



Transport
Roads & Maritime
Services

Review of Operational Noise Mitigation Measures

Windsor Bridge Replacement Project

JULY 2019



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Appendices

Appendix A Heritage Advice on Architectural Noise Treatment & Mitigation Measures

Document control

Report name	Windsor Bridge Review of Operational Noise Mitigation Measures
Revision number	Rev C

Revision history

Revision	Date	Comment	Reviewed by
A	1 March 2019	Memo submitted to DP&E for approval	Graham Standen
B	18 April 2019	Report addressing DP&E comments received 12 March 2019	Graham Standen
C	3 July 2019	Report addressing DP&E comments received 24 May 2019	Graham Standen

Glossary / Abbreviations

dB	Decibel. A scale used in sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure
dB(A)	A value used for 'A-weighted' sound pressure levels. 'A' frequency weighted is an adjustment made to sound-level measurement to approximate the response of the human ear
DP&E	Department of Planning and Environment
EIS	Environmental Impact Statement
ENMM	Environmental Noise Management Manual
EPA	NSW Environment Protection Authority
Project, the	Windsor Bridge Replacement Project
RNP	Road Noise Policy
Roads and Maritime	Roads and Maritime Services
Secretary	Secretary of the NSW Department of Planning and Environment (or delegate)
SPIR	Submissions / Preferred Infrastructure Report

1 Introduction

In accordance with Condition C20 of the Infrastructure Approval SSI-4951 a review of the operational noise mitigation measures has been undertaken for the Windsor Bridge Replacement Project (the Project).

Documentation relevant to this review includes:

- Windsor Bridge Replacement Project – Environmental Impact Statement (EIS) (SKM, November 2012), specifically Working Paper 6 – Noise and vibration;
- Windsor Bridge Replacement Project – Submissions Report incorporating Preferred Infrastructure Report (SPIR) (SKM, April 2013), specifically Appendix E –Operational noise and architectural treatment addendums; and
- Infrastructure Approval SSI-4951 (approved by the Minister for Planning and Infrastructure on 20 December 2013).

1.1 Condition of Approval

A review of compliance with Condition C20 is provided in Table 1-1. The table provides a comment on compliance and identifies where each component of the condition has been addressed within this report.

Table 1-1 Table of compliance

Condition C20 Requirement	Section in report where addressed
Unless otherwise agreed by the Director-General, within 6 months of commencing construction, the Applicant shall, in consultation with the EPA, prepare and submit for the approval of the Director-General, a review of the operational noise mitigation measures proposed to be implemented for the project. The review shall:	Section 1.2
(a) confirm the operational noise predictions of the project based on detailed design. This operational noise assessment shall be based on an appropriately calibrated noise model (which has incorporated additional noise monitoring, where necessary for calibration purposes);	An appropriately calibrated noise model (incorporating background noise monitoring) was developed during preparation of the EIS (refer Section 4.1) and updated during preparation of the Submissions report (refer Section 5.1). There have been no substantive changes in the detailed design relative to the Submissions report design (refer Section 6.2) that would significantly alter the operational noise predictions presented in the Submissions report (refer Table 5-1).
(b) review the suitability of the operational noise mitigation measures identified in the documents listed under condition A1 to achieve the criteria outlined in condition C14 based on the operational noise performance of the project predicted under (a) above; and	Roads and Maritime Services (Roads and Maritime) believes the reference to “A2” should be “A1”. Roads and Maritime also believes the reference to Condition C14 is an error. Condition C14 relates to construction noise and not to operational noise. Condition C14 is addressed in the approved Construction Noise and

Condition C20 Requirement	Section in report where addressed
	Vibration Management Sub-plan.
(c) where necessary, investigate additional feasible and reasonable noise mitigation measures to achieve the criteria outlined in the Road Noise Policy (DECCW, 2011).	<p>The assessments of road traffic noise impacts in the EIS/Submissions report were undertaken using the guidance detailed in the Road Noise Policy (RNP) and the Environmental Noise Management Manual (ENMM). Refer Section 4.1.</p> <p>Noise mitigation measures, in addition to those required by the EIS/Submissions Report, are not considered necessary to meet the Road Noise Policy (RNP). Refer Sections 4.3, 5.3 and 6.2.</p>

1.2 EPA Consultation

Consultation by Roads and Maritime Services (Roads and Maritime) with the EPA was undertaken on 4 May 2018 regarding the review of operational noise.

The EPA advised (in part): *‘The EPA also does not review operational noise assessments for road projects. Our expectation is that these assessments should take into consideration the NSW Road Noise Policy’.*

2 Project description

2.1 Overview

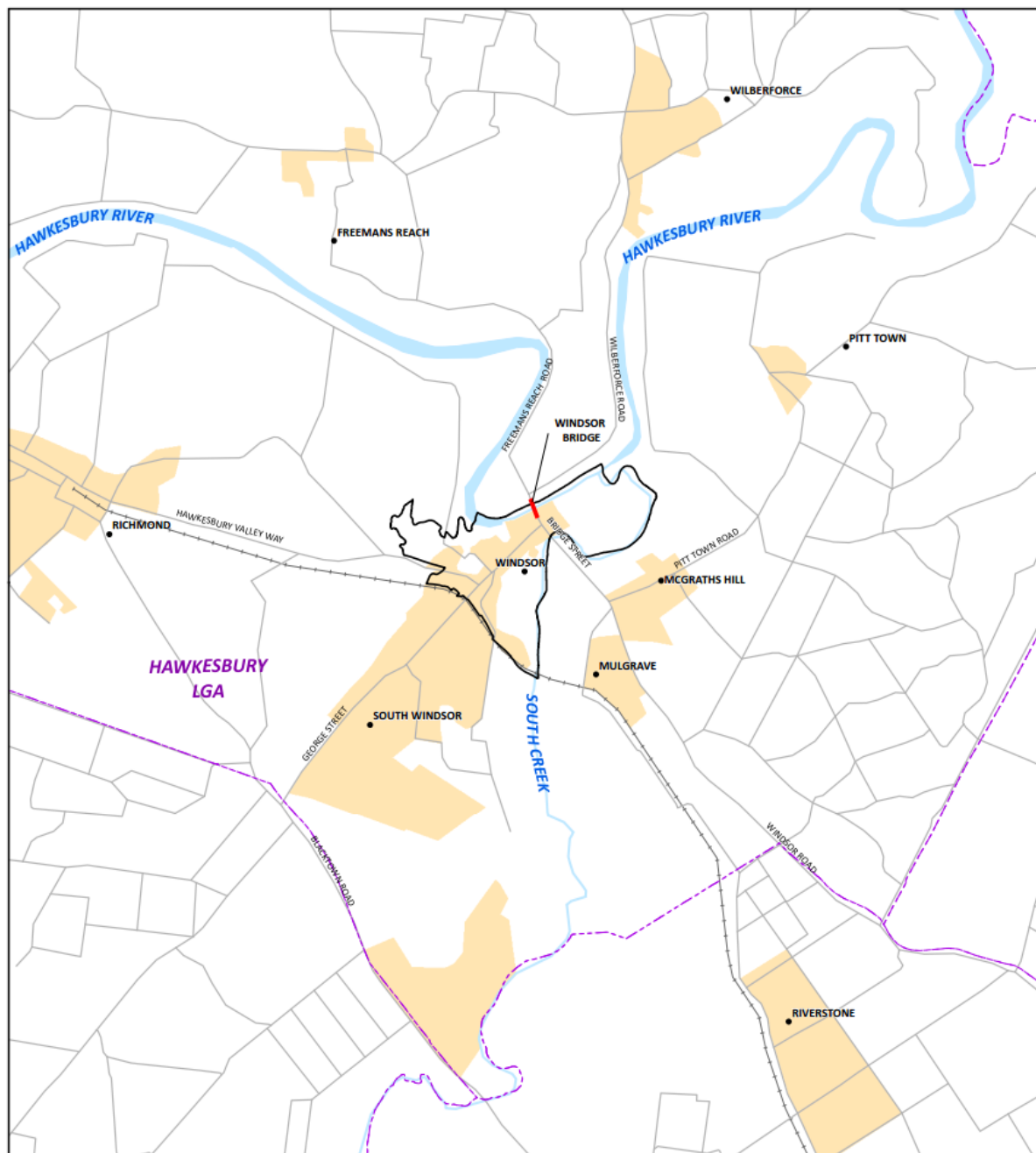
This Windsor Bridge Replacement Project (refer **Figure 2-1**) will involve:

- Construction of a new bridge over the Hawkesbury River at Windsor, around 35 metres downstream of the existing Windsor Bridge;
- Construction of new approach roads and intersections to connect the new bridge to existing road network;
- Modifications to local roads and access arrangements, including changes to the Macquarie Park access and connection of The Terrace;
- Construction of pedestrian and cycling facilities, including a shared pedestrian/cycle pathway for access to and across the new bridge;
- Removal and backfilling of the existing bridge approach roads;
- Demolition and removal of the existing road bridge, known as Windsor Bridge;
- Urban design and landscaping works, including within the parkland area of Thompson Square and adjacent to the northern intersection of Wilberforce Road, Freemans Reach Road and the Macquarie Park access road; and
- Ancillary works such as public utility adjustments, water management measures and scour protection works, as required.

2.2 Construction activities and sequence

Typically, the following sequences of activities are anticipated:

- **Pre-construction** - Salvage and interpret any impacted heritage sites, including historical archaeologically significant sites including sites within the Thompson Square Conservation Area and archaeological sites;
- **Site establishment** – installing boundary fencing, construction facilities, environmental controls and carrying out pre-clearing vegetation fauna surveys;
- **Relocation or protection of services** – relocating and protecting electricity, gas, water and telecommunications infrastructure affected by the Project;
- **Site preparation** – clearing and grubbing, topsoil stripping and storage;
- **Earthworks** – undertaking cut and fill works along the alignment to achieve desired levels, removal of unsuitable material, batter and embankment shaping;
- **Structures** – building the new bridge and drainage;
- **Pavements** – forming sub and base layers and construction final pavement finishes;
- **Road furniture** – installing signage, line marking and safety barriers;
- **Demolition** – demolition of the existing bridge;
- **Landscaping and restoration** – construction of shared use pathways, installation of park furniture and interpretative signage, reuse of topsoil, planting of native plants and seeding disturbed areas with native and cover crops species (note this will take place throughout construction as elements of the project are complete where ongoing disturbance is not anticipated); and
- **Open to traffic** – commissioning of the new bridge, bridge approaches, new intersections and related infrastructure.



LEGEND

- Windsor State Suburb Boundary
- Urban area
- LGA boundary
- River
- Major road
- Railway

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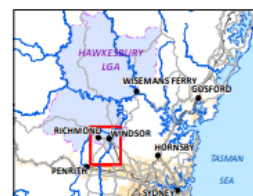


Figure 2-1 Location of the Windsor Bridge Replacement Project

3 Operational Noise Criteria

3.1 Base Criteria

The Road Noise Policy (RNP) (DECCW, 2011) classifies work to an existing road as a “redevelopment,” a definition that may be applied to a freeway, arterial or local road category. Depending on the road type, noise level assessment criteria are nominated for both the day and night periods.

The influence of traffic noise on existing receivers due to the proposed road and bridge works is defined in the Roads and Maritime Environmental Noise Management Manual (ENMM) (RTA, 2001) in practice as:

“A site is defined as having an “existing road traffic noise exposure” if the prevailing noise level from the existing road alignment(s) under consideration is equal to or greater than 55 dB(A) LAeq (15hr) (day) or 50 dB(A) LAeq (9hr) (night).”

The noise goals for both day and night aim to achieve these levels for at least a period of ten years after project completion. The criteria for the road redevelopment for the project have been summarised from the RNP and are presented in Table 3-1.

Table 3-1 Road Traffic Noise Base Criteria

Road Category	Type of Project/Land Use	Noise Criteria	
		Day 7am – 10pm	Night 10pm – 7am
Freeway/arterial /sub-arterial roads	Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads	LAeq (15hour) 60 dB (A)	LAeq (9hour) 55 dB (A)

3.2 Additional Criteria

In addition to the base criteria, the ENMM identifies a category of highly affected noise sensitive receivers that have been termed “acute”. These receivers experience noise levels that would be greater than or equal to LAeq (15hour) 65dB(A) and LAeq (9hour) 60 dB(A). In these instances an assessment of noise mitigation in accordance with ENMM practice note (iv) is considered.

4 Operational Noise (EIS)

4.1 Methodology

An assessment of the road traffic noise impacts of the Project was undertaken during preparation of the EIS as outlined in Working Paper 6 – Noise and Vibration.

