods, the survey results indicate that these limits are not met on the site access priority junction. Essentially, traffic would be required to slow down to negotiate turns with little if any delay for the through traffic movements.

Operation of Nelson Bay Road Roundabout

The higher order interactions that are part of the road network providing access to the subject site are the Nelson Bay Road intersection with the roundabout controlled junction with Fullerton Street. For the Nelson Bay Road / Fullerton Road roundabout, SIDRA[7] Intersection modelling indicates a good level of service of "A" on all approaches.

Liaison with the road authorities has been sought, but has not been completed at this time. This liaison should be completed before finalising the traffic investigations. It is an important step in the approval process to confirm the requirements of Council as the local road authority with regard to its current access strategy for the Stockton peninsula.

Further details of the intersection analyses are provided in **Appendix F** to this report.

6 Future Network Performance

6.1 Road Network

The forecast traffic generation form the subject site presented in Table 4-3 have been added to the existing flows to arrive at the 'with development' scenario. A summary of the changes in peak traffic flows taking the additional site movements into accounts is presented in **Table 6.1 – Forecast Mid-Block Traffic Volumes** below.

Table 6.1 – Forecast Mid-Block Traffic Volumes

Road	Location	Peak Period	Peak flow[1]	Mid-Block Road Capacity	Level of Service
Nelson Bay Road	North of Taylor Road	AM peak	887 N/B 1058 S/B	900 (one-way) [3] 1400 (one-way) [4]	A B
		PM peak	1263 N/B 742 S/B	900 (one-way) [4] 1400 (one-way) [4]	B A
Nelson Bay Road	North of Fullerton Street	AM peak	890 N/B 1063 S/B	900 (one-way) [4] 1400 (one-way) [4]	A B
		PM peak	1287 N/B 748 S/B	1400 (one-way) [4] 900 (one-way) [4]	B A
Nelson Bay Road	West of Fullerton Street	AM peak	764 E/B 1414 W/B	900 (one-way) [4] 1800 (one-way) [4]	A C
		PM peak	1530 E/B 811 W/B	1800 (one-way) [4] 900 (one-way) [4]	C A
Fullerton Street	South of Nelson Bay Rd	AM peak	351 N/B 274 S/B	380 (one-way) [2] 600 (one-way) [2]	B B
		PM peak	331 N/B 501 S/B	380 (one-way) [2] 600 (one-way) [2]	B C

Notes: 1. Peak flow from 8th June 2016 traffic survey results by Mark Waugh Pty Ltd
2. RTA 2002, Urban Road Conditions, One Lane, Level of Service (Refer Table 5.2 below)
3. RTA 2002, Urban Road Conditions, Two Lanes, Level of Service (Refer Table 5.2 below)

Table 6.1 demonstrates that the roads serving as the main access routes for the subject site will continue to operate well within their technical and functional lane capacity levels as described by Austroads and NSW RMS guidelines. The only change indicated is on Nelson Bay Road where the AM level of Service is predicted to be LoS 'C' which is till well within acceptable urban flow conditions.

The results above are drawn from the urban flow conditions Levels of Service definitions as presented in the Guide to Traffic Generating Developments ((NSW ART October 2002) Theses are reproduced here as Table 2.2 - Urban Road peak hour flows per direction, overleaf. It can be seen that the ultimate capacity for Taylor Road for example in this location is 900 vph at the limit of acceptable flow conditions under urban conditions Level of Service 'D', and possibly up to 1400 vehicles per hour in one direction for LoS 'E'. .

On Fullerton Street the mid bock flow conditions are forecast to exhibit no discernible change in Level of Service.

Table 6.1 demonstrates that the roads surrounding the subject site will continue to operate well within their technical and functional lane capacity levels as described by Austroads and NSW RMS guidelines.

6.2 Intersection Performance

Intersection performance have been re-tested here as part of the future site access considerations. The operation of Nelson Bay Road / Fullerton Street roundabout has been tested to demonstrate the potential future intersection performance. The results of the SIDRA analysis indicate the Nelson Bay Road / Fullerton Street roundabout intersection will continue to operate at satisfactory service levels with no discernible change in operational performance.

It should be noted that a comparable report has been prepared for the second site under consideration, and that both pieces of work have taken into account the traffic generation and impacts of the other proposal. Level of Service summaries for the junction analyses are included in **Appendix F** to this report.

6.3 Intersection Design

The traffic flow analysis outlined previously demonstrates that there are no technical capacity grounds for requiring intersection control beyond the most basis of priority controlled junctions. The Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2009) provides guidance on the warrants for various auxiliary lane treatments at intersections. **Figure 6.1** below illustrates the principles for a design speed of less than 100 kph. The posted speed limit on Boomerang Drive in the vicinity of the subject site is 60 kph. The warrants relate turn treatments to a combination of major road traffic volume and turning volumes.

For the existing traffic flows on Fullerton Street an **A**uxiliary **L**eft turn treatment (AUL) and a short **CH**annelised **R**ight Turn Treatment (CHR(S)) is the required treatment, assuming a nominal exiting flow (10 vph) from the subject site.

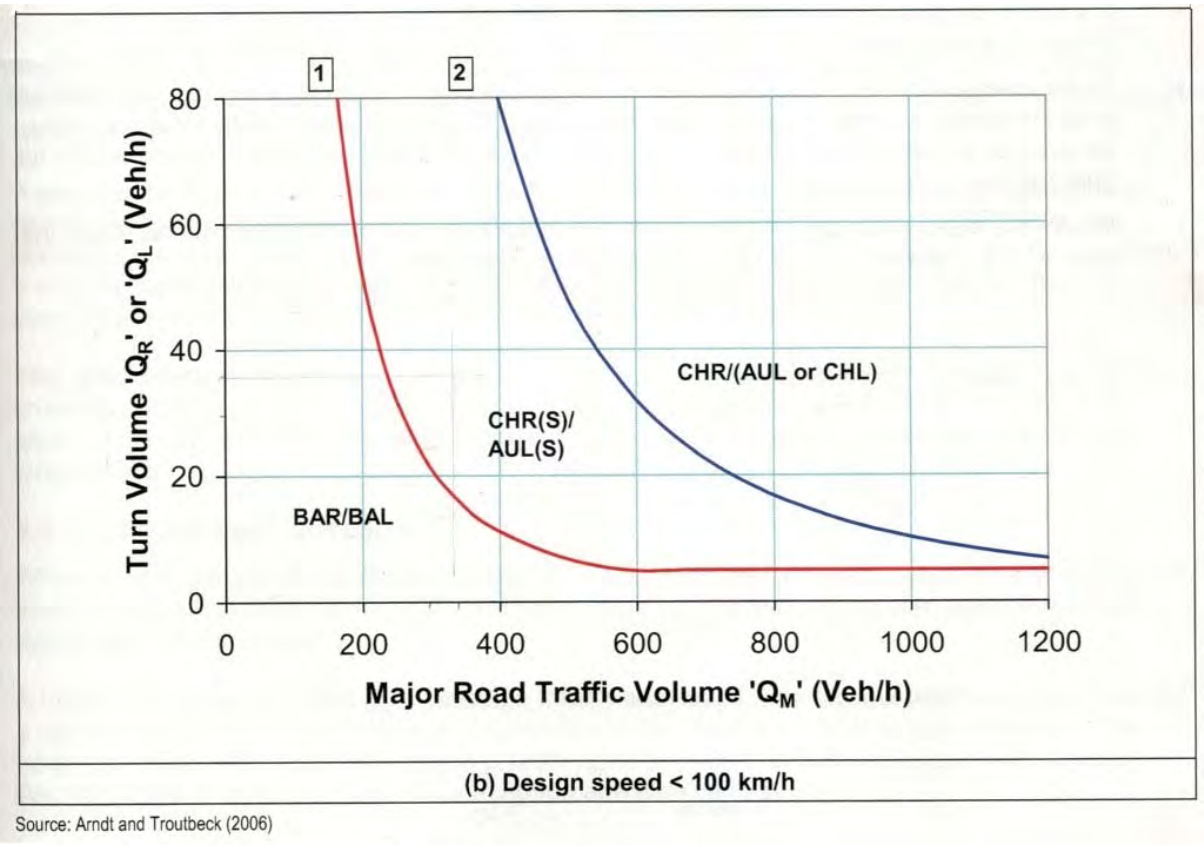


Figure 6.1 Warrants for turn treatments on major roads at unsignalised intersections
(Design Speed < 100kph)
Source: Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2009)

