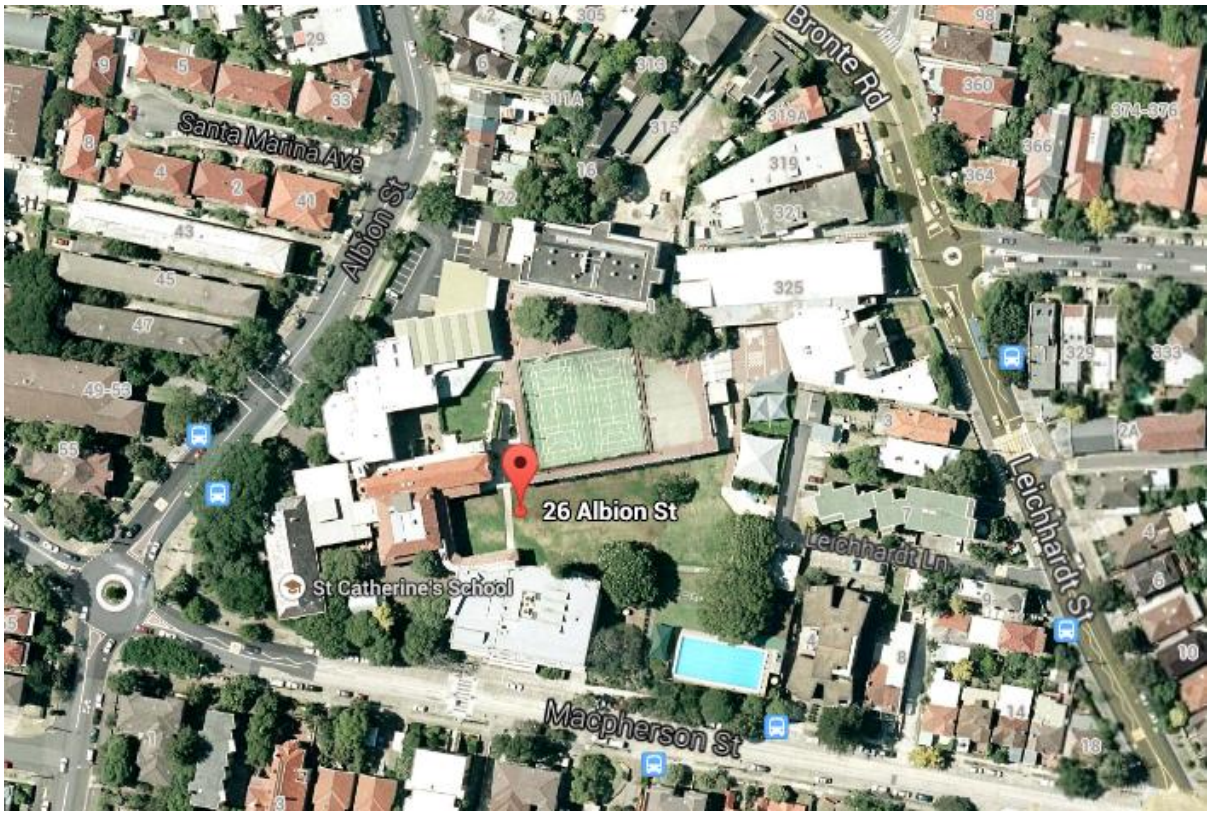
ENVIRONMENTAL RISK ASSESSMENT

DEVELOPMENT APPLICATION, CAMPUS MASTER PLAN

Prepared for

St. Catherine's School, Waverley



September 2014-09-22

Rev 01

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DOCUMENT CONTROL

Client: St. Catherine's School, Waverley
Job Title: Development Application, Campus Master Plan
Report Title: Environmental Risk Assessment

Revision	Date	Comment	Author	Reviewed By
00	22 Sep. 2014	Draft	Adam Martinez	Warwick Smith
01	22 Sep. 2014	Client Feedback	Adam Martinez	Adam Martinez

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1. INTRODUCTION

1.1 Project Overview

Sandrick Project Directions has been commissioned by St Catherine's School, Waverley, to assist with managing the preparation of an Environmental Impact Statement (EIS) to accompany a Development Application (DA) for the school which is located at 26 Albion Street, Waverley (the site).

