



# SYDNEY TRAMWAY MUSEUM

## RISK REGISTER

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**Version Number:** 6.4

# Document Control Record

## 1. Document Details:

**Name:** Risk Register

**Number** STM 6003

**Version Number:** 6.4

**Document Status:**  Working Draft

Approved for Issue

Archived

**Next Scheduled Review Date:** .....

## 2. Version History:

Version Number	Date	Reason/Comments
1.0	5/06/2006	Initial issue - new layout concept
1.1	17/08/2006	Reviewed some of the ratings
1.2	7/09/2006	Added more risks
1.3	20/03/2007	Added more risks and changed the ratings on risk 1
1.4	29/02/2008	Added additional risks
1.5	30/06/2008	Added more risks
2.0	31/10/2008	Modified format and added revised the Risk Plan numbers
2.1	31/12/2008	Added procedure No to risk 73 and added more risks
2.2	22/01/2009	Removed R Clarke as a reviewer
2.3	3/03/2009	Additional risks for C coupled to other cars
2.4	10/08/2009	Added more risks for Cross Street
3.0	30/11/2009	Changed the format and the Risk Matrix to the new format as suggested in the draft "Risk Management Guidance for Heritage Railway Operators – October 2008".
3.1	30/06/2010	Modified the format to ITSRR's Hazard Workshop format.
3.2	31/07/2010	Reviewed the risks.
3.3	30/11/2010	Added risks for Breakfast Torque and North Terminus changes.
3.4	10/04/2011	Added risk for boarding or leaving a moving tramcar
3.5	7/06/2011	Added a Risk for "Trams After Dark"
3.6	15/09/2012	Added risks for Big Bike Day
4.0	28/02/2014	Complete review of all risks and ratings plus a review of the MATRIX
4.1	30/06/2014	Review RNP risks with Princes Highway speed limit now 80kph and overhead wire pulled down by oversize truck
4.2	31/01/2015	Added Army Hill and the bike crossing to risks
4.3	3/03/2015	Added a risk for Category 1 medicals members for shunting.
5.0	30/06/2015	Complete reformat of the register with added comments about the risk ratings
6.0	30/09/2015	Complete reformat of the register in EXCEL
6.1	31/08/2016	Added a Risk for "Unsecured trams"
6.2	30/11/2016	Added risks for using Army Hill
6.3	20/12/2016	Responsible person reviewed against each risk.
6.4	15/05/2017	Added risks for a Steam tram to be displayed at STM Loftus
6.5	02/07/2017	Added risks for not stopping at bottom of Army & South hills

**Approved by:** ..... **Signature & Date:** .....

### 3. Distribution List

<b>Position</b>	<b>Date</b>	<b>Location of Documents</b>
Rail Safety Manager		Original held on GOOGLE secure Website
STM WEB SITE		Updated regularly and put onto the STM Web site.

## **Risk Register**

The Risk Register records all of the hazards that have been identified in the operating environment, along with the associated risks. It records how STM goes about controlling these risks and the staff who have oversight for risk control activity.

The Risk Register also includes references to relevant sections of this Rail Safety Management Plan and associated procedures, standards and guidance material that are relevant to each risk control.

Risk assessments were carried out in consultation with qualified and knowledgeable staff and members. These are people who bring extensive industry experience to the risk assessment process.

Only risks identified as HIGH LEVEL (intolerable) will be managed by the Risk Action Plans.

All other risks will be accepted or reviewed to see if they can be improved.

This Risk Register has a number of sheets linked. The sheets and their links are:

1	Document Control Record	Contains the Header Page and the Document Control Pages which details of all version. Note the Version Number on the Header Page is linked to the Version Number on the Document Control Page.
2	Layout of Sheets	This page details the various pages used and their links to other sheets.
3	Scope and Context	Defines the Scope and Context of the STM activities where the risks were considered.
4	Risk Matrix	Displays the Risk Matrix used to assess the risks listed.
5	List of Risks and their ratings	Lists all of the lists identified and assessed.
6	List of Rejected Controls	This sheet is linked to the List of Risks by the Risk number and lists any controls that STM rejected with the reasons.
7	Doc No. & Desc.	Lists the SMS document numbers and descriptions.
8	Notes or Comments	Includes any notes or comments about the Risk Register.

**Definitions**

NPWS	National Parks & Wildlife Service
OIC	Officer in Charge
PPE	Personal Protective Equipment
Road vehicle	Includes all motor vehicle and bicycles
RNP	Royal National Park
RMS	Roads and Maritime Services, part of Transport for NSW.
RSW	Rail Safety Worker
RSMS	Rail Safety Management System
RTA	Roads and Traffic Authority now renamed RMS
TOH	Tramway Operation Handbook (STM6062A and B)

**Number of Risks by Hazard Category**

	H	E	C
<b>1 - Museum Operations - Infrastructure</b>	5	27	66
<b>2 - Museum Operations - tram operating</b>	6	10	51
<b>3 - Museum Operations - Passenger/Crew Safety</b>	5	11	28
<b>4 - Worker Safety</b>	7	35	51
<b>5 - Security</b>	6	10	12
<b>6 - Other Organisations Using STM for Training</b>	5	5	11
<b>7 - Other</b>	1	1	1
<b>Total Number of risks</b>	<b>35</b>	<b>99</b>	<b>220</b>

H - Hazards

E - Events

C - Cause/Mechanism

# 000000SYDNEY TRAMWAY MUSEUM

## OVERVIEW OF MUSEUM ACTIVITIES

Date  
Changed

### Sydney Tramway Museum Operations

Sydney Tramway Museum (STM) operates Museum and tourist tram services, using heritage tram rolling stock, over a 3.3 kilometre section of the tramline between Sutherland and the Royal National Park, providing a tourist attraction for people visiting the Sutherland district.

STM is operated by its members on a voluntary, not-for-profit basis.

### Operations of the Museum lines

All trams operating on both the Sutherland and RNP lines carry a first box and the traffic crews carry a mobile phone to contact the OIC in the event of an emergency. These are checked by the Starter each time before a tram begins its journey to the terminus.

On all lines outside the Museum, the Staff and Ticket system operates and all services are scheduled. Also UP and DOWN tracks operate on all double tracks.

### Sutherland Line

The Museum was relocated from the RNP site to Loftus in the 1980's. Operations on the new site started in March 1988 and trams operated from Loftus to near the Cronulla railway line at Sutherland. The tramline has 3 level crossings, Pitt Street, TAFE Crossing and Army crossing. Pitt Street is a public road and the other 2 crossings are over private roads. All 3 level crossings are uncontrolled with only STOP signs on the roadways as per the RMS standards.

There are no limitations on the operations of this line .

However Army Hill, on the Sutherland line, will be re-commissioned about January 2017 which will mean ALL drivers will need to be re-accredited for driving on this hill.

###

There is a compulsory STOP at Army level crossing when trams are travelling south towards the museum.

###

There is a compulsory STOP at Pitt Street when trams are travelling north towards Sutherland.

### Royal National Park Tramline

The tramline to the Royal National Park was built and operated by the NSW Government Railways from 1886 until 1991. The branch line originally diverged from the Illawarra line just south of Loftus.

In 1979 the original platform was closed and a new, single track platform built some 100m closer to Loftus.

The link to the Illawarra line was removed and In 1993 the STM took over the line and began operating trams to the RNP station.

The Princes Highway level crossing was remodeled when the Museum took over the line and the Roads and Traffic Authority (now the RMS) wanted a better camber and road surface on the crossing. The crossing lights, originally installed by the Railways, were updated by the RTA and STM in 1993, with additional warning signs and lights installed some 100 meters either side of the crossing by the RMS. Also sensors, detecting the presences of trams to activate the crossing lights, were in stalled by STM at the same time.

The crossing lights are maintained by STM but the RMS maintains the warning signs and lights as per the interface agreement.

There is a compulsory STOP on either side of the Princes Highway when trams are approaching the level crossing. They must wait until they receive the "T" signal on the crossing lights but the drivers must ensure that it is also safe to do so. That is to ensure that traffic has stopped on both sides of the crossing..

## **000000SYDNEY TRAMWAY MUSEUM**

The STM leases the line from the *NSW Lands Department* (**need to know the new department's name**) and is responsible for all operations and maintenance of the RNP line including clearing the undergrowth along the RNP line.

The current agreement with the RMS only allows trams to operate between sunrise and sunset 7 days per week.

### **Visitors**

The visitors to the Museum can be many and varied. They can be primary school groups doing "transport" assignments, pensioner groups, other groups or from families with young children or young teenagers and grand parents visiting with grand children.

These visitors can be local or from interstate and overseas. Many bus groups come from interstate and call in on their way to other destinations.

### **Special Days at the Museum**

There are a number of special days held at the museum to boost our revenues.

Some of the special days are:

1. Anniversary of a particular tramcar (usually celebrating 100 years old).
2. Special anniversaries of significant dates of the Museum (50th anniversary).
3. The annual "Trams After Dark" day for members and photographers
4. The annual "Tram Festival" day which celebrates the anniversary of the last day trams operated in Sydney
5. Special photographers days (day and evening) displaying trams of different cities
6. Special days where Transport Heritage NSW (previously RTM) visit by bringing a steam train to Loftus station.
7. Days providing transport for other celebrations at Loftus Oval from Sutherland
8. "Back to the Fifties" day at the Museum where vintage cars are also on display.

Some of these days we also offer vintage bus rides around Loftus and have vintage car groups visit the museum.

### **SCOPE of RISK REVIEW**

This Risk Register covers the rail operations on the tramlines at Loftus

The Risk Register has been divided into a number of sections. The sections are:

#### **A - Museum Operations**

- Section 1 – Museum Operations - Infrastructure
- Section 2 - Museum Operations - tram operating
- Section 3 – Museum Operations - Passenger/Crew Safety
- Section 4 - Worker Safety
- Section 5 - Security
- Section 6 - Other Organisations Using STM for Training on its tram lines
- Section 7 - Other

### **Comments on the Register**

Below are some comments about the Risk Register that the Rail Safety Management Team (RSMT) feel should be mentioned for future reviewers to understand when reviewing the risks in this register.

**Risk Analysis Matrix**

Criteria for Sydney Tramway Museum (STM) Operations			Likelihood				
			Extremely rare event	Rare event	Not Likely to occur	Likely to occur	Almost certain to occur
Phrase	Consequence		1	2	3	4	5
Catastrophic	1 or more fatality and/or more than 10 serious injuries	A	A1	A2	A3	A4	A5
Critical	2-10 serious injuries	B	B1	B2	B3	B4	B5
Major	1 serious injury	C	C1	C2	C3	C4	C5
Minor	1 or more minor injuries ( <i>no treatment required</i> )	D	D1	D2	D3	D4	D5

High Level (intolerable)
  Moderate Level (Control)
  Low Level (Acceptable)

LIKELIHOOD (of adverse event occurring)		
1	Extremely rare event	Will occur once in exceptional circumstances at STM
2	Rare event	Has happened in the general rail industry but very unlikely at STM
3	Not Likely to occur	Heard of in heritage railway/tramway operations, but unlikely at STM
4	Likely to occur	Some reports for heritage railway /tramway operations, and likely at STM
5	Almost certain to occur	Expected at STM every year or every few years

**Inherent Risk** – all risks were initially assessed with NO controls implemented.

**Residual Risk** – this risk rating was assessed with all of the Risk Controls identified on the left of this column.

**Rejected Controls** - these controls were identified and considered by the RSMT but rejected as unsuitable for various reasons.