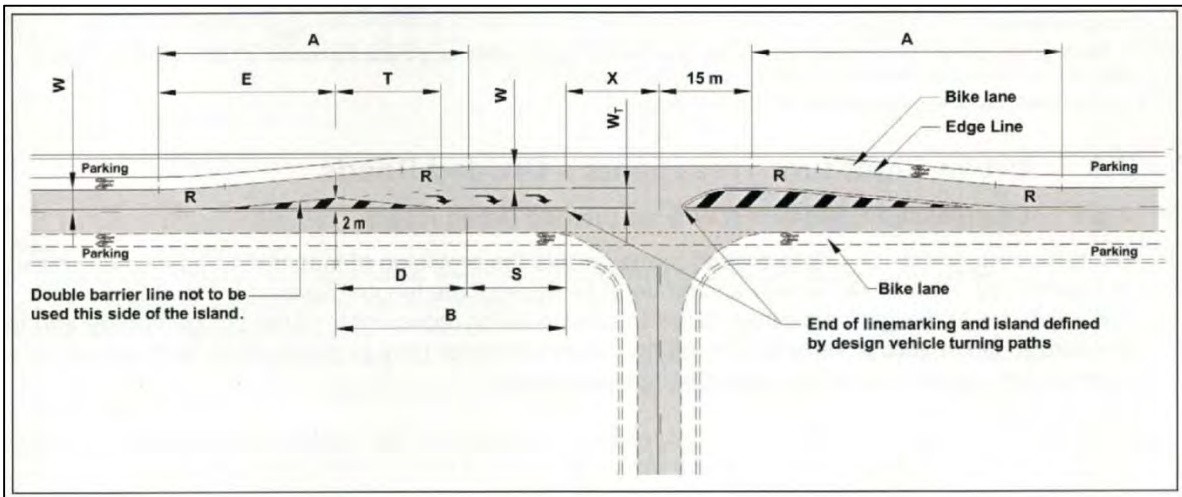
If the existing + development traffic flows on Fullerton Drive are applied at the rates calculated above, and with one site access only, then the form of the intersection required is a short **CH**annelised **R**ight Turn Treatment (CHR(S)) coupled with a **CH**annelised **L**eft Turn Treatment (CHL). If the alternative access strategy include the 2 proposed access junctions planned for the subject site, the combination of intersection controls recommended would be as follows:

a) North Access - Short **CH**annelised **R**ight Turn Treatment (CHR(S)) coupled with a **CH**annelised **L**eft Turn Treatment (CHL)
b) South Access - Short **CH**annelised **R**ight Turn Treatment (CHR(S)) coupled with an **A**uxiliary **L**eft turn treatment (AUL)

The need for short channelised right turn treatment is driven largely by the Fullerton Street flows, even though the level of site traffic turning right into the site is anticipated to be quite small. The difference in the left turn treatments is based on the assumption that most (if not all) left turn traffic entering the subject site would do so at the first opportunity, the north access point.

The conclusion drawn here is that one site access point is sufficient to deal with traffic capacity issues.
The form and function of the second access point should be reviewed and discussed with the road authorities to determine its role, as either an unrestricted public access point, or possibly as a gated emergency site access for evacuation and emergency service uses.

Figures 6.2, 6.3 and **Figure 6.4** illustrate the basic concepts for right and left turn treatments. Given the adjacent off road cycle facilities on the west side of Fullerton Street it is not expected that on road facilities would be required.



Notes:

1. This layout includes bicycle lanes. The layout may be used without providing bicycle lanes if insufficient space is available to accommodate them. If midblock bicycle lanes exist in the latter case, alternative treatments must be provided for cyclists to negotiate the intersection (e.g. a separate bicycle path on the nature strip).
2. Islands are to comprise linemarking only (i.e. no raised or depressed medians). Diagonal rows of raised reflective pavement markers within the painted island may be used to improve the delineation of the diagonal pavement markings.
3. The dimensions of the treatment are defined thus:

W = Nominal through lane width (m) (incl. widening for curves). For a new intersection on an existing road, the width is to be in accordance with the current link strategy.
W_T = Nominal width of turn lane (m) (incl. widening for curves based on the design turning vehicle) = 3.0 m minimum.
B = Total length of auxiliary lane including taper, diverge/deceleration and storage (m).
E = Distance from start of taper to 2.0 m width (m) = $(A/W_T) \times 2$.
T = Physical taper length (m) given by:

$$T = \frac{0.33VW_T}{3.6}$$

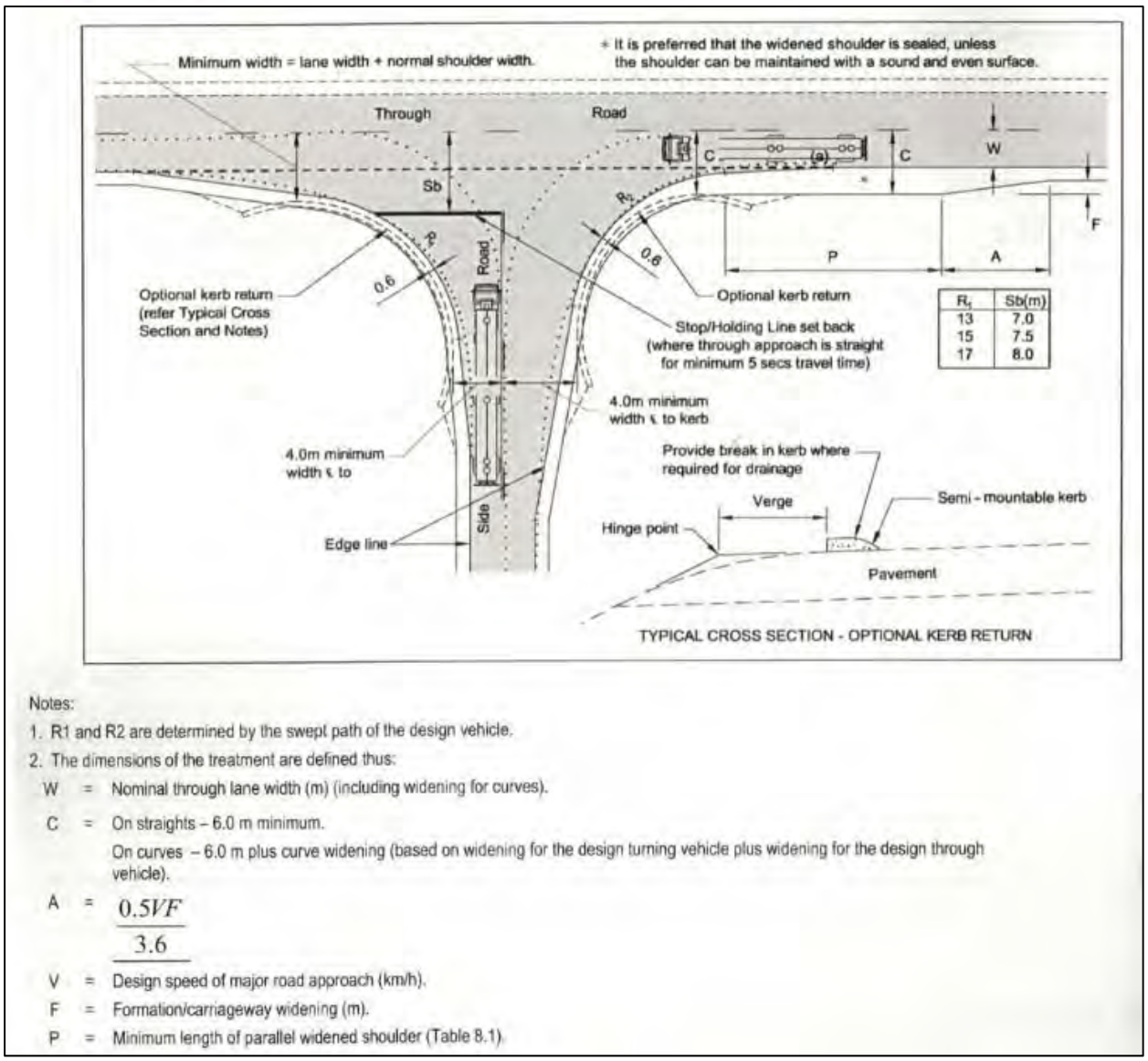
S = Storage length to cater for one design turning vehicle (m).
V = Design speed of major road approach (km/h).
X = Distance based on design vehicle turning path, typically 10–15 m.

Values of A, D, R and T are shown in Table 7.3.