The DA seeks concept approval for the school's Campus Master Plan and detailed design approval of the proposed Stage 1 works which comprise of a new Research, Performing Arts and Aquatic Centre (RPAC).

The proposed Campus Master Plan comprises a number of new buildings, internal refurbishments and the reallocation of some internal spaces across the site. The primary new buildings (and associated demolition works) include:

- Demolition of the existing outdoor swimming pool and construction of a new multi-level building (RPAC). The core facilities proposed within the RPAC include a new Research Centre, Performing Arts Auditorium, Aquatic Centre and Multi-Purpose Hall, with pedestrian links to the existing Dame Joan Sutherland Centre (DJSC) and Jo Karaolis Sports Centre (JKSC);
- Demolition of the existing Jane Barker Hall (JBH) and construction of a new building; and
- Demolition of the existing print room, reception and link building between Lenthall and the Administration Building (Level 6) and construction of new boarder's common room.

1.2 Scope and Boundaries

This Environmental Risk Assessment (ERA) has been prepared generally in accordance with AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines and ISO/IEC 31010:2009 Risk Management – Risk Assessment Techniques to identify the potential environmental impacts associated with the development as required of the Director General's Environmental Assessment Requirements (DGRs) issued on 29 January 2014 (SSD 6339).

The ERA has been prepared to address environmental risks associated with the proposed Stage 1 development only. As the proposed Stage 1 development is anticipated to have the largest environmental impact relative to the remaining stages of the proposed Campus Master Plan, the mitigation measures detailed within this ERA may be adopted in future stages of development where common key issues are identified.

In general, the ERA will identify and prioritise perceivable risks and a process to mitigate these risks will be detailed. Elimination of these risks will be the primary objective however where this does not prove feasible, control measures will be implemented and monitored as required.

2. RISK MANAGEMENT PROCESS

The term risk relates to an "effect of uncertainty on objectives" (Standards Australia, 2009, pg. 1). The risk managemenet process, as defined in AS/NZS ISO 31000:2009 is a "systematic application of management policies, procedures and practices to the activities of comunicating, consulting, establishing the context, and identifying, analysing, evaluating, treating, monitoring and reviewing risk".

Figure 1 below provides a visual representation of the steps involved in the risk management process and the importance of communication, consultation and constant monitoring throughout each phase of the process.

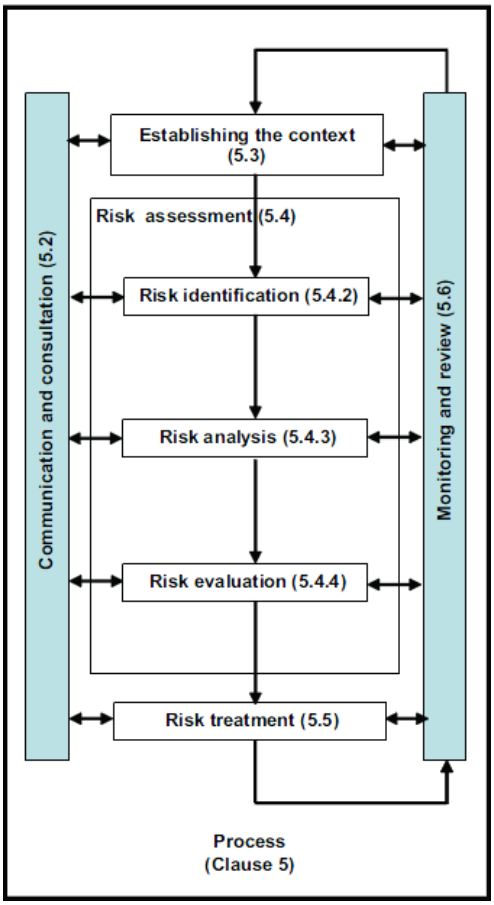

Figure 1 - Risk Management Process

2.1 Communication and Consultation

As Figure 1 illustrates, communication and consultation with stakeholders of the project should be an ongoing event throughout the risk management process at a variety of different levels depending on the audience and at what stage of the project lifecycle the project is in.