**RISK CODES on Risk Register**

L = Likelihood

C = Consequence

RR = Risk Rating

SFARP = So Far As Reasonably Possible

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Risk No.	Hazard	Event	Cause / Mechanism	Inherent Risk			No.	Risk Controls	Reference for controls	Responsible Person	Residual Risk			SFAIRP	Additional Controls	Responsible Person	Amended Risk			Date Added / Adjusted		
				L	C	RR					L	C	RR				L	C	RR			
<b>Hazard Category :- 1 - Museum Operations - Infrastructure</b>																						
1.1.1.1	Operating a tram on the Museum's tramlines	Derailment of tram	Obstacle, person or animal on track	4	B	High	1	Trams travel at low speeds.	STM6062B	Tram driver	2	B	Med.	Yes					20/12/2016			
				2	Specific speed restrictions in place where necessary	STM6062B & TSN1606	Operations Manager														22/11/2016	
				3	Good visibility of tram line	STM6063	Infrastructure Manager															
				4	Tram driver uses audible devices	STM6062B	Tram driver															20/12/2016
				5	Track inspections on first trip of the day	STM6019	Tram Crew															20/12/2016
				6	STM Emergency procedures	STM6034	Rail Safety Manager															
				7	Vegetation Control in place	STM6063	Infrastructure Manager															
1.1.1.2			Animal suddenly enters track near tram.	4	B	High	1	Trams travel at low speeds.	STM6062B	Tram driver	2	B	Med.	Yes					20/12/2016			
							2	Specific speed restrictions in place where necessary	STM6062B & TSN1606	Operations Manager									22/11/2016			
							3	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016			
							4	STM Emergency procedures	STM6034	Rail Safety Manager												
							5	Vegetation Control in place	STM6063	Infrastructure Manager												
1.1.1.3			Tram speeding due to driver action (travelling too fast)	4	B	High	1	Driver training	STM6062B	Operations Manager	2	B	Med.	Yes								
							2	Operational Rules	STM6062B & TSN1606	Operations Manager									22/11/2016			
							3	Observer and/or conductor on tramcars	STM6146	Operations Manager									16/12/2016			
							4	Operational Performance Audits conducted	STM6114	Operations Manager												
							5	STM Emergency procedures	STM6034	Rail Safety Manager												
1.1.1.4			Tram speeding due to driver under the influence of drug/alcohol	3	A	High	1	OIC check staff when signing on (declaration)	STM6070	Traffic Manager	2	A	Med.	Yes								
							2	Drug and alcohol policy	STM6130	Rail Safety Manager												
							3	Random D&A testing by ONRSR	Rail Safety Act	ONRSR												
							4	Drug testing as part of health standards	STM6066	Rail Safety Manager												
							5	STM Emergency procedures	STM6034	Rail Safety Manager												
1.1.1.5			Tram speeding due to driver having a "health incident"	4	A	High	1	Medicals completed as per requirements	STM6016	Rail Safety Manager	2	A	Med.	Yes								
							2	OIC check staff when signing on (declaration)	STM6070	Officer-in-Charge									20/12/2016			
							3	Observer, conductor or Safety (Deadman) controls	STM6146	Operations Manager												
							4	Specific speed restrictions in place where necessary	STM6062B	Operations Manager												
							5	STM Emergency procedures	STM6034	Rail Safety Manager												
1.1.1.6			Tram speeding due to driver fatigued	4	A	High	1	OIC check staff when signing on (declaration)	STM6070	Officer-in-Charge	1	A	Med.	Yes					20/12/2016			
							2	Fatigue policy in place	STM6039	Operations Manager												
							3	Observer, conductor or Safety (Deadman) controls	STM6146	Operations Manager									16/12/2016			
							4	Vigilance and awareness by other workers	STM6042	Officer-in-Charge												
							5	Crews assessed by OIC and other workers during the day	STM6081	Officer-in-Charge									20/12/2016			
							6	Limited cab comfort in older trams	Tramcar design	Traffic Manager												

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				L	C	RR					L	C	RR				L	C	RR	
							7	All tram trips are maximum of 10 minutes duration	Length of track	Traffic Manager										
							8	On special days, fatigue taken into account in roster	Staff Rosters	Operations Manager										
							9	Specific speed restrictions in place where necessary	STM6062B	Operations Manager										
							10	Additional crews rostered on special days	Staff Rosters	Operations Manager										
							11	Operations Manager plans timetable	Staff Rosters	Operations Manager										
1.1.1.7			Tram speeding due to driver competency	4	B	High	1	Driver training	STM6062B	Operations Manager	2	B	Med.	Yes						
							2	Operational Rules	STM6062B	Operations Manager										
							3	Observer and/or conductor on tramcars	STM6146	Operations Manager									16/12/2016	
							4	Operational Performance Audits conducted	STM6114	Operations Manager										
							5	STM Emergency procedures	STM6034	Rail Safety Manager										
							6	Specific speed restrictions in place where necessary	STM6062B & TSN1606	Operations Manager									22/11/2016	
1.1.1.8			Equipment failure on tram	4	B	High	1	Trams checked before start and end of day	STM6062B STM6031	Tram driver	2	C	Med.	Yes					20/12/2016	
							2	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							3	Specific speed restrictions in place where necessary	STM6062B	Operations Manager										
							4	Trams inspected as per procedures	STM6074	Workshop Manager									20/12/2016	
							5	Defect detecting and reporting procedures	STM6031	Workshop Manager									20/12/2016	
							6	Low mileage of trams travelled each year	STM6122	Traffic Manager										
							7	Remote reverser tramcars are left in the "UP hill" position on ALL grades and at the top of grades to ensure that the Fourth Emergency brake will operate if the brakes fail	STM6062B Sect 818	Tram Crew									20/12/2016	
1.1.1.9			Track failure due to degraded infrastructure	4	B	High	1	Tram crews familiarity of track	STM6062B	Tram driver	3	C	Med.	Yes					20/12/2016	
							2	Specific speed restrictions in place where necessary	STM6062B	Operations Manager										
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Regular inspections of track and sleepers replaced when required	STM6024 STM6028	Infrastructure Manager										
							5	Light axle loadings												
1.1.1.10			Pre-start track inspections using first trip of the day	2	A	High	1	Driver training	STM6062B	Operations Manager	3	C	Med.	Yes					Dec-2015	
							2	Specific speed restrictions in place where necessary	STM6062B	Operations Manager									Dec-2015	
							3	Trams travel at low speeds.	STM6062B	Tram driver									1/12/2015 20/12/2016	
							4	Good line of sight	STM6063	Infrastructure Manager									Dec-2015	
							5	Crews carry mobile phones	STM6019	Tram Crew									1/12/2015 20/12/2016	
							6	Completed inspections carried out on trams and verified by the OIC	STM6019	Operations Manager									Dec-2015	
1.1.1.11			Tight curves on tram tracks	4	B	High	1	Driver training	STM6062B	Operations Manager	1	C	Low	Yes						
							2	Specific speed restrictions in place where necessary	STM6062B	Operations Manager										
							3	Trams travel at walking pace	STM6062B	Tram driver									20/12/2016	

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				L	C	RR					L	C	RR				L	C	RR	
							4	Cross Street not normally used in daily operations	STM6062B Section 627	Operations Manager									22/11/2016	
							5	Rails greased regularly.												
1.1.2.1		Tram hits obstacle	Crews fail to notice gates closed across tracks	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	D	Med.	Yes					20/12/2016	
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver										
							4	Good visibility of gates	STM6063	Infrastructure Manager										
							5	Warning signs on gates		Infrastructure Manager										
1.1.2.2			Object close to moving trams	4	C	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	C	Med.	Yes					20/12/2016	
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver										
							4	Good visibility of tram line	STM6063	Infrastructure Manager										
							5	Track inspections on first trip of the day	STM6019	Tram driver									20/12/2016	
							6	Incident reporting process	STM6033	Rail Safety Manager										
							7	STM Emergency procedures	STM6034	Rail Safety Manager										
							8	Vegetation Control in place	STM6063	Infrastructure Manager										
1.1.3.1		Cyclist crossing RNP line	Cyclists unaware trams operate on the RNP line.	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	C	Med.	Yes					20/12/2016	
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Good visibility of tram line	STM6063	Infrastructure Manager										
							5	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							6	Warning signs installed at crossing warning cyclists trams operating on the line.		Infrastructure Manager										
							7	Drivers warned about cyclists crossing line.	Traffic meeting	Traffic Manager										
							8	STM Emergency procedures	STM6034	Rail Safety Manager										
1.1.4.1		Driver misinterprets bell or buzzer signal	Bell or buzzer activated by passenger	4	A	High	1	Crew vigilance	STM6062B	Tram driver	3	C	Med.	Yes					20/12/2016	
							2	Conductor can cancel "go" signal	STM6062B	Tram Crew									20/12/2016	
1.1.5.1		Electrocution	Tram electrically isolated from running rails, resulting in electrocution of staff or passenger	4	A	High	1	Loss of power detection	STM6062B	Operations Manager	2	C	Low	YES						
							2	Driver training - emergency procedures	STM6062B	Operations Manager										
							3	Crew training	STM6062B	Tram Crew									20/12/2016	
							4	STM Emergency procedures	STM6034	Rail Safety Manager										
1.1.6.1		Derailment as a result of rail buckle	Rail buckle causes tram to derail or spread track	4	A	High	1	Track inspections on first trip of the day	STM6081 STM6019	Tram Crew	2	C	Low	YES	Increased frequency of inspections				20/12/2016	
							2	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							3	Regularly inspections of tracks	STM6028	Infrastructure Manager										
							4	Good visibility of tram line	STM6063	Infrastructure Manager										
							5	All new/ replacement works carried out to recognised standards	STM6024	Infrastructure Manager										
							6	STM Emergency procedures	STM6034	Rail Safety Manager										
							7	Specific Speed restrictions in place when necessary	Safety Notices	Infrastructure Manager										

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				L	C	RR					L	C	RR				L	C	RR													
1.1.7.1		Derailment as a result of points moving under tram	Points move under tram while it is passing over it, through points not locking home or by unplanned operation	4	A	High	1	Track inspections on first trip of the day	STM6081 STM6019	Tram Crew	2	C	Low	YES	Increased frequency of inspections					20/12/2016												
							2	Crew vigilance	STM6062B	Tram Crew																		20/12/2016				
							3	Trams travel at low speeds.	STM6062B & TSN1605	Tram driver																				22/11/2016 20/12/2016		
							4	Regular maintenance and inspections of tracks	STM6028	Infrastructure Manager																						
							5	All new/ replacement works carried out to recognised standards	STM6024	Infrastructure Manager																						
							6	Specific speed restrictions in place where necessary.	STM6062B	Operations Manager																						
1.1.8.1		Unauthorised movement at points	Movement against incorrectly set points causes derailment	4	A	High	1	Crew vigilance	STM6062B	Tram Crew	2	C	Low	YES	Increased frequency of inspections					20/12/2016												
							2	Trams travel at low speeds.	STM6062B & TSN1605	Tram driver																	22/11/2016 20/12/2016					
							3	Regular maintenance and inspections of tracks	STM6028	Infrastructure Manager																						
							4	All new/ replacement works carried out to recognised standards	STM6024	Infrastructure Manager																						
							5	STM Emergency procedures	STM6034	Rail Safety Manager																						
1.1.9.1		Derailment due to degraded infrastructure condition	Poor track condition causes tram to derail or spread track	4	A	High	1	Track inspections on first trip of the day	STM6081 STM6019	Tram driver	2	C	Low	YES	Increased frequency of inspections					20/12/2016												
							2	Crew vigilance	STM6062B	Tram Crew																		20/12/2016				
							2	Trams travel at low speeds.	STM6062B	Tram driver																				20/12/2016		
							3	Regular inspections and maintenance of tracks	STM6028	Infrastructure Manager																						
							4	Good visibility of tram line	STM6063	Infrastructure Manager																						
							5	All new/ replacement works carried out to recognised standards	STM6024	Infrastructure Manager																						
1.1.10.1		Derailment due to component failure on tram	Component from tram fails, falls off or partially releases and derails tram	4	A	High	1	Annual checks of trams	STM6074	Workshop Manager	2	C	Low	YES	Increased frequency of inspections																	
							2	Trams checked before start and end of day	STM6062B STM6031	Tram Crew																			20/12/2016			
							3	Crew vigilance	STM6062B	Tram Crew																				20/12/2016		
							4	Trams travel at low speeds.	STM6062B	Tram driver																					20/12/2016	
							5	Regular inspections and maintenance of tracks	STM6028	Infrastructure Manager																						
							6	All new/ replacement works carried out to recognised standards	STM6024	Infrastructure Manager																						
							7	STM Emergency procedures	STM6034	Rail Safety Manager																						
1.1.11.1		Brakes fail	Rupture of air tank causing brakes to fail or other equipment failure	4	A	High	1	Annual checks of trams	STM6074	Workshop Manager	2	C	Low	YES																		
							2	Trams checked before start and end of day	STM6062B STM6031	Tram Crew																			20/12/2016			
							3	Regular inspections and maintenance of tracks	STM6028	Infrastructure Manager																				20/12/2016		
							4	Crew vigilance - safety valves pressure gauges visible to drivers in cabs	STM6062B	Tram Crew																					20/12/2016	
							5	Trams travel at low speeds.	STM6062B	Tram driver																						20/12/2016