Source: QDMR 2006

Figure 7.18: Urban CHR(S) treatment on a two-lane road

Figure 6.2 Urban Short Channelised Right Turn treatment - (CHR(S)
Source: Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2009)



Notes:

1. R1 and R2 are determined by the swept path of the design vehicle.
2. The dimensions of the treatment are defined thus:

W = Nominal through lane width (m) (including widening for curves).

C = On straights – 6.0 m minimum.
On curves – 6.0 m plus curve widening (based on widening for the design turning vehicle plus widening for the design through vehicle).

$$A = \frac{0.5VF}{3.6}$$

V = Design speed of major road approach (km/h).

F = Formation/carriageway widening (m).

P = Minimum length of parallel widened shoulder (Table 8.1).

Figure 6.3 Basic Auxiliary Left-turn treatment (BAL)

Source: Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2009)

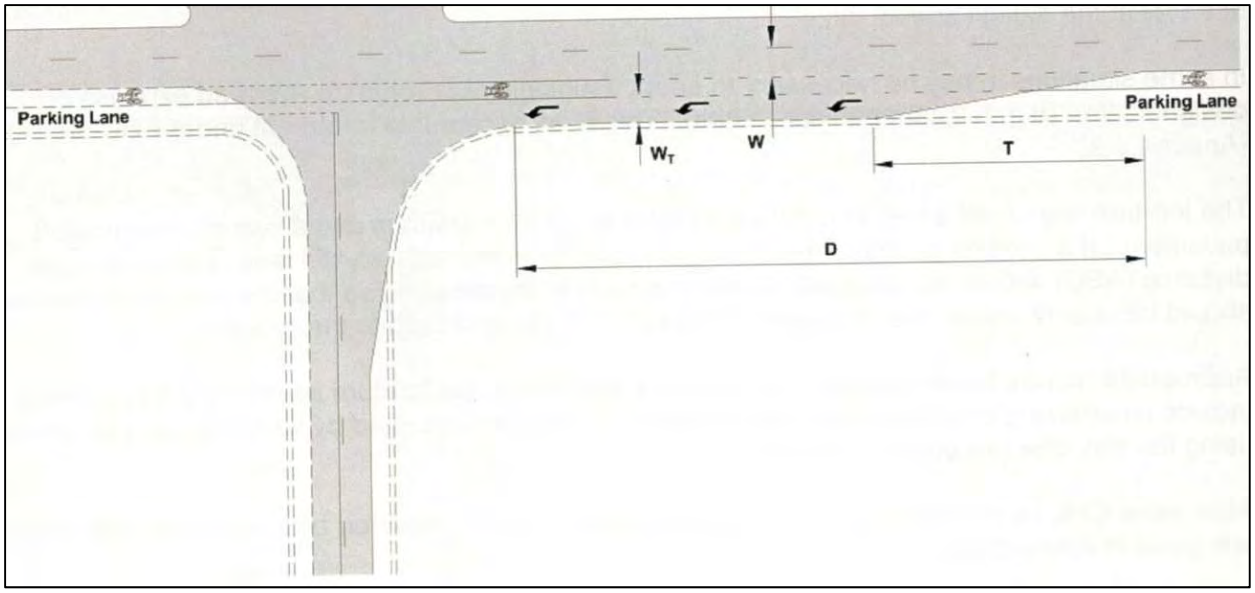


Figure 6.4 Channelised Urban Auxiliary Left-turn treatment (AUL/CHL) – (Cycle Lane optional)

Source: Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2009)

6.4 Recommended Access Strategy

(Traffic Management Principles from Austroads Guide to Traffic Management Part 4: Network Management)

The functional class of a road will determine the balance that needs to be struck between the traffic function and the access function of the abutting land.

The local access requirements of the subject site connecting to Popplewell Road will be satisfied by priority junction control, and road cross sections consistent with the engineering standards of the City of Newcastle for local street design. Nelson Bay Road is an arterial road, and so its important function is primarily to favour traffic movement over access considerations. Direct access is generally discouraged and in this instance can be avoided by using local road connections.

TRAFFIC ENGINEERING RECOMMENDATIONS: FORT WALLACCE SITE

Having regard for the anticipated road authority issues based on the results of analysis conducted to the Austroads and RMS Guidelines, consideration has been given to the range of possible access arrangements for the subject sites.

a) Upgrade site access / Fullerton Road intersection to short turn slot CHR (S) and Auxiliary left lane priority junctions to suit the adopted access strategy.

b) Should a two access strategy be preferred then the combination of junctions could be:
   - North Access - Short **CH**annelised **R**ight Turn Treatment (CHR(S)) coupled with a **CH**annelised **L**eft Turn Treatment (CHL)
   - South Access - Short **CH**annelised **R**ight Turn Treatment (CHR(S)) coupled with an **A**uxiliary **L**eft turn treatment (AUL)

The form and function of a second access point should be reviewed and discussed with the road authorities to determine its role, as either an unrestricted public access point, or possibly as a gated emergency site access for evacuation and emergency service uses.

7 Summary and Conclusions

7.1 Summary

The Defence Housing Australia proposes to cater for Newcastle based Defence members and their families and to replace existing DHA dwellings that do not meet current standards. DHA has recently purchased two surplus Defence sites at Stockton with the objective of obtaining the necessary planning approvals and developing them for a mix of housing for ADF personnel and the private market. This traffic study has investigated the existing conditions and potential development of Defence Housing Australia housing facilities on the Rifle Range site at Fern Bay near Newcastle NSW, arriving at the following outcomes:

Existing Conditions

a. Existing traffic flows on Nelson Bay Rd & Fullerton St are well within capacity limits of road of their function and construction standard.
b. Intersections have been assessed as operating at satisfactory service levels, the Fullerton Street / Nelson Bay Road roundabout is built to a high urban arterial road standard.
c. A cycle path is provided along the Hunter River foreshore from Stockton Bridge to Stockton Ferry terminal.
d. Existing Ferry services link Stockton to the Newcastle CBD with regular scheduled services.
e. Existing bus services also connect Stockton and Fern Bay to Newcastle, and north to Newcastle Airport.

Proposed Development

f. Additional traffic generation associated with the Fort Wallace site is 100 dwellings
g. The Rifle Range site development has been taken into consideration in this assessment.
h. Access is proposed from Fullerton Street via priority controlled intersections

Future Performance

i. Future flow conditions on Nelson Bay Road and Fullerton Street are forecast to remain well within technical capacity limits for the function and standard of construction of the road. There is no discernible difference in existing and forecast "with development flows.
j. The Fullerton Street / Nelson Bay Road roundabout has been assessed under future flow conditions as maintaining operation at satisfactory service levels.

ACCESS RECOMMENDATIONS:

In view of the conditions of the local roads and performance of the intersection of Nelson Bay Road /Fullerton Street the following recommendations are made for improvements to support the development proposal:

a) A single site access is sufficient, incorporating a Short **CH**annelised **R**ight Turn Treatment (CHR(S)) coupled with a **CH**annelised **L**eft Turn Treatment (CHL)

For the alternative access strategy which includes two (2) proposed access junctions planned for the subject site, the combination of intersection controls recommended would be as follows:

b) North Access - (CHR(S)) treatment coupled with a (CHL) Treatment
c) South Access - (CHR(S)) Treatment (CHR(S)) coupled with an **A**uxiliary **L**eft turn treatment (AUL)

The need for short channelised right turn treatment is driven largely by the Fullerton Street flows, even though the level of site traffic turning right into the site is anticipated to be quite small. The difference in the left turn treatments is based on the assumption that most (if not all) left turn traffic entering the subject site would do so at the first opportunity, the north access point.

The conclusion drawn here is that one site access point is sufficient to deal with traffic capacity issues. The form and function of the second access point should be reviewed and discussed with the road authorities to determine its role, as either an unrestricted public access point, or possibly as a gated emergency site access for evacuation and emergency service uses.

7.2 Conclusion

The conclusion drawn here is that the proposed site access arrangements for the Fort Wallace site will provide a very high quality of access for the subject site. One site access point is sufficient to deal with traffic capacity issues. It is recommended that the form and function of a second access point should this be pursued be reviewed and discussed with the road authorities to determine its role, as either an unrestricted public access point, or possibly as a gated emergency site access for evacuation and emergency service uses.