The assessment was undertaken using the guidance detailed in the RNP and the ENMM. These guidelines detail the criteria and methods used to assess impacts on noise sensitive receivers for road projects undertaken in NSW. The noise assessment was comprised of discrete tasks that formed the basis of determining the mitigation requirements. The tasks can be generalised as follows (refer Section 2.1 of the EIS Working Paper 6 – Noise and Vibration for further information):

- **Receiver identification** – residential and non residential sensitive receivers immediately adjacent to the project and those that are located further from the project but which may still be affected by traffic noise were identified.
- **Baseline noise monitoring** - Targeted noise and vibration monitoring at residential locations was undertaken to establish the influence of road traffic from the existing alignment. For the operational assessment the data provided baseline noise levels and was used to establish the predictive noise model, which was calibrated against these measurements. Once calibrated using the measurement locations, the noise model is used to determine the operational noise levels for all identified receivers for both the existing and proposed scenarios.
- **Modelling of existing and proposed road alignments** – Two key scenarios were modelled to predict operational noise impacts from the operation of the project and the need for consideration of noise mitigation. These scenarios were: the ‘do nothing’ or ‘no project’ option and the ‘with project’.
- **Calibration of the noise model** - The noise model was calibrated with the measured noise levels from the noise monitoring survey, which were correlated with the simultaneous traffic counts. The differences from the modelled and actual measured levels were corrected in the model by a calibration factor. This factor was then used in the correction of all the project assessment scenarios.
- **Mitigation recommendations** - Where predicted noise at sensitive receivers exceeded the project specific noise management levels, mitigation was recommended to reduce the level of external impacts where possible. Where the external noise environment was unable to be controlled at source, for feasible and reasonable reasons in terms of costs, benefit and practicality, options for treatment of individual properties were also considered.

4.2 Potential Impacts

Results from the noise modelling for the two key scenarios and for each residential receiver are presented in Table 4-1.

Based on the noise impact assessment results and application of the RNP and ENMM, noise mitigation options for receivers R2, R3 and R4 were considered.

Table 4-1 Predicted Noise levels up to 2026

ID	Address	Year opening 'no build' scenario dB(A)		Year opening 'build' scenario dB(A)		Design year 'no build' scenario dB(A)		Design year build scenario dB(A)		RNP criteria dB(A)		Are the RNP Criteria exceeded?		Change in noise level dB(A)				Acute level of noise		Consider mitigation?
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
R1	27 Wilberforce Rd	66	61	62	58	67	61	63	58	60	55	YES	YES	-3.7	-3.8	-3.7	-3.3	NO	NO	NO
R2	4 Bridge Street	65	61	70	66	65	61	71	67	60	55	YES	YES	5.3	5.4	5.4	6.0	YES	YES	YES
R3	10 Bridge Street	71	67	71	68	71	67	72	68	60	55	YES	YES	0.6	0.2	0.5	0.8	YES	YES	YES
R4	53 George Street	61	57	63	59	61	57	63	59	60	55	YES	YES	1.9	2.0	1.9	2.6	NO	NO	YES
R5	12 The Terrace	59	54	54	50	60	54	55	51	60	55	NO	NO	-4.6	-4.4	-4.7	-3.8	NO	NO	NO
R6	14 The Terrace	58	53	53	49	58	53	54	50	60	55	NO	NO	-4.2	-4.1	-4.3	-3.6	NO	NO	NO
R7	16 The Terrace	57	53	53	49	58	53	53	49	60	55	NO	NO	-4.3	-4.1	-4.4	-3.5	NO	NO	NO
R8	18 The Terrace	56	52	53	49	57	52	53	49	60	55	NO	NO	-3.1	-3.0	-3.2	-2.5	NO	NO	NO
R9	20 The Terrace	55	51	51	47	56	51	52	47	60	55	NO	NO	-3.9	-3.9	-4.0	-3.5	NO	NO	NO
R10	22 The Terrace	55	51	51	47	56	51	52	48	60	55	NO	NO	-3.9	-3.7	-3.8	-3.0	NO	NO	NO
R11	45 George Street	56	52	55	51	57	52	56	52	60	55	NO	NO	-0.9	-0.9	-1.0	-0.2	NO	NO	NO
R12	43 George Street	57	53	55	51	57	53	56	52	60	55	NO	NO	-1.3	-1.3	-1.4	-0.7	NO	NO	NO
R13	41 George Street	56	52	55	51	57	52	55	51	60	55	NO	NO	-1.5	-1.5	-1.5	-0.9	NO	NO	NO
R14	39 George Street	57	52	55	51	57	52	56	51	60	55	NO	NO	-1.6	-1.7	-1.6	-1.1	NO	NO	NO
R15	29 George Street	55	51	53	49	56	51	54	50	60	55	NO	NO	-1.9	-1.9	-1.8	-1.3	NO	NO	NO

4.3 Mitigation Measures

Sensitive receivers R2 and R4 are residential properties of weatherboard and masonry construction respectively. At sensitive receiver R3 the ground floor of the building is currently operated as a commercial premise, whereas the upper floor is a residential premise. Therefore only the upper floor qualified for architectural treatment under the ENMM.

In selecting appropriate architectural treatment options, the type, condition and fabric of the building was considered to provide the optimum internal noise benefit. At the receiver location R3, the implementation of architectural treatments was not straightforward as the other properties due to the heritage significance of the structure. The architectural treatment options were sympathetic to the character, style and heritage value of the building.

The key operational noise management measure, outlined in Table 10-1 (Section 10) of the EIS is provided in Table 4-2.

Table 4-2 Operational noise management measure (as per Project EIS, RMS 2012)

ID	Environmental Management Measure	Phase of Project
NV2	Architectural treatments for noise mitigation would be identified by appropriate qualified professional [acoustic engineers] and installed in consultation with property owners.	Pre - construction

These architectural treatments have been implemented as outlined in Section 6.2.

5 Operational Noise (Submissions Report)

5.1 Methodology

An addendum to the EIS Working Paper 6 - Noise and vibration was prepared as part of the Submissions Report for the project. The addendum includes a revised alignment design and identification of additional residential properties was undertaken to supplement the conclusions and recommendations in the EIS.

The calibrated model prepared as part of the noise impact assessment during the EIS (refer Section 4.1) was used. The modelling of noise impacts for the revised project design considered the same input data used in the earlier assessment of impacts.

Additional residential properties were identified during the exhibition and submission phase of the EIS and have been included in the assessment of noise sensitive receivers for the revised proposal. These properties were previously identified in the EIS Working Paper 6 - Noise and vibration as commercial premises and are listed in Table 5-1 as R16, R17, R18, and R19.

These properties were not identified in the EIS as residential; however, subsequent information has indicated that they are currently residential properties or otherwise eligible for acoustic treatment.

5.2 Potential Impacts

Table 5-1 presents the results of the modelling for the unmitigated noise levels for both day and night time for the proposed year of opening and the design year, as well as the predicted change in noise level for the “no-build” and “build” scenarios at these times.