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Risk No.	Hazard	Event	Cause / Mechanism	Inherent Risk			No.	Risk Controls	Reference for controls	Responsible Person	Residual Risk			SFAIRP	Additional Controls	Responsible Person	Amended Risk			Date Added / Adjusted
				L	C	RR					L	C	RR				L	C	RR	
							6	Low pressure to pressure vessel regulations	STM6062B	Operations Manager										
							7	Hand brakes available to drivers	STM6062B	Tram Crew									20/12/2016	
							8	Brakes tested before descending steep hills on each trip	STM6062B Section 818	Operations Manager									20/12/2016	
							9	When travelling in convoy, only 1 tram allow allowed on Army Hill or on the hill between Depot Junction and South Shed.	STM6062B Secion.628	Operations Manager									24/11/2016	
1.1.12.1		Derailment due to unauthorised or improper use of handbrakes or other tram equipment by passengers or workers	Brakes or other equipment activated or deactivated by passengers or other workers causes derailment	3	B	Med.	1	Crew vigilance	STM6062B & TSN1602	Tram Crew	2	C	Low	Yes					22/11/2016 20/12/2016	
							2	Trams chocked when stabled	STM6062B & TSN1602	Tram Crew									22/11/2016 20/12/2016	
							3	Trams visible by crew at all times	STM6062B & TSN1602	Tram Crew									22/11/2016 20/12/2016	
							4	Driving tools kept in secure place	STM6062B & TSN1601	Tram Crew									22/11/2016 20/12/2016	
							5	Only 1 set of driving tools per tram kept by driver	STM6062B & TSN1601	Operations Manager									22/11/2016	
1.1.13.1		Collision of tram with buffer stop at RNP platform	Tram fails to stop due to mechanical failure on tram	4	A	High	1	Trams checked before start and end of day	STM6062B STM6031	Tram Crew	1	D	Low	Yes					20/12/2016	
							2	Driver training - emergency procedures	STM6062B	Operations Manager										
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Annual checks of trams	STM6074	Workshop Manager										
							5	Buffer stop 2 to 3 car lengths from normal stopping place		Tram driver										
							6	Observer, conductor or Safety (Deadman) controls on trams		Operations Manager									16/12/2016	
							7	Placing a marker on the approach to RNP platform indicating a mandatory reduction to a set speed when entering the platform		Operations Manager										
1.1.13.2			Tram fails to stop due to track condition	4	A	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	1	D	Low	Yes						
							2	Crew vigilance	STM6062B	Tram Crew									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Track inspections on first trip of the day	STM6081 STM6019	Tram driver									20/12/2016	
							5	All new/replacement works carried out as per documented standards	STM6176	Infrastructure Manager										
							6	Incident reporting process	STM6033	Rail Safety Manager										
							7	STM Emergency procedures	STM6034	Rail Safety Manager										
1.1.13.3			Tram speeding due to driver under the influence of drug/alcohol	3	A	High	1	OIC check staff when signing on (declaration)	STM6070	Traffic Manager	1	C	Low	Yes						
							2	Drug and alcohol policy	STM6130	Rail Safety Manager										
							3	Random D&A testing by ONRSR	Rail Safety Act	ONRSR										
							4	Drug testing as part of health standards	STM6066	Rail Safety Manager										
							5	STM Emergency procedures	STM6034	Rail Safety Manager										
1.1.13.4			Tram fails to stop due to driver having a "health incident"	4	A	High	1	Medicals completed as per requirements	STM6016	Rail Safety Manager	1	C	Low	Yes						

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				L	C	RR					L	C	RR				L	C	RR	
							2	OIC check staff when signing on (declaration)	STM6070	Traffic Manager										
							3	Observer, conductor or Safety (Deadman) controls on trams	STM6146	Operations Manager										16/12/2016
							4	STM Emergency procedures	STM6034	Rail Safety Manager										
1.1.13.5			Tram speeding due to driver fatigued	4	A	High	1	OIC check staff when signing on (declaration)	STM6070	Traffic Manager	1	A	Med.	Yes						
							2	Fatigue policy in place	STM6039	Operations Manager										
							3	Observer, conductor or Safety (Deadman) controls on trams	STM6146	Operations Manager										16/12/2016
							4	Vigilance and awareness by other workers	STM6042	Traffic Manager										
							5	Compulsory stop by tram driver at crossing	STM6062B	Operations Manager										
							6	Crews assessed by OIC and other workers during the day	STM6081	Officer-in-Charge										
							7	Limited cab comfort in older trams	Tramcar design	Traffic Manager										
							8	All tram trips are maximum of 10 minutes duration	Length of track	Traffic Manager										
							9	On special days, fatigue taken into account in roster	Staff Rosters	Operations Manager										
							10	Additional crews rostered on special days	Staff Rosters	Operations Manager										
							11	Operations Manager plans timetable	Staff Rosters	Operations Manager										
1.1.13.6			Tram speeding due to driver competency	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	1	A	Med.	Yes						
							2	Operational Rules	STM6062B & TSN1606	Operations Manager										22/11/2016
							3	Observer and/or conductor on tramcars	STM6146	Operations Manager										16/12/2016
							4	Operational Performance Audits conducted	STM6114	Operations Manager										
							5	STM Emergency procedures	STM6034	Rail Safety Manager										
1.1.13.7			Tram skidding on tracks causes tram not to stop	4	B	High	1	Track inspections on first trip of the day	STM6019	Tram driver	1	A	Med.	Yes						20/12/2016
							2	Driver training - emergency procedures	STM6062B	Operations Manager										
							3	STM Emergency procedures	STM6034	Rail Safety Manager										
1.1.13.8			Obstacle on or near the track	4	B	High	1	Track inspections on first trip of the day	STM6019	Tram Crew	1	A	Med.	Yes						20/12/2016
							2	Driver training - emergency procedures	STM6062B	Operations Manager										
							3	Trams travel at low speeds.	STM6062B	Tram driver										20/12/2016
							4	Good visibility of tram line	STM6063	Infrastructure Manager										
							5	Incident reporting process	STM6033	Rail Safety Manager										
							6	Vegetation controlled and platforms outside loading gauge	STM6063 STM6024	Infrastructure Manager										
							7	Instructions given to passengers by crew not to lean out of tram	STM6062B	Operations Manager										
1.1.14.1		Move a steam tram motor moved around the museum for display purposes	Steam breaks away from towing tram	5	A	High	1	Steam tram will be towed at low speeds.		Workshop Manager	2	D	Low	Yes						15/05/2017
							2	Steam tram will not be moved when the public are visiting	STM Board	Workshop Manager										15/05/2017
							3	Steam tram will be stored in Display Hall	Powerhouse Specified	Workshop Manager										15/05/2017
							4	Tram will Not be in steam	Powerhouse Specified	Workshop Manager										15/05/2017

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				L	C	RR					L	C	RR				L	C	RR	
							5	Tram will only be moved short distances.	Under supervision of Powerhouse	Supervisor of Powerhouse									15/05/2017	
							6	Steam tram has aworking handbrake	Powerhouse Museum	Workshop Manager									15/06/2017	
							7	Steam tram will be towed by 99u and be connected to the steam tram by a coupling and 2 safety chains.	Under supervision of Powerhouse	Supervisor of Powerhouse									15/06/2017	
1.1.14.2			Obstacle, person on or near the track	5	A	High	1	Steam tram will be towed at low speeds.		Workshop Manager	2	D	Low	Yes					15/05/2017	
							2	Steam tram will not be moved when the public are visiting	STM Board	Workshop Manager									15/05/2017	
							3	Tram will Not be in steam	Powerhouse Specified	Workshop Manager									15/05/2017	
							4	Steam tram within STM's loading gauge	STM6024	Workshop Manager									15/05/2017	
1.1.15.1		Unable to stop at markers at bottom of Army Hill and South Hill	Descending the hill too fast for braking capacity of tram	5	A	High	1	Trams travel at low speeds.	STM6062B	Tram driver	2	B	Med.	Yes					2/07/2017	
							2	Operating Rulkes - Compulsory stops at bottom of hills	STM6062B-0604 and T/S1616	Tram driver									2/07/2017	
							3	Observer and/or conductor on tramcars	STM6146	Operations Manager									2/07/2017	
1.2.1.1	Overhead Wire	Person struck by falling trolley wire	Tram dewires and breaks trolley wire overhead	4	A	High	1	Overhead serviced/ maintained regularly	STM6029	Overhead Supervisor	2	C	Med.	Yes						
							2	Track inspections on first trip of the day	STM6081 STM6019	Tram driver									20/12/2016	
							3	Defect reporting procedures in place	STM6033	Tram Crew										
							4	Overhead constructed to recognised standards	STM6025	Chief Engineer										
							5	Tram crew training	STM6062B	Traffic Manager										
							6	STM Emergency procedures	STM6034	Rail Safety Manager										
1.2.2.1		Electrocution from live overhead	Tram dewires and breaks trolley wire overhead	4	A	High	1	Overhead serviced/ maintained regularly	STM6029	Overhead Supvr. Operations Manger	2	C	Med.	Yes						
							2	Defect reporting procedures in place	STM6033	Tram Crew										
							3	Overhead constructed to recognised standards	STM6025	Overhead Supervisor										
							4	Tram crew training	STM6062B	Operations Manager										
							5	STM Emergency procedures	STM6034	Rail Safety Manager										
							6	Specific Speed restrictions in place when necessary (i.e. when heat causes the overhead to sag increasing the risk of dewirement)	Safety Notices when required.	Operations Manager										
1.3.1.1	Level Crossings in general	Collision between tram and Road Vehicle	Tram fails to stop at level crossing due to mechanical failure on tram	4	A	High	1	Trams checked before start and end of day	STM6062B STM6031	Tram Crew	2	B	Med.	Yes					20/12/2016	
							2	Driver training - emergency procedures	STM6062B	Operations Manager										
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Specific speed restrictions in place where necessary	STM6062B	Operations Manager										
							5	Compulsory STOP at Pitt Street and RNP crossings	STM6062B	Operations Manager										
							6	Annual checks of trams	STM6074	Workshop Manager										
1.3.1.2			Tram fails to stop at crossing due to track condition	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	B	Med.	Yes						
							2	Crew vigilance	STM6062B	Tram Crew									20/12/2016	

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				L	C	RR					L	C	RR				L	C	RR	
							3	Track inspections on first trip of the day	STM6019	Tram Crew									20/12/2016	
							4	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							5	All new/replacement works carried out as per documented standards	STM6176	Infrastructure Manager										
							6	Incident reporting process	STM6033	Rail Safety Manager										
							7	Compulsory STOP at Pitt Street and RNP crossings	STM6062B	Operations Manager										
1.3.1.3			Road Vehicle fails to stop at crossing as a result of insufficient sighting distance	5	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	B	Med.	Yes						
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Incident reporting process	STM6033	Rail Safety Manager										
							6	Compulsory STOP at Pitt Street and RNP crossings	STM6062B	Operations Manager										
							7	Vegetation Control in place to clear and removal of obstructions / vegetation during inspections.	STM6063	Infrastructure Manager										
1.3.1.4			Road Vehicle fails to stop as a result of absence of approach signage	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	B	Med.	Yes						
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Incident reporting process	STM6033	Rail Safety Manager										
							6	Compulsory STOP at Pitt Street and RNP crossings	STM6062B	Operations Manager										
							7	Regular inspection of signage		Infrastructure Manager										
1.3.1.5			Road Vehicle fails to stop as a result of road surface condition	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	B	Med.	Yes						
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Compulsory STOP at Pitt Street and RNP crossings	STM6062B	Operations Manager										
1.3.1.6			Collision between emergency vehicle and tram	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	B	Med.	Yes						
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Good visibility of tram line	STM6063	Infrastructure Manager										
							6	Compulsory STOP at Pitt Street and RNP crossings	STM6062B	Operations Manager										
							7	Trams crews given instruction on who has the right of way.	STM6110	Operations Manager										
1.3.1.7			Vehicle driver assume only 1 tram crossing	5	A	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	B	Med.	Yes						
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	