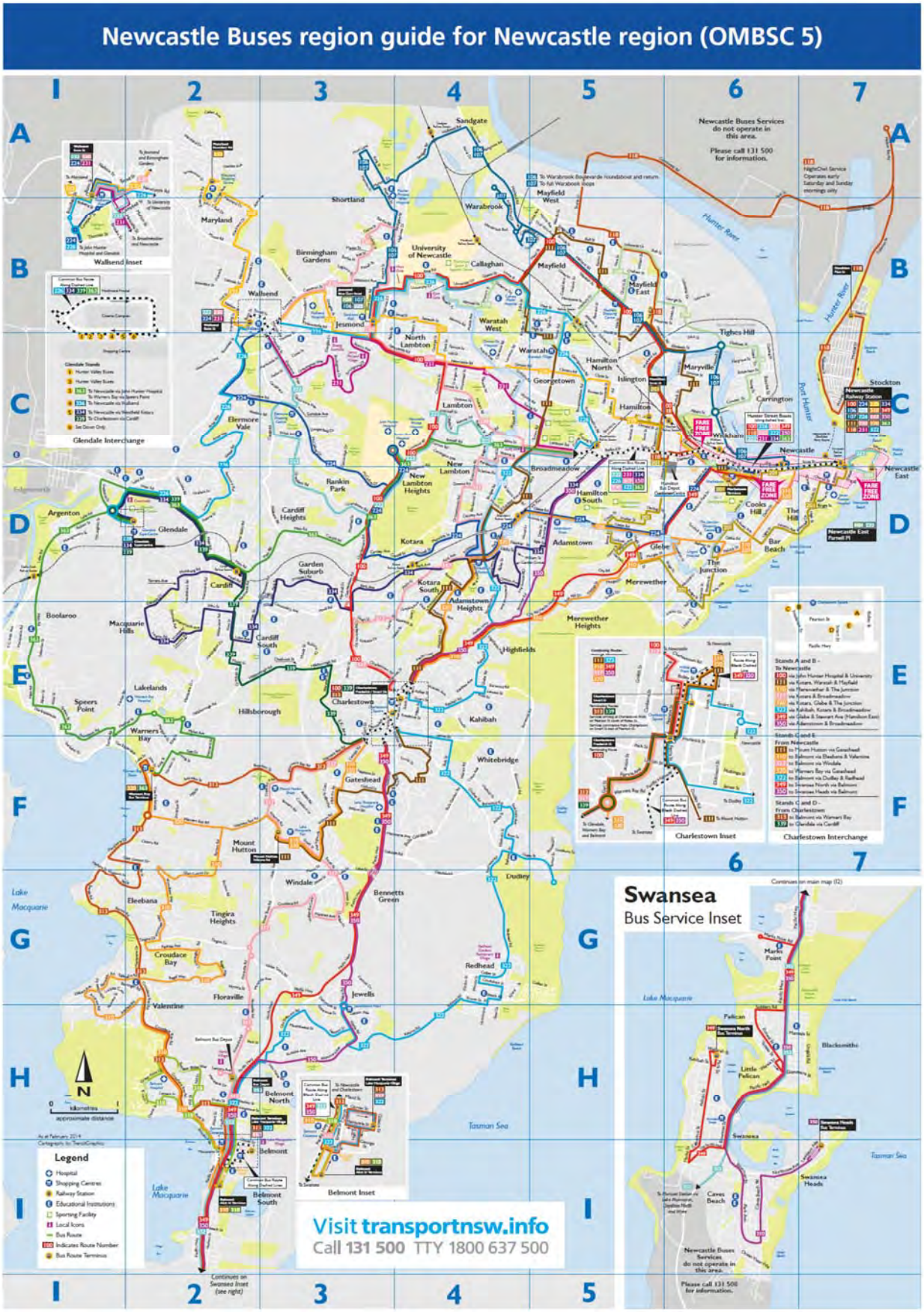
The overall conclusion is that the proposed access arrangements for the Fort Wallace site redevelopment are satisfactory and the planning proposal is therefore recommended on traffic and transport grounds.

Appendix A. Fort Wallace Illustrative Master Plan

Source: Architectus 2017

Appendix B. Newcastle Cycling Map

Appendix C. Public Transport Maps



BETTER TRANSPORT FUTURES

Route 130

Section Point Number
Location:

00 **Fingal Bay Shops** Marine Drive
01 Rocky Point Road
02 Marine Drive
03 Shoal Bay Road
04 Shoal Bay Road
05 **Nelson Bay** Coles, Donald Street
06 Government Road
07 Sandy Point Road
08 **Salamander Shopping Centre**
09 Salamander Way
10 Nelson Bay Road
11 Frost Road
12 Frost Road
13 **Boat Harbour** Kingsley Drive
14 **Anna Bay Shops** Gan Gan Road
15 Nelson Bay Road
16 Nelson Bay Road
17 Nelson Bay Road
18 Nelson Bay Road
19 Nelson Bay Road OR Marsh Road
20 Nelson Bay Road OR Marsh Road
21 Nelson Bay Road OR Marsh Road
22 Nelson Bay Road OR Marsh Road
23 Nelson Bay Road
24 **Salt Ash School**
25 Nelson Bay Road
26 Nelson Bay Road
27 Nelson Bay Road
28 Nelson Bay Road
29 **Newcastle Airport**
30 Nelson Bay Road
31 Nelson Bay Road
32 Nelson Bay Road
33 Nelson Bay Road
34 **Fern Bay** Bay Way Caravan Park
35 Nelson Bay Road
36 Nelson Bay Road
37 Teal Street
38 Cormorant Road
39 Cormorant Road
40 **Mayfield** Woolworths, Maitland Road
41 Maitland Road
42 **Newcastle Station** Coach Terminal