The results for the impact assessment indicate there would be a marginal increase in noise levels as the result of the revised bridge design for the previously assessed receiver locations. Receivers newly identified in the addendum report as residential properties are currently exposed to acute traffic noise levels from the existing alignment and are expected to be impacted by an acute noise levels as the result of the proposal.

5.3 Mitigation Measures

Additional properties that were identified as being residential dwellings during the exhibition of the EIS have been re-assessed against the project criteria in accordance with the RNP guidelines. The additional properties requiring mitigation are:

- 1&3 Thompson Square (R16);
- 64-68 George Street (R17);
- 14 Bridge Street (R18); and
- 16 Bridge Street (R19).

The additional residential dwellings are located around Thompson Square and have been identified as having cultural and heritage values consistent with the findings of heritage studies outlined in the EIS. These identified receivers at R16, R17, and R18 would be the subject of a separate heritage assessment to assist in the consideration of noise mitigation measures for each of the properties.

Table 5-1 Predicted Noise Levels

ID	Property Address	Year opening 'no build' scenario dB(A)		Year opening 'build' scenario dB(A)		Design year 'no build' scenario dB(A)		Design year 'build' scenario dB(A)		RNP criteria, dB(A)		Are the RNP Criteria exceeded?		Change in noise level dB(A)				Acute level of noise		Consider mitigation?
		Opening Year		Design year										Day		Day				
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
R1	27 Wilberforce Rd	66	61	63	58	67	62	64	59	60	55	YES	YES	-2.8	-2.9	-2.8	-2.9	NO	NO	NO
R2	4 Bridge Street	65	61	69	66	65	62	70	67	60	55	YES	YES	4.8	4.8	4.8	4.8	YES	YES	YES
R3	10 Bridge Street	71	67	71	68	71	68	72	68	60	55	YES	YES	0.5	0.2	0.5	0.2	YES	YES	YES
R4	53 George Street	61	58	63	59	62	58	64	60	60	55	YES	YES	1.8	1.8	1.7	1.8	NO	YES	YES
R5	12 The Terrace	59	54	54	50	60	55	55	51	60	55	NO	NO	-4.5	-4.2	-4.5	-4.1	NO	NO	NO
R6	14 The Terrace	58	53	54	49	58	54	54	50	60	55	NO	NO	-4.0	-4.0	-4.0	-3.9	NO	NO	NO
R7	16 The Terrace	57	53	53	49	58	53	54	50	60	55	NO	NO	-3.9	-3.7	-4.0	-3.6	NO	NO	NO
R8	18 The Terrace	56	52	53	48	57	52	53	49	60	55	NO	NO	-3.1	-3.1	-3.1	-3.1	NO	NO	NO
R9	20 The Terrace	55	51	51	47	56	51	52	47	60	55	NO	NO	-3.9	-4.0	-4.0	-4.0	NO	NO	NO
R10	22 The Terrace	55	51	51	47	56	51	52	47	60	55	NO	NO	-4.2	-3.9	-4.1	-3.8	NO	NO	NO
R11	45 George Street	56	52	55	51	57	52	56	52	60	55	NO	NO	-0.9	-0.8	-1.0	-0.7	NO	NO	NO
R12	43 George Street	57	53	55	51	57	53	56	52	60	55	NO	NO	-1.3	-1.2	-1.4	-1.2	NO	NO	NO
R13	41 George Street	56	52	55	51	57	53	56	52	60	55	NO	NO	-1.4	-1.4	-1.4	-1.4	NO	NO	NO
R14	39 George Street	57	52	55	51	57	53	56	52	60	55	NO	NO	-1.6	-1.6	-1.6	-1.5	NO	NO	NO
R15	29 George Street	55	51	54	50	56	52	54	50	60	55	NO	NO	-1.7	-1.7	-1.7	-1.6	NO	NO	NO
R16	3 Thompson Sqre	68	65	63	59	69	65	64	60	60	55	YES	YES	-4.7	-5.2	-4.7	-5.2	NO	YES	YES
R17	64-68 George St	65	62	65	63	65	62	66	63	60	55	YES	YES	0.7	0.5	0.7	0.5	YES	YES	YES
R18	14 Bridge Street	72	68	71	67	72	69	72	68	60	55	YES	YES	-0.6	-0.9	-0.6	-0.9	YES	YES	YES
R19	16 Bridge Street	70	66	70	65	70	66	70	66	60	55	YES	YES	-0.2	-0.4	-0.1	-0.3	YES	YES	YES

6 Detailed Design

6.1 Operational noise assessment during detailed design

Since the EIS/Submissions report, the project has progressed to detailed design. There have been no substantive changes in the detailed design relative to the EIS/Submissions design that would significantly alter the operational noise predictions presented in the EIS/Submissions Report for residences at 4, 6 and 8 Bridge Street.

These three receivers represent the closest, and therefore most affected properties to these proposed road design changes and as such would be the most affected properties. To this end, the following design features which are key to determining operational noise levels have not changed in the detailed design in this section of the project:

- Horizontal and vertical alignment;
- Proximity of the closest lane to residences;
- Road pavements;
- Design speeds;
- Traffic volumes;
- Traffic composition (including % heavy vehicle at night); and
- Traffic signals or other traffic controls.

This assessment considers the above requirements based on the current IFC design and traffic modelling results as detailed in Windsor Bridge Replacement Project Traffic and Options Modelling Report (Arcadis, 2017). This assessment of the road traffic noise impacts has been undertaken in accordance with the RNP.

6.2 Status of implemented management measures

Based on the EIS/Submissions report assessment seven residential properties require architectural treatment to reduce traffic noise from 2026 traffic levels. Impact mitigation options for these properties were investigated during the detailed design phase of the project. During these investigations it was established (via a site inspection 9 Oct 2017) that R18 (14 Bridge Street) was in fact a commercial property (Music Shop) and therefore not considered for noise treatment. The RNP outlines the noise assessment criteria for residences, schools, hospitals, places of worship, day care centres and aged care facilities. No criteria for commercial premises is provided in the RNP as the intention is to consider mitigation only for places where people sleep on a mostly permanent basis.

Prior to commencement of construction, Jacobs engaged City Plan Services (on behalf of Roads and Maritime) to undertake a report on Heritage Advice on Architectural Noise Treatment & Mitigation Measures (CityPlan, 2017). This report details the acoustic treatments required at each of the receivers and is provided as Attachment A.

In line with the management measures detailed in the EIS, Submissions Report, the site inspections undertaken during detailed design and above mentioned CityPlan Report, Roads and Maritime has implemented acoustic noise treatments at the residential receivers outlined in Table 6-1.

Following the EIS/Submissions Report, additional mitigation measures are not required to address the operational noise of the project.