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				L	C	RR					L	C	RR				L	C	RR	
							5	Good visibility of tram line	STM6063	Infrastructure Manager										
							6	Compulsory STOP at Pitt Street and RNP crossings	STM6062B	Operations Manager										
1.3.1.8			Vehicles parked across level crossing at Army Depot	5	A	High	1	The access gates to the Army Depot have been moved to allow for most vehicles to stop clear of of the tramline.	Discussions with Army	Operations Manager	3	B	Med.	Yes					20/11/2016	
							2	Good visibility of the level crossing	STM6063	Infrastructure Manager									20/11/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Compulsory STOP at the bottom of Army Hill north of the Army Depot level crossing	STM6062B	Operations Manager									20/11/2016	
1.3.2.1		Pedestrian and tram collide	Pedestrian uses level crossing to the road cross	5	A	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	B	Med.	Yes						
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Good visibility of tram line	STM6063	Infrastructure Manager										
							5	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							6	Compulsory STOP at Pitt Street and RNP level crossings	STM6062B	Operations Manager										
1.3.2.2			Pedestrian does not notice tram approaching	4	B	High	1	Crew vigilance	STM6062B	Tram driver	2	B	Med.	Yes					20/12/2016	
							2	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							3	Good visibility of tram line	STM6063	Infrastructure Manager										
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Compulsory STOP at Pitt Street level crossing	STM6062B	Operations Manager										
							6	Vegetation Control in place	STM6063	Infrastructure Manager										
							7	On RNP a fire trail beside the tramline exists.		Infrastructure Manager										
1.3.3.1		Derailment of tram on level crossing	Tram speeding due to driver action (travelling too fast)	5	A	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	B	Med.	Yes						
							2	Operational Rules	STM6062B	Operations Manager										
							3	Observer and/or conductor on tramcars	STM6146	Operations Manager									16/12/2016	
							4	Operational Performance Audits conducted	STM6114	Operations Manager										
							5	Compulsory STOP at Pitt Street and RNP crossings	STM6062B	Operations Manager										
							8	STM Emergency procedures	STM6034	Rail Safety Manager										
1.3.3.2			Tram fails to stop at crossing due to track condition	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	B	Med.	Yes						
							2	Track inspections on first trip of the day	STM6019	Operations Manager										
							3	Operational Rules	STM6062B	Operations Manager										
							4	Observer and/or conductor on tramcars	STM6146	Operations Manager									16/12/2016	
							5	Operational Performance Audits conducted	STM6114	Operations Manager										
							6	Compulsory STOP at Pitt Street and RNP crossings	STM6062B	Operations Manager										
							7	All new/replacement works carried out as per documented standards	STM6176	Infrastructure Manager										

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				L	C	RR					L	C	RR				L	C	RR										
1.3.4.1		Overhead wire struck by overheight vehicle	Vehicle over legal height and brings down the tramway overhead across the crossing	5	A	High	1	Trolley wire clearance 5.6m, RMS maximum truck height is 4.6m	RMS Standards	Infrastructure Manager	2	A	Med.	Yes															
							2	Power supply for the overhead turned OFF when trams not operating.	STM6110	Officer-in-Charge																			
							3	Electrical protection set at low current with HRC fuses.	Electrical Standards	Infrastructure Manager																			
							4	Compulsory STOP at Pitt Street crossing	STM6062B	Operations Manager																			
							5	Good visibility of tram line	STM6063	Infrastructure Manager																			
1.4.1.1	Unique to level crossings on Sutherland line	Collision between tram and Road Vehicle	Road Vehicle fails to stop as a result of crossing not illuminated	5	A	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	B	Med.	Yes															
							2	Crew vigilance	STM6062B	Tram driver															20/12/2016				
							3	Trams travel at low speeds.	STM6062B	Tram driver																	20/12/2016		
							4	Tram driver uses audible devices	STM6062B	Tram driver																		20/12/2016	
							5	Trams illuminated at night including headlight	STM6062B	Operations Manager																			
							6	Good visibility of tram line	STM6063	Infrastructure Manager																			
							7	Compulsory STOP at Pitt Street crossing	STM6062B	Operations Manager																			
1.4.1.2			Vehicles not stopping due to SSC changing the signs from STOP to GIVE WAY at Pitt Street level crossing	5	A	High	1	Have SSC to replace the signs back to STOP signs		SSC/RSM	2	C	Med.	Yes									21/08/2016						
							2	Move the 50kph for motorists entering Rawson Avenue further south on Princes Highway		SSC																	21/08/2016		
							3	Have SSC clear the trees and shrubs on Rawson Avenue		SSC																		21/08/2016	
							4	Have SSC install clearer warning signs on Rawson Avenue and Princes Highway		SSC																		21/08/2016	
1.4.1.3			Motorists vision from the roadway is not good when travelling from Loftus Station they DO NOT STOP	5	A	High	1	Have SSC to replace the signs back to STOP signs		SSC	2	C	Med.	Yes									21/08/2016						
							2	Have TAFE northern boundary wall cut back to improve the vision for motorists		SSC/TAFE																21/08/2016			
1.5.1.1	Unique to Princes Highway Level Crossing	Collision between tram and Road Vehicle	Tram fails to stop at level crossing due to mechanical failure on tram	4	A	High	1	Trams checked before start and end of day	STM6062B STM6031	Tram Crew	4	C	Low	Yes									20/12/2016						
							2	Driver training - emergency procedures	STM6062B	Operations Manager																			
							3	Trams travel at low speeds.	STM6062B	Tram driver																			20/12/2016
							4	Specific speed restrictions in place where necessary	STM6062B	Operations Manager																			
							5	Warning crossing lights installed at crossing	Road Standards	RMS																			
							6	ARMCO safety rails installed on Princes Highway	Road Standards	RMS																			
							7	Annual checks of trams	STM6074	Workshop Manager																			
							8	STM Emergency procedures	STM6034	Rail Safety Manager																			
1.5.1.2			Tram fails to stop at crossing due to track condition	5	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	B	Med.	Yes															
							2	Track inspections on first trip of the day	STM6081 STM6019	Tram Crew																20/12/2016			
							3	Crew vigilance	STM6062B	Tram driver																	20/12/2016		

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				L	C	RR					L	C	RR				L	C	RR	
							4	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							5	All new/replacement works carried out as per documented standards	STM6176	Infrastructure Manager										
							6	Warning crossing lights installed at crossing	Road Standards	RMS										
							7	Incident reporting process	STM6033	Rail Safety Manager										
							8	Compulsory STOP at Pitt Street and RNP crossings	STM6062B	Operations Manager										
1.5.1.3			Tram fails to stop at crossing due to crossing signal failure	5	A	High	1	Signals checked before start of day	STM6110	Tram Crew	2	B	Med.	Yes					20/12/2016	
							2	Driver training - emergency procedures	STM6062B	Operations Manager										
							3	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							4	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							5	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							6	Good visibility of tram line	STM6063	Infrastructure Manager										
							7	Incident reporting process	STM6033	Rail Safety Manager										
1.5.1.4			Tram starts against crossing signal	5	A	High	1	Observer and/or conductor on trams	STM6146	Operations Manager	2	B	Med.	Yes					16/12/2016	
							2	Driver training	STM6062B	Operations Manager										
							3	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							4	Compulsory stop by tram driver at crossing	STM6062B	Operations Manager										
							5	Warning crossing lights installed at crossing to detect tram	Road Standards	RMS										
1.5.1.5			Road Vehicle fails to stop at crossing as a result of insufficient sighting distance	4	B	High	1	Reduction in vehicle speed limit at crossing and on Princes Highway from 90 to 80 kph	Speed limit on Princes Highway	RMS	2	B	Med.	Yes						
							2	Driver training - must wait until road vehicles stop before crossing	STM6062B	Operations Manager										
							3	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							4	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							5	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							6	Warning crossing lights installed at crossing	Road Standards	RMS										
							7	Compulsory stop by tram driver at RNP crossing	STM6062B	Tram Crew									20/12/2016	
							8	Vegetation Control in place	STM6063	Infrastructure Manager										
1.5.1.6			Road Vehicle fails to stop as a result of failure of road side signal or absence of approach signage	4	B	High	1	Signals checked before start of day	STM6110	Tram Crew	2	B	Med.	Yes					20/12/2016	
							2	Driver training - must wait until road vehicles stop before crossing	STM6062B	Operations Manager										
							3	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							4	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							5	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							6	Compulsory stop by tram driver at RNP crossing	STM6062B	Operations Manager										
							7	Vegetation Control in place	STM6063	Infrastructure Manager										
1.5.1.7			Road Vehicle fails to stop as a result of road surface condition	4	B	High	1	Reduction in vehicle speed limit at crossing and on Princes Highway from 90 to 80 kph	Speed limit on Princes Highway	RMS	2	B	Med.	Yes						

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				L	C	RR					L	C	RR				L	C	RR	
							2	Driver training - must wait until road vehicles stop before crossing	STM6062B	Operations Manager										
							3	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							4	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							5	Compulsory stop by tram driver at RNP crossing	STM6062B	Operations Manager										
							6	Warning crossing lights installed at crossing	Road Standards	RMS										
							7	ARMCO safety rails installed on Princes Highway	Road Standards	RMS										
1.5.1.8			Collision between emergency vehicle and tram	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	B	Med.	Yes						
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Compulsory STOP at RNP level crossings	STM6062B	Operations Manager										
							6	Warning crossing lights installed at crossing	Road Standards	RMS										
							7	Good visibility of tram line	STM6063	Infrastructure Manager										
1.5.1.9			Road vehicle driver assume only 1 tram crossing	5	A	High	1	Crossing lights set for many trams to cross	STM6110	Infrastructure Manager	3	B	Med.	Yes						
							2	Driver training - emergency procedures	STM6062B	Operations Manager										
							3	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							4	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							5	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							6	Warning crossing lights installed at crossing to detect ALL trams	Road Standards	RMS										
							7	Good visibility of tram line	STM6063	Infrastructure Manager										
1.5.2.1		Pedestrian and tram collide	Pedestrian uses crossing to cross Princes Highway	4	B	High	1	Trams travel at low speeds.	STM6062B	Tram driver	2	B	Med.	Yes					20/12/2016	
							2	Driver training - emergency procedures	STM6062B	Operations Manager										
							3	Good visibility of tram line	STM6063	Infrastructure Manager										
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Compulsory stop by tram driver at level crossing	STM6062B	Operations Manager										
							6	Warning crossing lights installed at crossing	Road Standards	RMS										
1.5.2.2			Pedestrian does not notice tram approaching	5	A	High	1	Trams travel at low speeds.	STM6062B & TSN1606	Tram driver	2	B	Med.	Yes					22/11/2016 20/12/2016	
							2	Driver training - emergency procedures	STM6062B	Operations Manager										
							3	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							4	Good visibility of tram line	STM6063	Infrastructure Manager										
							5	Compulsory stop by tram driver at level crossing	STM6062B	Tram Crew									20/12/2016	
							6	Warning crossing lights installed at crossing	Road Standards	RMS										
1.5.3.1		Manual control of crossing lights	Lights and bells operate when no trams crossing.	3	B	Med.	1	Time limit activation of lights and bells in manual mode set to 2 minutes	STM6110	Infrastructure Manager	2	D	Low	Yes						

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				L	C	RR					L	C	RR				L	C	RR	
							2	Facility for manual mode secured in locked section hut	STM6110	Infrastructure Manager										
							3	Lights turned off when not in use.	STM6110	Infrastructure Manager										
1.5.4.1		Derailment of tram on level crossing	Tram speeding due to driver action (travelling too fast)	4	A	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	B	Med.	Yes						
							2	Operational Rules	STM6062B	Operations Manager										
							3	Observer and/or conductor on tramcars	STM6146	Operations Manager									16/12/2016	
							4	Operational Performance Audits conducted	STM6114	Operations Manager										
							5	Warning crossing lights installed at crossing to detect tram	Road Standards	RMS										
							6	ARMCO safety rails installed on Princes Highway	Road Standards	RMS										
1.5.5.1		Pedestrians near South Shed	Pedestrian steps out from behind the shed into the path of a tram	5	A	High	1	Trams travel at low speeds.	STM6062B	Tram driver	2	B	Med.	Yes					24/11/2016 20/12/2016	
							2	Tram drivers use audible devices when approaching the end of the shed	STM6062B	Tram driver									24/11/2016 20/12/2016	
							3	Short fence at north end of shed.	To be erected	Infrastructure Manager					Short fence at north end of shed.	Infrastructure Manager			24/11/2016	
TOTALS	5	27	66																	