"Effective external and internal communication and consultation should take place to ensure that those accountable for implementing the risk management process and stakeholders understand the basis on which decisions are made, and the reasons why particular actions are required" (Standards Australia, 2009, pg. 14).

Internal Communication

In addition to regular face-to-face meetings, Project Control Group (PCG) meetings and design workshops, online project documentation management and communication portals such as Aconex and Microsoft SharePoint are an excellent method to ensure the immediate project team, and all relevant internal stakeholders as invited, remain up to date with the latest project information.

Relevant project information can include development approvals, authority correspondence, project programmes (e.g. design, procurement, construction etc.), specialist consultant plans and documentation, relevant certifications etc.

The aforementioned examples also provide a platform for online correspondence with all members of the project team ensuring all members of the team are aware of the key issues associated with the project and are accountable for the delivery of their works.

Other relatively inexpensive methods of online project collaboration include cloud storage of project documentation using a platform such as Dropbox or equivalent, and for smaller files and tracking correspondence, Microsoft Outlook or other equivalent email clients.

The project team currently uses a combination of Dropbox and Microsoft Outlook to manage project documentation and communication; the benefits of adopting a portal such as Aconex and Microsoft SharePoint throughout the construction phase of Stage 1 works will be considered in due course.

Community Consultation

In projects of this scale, community consultation is a key component contributing to the overall successful delivery of a project. The primary purpose of these consultation sessions is to identify common key issues amongst stakeholders and where reasonable, develop mitigation strategies to address these issues. Consultation sessions can also be used as an informative platform to provide key information on:

- Understanding the development concept and its driving factors;
- The status of the development in relation to key project milestones;
- Upcoming events and the delivery strategy;
- Impacts the development may have on external stakeholders such as businesses, home owners and tenants; and
- Key points of contact to submit ongoing enquiries about the project to the nominated person on the project team.

St. Catherine's School has been diligent with their communication strategy during the preparation of the DA, meeting on numerous occasions with the following stakeholders:

- Waverley Council and its Ward Officers;
- Charing Cross Precinct;
- No. 4 Macpherson St specifically; and
- Wider Waverley community generally.

A communication link has also been established by the school to encourage ongoing community feedback generally.

A construction specific communication strategy will be developed at the appropriate time to ensure the immediate community are informed of:

- Construction status updates generally;
- Timing of noisy works;
- Proposed changes to construction hours to facilitate key works; and
- General construction housekeeping strategies.

Similar to the current communication link established by the school, a point of contact will be nominated during the construction phase of Stage 1 to ensure the community have a platform to submit enquiries or register a complaint to be addressed.

2.2 Establishing the Context

2.2.1 Establishing the Context of the Risk Management Process

"The objectives, strategies, scope and parameters of the activities of the organisation, or those parts of the organisation where the risk management process is being applied, should be established" (Standards Australia, 2009, pg. 16).

The key objectives of the St. Catherine's School Campus Master Plan include:

- Provide state-of-the-art facilities which complement St. Catherine's commitment to providing broad, challenging and vibrant education within a nurturing environment;
- Enhance the current educational curriculum for Sport/ Personal Development, Health and Physical Education (PDHPE) by introducing an Aquatic Centre in place of the existing, aged outdoor pool;
- Enhance the current educational curriculum for performing arts by providing a new state-of-the-art professional grade auditorium which addresses the constraints of the existing "play-box theatre" within the Dame Joan Sutherland Centre (DJSC) (including its small spectator gallery, insufficient back-of-house facilities, inadequate size to accommodate school performances etc);
- Introduce a new Research Centre which reflects a contemporary world-leading teaching and learning environment for staff and K-12 students, equipped with a broad variety of leading edge and learning based technology within a diverse range of learning environments;
- Ensure an efficient, adaptive reuse of residual spaces created by the development of new facilities to create a variety of education based precincts throughout the school campus;
- Create new Junior and Senior School entries off Albion Street and Leichhardt Street respectively, which are sympathetic to existing traffic conditions and provide a safe, accessible pedestrian link between Albion and Leichhardt Streets for the school community;
- Create a new, safe formal school entry from Macpherson Street directly to the Administration Building via the Museum, separating vehicle entry from pedestrian entry whilst emphasising the significance of the school's heritage; and
- Minimise dependency on external facilities to support the educational curriculum, as well as co-curricular and extracurricular activities offered by St. Catherine's School to the school community.