Table 6-1 Summary of acoustic treatment works

Receiver ID	Ref Doc	Property Address	Treatment status
R2	EIS	4 Bridge Street	Works Complete
R3	EIS	10 Bridge Street	Works Complete
R4	EIS	53 George Street	Works Complete
R16	Subs Report	1&3 Thompson Square	Works Complete
R17	Subs Report	64-68 George Street	Owner did not want to proceed with treatment
R18	Subs Report	14 Bridge Street	Not applicable – commercial property
R19	Subs Report	1/52 George Street	Works complete

6.3 Post construction operational noise monitoring and performance reporting

As specified by D9 in the CoA, within 12 months of the commencement of operation of the project, or as otherwise agreed by the Secretary, the Applicant shall undertake operational noise monitoring to compare actual noise performance of the project against noise performance predicted in the review of noise mitigation measures required by this consent, and prepare an Operational Noise Report to document this monitoring.

This assessment will confirm the effectiveness of implemented operational noise management measures as detailed above based on actual operational traffic volumes.

7 References

Arcadis (2017) *Windsor Bridge Replacement Project. Traffic and Options Modelling Report*. Prepared on behalf of Roads and Maritime, Revision G, 21 June 2017.

SKM (2012) *Windsor Bridge Replacement Project – Environmental Impact Statement*. Prepared on behalf of Roads and Maritime Services, November 2012.

SKM (2013) *Windsor Bridge Replacement Project – Submissions Report incorporating Preferred Infrastructure Report (SPIR)*. Prepared on behalf of Roads and Maritime Services, April 2013.

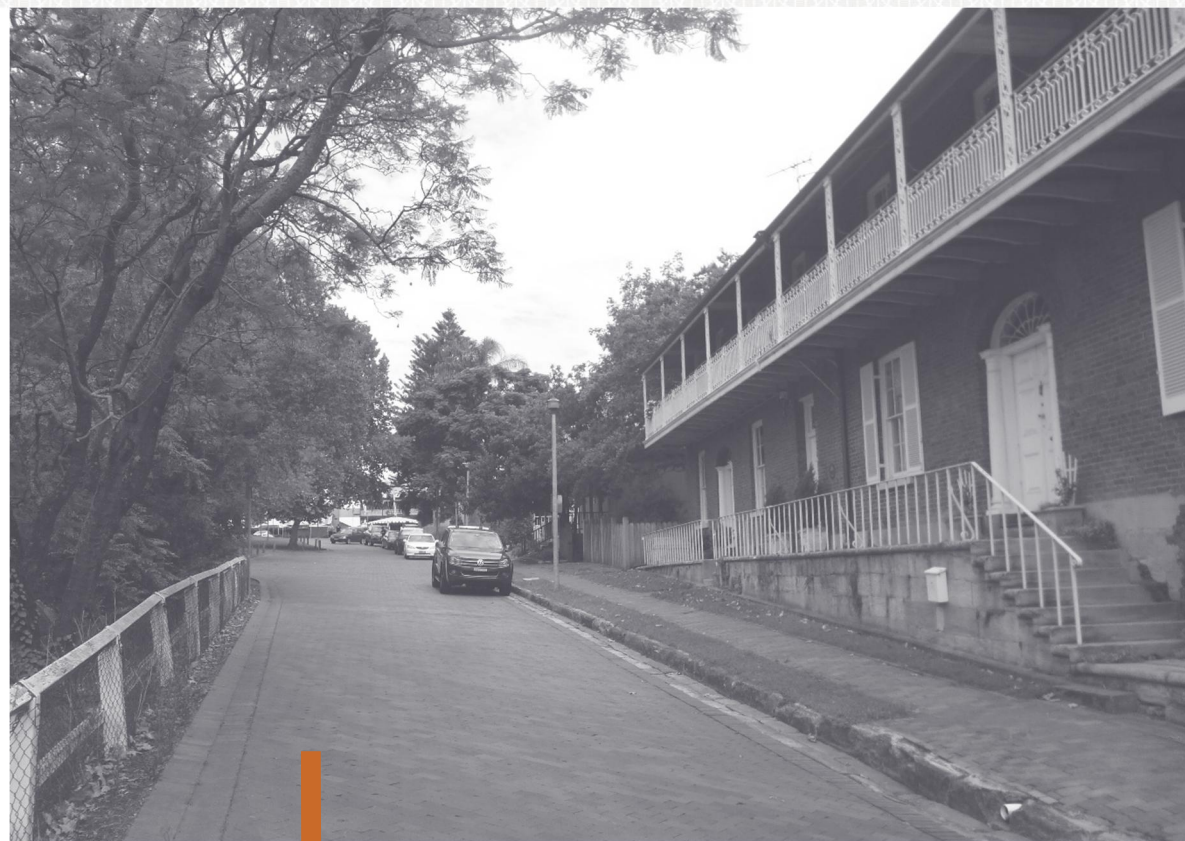
DECCW (2011) *Road Noise Policy*. Department of Environment, Climate Change and Water NSW, March 2011.

RTA (2001) *Environmental Noise Management Manual*. Roads and Traffic Authority, December 2001.

CityPlan (2017) *Heritage Advice on Architectural Noise Treatment & Mitigation Measures. Windsor Bridge Replacement Project. 1 & 3 Thompson Square; 64-68 George Street; 14 Bridge Street, Windsor*. City Plan Heritage P/L, Prepared on behalf of Roads and Maritime, September 2017.

Appendix A

Heritage Advice on Architectural Noise Treatment & Mitigation Measures



Heritage Advice on Architectural Noise Treatment & Mitigation Measures

Windsor Bridge Replacement Project

1 & 3 Thompson Square; 64-68 George Street; 14 Bridge Street,
Windsor

Submitted to Jacobs
On Behalf of Roads and Maritime Services

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Report Revision History

Revision	Date Issued	Prepared by	Verified by
01 - DRAFT	17/03/17	Kerime Danis <i>Director - Heritage</i>	Kerime Danis <i>Director - Heritage</i>
Final	8/09/2017	Kerime Danis <i>Director - Heritage</i>	

CERTIFICATION

This report has been authorised by City Plan Heritage P/L, with input from a number of other expert consultants, on behalf of Client. The accuracy of the information contained herein is to the best of our knowledge not false or misleading. The comments have been based upon information and facts that were correct at the time of writing this report.

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1. Introduction

1.1 Background

City Plan Heritage has been engaged by Jacobs on behalf of the Roads and Maritime Services (RMS) to provide consultant heritage advice in relation to the noise mitigation measures associated with the Windsor Bridge Replacement Project.