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				L	C	RR					L	C	RR				L	C	RR						
<b>Hazard Category :- 2 - Museum Operations - tram operating</b>																									
2.1.1.1	Operating a tram on the Museum's tramlines	Tram involved in collision with another tram	Tram speeding due to driver action (travelling too fast)	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	C	Med.	Yes											
							2	Operational Rules including spacing between trams	STM6062B	Operations Manager															
							3	Observer and/or conductor on tramcars	STM6146	Operations Manager															16/12/2016
							4	Operational Performance Audits conducted	STM6114	Operations Manager															
							5	Good visibility of tram line	STM6063	Infrastructure Manager															
							6	Staff and ticket safe working employed on all single lines outside Museum	STM6062B	Tram Crew															20/12/2016
2.1.1.2			Tram speeding due to driver under the influence of drug/alcohol	3	A	High	1	OIC check staff when signing on (declaration)	STM6070	Officer-in-Charge	2	A	Med.	Yes						20/12/2016					
							2	Drug and alcohol policy	STM6130	Rail Safety Manager															
							3	Random D&A testing by ONRSR	Rail Safety Act	ONRSR															
							4	Drug testing as part of health standards	STM6066	Rail Safety Manager															
2.1.1.3			Tram speeding due to driver having a "health incident"	4	A	High	1	Medicals completed as per requirements	STM6016	Rail Safety Manager	2	A	Med.	Yes											
							2	OIC check staff when signing on (declaration)	STM6070	Traffic Manager															
							3	Observer, conductor or Safety (Deadman) controls on trams	STM6146	Operations Manager												16/12/2016			
							4	Specific speed restrictions in place where necessary	STM6062B	Tram Crew												20/12/2016			
2.1.1.4			Tram speeding due to driver fatigued	4	A	High	1	OIC check staff when signing on (declaration)	STM6070	Traffic Manager	1	A	Med.	Yes											
							2	Fatigue policy in place	STM6039	Operations Manager															
							3	Observer, conductor or Safety (Deadman) controls on trams	STM6146	Operations Manager												16/12/2016			
							4	Vigilance and awareness by other workers	STM6042	Traffic Manager															
							5	Crews assessed by OIC and other workers during the day	STM6081	Officer-in-Charge															
							6	Limited cab comfort in older trams	Tramcar design	Traffic Manager															
							7	All tram trips are maximum of 10 minutes duration	Length of track	Traffic Manager															
							8	On special days, fatigue taken into account in roster	Staff Rosters	Operations Manager															
							9	Specific speed restrictions in place where necessary	STM6062B	Operations Manager															
							10	Additional crews rostered on special days	Staff Rosters	Operations Manager															
							11	Operations Manager plans timetable	Staff Rosters	Operations Manager															
2.1.1.5			Tram speeding due to driver competency	4	B	High	1	Driver training	STM6062B	Operations Manager	3	C	Med.	Yes											
							2	Operational Rules including spacing between trams	STM6062B	Operations Manager															
							3	Observer and/or conductor on tramcars	STM6146	Operations Manager												16/12/2016			
							4	Operational Performance Audits conducted	STM6114	Operations Manager															
							5	Specific speed restrictions in place where necessary	STM6062B & TSN1606	Operations Manager												22/11/2016			

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				L	C	RR					L	C	RR				L	C	RR	
							6	Operations Manager plans timetable	Staff Rosters	Operations Manager										
2.1.1.6			Tram equipment failure	4	B	High	1	Trams checked before start and end of day	STM6031	Tram Crew	3	C	Med.	Yes					20/12/2016	
							2	Driver training - emergency procedures	STM6062B	Operations Manager										
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Hand brakes on all trams	STM6062B	Tram Crew									20/12/2016	
							5	Operating procedures where power is lost.	STM6062B	Tram Crew									20/12/2016	
							6	Remote reverser tramcars are left in the "UP hill" position on ALL grades and at the top of grades to ensure that the Fourth Emergency brake will operate if the brakes fail	STM6062B Sect 818	Tram Crew									20/12/2016	
2.1.1.7			Trams merging on Tramway Avenue	5	B	High	1	Driver training	STM6062B	Operations Manager	2	C	Med.	Yes						
							2	Operational Rules for merging	STM6062B	Operations Manager										
							3	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							4	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							5	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							6	Good visibility of tram line	STM6063	Infrastructure Manager										
							7	Cross Street not part of the running lines and no passengers travel on the trams in Cross Street	STM6062B	Operations Manager										
2.1.1.8			Public "play" with the controls due to trams being unattended at Railway Square	5	B	High	1	Driving tools kept in secure place	STM6062B & TSN1601	Tram Crew	2	C	Med.	Yes					16/07/2016 20/12/2016	
							2	Handbrakes applied when tram parked at Railway Square Waiting Shed terminus.	Traffic/Safety Notice 1602	Tram Crew									16/07/2016 20/12/2016	
							3	Only 1 set of driving tools per tram kept by driver	STM6062B & TSN1601	Operations Manager									16/07/2016	
							4	Crew vigilance and remain at the terminus when tram parked.	STM6062B & TSN1604	Tram Crew									16/07/2016 20/12/2016	
							5	All trams are chocked and crews cross check	STM6062B & TSN1605	Tram Crew									16/07/2016 20/12/2016	
							6	Trams parked on level sites	STM6062B & TSN1607	Tram Crew									16/07/2016 20/12/2016	
							7	Crew remain with tram unless properly secured against movement	Traffic/Safety Notice 1602	Tram Crew									16/07/2016 20/12/2016	
2.1.1.9			Wheel chock removed by persons unknown.	5	B	High	1	Handbrakes applied when tram parked at Railway Square Waiting Shed terminus.	Traffic/Safety Notice 1602	Tram Crew	2	C	Med.	Yes					16/07/2016 20/12/2016	
							2	Crew vigilance and remain at the terminus when tram parked.	STM6062B & TSN1604	Tram Crew									16/07/2016 20/12/2016	
							3	Trams parked on level sites	STM6062B & TSN1607	Tram Crew									16/07/2016 20/12/2016	
							4	Crew remain with tram unless tram secured against movements as per standards	Traffic/Safety Notice 1602	Tram Crew									16/07/2016 20/12/2016	
2.1.1.10			Handbrake released by persons unknown.	5	B	High	1	Crew vigilance and remain at the terminus when tram parked.	STM6062B & TSN1604	Tram Crew	2	C	Med.	Yes					16/07/2016 20/12/2016	
							2	Trams parked on level sites	STM6062B & TSN1607	Tram Crew									16/07/2016 20/12/2016	
							3	All trams are chocked and crews cross check	Traffic/Safety Notice 1602	Tram Crew									16/07/2016 20/12/2016	

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				L	C	RR					L	C	RR				L	C	RR	
							4	Crew remain with tram unless tram secured against movements as per standards	Traffic/Safety Notice 1602	Tram Crew									16/07/2016 20/12/2016	
2.1.1.11			Tram runs away and collides with another tram because it was not correctly secured	5	A	High	1	All trams are chocked and crews cross check	Traffic/Safety Notice 1602	Tram Crew	2	C	Med.	Yes					16/07/2016 20/12/2016	
							2	Handbrake applied	Traffic/Safety Notice 1602	Tram Crew									16/07/2016 20/12/2016	
							3	Crew vigilance and remain at the terminus when tram parked.	Traffic/Safety Notice 1604	Tram Crew									16/07/2016 20/12/2016	
							4	Trams parked on level sites	Traffic/Safety Notice 1609	Tram Crew									16/07/2016 20/12/2016	
							5	Crews of trams parked on the hill at Tramway Avenue MUST stay with the tram	Traffic/Safety Notice 1602	Tram Crew									16/07/2016 20/12/2016	
2.1.1.12			Tram travels too close to another tram when in a convoy	5	A	High	1	All tram crews taught to leave ample space when in convoy	STM6062B Section 0628 & TSN1606	Tram Crew	2	C	Med.	Yes					16/07/2016 20/12/2016	
							2	All tram crews to leave ample space when in convoy	Traffic/Safety Notice 1605	Tram Crew									16/07/2016 20/12/2016	
							3	Trams descending down Army Hill must NOT travel in convoy. The second tram must wait until the first tram has past the Army level crossing.	STM6062B - section 628	Tram Crew									20/11/2016 20/12/2016	
2.1.2.1		Brakes fail	Rupture of air tank causing brakes to fail or other equipment failure	4	A	High	1	Annual checks of trams	STM6074	Workshop Manager	2	C	Low	YES						
							2	Trams checked before start and end of day	STM6062B STM6031	Tram Crew									20/12/2016	
							3	Regular inspections and maintenance of tracks	STM6028	Infrastructure Manager										
							4	Crew vigilance - safety valves pressure gauges visible to drivers in cabs	STM6062B	Tram driver									20/12/2016	
							5	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							6	Low pressure to pressure vessel regulations	STM6062B	Tram driver									20/12/2016	
							7	Hand brakes available to drivers	STM6062B	Tram driver									20/12/2016	
2.1.3.1		Operate coupled trams in service	Coupling between tramcars breaks in service	3	A	High	1	Driver training and special accreditation	STM6062B	Operations Manager	1	C	Low	Yes						
							2	Operational Rules	STM6062B	Operations Manager										
							3	Only on special occasions	STM6062B	Operations Manager										
							4	Special procedure for communications between conductors	STM6062B	Operations Manager										
							5	Trams tested before being accredited		Workshop Manager										
							6	Trams setup to automatically stop if coupling fails and trams separate		Operations Manager										
2.1.4.1		Tram stops due to power failure	Power failure due to PCC and other trams operating in convoy	3	A	High	1	Driver training and special accreditation	STM6121 Sect. Authorisations	Operations Manager	1	C	Low	Yes					28/11/2016	
							2	Operational Rules	STM6062B section 628 & T/S No. 1614	Operations Manager									28/11/2016	
							3	Only operates in convoy on special occasions	STM6062B section 628 & T/S No. 1614	Operations Manager									28/11/2016	
							4	Tram crews in contact with OIC via mobile phones	T/S No. 1612 & STM5048	Operations Manager									28/11/2016	



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				L	C	RR					L	C	RR				L	C	RR						
2.2.1.1	Tram to road vehicle within Museum	Tram involved in collision with a road vehicle	Tram speeding due to driver action (travelling too fast)	4	B	High	1	Driver training	STM6062B	Operations Manager	2	A	Med.	Yes											
							2	Operational Rules	STM6062B & TSN1606	Operations Manager												22/11/2016			
							3	Observer and/or conductor on tramcars	STM6146	Operations Manager														16/12/2016	
							4	Operational Performance Audits conducted	STM6114	Operations Manager															
							5	Good visibility of tram line	STM6063	Infrastructure Manager															
							6	Restricted access of motor vehicles within Museum site		Operations Manager															
2.2.1.2			Tram speeding due to driver under the influence of drug/alcohol	3	A	High	1	OIC check staff when signing on (declaration)	STM6070	Officer-in-Charge	2	A	Med.	Yes						20/12/2016					
							2	Drug and alcohol policy	STM6130	Rail Safety Manager															
							3	Random D&A testing by ONRSR	Rail Safety Act	ONRSR															
							4	Drug testing as part of health standards	STM6066	Rail Safety Manager															
							5	Restricted access of motor vehicles within Museum site		Operations Manager															
2.2.1.3			Tram speeding due to driver having a "health incident"	4	A	High	1	Medicals completed as per requirements	STM6016	Rail Safety Manager	2	A	Med.	Yes											
							2	OIC check staff when signing on (declaration)	STM6070	Officer-in-Charge											20/12/2016				
							3	Observer, conductor or Safety (Deadman) controls on trams	STM6146	Operations Manager													16/12/2016		
							4	Restricted access of motor vehicles within Museum site		Operations Manager															
							5	STM Emergency procedures	STM6034	Rail Safety Manager															
2.2.1.4			Tram speeding due to driver fatigued	4	A	High	1	OIC check staff when signing on (declaration)	STM6070	Officer-in-Charge	1	A	Med.	Yes						20/12/2016					
							2	Fatigue policy in place	STM6039	Operations Manager															
							3	Observer, conductor or Safety (Deadman) controls on trams	STM6146	Operations Manager													16/12/2016		
							4	Vigilance and awareness by other workers	STM6042	Traffic Manager															
							5	Crews assessed by OIC and other workers during the day	STM6081	Officer-in-Charge															
							6	Limited cab comfort in older trams	Tramcar design	Traffic Manager															
							7	All tram trips are maximum of 10 minutes duration	Length of track	Traffic Manager															
							8	On special days, fatigue taken into account in roster	Staff Rosters	Operations Manager															
							9	Additional crews rostered on special days	Staff Rosters	Operations Manager															
							10	Operations Manager plans timetable	Staff Rosters	Operations Manager															
2.2.1.5			Tram speeding due to driver competency	4	B	High	1	Driver training	STM6062B	Operations Manager	3	C	Med.	Yes											
							2	Operational Rules	STM6062B & TSN1606	Operations Manager												22/11/2016			
							3	Observer on most tramcars	STM6146	Operations Manager															
							4	Operational Performance Audits conducted	STM6114	Operations Manager															
							5	Restricted access of motor vehicles within Museum site		Operations Manager															
2.2.1.6			Tram skidding on tracks causes tram not to stop	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	C	Med.	Yes											
							2	Crew vigilance	STM6062B	Tram driver												20/12/2016			