Bus route map

130, 131, 132, 133, 134, 135

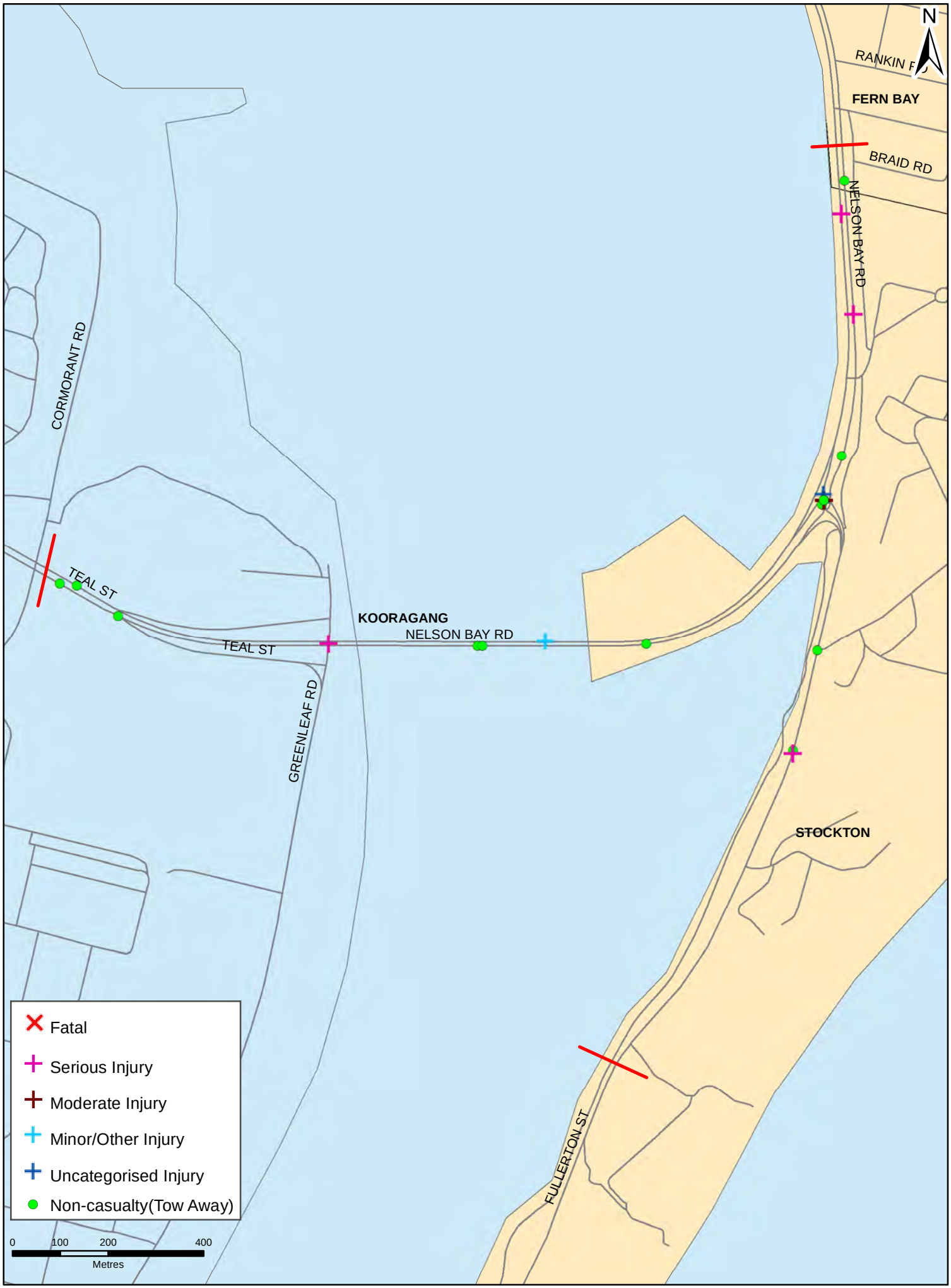
Timing Points

A Fingal Bay Shops Marine Drive
B Shoal Bay Resort Shoal Bay Road
C Little Beach Dixon Drive
D Tomaree Hospital & Seabreeze Shops
E Nelson Bay Coles, Donald Street
F Corlette Vantage Estate
G Galoola Drive & Bagnall Beach Road
H Corlette Post Office
I Salamander Shopping Centre
J Boat Harbour Kingsley Drive
K Birubi Point Fitzroy Street
L Anna Bay Shops Gan Gan Road
M Taylors Beach Roundabout
N Soldiers Point Ridgeway Avenue
O Bobs Farm School Marsh Road
P Salt Ash School
Q Newcastle Airport
R Fern Bay Bay Way Caravan Park
S Mayfield Woolworths, Maitland Road
T Newcastle Station Coach Terminal
U Raymond Terrace Sturgeon Street

Appendix D. Crash History

Stockton Bridge, Nelson Bay Road and Fullerton Street, Fern Bay

Crash period 01/07/2010 to 30/06/2015



Andrew Hampson

May 2016

Detailed Crash Report - sorted

Transport for NSW
Centre for Road Safety

Crash No. / Data Source	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Hunter Region				**Newcastle LGA**			**Stockton**							**Nelson Bay Rd**						
717007 P	03/07/2010	Sat	14:25	at	FULLERTON ST	RDB	CRV	Fine	Dry	80	2	CAR	F81	W in FULLERTON ST	10 Proceeding in lane		N	0	0	
E41773328					Daylight	RUM: 10	Cross traffic					TRK	M28	S in NELSON BAY RD	50 Proceeding in lane					
Hunter Region				**Newcastle LGA**			**Stockton**							**Nelson Bay Rd**						
717500 P	12/07/2010	Mon	12:20	10 m	S FULLERTON ST	RDB	CRV	Fine	Dry	80	2	LOR	M67	S in NELSON BAY RD	40 Proceeding in lane		N	0	0	
E41570045					Daylight	RUM: 30	Rear end					CAR	F65	S in NELSON BAY RD	40 Proceeding in lane					
Hunter Region				**Port Stephens LGA**			**Fern Bay**							**Nelson Bay Rd**						
723113 P	12/08/2010	Thu	07:50	100 m	N FULLERTON COVE RD	DIV	STR	Fine	Dry	100	2	CAR	M21	S in NELSON BAY RD	Unk Proceeding in lane		N	0	0	
E41907766					Daylight	RUM: 30	Rear end					WAG	F47	S in NELSON BAY RD	Unk Proceeding in lane					
Hunter Region				**Newcastle LGA**			**Stockton**							**Fullerton St**						
740774 P	01/02/2011	Tue	08:50	555 m	S NELSON BAY RD	2WY	CRV	Fine	Dry	70	1	WAG	M40	S in FULLERTON ST	55 Proceeding in lane		N	0	0	F
E376143391					Daylight	RUM: 81	Off left/rt bnd=>obj					Utility pole								
Hunter Region				**Newcastle LGA**			**Kooragang**							**Teal St**						
750199 P	10/04/2011	Sun	01:14	600 m	N SANDPIPER CL	DIV	STR	Fine	Dry	80	1	WAG	M53	W in TEAL ST	80 Proceeding in lane		N	0	0	
E44524077					Darkness	RUM: 66	Object on road					Other non fixed object								
Hunter Region				**Newcastle LGA**			**Stockton**							**Nelson Bay Rd**						
757281 P	05/05/2011	Thu	14:55	at	FULLERTON ST	RDB	STR	Fine	Dry	70	2	CAR	M17	N in NELSON BAY RD	20 Turning right		I	0	2	
E44540221					Daylight	RUM: 21	Right through					CAR	F71	S in NELSON BAY RD	20 Proceeding in lane					
Hunter Region				**Newcastle LGA**			**Stockton**							**Nelson Bay Rd**						
765006 P	04/08/2011	Thu	12:45	600 m	N FULLERTON ST	DIV	STR	Fine	Dry	80	1	CAR	M59	N in NELSON BAY RD	75 Proceeding in lane		I	0	1	
E654664490					Daylight	RUM: 71	Off rd left => obj					Utility pole								
Hunter Region				**Newcastle LGA**			**Stockton**							**Fullerton St**						
770833 P	04/10/2011	Tue	12:00	560 m	S NELSON BAY RD	2WY	CRV	Fine	Dry	70	1	M/C	F43	N in FULLERTON ST	70 Pull out opposite		I	0	1	S
E46401051					Daylight	RUM: 51	Out of control otake													
Hunter Region				**Newcastle LGA**			**Kooragang Isla**							**Greenleaf Rd**						
781088 P	20/10/2011	Thu	21:45	at	STOCKTON BDGE	2WY	STR	Fine	Dry	60	4	CAR	M22	N in GREENLEAF RD	Unk Proceeding in lane		I	0	2	
E46808741					Darkness	RUM: 71	Off rd left => obj					CAR		N in GREENLEAF RD	0 Parked					
												PED	F18	GREENLEAF RD	Lie/sit on carriageway					
												PED	M19	GREENLEAF RD	Lie/sit on carriageway					

Detailed Crash Report - sorted

Transport for NSW
Centre for Road Safety

Crash No. / Data Source	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Hunter Region				**Newcastle LGA**			**Stockton**							**Nelson Bay Rd**						
789179 P	02/03/2012	Fri	04:50	700 m W	FULLERTON ST	DIV	STR	Raining	Wet	60	1	CAR	F57	E in NELSON BAY RD	60 Proceeding in lane		I	0	1	
E91173101					Darkness	RUM: 73	Off rd rght => obj					Fence (prior to 2014)								
Hunter Region				**Newcastle LGA**			**Stockton**							**Nelson Bay Rd**						
787317 P	14/03/2012	Wed	05:30	400 m N	FULLERTON ST	DIV	STR	Fine	Dry	70	1	WAG	M57	S in NELSON BAY RD	60 Proceeding in lane		I	0	1	
E47407445					Darkness	RUM: 71	Off rd left => obj					Utility pole								
Hunter Region				**Newcastle LGA**			**Stockton**							**Nelson Bay Rd**						
811301 P	11/09/2012	Tue	05:33	at	STOCKTON BDGE	DIV	CRV	Fine	Dry	80	4	4WD	M24	W in NELSON BAY RD	50 Proceeding in lane		N	0	0	
E50837287					Dawn	RUM: 30	Rear end					VAN	M38	W in NELSON BAY RD	50 Proceeding in lane					
												4WD	M34	W in NELSON BAY RD	50 Proceeding in lane					
												CAR	F61	W in NELSON BAY RD	50 Proceeding in lane					
Hunter Region				**Newcastle LGA**			**Stockton**							**Nelson Bay Rd**						
836620 P	15/05/2013	Wed	10:00	at	FULLERTON ST	RDB	CRV	Fine	Dry	70	2	CAR	M62	W in FULLERTON ST	30 Proceeding in lane		N	0	0	
E51252036					Daylight	RUM: 10	Cross traffic					CAR	F19	S in NELSON BAY RD	50 Proceeding in lane					
Hunter Region				**Newcastle LGA**			**Kooragang**							**Teal St**						
857191 P	29/10/2013	Tue	16:45	100 m E	CORMORANT ROAD OP	DIV	STR	Overcast	Wet	80	1	CAR	F38	E in TEAL ST	90 Proceeding in lane		N	0	0	S
E53018456					Daylight	RUM: 71	Off rd left => obj					Fence (prior to 2014)								
Hunter Region				**Newcastle LGA**			**Stockton**							**Nelson Bay Rd**						
1009025 P	24/01/2014	Fri	20:10	at	FULLERTON ST	TJN	CRV	Overcast	Wet	70	1	CAR	M64	N in NELSON BAY RD	80 Proceeding in lane		I	0	1	S
E460723191					Darkness	RUM: 87	Off lft/lft bnd=>obj					Utility pole								
Hunter Region				**Newcastle LGA**			**Kooragang**							**Nelson Bay Rd**						
1010672 P	04/02/2014	Tue	07:40	at	STOCKTON BDGE	DIV	STR	Fine	Dry	80	1	CAR	M U	W in NELSON BAY RD	65 Proceeding in lane		N	0	0	
E53628132					Daylight	RUM: 71	Off rd left => obj					Bridge								
Hunter Region				**Newcastle LGA**			**Kooragang**							**Nelson Bay Rd**						
1014048 P	09/03/2014	Sun	18:50	500 m S	FULLERTON ST	DIV	STR	Fine	Dry	80	2	CAR	M31	W in NELSON BAY RD	40 Proceeding in lane		N	0	0	
E188434897					Daylight	RUM: 30	Rear end					CAR	M57	W in NELSON BAY RD	0 Stationary					
Hunter Region				**Newcastle LGA**			**Stockton**							**Fullerton St**						
1022452 P	17/04/2014	Thu	14:45	at	STOCKTON CENTRE ENT	2WY	STR	Fine	Dry	70	2	CAR	M52	W in FULLERTON ST	10 Forward from drive		N	0	0	
E54257614					Daylight	RUM: 47	Emerging from drive					4WD	M68	S in FULLERTON ST	55 Proceeding in lane					