A letter of heritage advice on the noise mitigation measures for the Heritage Item located at 10 Bridge Street, Windsor has previously been provided on 9 August 2012. Subsequently, in March 2013, additional advice was provided for the three heritage items that are subject of the current report were inspected externally and preliminary advice given at the time. The advice on both occasions was given in response to the Director General's Requirements (DGRs), which were issued on 24 November 2011. The current heritage advice builds upon the previous advice and develops further the treatment options in light with the internal inspections of the subject heritage items.

The RMS is seeking approval for the replacement of the existing Windsor Bridge crossing of the Hawkesbury River at Windsor and upgrading of adjacent intersection and approach roads. The project has been declared as a State Significant Infrastructure project (number SSI-4951) and the Director General's Conditions of Approval (CoA) have been issued. Subsequently, a number of studies have and are being prepared in response to the CoA and the Environmental Impact Statement (EIS) management measures including heritage related matters.

This heritage advice provides both specific and general mitigation measures that can be applied for architectural noise treatment of windows and doors of the heritage items potentially impacted by the project. Although the following recommended architectural noise treatments can be applied to any similar type of windows and doors of residential buildings, this report particularly considers the windows and doors of the heritage buildings detailed below:

- § The Doctors House at 1-3 Thompson Square
- § Former School of Arts Building at 14 Bridge Street
- § The former Hawkesbury Stores at 64-68 George Street

These receivers were identified in the Windsor Bridge Replacement Submissions Report (April, 2013) as additional receivers requiring acoustic treatment.

It should be noted that these properties are potentially eligible for architectural noise treatment based upon the potential for residential use. These properties were not identified in the EIS as residential; however, subsequent information has indicated that they are suitable or currently residential properties. The Doctors House at 1 and 3 Thompson Square are currently used as residential dwellings while the other two heritage items are used for commercial purposes with associated residential uses.

1.2 Site Location

The subject sites are located around the Thompson Square at Windsor. The Doctors House at 1 & 3 Thompson Square is on the northwest of the Square while 64-68 George Street shops are located directly opposite Thompson Square on the southern side of George Street, and 14 Bridge Street is located on the eastern side of the Street to the southeast of the George Street roundabout. The following map indicates locations of the subject properties and their relationship with Thompson Square.

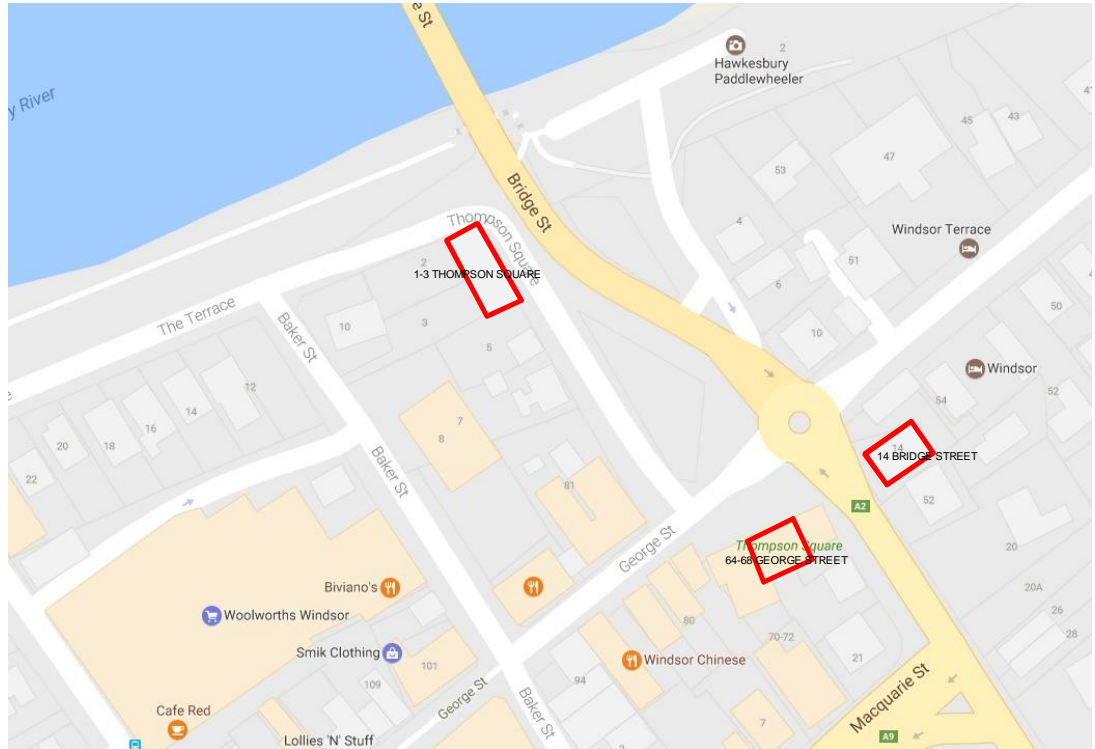


Figure 1: Location of the subject properties around Thompson Square in Windsor.

1.3 Methodology

Outlined below are the specific EIS Statement of Commitments (SOCs) for the project relevant to the development of this report.

SoC No.	Requirement
HH9 (EIS)	Architectural noise environmental management measures for heritage listed buildings will be developed in agreement with property owners and installed by suitably qualified professionals
NV2 (EIS)	Architectural treatments for noise mitigation would be identified by appropriate qualified professional and installed in consultation with property owners.

This heritage advice has been prepared in accordance with the NSW Heritage Manual 'Assessing Heritage Significance' guidelines. The philosophy and process adopted is that guided by the Australia ICOMOS Burra Charter 2013.

In preparation of this heritage advice City Plan Heritage has consulted the documentation listed below and obtained expert advice of Gary Waller of G & C Waller Builders. Gary is a carpenter with extensive expertise in traditional joinery. This report has been based on both the external and internal inspections of the properties that are subject of the current noise reduction mitigation measures. Inspections were carried out on 2 February 2017 to provide

a good understanding of potential intactness and detailing of the windows and doors of the subject three heritage buildings. The reports and studies that were reviewed in the preparation of this heritage advice include:

- § RTA, Windsor Bridge Replacement State Significant Infrastructure application report, October 2011
- § Director General's Requirements (SSI - 4951) dated 24 November 2011
- § SKM, Windsor Bridge Replacement Project Environmental Impact Statement, November 2012
- § SKM, Windsor Bridge Replacement Project Submissions Report, April 2013
- § Minister of Planning and Infrastructure, Instrument of Approval (SSI - 4951), December 2013
- § State Heritage Register Inventory Forms for Thomson Square incorporating 62-64 George Street and 1-3 Thompson Square
- § Register of the National Estate listing forms for 14 Bridge Street, 62-74 George Street and 1-3 Thompson Square
- § various Windsor Bridge Replacement project reports by the project consultant team in particular Appendix 4: Site Inspection Recording Forms of the Windsor Bridge Replacement Project Historic Heritage Assessment & Statement of Heritage Impact by BIOSIS Research dated November 2012.
- § W. Murray, A. Croker, *Traditional Joinery - Sydney Houses 1810-1915*, 2005, Watermark Press
- § City Plan Heritage, *Heritage Advice on Noise Mitigation measures - Windsor Bridge Replacement Project*, March 2013

Before any architectural noise treatments identified in this report are implemented, a detailed inspection of the properties will be undertaken by Roads and Maritime Services (RMS), a heritage architect and carpenter(s) in conjunction with the respective property owner to identify and agree on appropriate treatments.