Scope

The scope of Stage 1 works generally includes:

1. Demolition of the existing swimming pool, change rooms, portable classroom;
2. Tree removal and replacement;
3. Construction and use of RPAC in the location of existing swimming pool and the approved commenced Indoor Sports Complex (DA 258/89) to include basement car parking, an aquatic centre with associated amenities, multi-purpose hall, auditorium accommodating 489 attendants with associated amenities and research centre; and
4. Landscaping of the site.

2.2.2 Defining the Risk Criteria

This report seeks to extrapolate the environmental risks associated with the proposed Stage 1 development with primary focus on key construction and operational issues including transport and accessibility, noise and vibration, heritage, stormwater management and dust controls, air quality, biodiversity, waste and crime.

Using Table 1 and Table 2, the likelihood and consequence of a risk are assessed numerically against the pre-defined criteria. With an indication of the likelihood of occurrence and the consequence level, the risks are then objectively assessed against the Risk Assessment Matrix illustrated in Table 3. The numeric value generated from this process is then reviewed against Table 4 to acquire an objective risk classification.

Level	Likelihood	Definition	Probability (%)
1.	Very Unlikely	The event may occur in exceptional circumstances only.	<5
2.	Unlikely	The event is unlikely to occur during the normal course of construction and/or operation.	5-25
3.	Possible	The event may occur during the normal course of construction and/or operation.	26-50
4.	Likely	There is a good chance the event will occur during the normal course of construction and/or operation.	51-90
5.	Almost Certain	The event is almost certain to occur during the course of construction and/or operation.	>90

Table 1 - Risk Analysis Likelihood Definitions

Level	Consequence Level	Definition
1.	Insignificant	The event will resolve in short term negligible impacts.
2.	Minor	The event will resolve in short term minor/reversible impacts.
3.	Moderate	The event will resolve in medium term moderate/reversible impacts.
4.	Major	The event will resolve in medium term major/potentially irreversible impacts.
5.	Catastrophic	The event will resolve in long term irreversible impacts.

Table 2 - Risk Analysis Consequence Definitions

	Likelihood				
Consequence	1. Very Unlikely	2. Unlikely	3. Possible	4. Likely	5. Almost Certain
1. Insignificant	2 – Low	3 – Low	4- Moderate	5- Moderate	6 – High
2. Minor	3 – Low	4 - Moderate	5 – Moderate	6 – High	7 - High
3. Moderate	4 - Moderate	5 – Moderate	6 - High	7 - High	8 – Very High
4. Major	5 – Moderate	6 – High	7 - High	8 – Very High	9 - Very High
5. Catastrophic	6 – High	7 - High	8 – Very High	9 - Very High	10- Very High

Table 3 - Risk Assessment Matrix

Range	Risk Rating	Comments
1 – 3	Low	Mitigated through standard control measures (i.e. detailed design, quality assurance, safety controls etc.).
4 – 5	Moderate	Mitigated by implementing relatively standard environmental measures.
6 – 7	High	Requires in depth assessment and planning to mitigate where possible.
8 – 10	Very High	Requires in depth assessment and planning to eliminate where practicable.

Table 4 – Risk Classification

2.3 Risk Assessment

A consequence/probability matrix was used to assess the identified risks in accordance with AS/NZ ISO 30000:2009 and ISO/IEC 31010:2009. The Risk Register has been included in Appendix A identifying the results of the risk assessment using the pre-established risk criteria detailed in Section 2.2.2.

In general, it is recommended that the risk assessment process be performed by a specialised multi-disciplinary project team with thorough understanding of the context surrounding the project as well as activities surrounding the risk assessment. The assessment process should initially occur at project inception and then at regular intervals throughout the project in accordance with various stages of the project's lifecycle.

2.3.1 Risk Identification

The following items formed the foundation of the Risk Identification stage:

- Identify sources of risk;
- Identify areas of impact; and
- Identify potential consequences.

It is important to note that risks can be both positive and negative and the risks associated with not pursuing opportunities should also be considered.