Detailed Crash Report - sorted

Crash No. / Data Source	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Hunter Region				**Newcastle LGA**					**Kooragang**					**Teal St**						
1038161 P	28/08/2014	Thu	21:00	at	GREENLEAF ROAD TO	DIV	STR	Overcast	Wet	80	3	CAR	M19	W in TEAL ST	40	Proceeding in lane	N	0	0	
E55550975					Darkness	RUM:	30	Rear end				CAR	F29	W in TEAL ST	0	Stationary				
												CAR	F17	W in TEAL ST	0	Stationary				
Hunter Region				**Port Stephens LGA**					**Fern Bay**					**Nelson Bay Rd**						
1041839 P	07/09/2014	Sun	04:30	150 m	S TAYLOR RD	DIV	STR	Raining	Wet	70	2	UTE	U U	S in NELSON BAY RD	70	Proceeding in lane	N	0	0	F
E56227779					Darkness	RUM:	71	Off rd left => obj				CAR		S in NELSON BAY RD	0	Parked footpath				

Report Totals: Total Crashes: 20 Fatal Crashes: 0 Injury Crashes: 7 Killed: 0 Injured: 9

Crashid dataset Stockton Bridge, Nelson Bay Road and Fullerton Street, Fern Bay - crash data from 01/07/2010 to 30/06/2015

Note: *Ordered by: Crash Date,Crash Time,Crash No.*

Crash self reporting, including self reported injuries began in Oct 2014. Trends from 2014 are expected to vary from previous years. More unknowns are expected in self reported data. For further information refer to Data Manual or report provider.

Summary Crash Report

# Crash Type		
Car Crash	19	95.0%
Light Truck Crash	1	5.0%
Rigid Truck Crash	1	5.0%
Articulated Truck Crash	0	0.0%
'Heavy Truck Crash	*(1)*	*(5.0%)*
Bus Crash	0	0.0%
"Heavy Vehicle Crash	*(1)*	*(5.0%)*
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	1	5.0%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	1	5.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	5	25.0%
Non intersection	15	75.0%

* Up to 10 metres from an intersection

Collision Type		
Single Vehicle	9	45.0%
Multi Vehicle	11	55.0%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	16	80.0%
Unclassified Road	4	20.0%

Contributing Factors		
Speeding	3	15.0%
Fatigue	2	10.0%

Weather		
Fine	15	75.0%
Rain	2	10.0%
Overcast	3	15.0%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	5	25.0%
Dry	15	75.0%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	1	5.0%
Daylight	12	60.0%
Dusk	0	0.0%
Darkness	7	35.0%

Crash Movement		
Intersection, adjacent approaches	2	10.0%
Head-on (not overtaking)	0	0.0%
Opposing vehicles; turning	1	5.0%
U-turn	0	0.0%
Rear-end	5	25.0%
Lane change	0	0.0%
Parallel lanes; turning	0	0.0%
Vehicle leaving driveway	1	5.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	0	0.0%
Off road on straight, hit object	7	35.0%
Out of control on straight	0	0.0%
Off road, on curve	0	0.0%
Off road on curve, hit object	2	10.0%
Out of control on curve	0	0.0%
Other crash type	2	10.0%

Speed Limit					
40 km/h or less	0	0.0%	80 km/h zone	9	45.0%
50 km/h zone	0	0.0%	90 km/h zone	0	0.0%
60 km/h zone	2	10.0%	100 km/h zone	1	5.0%
70 km/h zone	8	40.0%	110 km/h zone	0	0.0%

~ 07:30-09:30 or 14:30-17:00 on school days	~ 40km/h or less			~ School Travel Time Involvement		
	0	0.0%		5	25.0%	

Day of the Week												
Monday	1	5.0%	Wednesday	2	10.0%	Friday	2	10.0%	Sunday	3	15.0%	WEEKEND	4	20.0%
Tuesday	5	25.0%	Thursday	6	30.0%	Saturday	1	5.0%	WEEKDAY	16	80.0%			

CRASHES	20	
Fatal	0	0.0%
Serious inj.	4	20.0%
Moderate inj.	1	5.0%
Minor/Other inj.	1	5.0%
Uncategorised inj.	1	5.0%
Non-casualty	13	65.0%

CASUALTIES	9	
Killed	0	0.0%
Seriously inj.	4	44.4%
Moderately inj.	3	33.3%
Minor/Other inj.	1	11.1%
Uncategorised inj.	1	11.1%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Self Reported Crash	0	0%

Time Group		% of Day	
00:01 - 02:59	1	5.0%	12.5%
03:00 - 04:59	2	10.0%	8.3%
05:00 - 05:59	2	10.0%	4.2%
06:00 - 06:59	0	0.0%	4.2%
07:00 - 07:59	2	10.0%	4.2%
08:00 - 08:59	1	5.0%	4.2%
09:00 - 09:59	0	0.0%	4.2%
10:00 - 10:59	1	5.0%	4.2%
11:00 - 11:59	0	0.0%	4.2%
12:00 - 12:59	3	15.0%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	3	15.0%	4.2%
15:00 - 15:59	0	0.0%	4.2%
16:00 - 16:59	1	5.0%	4.2%
17:00 - 17:59	0	0.0%	4.2%
18:00 - 18:59	1	5.0%	4.2%
19:00 - 19:59	0	0.0%	4.2%
20:00 - 21:59	3	15.0%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Street Lighting Off/Nil		% of Dark
0	of 7	in Dark 0.0%

Crashes		Casualties
6	2014	1
2	2013	0
3	2012	2
6	2011	6
3	2010	0

McLean Periods		% Week	
A	6	30.0%	17.9%
B	1	5.0%	7.1%
C	6	30.0%	17.9%
D	1	5.0%	3.5%
E	0	0.0%	3.6%
F	1	5.0%	10.7%
G	1	5.0%	7.1%
H	1	5.0%	7.1%
I	0	0.0%	12.5%
J	3	15.0%	10.7%

#Holiday Periods																		
New Year	0	0.0%	Easter	1	5.0%	Queen's BD	0	0.0%	Christmas	0	0.0%	Easter SH	2	10.0%	Sept./Oct. SH	1	5.0%	
Aust. Day	1	5.0%	Anzac Day	0	0.0%	Labour Day	0	0.0%	January SH	1	5.0%	June/July SH	2	10.0%	December SH	0	0.0%	

Crashid dataset Stockton Bridge, Nelson Bay Road and Fullerton Street, Fern Bay - crash data from 01/07/2010 to 30/06/2015 plus provisional data to date

Note: Crash self reporting, including self reported injuries began Oct 2014. Trends from 2014 are expected to vary from previous yrs. More unknowns are expected in self reported data. Reporting yrs 1996-2004 and 2014 onwards contain uncategorised inj crashes.