1.4 Author Identification

The following report has been prepared by Kerime Danis (Director - Heritage) in association with Gary Waller of G & C Waller Builders. The author wishes to thank Damien Wagner and Graham Bottomley of Jacobs for their help in the organisation of the site accesses and assistance during the physical site inspections respectively.

2. Sites subject to this heritage advice

The Windsor Bridge Replacement Project is located within the vicinity of a number of heritage items of State and local significance including buildings, town squares and Thompson Square Heritage Conservation Area, which have been identified to be affected by the project. Three of these heritage items are either currently residences or have potential to be residences without substantial modification, and require consideration for the provision of architectural noise treatment to mitigate noise impacts. These items are briefly described in order to understand the construction period, type and intactness of existing joinery to provide a basis for the potential alternative architectural noise treatment options.

2.1.1 The Doctors House (1 & 3 Thompson Square)

Built c1844 as two separate residences, the Doctors House is a twin, two-storey early Victorian style terrace with attics within the simply detailed pitched roof. It consists of two residences and features a face brick construction on an ashlar sandstone base. Located on a prominent position at the north-western end of Thompson Square, the Doctors House has white painted timber joinery comprising six-pane sash windows to the ground floor level and French doors to the upper floor level. Three solid panelled entry doors with fanlights (two with arched fanlights) provide access from the elevated veranda across the entire facade. Both of the residences have the same six-pane double-hung windows to the rear of their respective residences.

The Doctors House is listed on the State Heritage Register as part of the Thompson Square Precinct (SHR No. 00126) and is also on the Hawkesbury LEP 2012 (No. I00126). The online inventory form for the item does not include a Statement of Significance or description; however, the Register of the National Estate listing provides a very brief Statement of Significance:

Fine substantial early sandstone and brick terrace building.

Statement of Significance in the BIOSIS Research ranks the House as being of Exceptional significance and reads as¹:-

The Doctors House is a significant as an individual item for its historic, aesthetic and architectural qualities. It has been a landmark building since it was constructed and played a prominent role in the history of the commercial precinct of Thompson Square.

The Doctors House is also significant for its contribution to the overall significance of Thompson Square by providing a recognisable definition to the western perimeter of the square. As part of a group of buildings surrounding Thompson Square, the Doctors House is one of the buildings, which as a group, demonstrates the different phases of the square's development. It contributes to the sense of age and history that is integral to the identity of Thompson Square and Windsor.

The site of the Doctors House is significant also for the archaeological potential it holds, having previously been the site of an inn.

The photographs on the next page show the current variety of the original timber joinery of 1 & 3 Thompson Square. The owners of 1 Thompson Square have installed a second French door inside the reveal of the existing Original French doors of the upper floor balcony with single pane glazing. This treatment has been found as being of most suitable architectural acoustic treatment for such significant French door joinery. Photographs of the subject French door and the new internal joinery have been provided on the next page.

¹ BIOSIS Research (Nov 2012), Appendix 4, p.40.



Figure 2: No. 3 Thompson Square



Photo 3: No. 1 Thompson Square



Figure 2: Typical six-pane double-hung window of Doctors House (No. 3) - external

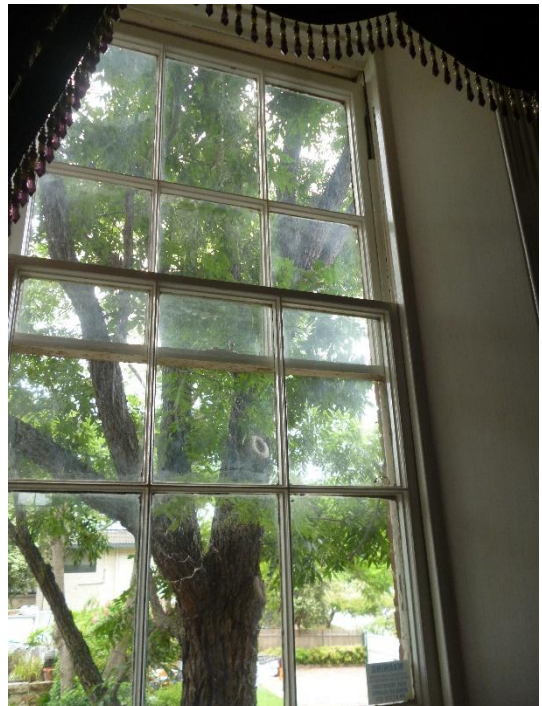


Photo 3: Typical six-pane double-hung window of Doctors House (No. 3) - internal



Figure 4: Typical French door of Doctors House with second internal door at No. 1

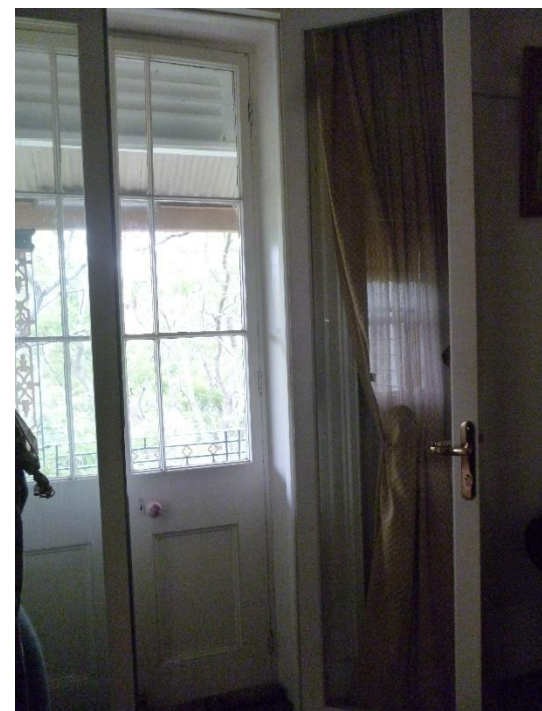


Photo 5: Typical French door of Doctors House with second internal door at No. 1

2.2 Former School of Arts Building (14 Bridge Street)

The former School of Arts Building was constructed in 1861 as a civic building in a stuccoed Italianate style. It is a single-storey building with a central veranda supported on two posts and accessed by wide stairs between the two later constructed projecting bays. The original simple gabled building is encased by the two symmetrical bays also in stuccoed finish featuring architectural detailing of the classical order with flat parapeted roof.