2.3.2 Risk Analysis

The risk analysis is used to develop an understanding of the key risk items associated with the project and provide input to the risk evaluation stage. In accordance with AS/NZ ISO30000:2009 this stage of the assessment considers the "causes and sources of risk, their positive and negative consequences, and the likelihood that those consequences can occur".

2.3.3 Risk Evaluation

The risk evaluation stage involves comparing the level of risk against the pre-established risk criteria. This purpose of this stage is to assist management in making decisions about which risks require treatment, prioritisation of treatment methods and the extent to which this treatment will occur.

2.4 Risk Treatment

"Risk treatment involves selecting one or more options for modifying risks, and implementing those options. Once implemented, treatments provide or modify the controls" (Standards Australia, 2009, pg. 18).

The Risk Register in Appendix A illustrates a cyclical process of evaluating a risk, implementing treatment measures and re-evaluating the risk to determine the revised impact severity or likelihood. In the event that the risk is still not tolerable, a new risk treatment method is implemented and the effectiveness of that treatment is then evaluated. This process continues until the risk has either been eliminated or reduced to a tolerable state.

Risk tolerability was assessed using the As Low As Reasonably Practicable (ALARP) principle. Illustrated as a carrot diagram in Figure 2, the essence of this principle is to reduce the magnitude of a risk to a point where the cost of further mitigating the risk is grossly disproportionate to the beneficiaries of the outcome, consequently achieving a state that is "reasonably practicable".

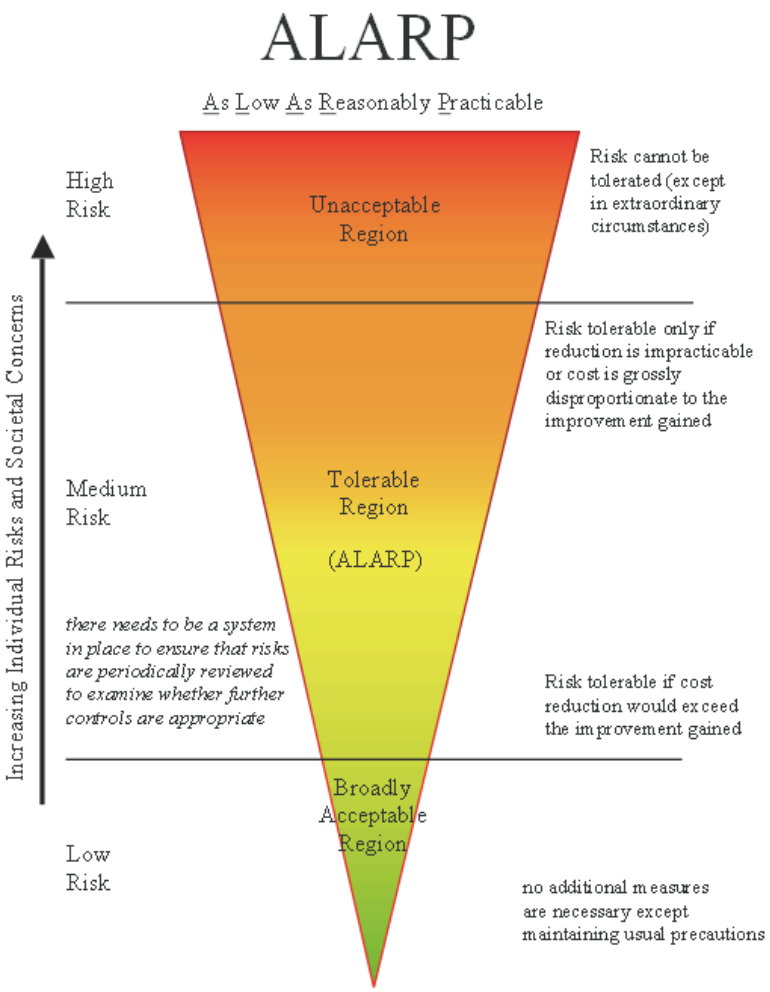

Figure 2 - http://www.onsafelines.com/alarp.html

2.5 Monitor and Review

To maintain the validity of a risk management assessment, it is critical for management to review risk treatment plans on a regular basis to ensure preliminary assumptions and risk priorities are still appropriate, and to assess the actual results of mitigation strategies against initial expectations.