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Appendix E. Traffic Movement Survey Results

TURNING MOVEMENT SURVEY

Nelson Bay Rd and Fullerton St, Nelson Bay
Wednesday, June 8, 2016

Weather:	Overcast
Suburban:	Nelson Bay
Customer:	Better Transport

Survey Start	
AM:	7:00
PM:	14:00

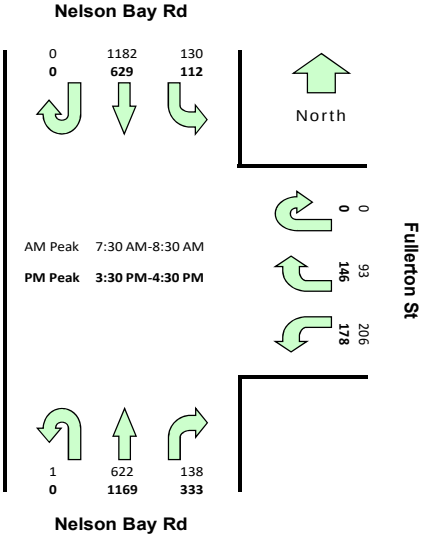
Peakhour	
AM:	7:30 AM-8:30 AM
PM:	3:30 PM-4:30 PM

All Vehicles

Time		North Approach Nelson Bay Rd			East Approach Fullerton St			South Approach Nelson Bay Rd			Hourly Total	
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	Hour	Peak
7:00	7:15	0	171	14	0	20	64	0	25	245	2286	
7:15	7:30	0	226	23	0	12	53	1	20	188	2350	
7:30	7:45	0	270	29	0	24	65	0	34	189	2372	Peak
7:45	8:00	0	298	22	0	22	55	1	32	183	2272	
8:00	8:15	0	333	41	0	26	40	0	36	127	2116	
8:15	8:30	0	281	38	0	21	46	0	36	123	1942	
8:30	8:45	0	216	57	0	22	44	0	42	130	1846	
8:45	9:00	0	168	47	0	37	59	0	47	99	1799	
9:00	9:15	0	185	24	0	30	48	0	29	113	1780	
9:15	9:30	0	197	35	0	30	54	0	31	102		
9:30	9:45	0	180	36	0	17	55	0	57	119		
9:45	10:00	0	168	39	0	23	48	0	45	115		
14:00	14:15	0	210	30	0	40	60	0	46	169	2326	
14:15	14:30	0	207	25	0	44	56	0	73	188	2404	
14:30	14:45	0	182	45	0	44	56	0	75	178	2389	
14:45	15:00	2	159	39	0	35	49	0	86	228	2495	
15:00	15:15	0	173	15	0	58	64	0	72	251	2526	
15:15	15:30	0	166	28	0	43	47	0	75	219	2512	
15:30	15:45	0	164	41	0	46	50	0	76	309	2567	Peak
15:45	16:00	0	145	29	0	31	38	0	98	288	2461	
16:00	16:15	0	153	21	0	34	53	0	77	281	2411	
16:15	16:30	0	167	21	0	35	37	0	82	291		
16:30	16:45	0	116	30	0	39	45	0	73	277		
16:45	17:00	0	149	29	0	26	45	0	87	243		

Peak Time		North Approach Nelson Bay Rd			East Approach Fullerton St			South Approach Nelson Bay Rd			Peak
Period Start	Period End	U	T	L	U	R	L	U	R	T	total
7:30	8:30	0	1182	130	0	93	206	1	138	622	2372
15:30	16:30	0	629	112	0	146	178	0	333	1169	2567

Graphic



Light Vehicles

Time		North Approach Nelson Bay Rd			East Approach Fullerton St			South Approach Nelson Bay Rd		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
7:00	7:15	0	166	13	0	20	62	0	25	234
7:15	7:30	0	215	22	0	10	49	0	18	177
7:30	7:45	0	259	29	0	22	65	0	32	176
7:45	8:00	0	292	21	0	21	54	1	32	169
8:00	8:15	0	315	39	0	24	40	0	32	116
8:15	8:30	0	276	38	0	20	44	0	34	114
8:30	8:45	0	199	57	0	21	42	0	42	116
8:45	9:00	0	156	44	0	34	56	0	46	87
9:00	9:15	0	175	24	0	30	48	0	28	103
9:15	9:30	0	189	33	0	28	53	0	29	88
9:30	9:45	0	174	35	0	16	53	0	54	115
9:45	10:00	0	161	38	0	23	45	0	44	104
14:00	14:15	0	201	28	0	39	58	0	44	156
14:15	14:30	0	203	25	0	44	52	0	71	182
14:30	14:45	0	174	43	0	43	55	0	75	165
14:45	15:00	2	149	38	0	35	46	0	83	218
15:00	15:15	0	166	15	0	58	64	0	72	248
15:15	15:30	0	150	27	0	43	45	0	75	213
15:30	15:45	0	161	41	0	46	50	0	76	299
15:45	16:00	0	132	29	0	31	38	0	97	282
16:00	16:15	0	151	21	0	34	52	0	76	275
16:15	16:30	0	160	20	0	35	37	0	80	281
16:30	16:45	0	110	30	0	39	44	0	73	265
16:45	17:00	0	145	28	0	26	45	0	87	239

Heavy Vehicles

Time		North Approach Nelson Bay Rd			East Approach Fullerton St			South Approach Nelson Bay Rd		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
7:00	7:15	0	5	1	0	0	2	0	0	11
7:15	7:30	0	11	1	0	2	4	1	2	11
7:30	7:45	0	11	0	0	2	0	0	2	13
7:45	8:00	0	6	1	0	1	1	0	0	14
8:00	8:15	0	18	2	0	2	0	0	4	11
8:15	8:30	0	5	0	0	1	2	0	2	9
8:30	8:45	0	17	0	0	1	2	0	0	14
8:45	9:00	0	12	3	0	3	3	0	1	12
9:00	9:15	0	10	0	0	0	0	0	1	10
9:15	9:30	0	8	2	0	2	1	0	2	14
9:30	9:45	0	6	1	0	1	2	0	3	4
9:45	10:00	0	7	1	0	0	3	0	1	11
14:00	14:15	0	9	2	0	1	2	0	2	13
14:15	14:30	0	4	0	0	0	4	0	2	6
14:30	14:45	0	8	2	0	1	1	0	0	13
14:45	15:00	0	10	1	0	0	3	0	3	10
15:00	15:15	0	7	0	0	0	0	0	0	3
15:15	15:30	0	16	1	0	0	2	0	0	6
15:30	15:45	0	3	0	0	0	0	0	0	10
15:45	16:00	0	13	0	0	0	0	0	1	6
16:00	16:15	0	2	0	0	0	1	0	1	6

16:15	16:30	0	7	1	0	0	0	0	2	10
16:30	16:45	0	6	0	0	0	1	0	0	12
16:45	17:00	0	4	1	0	0	0	0	0	4

Bus

Time		North Approach Nelson Bay Rd			East Approach Fullerton St			South Approach Nelson Bay Rd		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
7:00	7:15	0	1	1	0	1	0	0	0	1
7:15	7:30	0	2	0	0	0	0	0	0	0
7:30	7:45	0	2	2	0	1	0	0	0	1
7:45	8:00	0	7	2	0	0	0	0	0	1
8:00	8:15	0	7	0	0	1	1	0	0	0
8:15	8:30	0	2	2	0	0	0	0	0	0
8:30	8:45	0	0	0	0	2	0	0	1	1
8:45	9:00	0	0	1	0	1	0	0	0	1
9:00	9:15	0	2	0	0	2	0	0	0	2
9:15	9:30	0	1	1	0	1	0	0	0	0
9:30	9:45	0	1	1	0	1	0	0	0	0
9:45	10:00	0	1	0	0	0	0	0	0	1
14:00	14:15	0	0	1	0	1	0	0	0	0
14:15	14:30	0	1	1	0	0	1	0	0	0
14:30	14:45	0	1	0	0	0	0	0	0	1
14:45	15:00	0	2	1	0	0	0	0	1	3
15:00	15:15	0	1	0	0	1	0	0	1	4
15:15	15:30	0	1	1	0	1	0	0	0	8
15:30	15:45	0	2	1	0	1	0	0	1	8
15:45	16:00	0	0	1	0	1	0	0	1	5
16:00	16:15	0	1	2	0	1	0	0	1	1
16:15	16:30	0	1	0	0	1	0	0	1	2
16:30	16:45	0	2	0	0	0	0	0	0	0
16:45	17:00	0	1	1	0	0	0	0	0	2