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				L	C	RR					L	C	RR				L	C	RR	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Track inspections on first trip of the day	STM6081 STM6019	Tram Crew									20/12/2016	
							6	Restricted access of motor vehicles within Museum site		Operations Manager										
2.2.1.7			Tram fails to stop when cars enters path of tram.	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	C	Med.	Yes						
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Good visibility of tram line	STM6063	Infrastructure Manager										
							6	Restricted access of motor vehicles within Museum site		Operations Manager										
							7	STM Emergency procedures	STM6034	Rail Safety Manager										
2.2.1.8			Car out of control as car driver collapses	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	C	Med.	Yes						
							2	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							3	Good visibility of tram line	STM6063	Infrastructure Manager										
							4	Restricted access of motor vehicles within Museum site		Operations Manager										
							5	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							6	STM Emergency procedures	STM6034	Rail Safety Manager										
2.2.1.9			Tram equipment failure	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	C	Med.	Yes						
							2	Restricted access of motor vehicles within Museum site		Operations Manager										
							3	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							4	STM Emergency procedures	STM6034	Rail Safety Manager										
							5	Remote reverser tramcars are left in the "UP hill" position on ALL grades and at the top of grades to ensure that the Fourth Emergency brake will operate if the brakes fail	STM6062B Sect 818	Tram Crew									20/12/2016	
2.2.1.10			Road vehicle collides with stationary tram	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	C	Med.	Yes						
							2	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							3	Restricted access of motor vehicles within Museum site		Operations Manager										
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	STM Emergency procedures	STM6034	Rail Safety Manager										
2.2.1.11			Road vehicle reverses into path of tram without warning	4	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	3	C	Med.	Yes						
							2	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							3	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							4	Good visibility of tram line	STM6063	Infrastructure Manager										
							5	Restricted access of motor vehicles within Museum site		Operations Manager										
2.2.1.12			Tram passing Workshop Annex from the depot	4	B	High	1	Driver training	STM6062B	Operations Manager	3	C	Med.	Yes						

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				L	C	RR					L	C	RR				L	C	RR	
							2	Trams travel at low speeds.	STM6062B & TSN1605	Tram driver									20/12/2016	
							3	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							4	Restricted access of motor vehicles within Museum site		Operations Manager										
							5	STOP sign near the Workshop	STM6062B	Infrastructure Manager										
2.2.1.13			Excessive numbers of passengers or public leading to crowd control or overcrowding issues	5	A	High	1	Crew vigilance	STM6062B	Tram driver	2	C	Low	Yes					20/12/2016	
							2	Trams travel at low speeds.	STM6062B & TSN1605	Tram driver									20/12/2016	
							3	Additional traffic and technical crews rostered on big days	Staff Rosters	Operations Manager										
							4	Crews briefed before operations commenced	Toolbox talk	Operations Manager										
							5	Good visibility of tram line	STM6063	Infrastructure Manager										
							6	Limited wait time as more trams operating	Traffic Roster	Operations Manager										
							7	Operations Manager reviews suitability and availability of trams	Tramcar Status	Operations Manager										
							8	Operations Manager assigns tram crews to each tram.	Traffic Roster	Operations Manager										
2.3.1.1	Tram to pedestrian	Tram involved in collision with a pedestrian	Tram speeding due to driver action (travelling too fast)	3	A	High	1	Driver training	STM6062B	Operations Manager	2	A	Med.	Yes						
							2	Operational Rules	STM6062B & TSN1606	Operations Manager									22/11/2016	
							3	Observer on most tramcars	STM6146	Operations Manager										
							4	Operational Performance Audits conducted	STM6114	Operations Manager										
							5	Good visibility of tram line	STM6063	Infrastructure Manager										
2.3.1.2			Tram speeding due to driver under the influence of drug/alcohol	3	A	High	1	OIC check staff when signing on (declaration)	STM6070	Officer-in-Charge	2	A	Med.	Yes					20/12/2016	
							2	Drug and alcohol policy	STM6130	Rail Safety Manager										
							3	Random D&A testing by ONRSR	Rail Safety Act	ONRSR										
							4	Drug testing as part of health standards	STM6066	Rail Safety Manager										
2.3.1.3			Tram speeding due to driver having a "health incident"	4	A	High	1	Medicals completed as per requirements	STM6016	Rail Safety Manager	2	A	Med.	Yes						
							2	OIC check staff when signing on (declaration)	STM6070	Officer-in-Charge									20/12/2016	
							3	Observer or Safety (Deadman) controls	STM6146	Operations Manager										
							4	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
2.3.1.4			Tram speeding due to driver fatigued	4	A	High	1	OIC check staff when signing on (declaration)	STM6070	Officer-in-Charge	1	A	Med.	Yes					20/12/2016	
							2	Fatigue policy in place	STM6039	Operations Manager										
							3	Observer or Safety (Deadman) controls	STM6146	Operations Manager										
							4	Vigilance and awareness by other workers	STM6042	Traffic Manager										
							5	Crews assessed by OIC and other workers during the day	STM6081	Officer-in-Charge										
							6	Limited cab comfort in older trams	Tramcar design	Traffic Manager										

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				L	C	RR					L	C	RR				L	C	RR	
							7	All tram trips are maximum of 10 minutes duration	Length of track	Traffic Manager										
							8	On special days, fatigue taken into account in roster	Staff Rosters	Operations Manager										
							10	Additional crews rostered on special days	Staff Rosters	Operations Manager										
							11	Operations Manager plans timetable	Staff Rosters	Operations Manager										
2.3.1.5			Pedestrian walks in front of tram	5	A	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	D	Low	Yes						
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Good visibility of tram line	STM6063	Infrastructure Manager										
2.3.1.6			Pedestrian not aware of tram - inattention	5	A	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	D	Low	Yes						
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B & TSN1606	Tram driver									20/12/2016	
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Good visibility of tram line	STM6063	Infrastructure Manager										
							6	STM Emergency procedures	STM6034	Rail Safety Manager										
2.3.1.7			Pedestrian not aware of tram due to obstruction	5	A	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	D	Low	Yes						
							2	Crew vigilance	STM6062B	Tram driver									20/12/2016	
							3	Trams travel at low speeds.	STM6062B & TSN1606	Tram driver									20/12/2016	
							4	Tram driver uses audible devices	STM6062B	Tram driver									20/12/2016	
							5	Incident reporting process	STM6033	Rail Safety Manager										
							6	Good visibility of tram line	STM6063	Infrastructure Manager										
							7	Vegetation Control in place	STM6063	Infrastructure Manager										
2.3.1.8			Excessive numbers of passengers or public leading to crowd control or overcrowding issues	5	A	High	1	Crew vigilance	STM6062B	Operations Manager	2	C	Low	Yes						
							2	Trams travel at low speeds.	STM6062B & TSN1606	Tram driver									22/11/2016 20/12/2016	
							3	Additional traffic and technical crews rostered on big days	Staff Rosters	Operations Manager										
							4	Crews briefed before operations commenced	Toolbox talk	Operations Manager										
							5	Good visibility of tram line	STM6063	Infrastructure Manager										
							6	Limited wait time as more trams operating	Traffic Roster	Operations Manager										
2.3.1.9			Pedestrians use concreted tram on Army Hill to walk along the tram line	5	A	High	1	Crew vigilance	STM6062B	Tram driver	2	C	Low	Yes					20/11/2016 20/12/2016	
							2	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							3	Additional traffic and technical crews rostered on big days	Staff Rosters	Operations Manager									20/11/2016	
							4	Crews briefed before operations commenced	Toolbox talk	Operations Manager									20/11/2016	
							5	Good visibility of tram line	STM6063	Infrastructure Manager									20/11/2016	

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				L	C	RR					L	C	RR				L	C	RR								
2.4.1.1	Fall in tram	Person falls inside tram	Sudden braking of tram	5	B	High	1	Driver training - emergency procedures	STM6062B	Operations Manager	2	D	Low	Yes													
							2	Crew vigilance	STM6062B	Tram driver												20/12/2016					
							3	Trams travel at low speeds.	STM6062B	Tram driver															20/12/2016		
							4	Crews have been briefed about risks	STM6043	Traffic Manager																	
2.4.1.2			Tram moves off suddenly	5	B	High	1	Crew vigilance	STM6062B	Tram Crew	2	D	Low	Yes							20/12/2016						
							2	Trams travel at low speeds.	STM6062B	Tram driver													20/12/2016				
							3	Tram driver uses audible devices when starting	STM6062B	Tram driver															20/12/2016		
							4	Crews have been briefed about risks	STM6043	Traffic Manager																	
2.4.1.3			Person trips on step	4	C	Med.	1	Crew vigilance	STM6062B	Tram driver	2	D	Low	Yes							20/12/2016						
							2	Trams travel at low speeds.	STM6062B	Tram driver														20/12/2016			
2.5.1.1	Fall from tram	Person falls from moving tram	Sudden braking	5	B	High	1	Crew vigilance	STM6062B	Tram driver											20/12/2016						
							2	Trams travel at low speeds.	STM6062B	Operations Manager																	
							3	Use of enclosed trams for high risk groups	STM6062B	Operations Manager																	
							4	Standing passengers not encouraged		Traffic Manager																	
2.5.1.2			Inattention on part of the passenger	5	B	High	1	Crew vigilance	STM6062B	Tram driver	2	D	Low	Yes							20/12/2016						
							2	Trams travel at low speeds.	STM6062B	Tram driver														20/12/2016			
							3	Standing passengers not encouraged		Traffic Manager																	
2.5.1.3			Person trips on step	5	B	High	1	Conductor monitors passengers	STM6062B	Tram conductor	2	D	Low	Yes							20/12/2016						
							2	Trams travel at low speeds.	STM6062B	Tram driver														20/12/2016			
							3	Board aids for impaired passengers	STM6062B	Operations Manager																	
2.5.1.4			Passengers/crew trying to board moving tram	5	A	High	1	Crew vigilance	STM6062B	Tram driver	2	C	Med.	Yes							20/12/2016						
							2	Trams travel at low speeds.	STM6062B	Tram driver														20/12/2016			
							3	Crew training emphasis that crew or passengers are not to board or leave a moving tram.	STM6062B	Operations Manager																	
2.5.1.5			Conductor standing on footboard trams	5	A	High	1	Crew vigilance	STM6062B	Tram driver	2	D	Low	Yes							20/12/2016						
							2	Trams travel at low speeds.	STM6062B	Tram driver														20/12/2016			
							3	Conductor training emphasis the need to "hold on" during tram travel	STM6043	Traffic Manager																	
2.5.1.6			Excessive numbers of passengers or public leading to crowd control or overcrowding issues	5	A	High	1	Crew vigilance	STM6062B	Tram driver	2	C	Low	Yes							20/12/2016						
							2	Trams travel at low speeds.	STM6062B	Tram driver														20/12/2016			
							3	Additional traffic and technical crews rostered on big days	Staff Rosters	Operations Manager																	
							4	Crews briefed before operations commenced	Toolbox talk	Operations Manager																	
							5	Limited wait time as more trams operating	Traffic Roster	Operations Manager																	
							6	Standing passengers not encouraged		Traffic Manager																	
							7	Extra or larger trams scheduled		Operations Manager																	
2.5.2.1		Person falls from stationary tram	Conductor on footboard trams	5	A	High	1	Crew vigilance	STM6062B	Tram Crew	2	D	Low	Yes							20/12/2016						
							2	Crew training	STM6062B	Operations Manager																	
							3	Conductor training	STM6043	Traffic Manager																	
							4	Adequate hand holds on trams	STM6062B	Operations Manager																	
							5	Footboards not used in heavy rain	STM6062B	Operations Manager																	

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				L	C	RR					L	C	RR				L	C	RR	
							6	Adequate clearance of infrastructure	STM6024	Infrastructure Manager										
							7	SCW 2 medicals for conductors	STM6016	Traffic Manager										
							8	Conductors not to walk along footboards whilst tram moving except where the public are at risk.	STM6062B	Operations Manager										
2.5.2.2			Inattention on part of the passenger	5	A	High	1	Crew vigilance	STM6062B	Tram Crew	2	D	Low	Yes					20/12/2016	
							2	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							3	Board aids for impaired passengers	STM6062B	Operations Manager										
2.5.2.3			Person trips on step	4	C	Med.	1	Crew vigilance	STM6062B	Tram Crew	2	D	Low	Yes					20/12/2016	
							2	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							3	Board aids for impaired passengers	STM6062B	Operations Manager										
2.5.2.4			Excessive numbers of passengers or public leading to crowd control or overcrowding issues	5	A	High	1	Crew vigilance	STM6062B	Tram Crew	2	C	Low	Yes					20/12/2016	
							2	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							3	Additional traffic and technical crews rostered on big days	Staff Rosters	Operations Manager										
							4	Crews briefed before operations commenced	Toolbox talk	Operations Manager										
							5	Limited wait time as more trams operating	Traffic Roster	Operations Manager										
							6	Standing passengers not encouraged		Traffic Manager										
							7	Extra or larger trams scheduled		Operations Manager										
2.6.1.1	Loose items in tram	Loose items move during tram trip	Sudden braking	4	C	Med.	1	Crew vigilance	STM6062B	Tram Crew	2	D	Low	Yes					20/12/2016	
							2	Trams travel at low speeds.	STM6062B	Tram driver									20/12/2016	
							3	No loose seats on trams and no overhead luggage racks	STM6062B	Operations Manager										
							4	Operational items kept in driver's cabin segregated from passengers	STM6062B	Operations Manager										
							5	Conductors supervise loading on trams	STM6062B	Tram conductor									20/12/2016	
TOTALS	6	10	51																	