Stakeholders that can assist with the ongoing process include, but are not limited to, the Client and the Client's representative Project Manager, the Project Architect, the consultant team including engineers of all disciplines and the appointed Principal Contractor.

Various methods that may be used to proactively identify and manage risks throughout the development process include, but are not limited to:

- Regular meetings with the Client;
- Regular design/construction meetings;
- Regular meetings with key stakeholders including the community;
- Communication with relevant authorities as required;
- Regular inspections by the consultant team throughout construction;

- Enforce stringent Work Health and Safety policies including daily review of Safe Work Method Statements (SWMS); and
- Regular Safety Toolbox Talks during construction;
- Independent audits from external Work Health and Safety (WH&S) consultants during construction.

3. DISCUSSION

The key risk items identified in Appendix A that have a residual risk rating of "high" in accordance with Table 4 are risks associated with the construction of the proposed development (i.e. not operation).

Given the nature of the development and the general density of the suburb of Waverley, the risks identified as "high" (primarily transport related) are believed to be consistent with the majority of construction activities undertaken in the inner-city suburbs of Sydney, and will be managed appropriately.

It is important to note that the consequence of certain key risk items such as contamination through spills of fuels and chemicals may remain constant despite the control measures implemented. In these situations, the Project Team will exercise diligence in implementing the necessary control measures to minimise the likelihood of the risk occurring to a level that is As Low As Reasonable Practicable.

In accordance with the Risk Management Process, the Control Measures prescribed in Appendix A will be implemented and monitored on a regular basis as required. If the control measures identified are not as effective as anticipated, or the risk requires additional control measures, further measures will be agreed with the Client and Project Team and implemented as appropriate at the result of regular reviews.

Appendix A – Risk Register

Description of Risk	Impacts	Phase Construction = C Operation = O	Likelihood	Consequence Rating	Initial Risk Assessment Matrix Score	Management Controls	Residual Likelihood	Residual Consequence Rating	Residual Risk Assessment Matrix Score
Transport and Accessibility	Disruption to street parking	C	5	3	8	- Site specific Construction Traffic Management Plan to be prepared and implemented by appointed Contractor during construction - Traffic Impact Assessment prepared by ARUP – recommendations to be implemented by school - Increase in on-site parking proposed within basement level of development	4	3	7
		O	4	3	7		3	2	5
	Increased traffic congestion	C	5	3	8	- Construction vehicles to enter and exit construction zones in the forward direction where possible. - Where practical, materials and equipment to be delivered and off-loaded within site boundary to avoid disruption to public roadways - Vehicle movement in and out of the construction zone to be minimal during AM and PM peak hours. - Pedestrian traffic to take priority over construction vehicles	4	3	7
		O	4	3	7		3	2	5
	Disruption to foot traffic and cyclists	C	4	3	7	- Traffic management controllers to be available if required - Construction vehicles to give way to pedestrians	3	2	5

Description of Risk	Impacts	Phase Construction = C Operation = O	Likelihood	Consequence Rating	Initial Risk Assessment Matrix Score	Management Controls	Residual Likelihood	Residual Consequence Rating	Residual Risk Assessment Matrix Score
Noise and Vibration	Noise impact generated by construction activities	C	4	3	7	- Construction noise levels generally to achieve site specific targets established by the appointed acoustician by implementing recommended mitigation strategies - Use of large noise emitting machinery to be prioritised during permissible construction hours where practical - Scheduled construction activities expected to generate excessive noise to be communicated with impacted residents - Noise levels to be closely monitored from nearby residences - Minimise need for reversing of construction vehicles by implementing sufficient signage and appropriate safety strategies	4	2	6
	Noise impact generated by operation of facilities	O	3	2	5	- Pedestrian and vehicular entry and exit of facilities to be managed during larger events - Noise emitting plant and equipment to be acoustically treated in order to achieve site specific noise criteria as established by the appointed acoustician - Site specific noise criteria to be achieved by implementing advice provided by acoustician in design stage	2	1	3