The original facade behind the veranda features two arched doors with a centrally located arched six-pane sash window. The windows on the later projecting bays also are arched but two-pane sash windows. There are also glass multi-paned doors within the reveals of the veranda, which will require acoustic treatment.

The former School of Arts Building is listed on the State Heritage Register as part of the Thompson Square Precinct (SHR No. 00126) and is also on the Hawkesbury LEP 2012 (Part of No. 100126). The online inventory form for the item does not include a Statement of Significance or description; however, the Register of the National Estate listing provides a very brief Statement of Significance:

Potentially fine architectural element occupying key site in the Thompson Square precinct. Has valuable historical links with early community life of Windsor. Listing excludes skillion additions at front.

Statement of Significance in the BIOSIS Research ranks the House as being of High significance and reads as²:-

The former School of Arts building is significant as a mid-Victorian building with civic beginnings. It appears to be largely intact and therefore retains the ability to be restored to its most significant aesthetic form. The former School of Arts building is also significant for its links with early community life in Windsor.

It has historical significance as representing a movement that promoted the benefits of educating the skilled working classes, which was the birth of the municipal library and neighbourhood centre.

The building is part of the group that defines the perimeter of Thompson Square. The combination of all the buildings within the Thompson Square heritage curtilage demonstrates the different phases of Thompson Square's development. It contributes to the sense of age and history that is integral to the identity of Thompson Square and Windsor.

The site is significant also for its archaeological potential. The property encompasses part of the early Government Domain and the former School of Arts is built on some or part of a government storehouse and therefore has a high degree of scientific potential.



Figure 6: Former School of Arts building at 14 Bridge Street

² BIOSIS Research (Nov 2012), Appendix 4, p.91.



Figure 7: Typical arched double-hung window of former School of Arts building (14 Bridge Street) - Dans Studio



Photo 8: Typical door joinery with fanlight above within the former School of Arts building (14 Bridge Street) - Dans Studio



Figure 9: Existing arched double-hung windows of 14 Bridge Street - Dans Studio



Photo 10: Two-pane double-hung windows also exist at 14 Bridge Street - side elevation



Figure 11: Existing arched double-hung windows of 14 Bridge Street - external

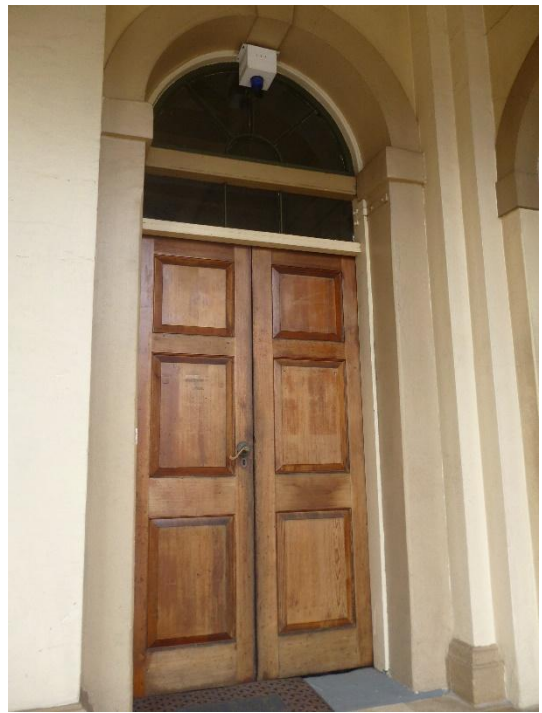


Photo 12: Typical six-pane façade entry door of 14 Bridge Street with arched fanlight



Figure 13: Nine-pane double-hung windows at the music Tuition section of 14 Bridge Street



Photo 14: Another type of door joinery has nine-pane glazed upper panel with single-pane arched fanlight at the front veranda

2.3 Shops - Former Hawkesbury Stores (64 - 68 George Street)

Adjacent to a single-storey building at number 62 George Street, the subject building is a two-storey c1880s Victorian terrace style mixed commercial and residential building accommodating three residences on the first floor level.

The upper floor features French doors with fanlights similar to those at number 10 Bridge Street in Thompson Square.

The former Hawkesbury Stores Building is listed on the State Heritage Register as part of the Thompson Square Precinct (SHR No. 00126) and is also on the Hawkesbury LEP 2012 (Part of No. 100126). The online inventory form for the item does not include a Statement of Significance or description; however, the Register of the National Estate listing provides a very brief Statement of Significance for the group consisting of 60, 62-74, 84 George St:

Important sites surrounding Thompson Square precinct that require sympathetic rebuilding in authentic Georgian style to preserve the character of this historic square.

Statement of Significance in the BIOSIS Research ranks the House as being of High significance and reads as³:-

The group of buildings at 62 – 68 George Street is significant as part of the Thompson Square precinct as well as in their own group. The buildings have strong associations with the Moses family, an early prominent business family in Windsor and with the important river trade in Windsor. The buildings show three phases of development with the earliest phase represented by the single storey building. No 62 is also significant for its survival as late Georgian to early Victorian building and the rebuilt sections for their direct association with the historical values of the earlier component of the structure.

The buildings are also significant for their location along the ridge of George Street, which provides them a prominent position at the top of the Square and connect Thompson Square with the commercial entrance to Windsor. They are part of a group that defines the south eastern edge of Thompson Square. The combination of all the buildings within the Thompson Square heritage curtilage demonstrates the different phases of Thompson Square's development. It contributes to the sense of age and history that is integral to the identity of Thompson Square and Windsor.



Figure 15: Shops at 64-66 George Street with upper floor residential uses



Photo 16: Close-up view of the upper floor of shops at 64-66 George Street

³ BIOSIS Research (Nov 2012), Appendix 4, pp. 105-106.



Figure 17: No. 66 George Street - shopfront



Photo 18: No. 68 George Street - shopfront



Figure 17: No. 66 George Street - internal view of the shopfront



Photo 18: No. 68 George Street - shopfront - same as No. 66 George Street