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				L	C	RR					L	C	RR				L	C	RR	
<b>Hazard Category :- 3 - Museum Operations - Passenger/Crew Safety</b>																				
3.1.1.1	Trips and Falls	Person trips/falls within the Museum site including buildings	Physical hazard or object	5	C	Med.	1	Footpaths available		Infrastructure Manager	3	C	Med.	Yes						
							2	Restriction on public access to operational areas of museum site		Operations Manager/Workshop Manager										
3.1.1.2			Uneven Pavements	5	C	Med.	1	Crew vigilance		Tram Crew	3	D	Low	Yes						20/12/2016
							2	Restriction on public access to operational areas of museum site		Operations Manager/Workshop Manager										
3.1.1.3			Raised tracks	5	C	Med.	1	Crew vigilance		Tram Crew	3	D	Low	Yes						20/12/2016
							2	Restriction on public access to operational areas of museum site		Operations Manager/Workshop Manager										
3.1.1.4			Inattention on part of visitor	5	C	Med.	1	Crew vigilance	STM6062B	Tram Crew	3	D	Low	Yes						20/12/2016
							2	Restriction on public access to operational areas of museum site		Operations Manager/Workshop Manager										
3.1.1.5			Excessive numbers of passengers or public leading to crowd control or overcrowding issues	5	A	High	1	Crew vigilance	STM6062B	Tram Crew	2	C	Low	Yes						20/12/2016
							2	Trams travel at low speeds.	STM6062B	Tram driver										20/12/2016
							3	Additional traffic and technical crews rostered on big days	Staff Rosters	Operations Manager										
							4	Crews briefed before operations commenced	Toolbox talk	Operations Manager										
							5	Good visibility of tram line	STM6063	Infrastructure Manager										
							6	Limited wait time as more trams operating	Traffic Roster	Operations Manager										
							7	First aid equipment carried on trams	STM6081 STM6019	Tram Crew										20/12/2016
							8	Mobile phones carried on trams	STM6081 STM6019	Tram Crew										20/12/2016
							9	STM Emergency procedures	STM6034	Rail Safety Manager										
3.1.2.1		Crew climb onto roof of tramcar	To access damaged equipment, e.g. broken trolley rope when out on the tram line	4	B	High	1	Climbing onto tramcar roof only allowed using ladder NOT the steps on the tram	STM6062B	Operations Manager	2	C	Med.	Yes						
							2	Trolley ropes checked regularly and problems reported	STM6031	Operations Manager										
3.1.3.1		Passenger sustains injury from being dragged by moving tram	Passenger is injured through being caught in a closing, folding or sliding door.	4	B	High	1	Crew vigilance	STM6062B	Tram Crew	2	C	Med.	Yes						20/12/2016
							2	Trams travel at low speeds.	STM6062B	Tram driver										20/12/2016
3.1.4.1		Visitors in the Workshop	Public fall in pit in Workshop	4	B	High	1	Pit in non public area		Workshop Manager	2	C	Med.	Yes						
							2	Public escorted in Workshop by qualified person		Workshop Manager										
							3	Pit usually covered by tram or fenced off.		Workshop Manager										
3.2.1.1	On tram	Person received electric shock	Defective equipment	4	A	High	1	Crew training	STM6062B	Tram driver	3	C	Med.	Yes						20/12/2016
							2	Equipment not able to be accessed by passengers		Workshop Manager										
							3	Annual checks of trams	STM6074	Workshop Manager										
3.2.1.2			Inappropriate access to equipment on tram	4	A	High	1	Crew training	STM6062B	Tram Crew	3	C	Med.	Yes						20/12/2016
							2	Equipment not able to be accessed by passengers		Workshop Manager										
							3	Annual checks of trams	STM6074	Workshop Manager										

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				L	C	RR					L	C	RR				L	C	RR					
3.2.2.1		Fire on Tram	Electrical fault	4	A	High	1	Crew training	STM6062B	Tram Crew	3	C	Med.	Yes					20/12/2016					
							2	Annual checks of trams	STM6074	Workshop Manager														
							3	Fire extinguishers on trams	STM6062B	Chief Engineer														
							4	Regular inspections of controllers		Workshop Manager														
							5	Cabling inspected and if required replaced when overhauls.		Workshop Manager														
3.2.2.2			Defective equipment	4	A	High	1	Crew training	STM6062B	Tram Crew	3	C	Med.	Yes					20/12/2016					
							2	Annual checks of trams	STM6074	Workshop Manager														
							3	Fire extinguishers on trams	STM6062B	Chief Engineer														
							4	Regular inspections of controllers		Workshop Manager														
							5	Cabling inspected and if required replaced when overhauls.		Workshop Manager														
3.2.2.3			Lightning Strike	3	3	High	1	Crew training	STM6062B	Tram Crew	3	C	Med.	Yes					20/12/2016					
							2	Fire extinguishers on trams	STM6062B	Chief Engineer														
							3	Lightning arrestor on tram		Workshop Manager														
3.2.2.4			Inappropriate access to equipment on tram	4	A	High	1	Crew training	STM6062B	Tram Crew	3	C	Med.	Yes					20/12/2016					
							2	Equipment not able to be accessed by passengers		Workshop Manager														
							3	Annual checks of trams	STM6074	Workshop Manager														
3.2.2.5			Driver inexperience with operation of tram	4	A	High	1	Crew training	STM6062B	Tram Crew	3	C	Med.	Yes					20/12/2016					
							2	Fire extinguishers on trams	STM6062B	Chief Engineer														
							3	Annual checks of trams	STM6074	Workshop Manager														
							4	Crews not allowed to touch electrical equipment.																
3.2.3.1		Passenger falls ill on tram	Passenger unhealthy when boarding tram	4	B	High	1	Crew vigilance	STM6062B	Traffic Crew	2	D	Low	Yes					20/12/2016					
							2	Crew carry mobile phones to contact emergency services	STM6062B	Tram Crew														
3.2.3.2			Passenger unhealthy when on tram	5	B	High	1	Crew vigilance	STM6062B	Traffic Crew	2	D	Low	Yes					20/12/2016					
							2	Crew carry mobile phones to contact emergency services	STM6062B	Traffic Crew														
							3	Easy access to all lines by Emergency services		Infrastructure Manager														
							4	Tram trips less than 10 minutes duration		Operations Manager														
3.2.4.1		Tram crew ignore the "DO NOT MOVE" sign and take a defective tram into traffic	Crew not adhering to procedures	4	A	High	1	Tram crew training	STM6062B	Operations Manager	3	C	Med.	Yes										
							2	Operational Rules	STM6062B	Operations Manager														
							3	Trams checked before start of day	STM6062B STM6031	Tram Crew														
							4	List provided in Running Shed of trams to be used in Traffic for a particular day		Operations Manager														
3.3.1.1	Substation	Person received electric shock	Inappropriate access to equipment	4	A	High	1	Substation off limits to visitors		Infrastructure Manager	1	1	Med.	Yes										
							2	Tram crews do not need to access substation to turn power on/off		Infrastructure Manager														
							3	Substation access restricted to authorised personnel		Infrastructure Manager														
3.4.1.1	Movement of defective tram	Person move tram "tagged" as defective	Driver inexperience with operation of tram	4	B	High	1	All driver's receive training	STM6062B	Operations Manager	3	C	Med.	Yes										
							2	Vigilance and awareness of other workers		Operations Manager														



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				L	C	RR					L	C	RR				L	C	RR	
							3	Crew must complete Pre-operation Checklist	STM6031	Operations Manager										
3.4.1.2			Inattention of driver during pre-operation check	4	B	High	1	All driver's receive training	STM6062B	Operations Manager	3	C	Med.	Yes						
							2	Vigilance and awareness of other workers		Operations Manager										
3.5.1.1	Unusual activity occurring at Museum	Organisations using the STM Site for conducting an activity	The public watching Activity	5	B	High	1	Setup a perimeter area for "No go" zone for public	STM6153	STM Supervisor on site	2	D	Low	Yes						
							2	Ask persons to "move on".	STM6153	STM Supervisor on site										
							3	Ensure adequate members present to supervise the public	STM6153	STM Supervisor on site										
							4	Ensure Organisation is experienced and know the risks in proposed activity	STM6153	STM Supervisor on site										
3.5.1.2			Passing motorists surprised at the activity and not watching the road	4	B	High	1	Screen Off area of the activity	STM6153	STM Supervisor on site	2	D	Low	Yes						
							2	Notify relevant authorities of the proposed activity	STM6153	STM Supervisor on site										
3.5.1.3			Public contact media thinking that there is an emergency	4	D	Med.	1	Notify relevant authorities of the proposed activity	STM6153	STM Supervisor on site	2	D	Low	Yes						
3.5.1.4			Public contact emergency services thinking there is an emergency	4	D	Med.	1	Notify relevant authorities of the proposed activity	STM6153	STM Supervisor on site	2	D	Low	Yes						
3.5.1.5			ARMY concerned by activities thinking that there is an emergency	4	D	Med.	1	Notify relevant authorities of the proposed activity	STM6153	STM Supervisor on site	2	D	Low	Yes						
3.5.1.6			TAFE concerned by activities thinking that there is an emergency	4	D	Med.	1	Notify relevant authorities of the proposed activity	STM6153	STM Supervisor on site	2	D	Low	Yes						
3.5.1.7			Sydney Trains concerned by activity at North terminus thinking that there is an emergency	4	D	Med.	1	Notify relevant authorities of the proposed activity	STM6153	STM Supervisor on site	2	D	Low	Yes						
TOTALS	5	11	28																	

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				L	C	RR					L	C	RR				L	C	RR	
<b>Hazard Category :-</b>				<b>4 - Worker Safety</b>																
4.1.1.1	Staff Issue	RSW acts/ works unsafely	RSW under the influence of drug/alcohol	4	B	High	1	Manager checks staff when signing on	STM6070	Officer-in-Charge	3	C	Med.	Yes						
							2	Drug and alcohol policy	STM6130	Rail Safety Manager										
							3	Random D&A testing by ONRSR	Rail Safety Act	ONRSR										
							4	Drug testing as part of health standards	STM6066	Rail Safety Manager										
							5	Vigilance and awareness of other workers		Infrastructure Manager										
4.1.1.2			RSW having a "health incident"	4	B	High	1	Manager checks staff when signing on	STM6070	Infrastructure Manager	3	C	Med.	Yes						
							2	Medicals completed as per requirements	STM6016	Rail Safety Manager										
							3	Vigilance and awareness of other workers		Infrastructure Manager										
4.1.1.3			Safety rules not adhered to	4	A	High	1	All RSW's have access to the SMS	STM6156 Web site	Rail Safety Manager	3	C	Med.	Yes						
							2	All RSW's receive training/peer review		Operations Manager Workshop Manager										
							3	Workers rostered and managed according to competency		Traffic Manager										
							4	Some power tools have control by keys		Workshop Manager										
4.1.1.4			RSW not competent with task	4	A	High	1	All RSW's have access to the SMS	STM6156 Web site	Rail Safety Manager	3	C	Med.	Yes						
							2	All RSW's receive training/peer review		Workshop Manager										
							3	Workers rostered and managed according to competency		Traffic Manager										
							4	Some power tools have control by keys		Workshop Manager										
4.1.2.1		Inattention on part of RSW	RSW talking or texting on mobile phone	5	A	High	1	STM states crews are not to talk or text whilst tram is moving	STM6042	Operations Manager	3	C	Med.	Yes						
							2	Crew Training stresses about talking or texting on mobile phone	STM6062A	Operations Manager										
							3	Induction process states when using mobile phones to move away from tracks	STM6017	Rail Safety Manager										
4.2.1.1	On tram	Workers fall from tram	Workers travelling on Works trams without barriers	5	A	High	1	Staff instructed not to ride on Works trams unless inside the driver cabs		Infrastructure Manager	2	B	Med.	Yes						
							2	No outside seats provided for works staff on trams		Infrastructure Manager										
							3	Works trams travel at low speed	STM6062B	Operations Manager										
							4	Worker competencies		Workshop Manager										
							5	Easy access to all lines by Emergency services		Infrastructure Manager										
4.2.2.1		Person trapped between trams	Shunting and/or coupling of trams at the museum	4	B	High	1	Coupling not required in normal operation		Workshop Manager	3	C	Med.	YES						
							2	Coupling Procedures in place		Operations Manager										
							3	Only experienced personnel perform the task		Workshop Manager										
							4	One tram secured.		Traffic Crew										
							5	Performed at very low speeds.		Operations Manager										
							6	No person stands between moving vehicles	STM6062B	Workshop Manager										
							7	Some trams have automatic couplers.	STM6062B	Workshop Manager										