Description of Risk	Impacts	Phase Construction = C Operation = O	Likelihood	Consequence Rating	Initial Risk Assessment Matrix Score	Management Controls	Residual Likelihood	Residual Consequence Rating	Residual Risk Assessment Matrix Score
	Damage to buildings and property from vibrations	C	3	3	6	- Undertake pre and post construction dilapidation reports. - If required, isolate equipment such as pumps, compressors, generators etc. from ground level via spring mounts, rubber mounts, floating plinths etc. as prescribed by acoustician - Monitor effected locations during peak construction activities	3	2	5
Heritage	Impact on heritage items/Conservation areas	C + O	1	1	2	- The Statement of Heritage Impact (SoHI) prepared by NBRS has concluded that the proposed development will have negligible impact on known items of heritage significance; no further assessment or mitigation strategies are required - If items of heritage significance are uncovered during the course of construction activities, advice will be sought from an appropriately qualified consultant	1	1	2
Stormwater Management and Dust Controls	Contamination through spills of fuels and chemicals	C	3	5	8	- Procedures to rapidly respond, contain and treat spills to be implemented - Establish exclusion zones for fuels and chemicals as required	1	5	6

Description of Risk	Impacts	Phase Construction = C Operation = O	Likelihood	Consequence Rating	Initial Risk Assessment Matrix Score	Management Controls	Residual Likelihood	Residual Consequence Rating	Residual Risk Assessment Matrix Score
	Contamination through sediment and erosion run off	C	3	4	7	- Install temporary sediment and erosion controls around stockpiles and storm water drains as prescribed by the appointed Civil Engineer - Undertake inspections of sediment control measures and surface run off after each storm event - Minimise quantity of soil exposure at any one time - Ground stability to be re-established as soon as practical - Clean water runoff to be directed away from construction areas - Vehicles to be cleaned/washed down prior to exiting the construction site to minimise cartage of loose material which may dislodge during transport	2	4	6
	Excessive dust generation	C	3	3	6	- Minimise external works during windy conditions - Water exposed/unstabilised stockpiles to suppress dust - Place covers on loads - Minimise quantity of soil exposure at any one time - Provide a dedicated vehicle wash down area for construction vehicles prior to leaving site	3	2	5

Description of Risk	Impacts	Phase Construction = C Operation = O	Likelihood	Consequence Rating	Initial Risk Assessment Matrix Score	Management Controls	Residual Likelihood	Residual Consequence Rating	Residual Risk Assessment Matrix Score
Air Quality	Health risk or loss of amenity due to emission of exhaust gases to the environment (e.g. construction plant and equipment)	C	3	3	6	- Ensure contractors undertake routine maintenance of construction plant and equipment. - Ensure that all vehicles and machinery are fitted with appropriate emission control equipment, maintained in accordance with relevant specifications	2	3	5
Biodiversity	Damage to trees nominated to be retained	C	2	4	6	- Implement tree protection zones in accordance with Tree Impact Assessment prepared by Tree and Landscape Consultants (TALC) - Exercise diligence by regularly monitoring the effectiveness and condition of specific tree treatment measures and make adjustments as necessary	1	4	5
Waste	Excessive waste generation	C + O	3	3	6	- Waste generated during construction for disposal to be removed by a licensed waste contractor and disposed of in a licensed landfill facility if/as required - Reduce wastes by selecting, in order of preference, avoidance, reduction, reuse and recycling - Make purchasing decisions that consider recycled products - Consider measures and targets for reduction, reuse and recycling options - Segregate and recycle solid wastes generated by construction activities	2	2	4

Description of Risk	Impacts	Phase Construction = C Operation = O	Likelihood	Consequence Rating	Initial Risk Assessment Matrix Score	Management Controls	Residual Likelihood	Residual Consequence Rating	Residual Risk Assessment Matrix Score
Crime	Potential areas of crime associated behaviour	O	2	2	4	- The design encourages passive surveillance within the site and surrounding areas - Automatic lighting to be considered at main entries - Landscape Master Plan improves sightlines by minimising planting density where appropriate - On site security patrols occur outside of school hours. Hours vary between term and non-term time, as well as between week day and weekend times	1	2	3