Cyclists

Time		North Approach Nelson Bay Rd			East Approach Fullerton St			South Approach Nelson Bay Rd		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
7:00	7:15	0	0	0	1	0	2	0	0	0
7:15	7:30	0	0	0	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0	0	0
8:00	8:15	0	0	0	0	0	0	0	0	0
8:15	8:30	0	0	1	0	0	0	0	0	0
8:30	8:45	0	0	0	1	0	0	0	0	0
8:45	9:00	0	0	0	0	0	0	0	0	0
9:00	9:15	0	0	0	0	0	0	0	0	0
9:15	9:30	0	0	0	0	0	1	0	0	0
9:30	9:45	0	0	0	0	0	0	0	0	0
9:45	10:00	0	0	0	0	0	0	0	0	0
14:00	14:15	0	0	0	0	0	0	0	0	0
14:15	14:30	0	0	0	0	0	0	0	0	0
14:30	14:45	0	0	0	0	0	0	0	0	0
14:45	15:00	0	0	0	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	1	0	0	0
15:15	15:30	0	0	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0	0	0

15:45	16:00	0	0	0	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	1	0	0	0
16:30	16:45	0	0	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0	0	0

Pedestrians Crossing

Time		Approach Nelson B		t Approach Fullerton		Approach Nelson B	
Period Start	Period End	Westbound	Eastbound	orthboun	outhboun	Westbound	Eastbound
7:00	7:15	0	0	0	0	0	0
7:15	7:30	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0
8:00	8:15	0	0	0	0	0	0
8:15	8:30	0	0	0	0	0	0
8:30	8:45	0	0	0	0	0	0
8:45	9:00	0	0	0	0	0	0
9:00	9:15	0	0	0	0	0	0
9:15	9:30	0	0	0	0	0	0
9:30	9:45	0	0	0	0	0	0
9:45	10:00	0	0	0	0	0	0
14:00	14:15	0	0	0	0	0	0
14:15	14:30	0	0	0	0	0	0
14:30	14:45	0	0	0	0	0	0
14:45	15:00	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0
15:45	16:00	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0

Appendix F. Traffic Modelling Summary

LANE LEVEL OF SERVICE

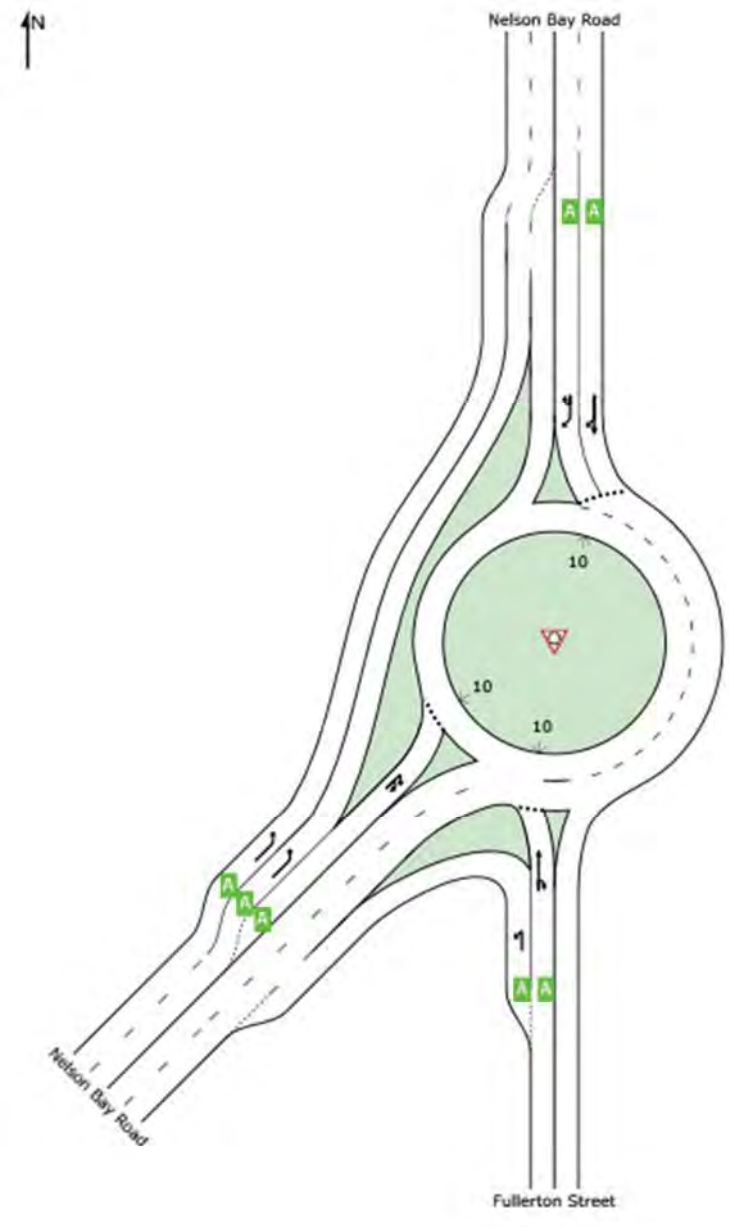
Lane Level of Service

Site: 101 [Nelson Bay Rd & Fullerton St - AM+RR+FW+BG1.5]

DHA Stockton
Roundabout

All Movement Classes

	South	North	Southwest	Intersection
LOS	A	A	A	A



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

LANE LEVEL OF SERVICE

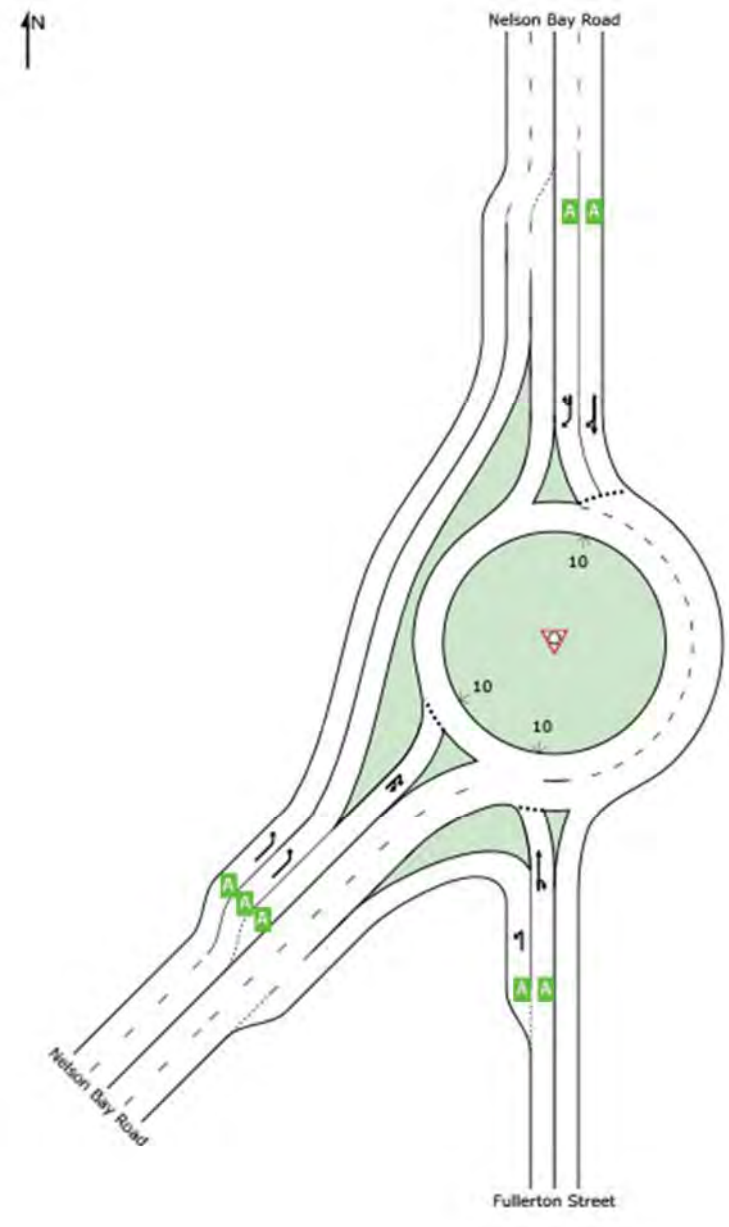
Lane Level of Service

Site: 101 [Nelson Bay Rd & Fullerton St - PM+RR+FW+BG1.5]

DHA Stockton
Roundabout

All Movement Classes

	South	North	Southwest	Intersection
LOS	A	A	A	A



Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.