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				L	C	RR					L	C	RR				L	C	RR	
							8	Air hoses are connected after trams are mechanically coupled and disconnected before uncoupling.	STM6062B	Traffic Crew										
4.2.3.1		Crews/workers working in the open air	Crews/workers spend too much time in the sun	5	B	High	1	Tram crews travel inside the trams most of the time		Traffic Manager	3	D	Med.	Yes						
							2	Adequate breaks provided		Officer-in-Charge										
							3	Shaded areas provided		Traffic Manager									20/12/2016	
4.2.4.1		Members shunt trams alone	Category 1 medical members allowed to shunt trams alone	4	A	High	1	Medicals completed as per requirements	STM6016	Rail Safety Manager	3	C	Med.	Yes						
							2	Usually operate on non operating days	STM6016	Operations Manager										
							3	Applies to ballast motors who do not carry passengers	STM6016	Operations Manager										
							4	Shunting operations applicable to Yard only.	STM6016	Operations Manager										
							5	Higher than normal Medical Category of members		Operations Manager										
4.2.5.1		Use of Safety interlocking device (Dead Man)	Circumventing the Safety interlocking device (Dead Man) by tram crews	4	B	High	1	Nothing in cab to use to circumvent Safety Interlocking equipment	STM6022	Operations Manager	2	C	Med.	Yes						
							2	Short Journeys - no more than 5 minutes		Traffic Manager										
							3	Crews made aware of penalties if circumventing the safety device	STM6062B STM6091 STM6096	Traffic Manager										
							4	Few trams have this facility		Operations Manager										
4.3.1.1	Trips and falls	Crew/workers working on ballasted track	Crew/workers walking on ballasted track	5	C	High	1	Staff vigilance		Infrastructure Manager	3	D	Med.	Yes						
							2	Tram crews carry mobile phone	STM6081 STM6019	Traffic Crew									20/12/2016	
							3	Adequate walkways on either side of tram lines		Infrastructure Manager										
							4	General Track Awareness training given	STM6156	Infrastructure Manager										
							5	RSW Health standards	STM6016	Operations Manager										
4.3.2.1		Falling from vehicle while working on overhead wires	Not properly trained	5	A	High	1	All vehicles used have handrails around work platforms		Chief Engineer	3	D	Low	Yes						
							2	RSW trained prior to working on overhead work		Overhead Supervisor										
							3	Correct safety gear worn by workers as required		Overhead Supervisor										
							4	Tram crews carry mobile phone	STM6081 STM6019	Traffic Crew									20/12/2016	
							5	Easy access to all lines by Emergency services		Infrastructure Manager										
4.3.3.1		Person trips/falls within the Workshop and depot area	Physical hazard or object	4	B	High	1	Staff vigilance		Infrastructure Manager	3	C	Med.	Yes						
							2	Instructions given		Workshop Manager										
							3	Worker competencies		Workshop Manager										
							4	Site induction for visitors	STM6017	Workshop Manager										
							5	Visitors accompanied by Museum staff		Workshop Manager										
							6	Areas "out of bounds" clearly delineated by barriers, painted lines or signs.		Workshop Manager										
4.3.3.2			Open Pits	5	C	Med.	1	Pits covered or railing put around		Workshop Manager	3	C	Med.	Yes						
							2	Instructions given to W/S staff		Workshop Manager										
							3	Worker competencies		Workshop Manager										
							4	Site induction for visitors	STM6017	Workshop Manager										

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				L	C	RR					L	C	RR				L	C	RR	
							5	Visitors accompanied by Museum staff		Workshop Manager										
4.3.3.3			Raised tracks	5	C	Med.	1	Staff vigilance		Workshop Manager	3	D	Low	Yes						
							2	Instructions given		Workshop Manager										
							3	Site induction for visitors	STM6017	Workshop Manager										
							4	Visitors accompanied by Museum staff		Workshop Manager										
4.3.4.1		Falling from elevated platform or ladder	Not properly trained	5	A	High	1	RSW trained prior to being equipment		Chief Engineer Overhead Supervisor	3	D	Low	Yes						
							2	Correct safety gear worn by workers as required		Overhead Supervisor										
							3	Workshop talks		Overhead Supervisor										
							4	Worker competencies		Workshop Manager										
4.3.5.1		Inattention on part of RSW	RSW talking or texting on mobile phone	5	A	High	1	STM states crews are not to talk or text whilst tram is moving	STM6042	Operations Manager	3	C	Med.	Yes						
							2	Crew Training stresses about talking or texting on mobile phone	STM6062A	Traffic Crew									20/12/2016	
							3	Induction process states when using mobile phones to move away from tracks	STM6017	Rail Safety Manager										
4.4.1.1	Installing or replace Overhead Wire or Fitting	Electric shock	Not properly trained	5	A	High	1	RSW trained prior to being equipment and staff competent to do the tasks.	SWMS001	Chief Engineer Overhead Supervisor	3	D	Low	Yes					14/08/2015 22/6/2017	
							2	Crew inspect to see that earth potential is not in reach, or will not become in reach during replacement	SWMS001	Overhead Supervisor									14/08/2015	
							3	Crew isolate traction supply in accordance with procedure if necessary.	STM6###	Overhead Supervisor									14/08/2015	
4.4.2.1		Struck by displaced or falling overhead wire or fitting	Not properly trained	5	A	High	1	RSW trained prior to being equipment and staff competent to do the tasks.	SWMS001	Chief Engineer Overhead Supervisor	3	D	Low	Yes					14/08/2015	
							2	Control measures specified in the Safe Methods Work Statement (SMWS)	SWMS001	Overhead Supervisor									14/08/2015	
							3	Overhead line crew reviews the SMWS and understand the risks before the tasks are tackled.	SWMS001	Overhead Supervisor									14/08/2015	
4.4.3.1		Falling from elevated platform or ladder	Not properly trained	5	A	High	1	RSW trained prior to being equipment and staff competent to do the tasks.	SWMS001	Chief Engineer Overhead Supervisor	3	D	Low	Yes					14/08/2015	
							2	Correct safety gear worn by workers as required	SWMS001	Overhead Supervisor									14/08/2015	
							3	Control measures specified in the Safe Methods Work Statement (SMWS)	SWMS001	Overhead Supervisor									14/08/2015	
4.4.4.1		Working on the overhead wiring	Not properly trained to perform work.	5	A	High	1	Overhead supervisors must complete an evaluation and assessment to be able to supervise work on the overhead	STM6203 Assessment of Comp. for Supervisor Overhead	Chief Engineer Overhead Supervisor	3	C	Low	Yes					14/08/2015	
							2	Only competent staff can do the tasks. Reviewed during planned Safe Work activity.	SWMS001	Chief Engineer Overhead Supervisor									14/08/2015	
4.4.5.1		Lifting & tensioning equipment unsafe	Not properly trained to use equipment	5	A	High	1	Only competent staff can do use the equipment. Reviewed during planned Safe Work activity.	SWMS001	Chief Engineer Overhead Supervisor	3	C	Med.	Yes					14/08/2015	
							2	Crews visually inspect EWP & tackle for any damage before use	SWMS001	Overhead Supervisor									14/08/2015	

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				L	C	RR					L	C	RR				L	C	RR	
4.4.6.1		Fittings become loose after installation	Not properly trained to use equipment	5	A	High	1	Only competent staff can do use the equipment. Reviewed during planned Safe Work activity.	SWMS001	Chief Engineer Overhead Supervisor	3	C	Med.	Yes					14/08/2015	
							2	Fittings checked before leaving the job	SWMS001	Overhead Supervisor										
4.4.6.2			Failure of equipment	5	A	High	1	Equipmnt checked before installation starts	SWMS001	Chief Engineer Overhead Supervisor	3	C	Med.	Yes					14/08/2015	
4.4.7.1		Working on the overhead can be performed when the overhead wire is either energised.	Not properly trained to use equipment	5	A	High	1	Only competent staff can do use the equipment. Reviewed during planned Safe Work activity.	SWMS001	Chief Engineer Overhead Supervisor	3	C	Med.	Yes					14/08/2015	
							2	Wooden tower fully insulated	SWMS001	Chief Engineer Overhead Supervisor										
4.5.1.1	Using Overhead Line vehicle	Collision Injury	Not properly trained	5	A	High	1	Crews trained to look up, down, left, right, backwards and forwards when the Elevated Work Platform (EWP) is moving or elevating.	SWMS001	Overhead Supervisor	3	C	Med.	Yes					14/08/2015	
4.5.2.1		Exceeding Working Load Limit (WLL) of EWP	Not properly trained	5	A	High	1	Crews ensure only two persons and 100Kg of equipment only permitted on the EWP	SWMS001	Overhead Supervisor	3	C	Med.	Yes					14/08/2015	
4.5.3.1		Falling from height	Not properly trained	5	A	High	1	Induction process states when using mobile phones ground staff to move away from tracks	SWMS001	Overhead Supervisor	3	C	Med.	Yes					14/08/2015	
							2	Crews do not to lean over platform railing and remain wholly within the platform.	SWMS001	Overhead Supervisor										14/08/2015
							3	Hand railings are raised when EWP in use.	SWMS001	Overhead Supervisor										
4.5.4.1		Falling objects	Not properly trained	5	A	High	1	Crews ensure that tools and other items are safely stow	SWMS001	Overhead Supervisor	3	C	Med.	Yes					14/08/2015	
							2	All persons wear head protection including those at ground level within the area around the EWP.	SWMS001	Overhead Supervisor										
4.5.5.1		Overhead obstructions	Crews not keeping a lookout	5	A	High	1	Keep clear of overhead obstructions	SWMS001	Overhead Supervisor	3	D	Low	Yes					14/08/2015	
							2	Covered in pre job preparation	SWMS001	Overhead Supervisor										
4.5.6.1		Slips and Falls	Not properly trained	5	A	High	1	All members working around the EWP vehicle must be "site aware" regarding slips and falls at the work site;	SWMS001	Overhead Supervisor	3	D	Low	Yes					14/08/2015	
							2	Covered in pre job preparation	SWMS001	Overhead Supervisor										
4.5.7.1		Operating the EWP vehicles	Faulty equipment	5	A	High	1	Crews visually inspect EWP & tackle for any damage before use	SWMS001	Chief Engineer Overhead Supervisor	3	D	Low	Yes					14/08/2015	
							2	STM6031 Tramcar Pre-operation Checklist	STM6031 & SWMS001	Traffic Crew										14/08/2015 20/12/2016
4.5.7.2			Not properly trained to operate the EWP vehicle	5	A	High	1	Overhead supervisors must complete an evaluation and assessment to be able to supervise work on the overhead	STM6203 Assessment of Comp. for Supervisor Overhead	Chief Engineer Overhead Supervisor	3	D	Low	Yes					14/08/2015	
							2	Only competent staff can do the tasks. Reviewed during planned Safe Work activity.	SWMS001	Chief Engineer Overhead Supervisor										14/08/2015
4.5.8.1		Possible injury when lowering the platform railings on e EWP platform	The platform railings could drop too quickly and cause an injury	4	C	Med.	2	Overhead crews reminded of the hazard before commencing the job.	SWMS001	Overhead Supervisor	2	D	Low	Yes					14/08/2015	
4.6.1.1	Workshop environment	Person trips/falls within the workshop	Physical hazard or object	4	B	High	1	First aid equipment kept in workshop		Workshop Manager	2	C	Med.	Yes						

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				L	C	RR					L	C	RR				L	C	RR	
							2	Emergency services have access to workshop		Workshop Manager										
							3	Areas "out of bounds" clearly delineated by barriers, painted lines or signs.		Workshop Manager										
4.6.2.1		Person received electric shock	Defective equipment	4	C	Med.	1	Regular inspections of plant and equipment		Workshop Manager	3	C	Med.	Yes						
							2	Equipment "Tag Out" process in use		Infrastructure Manager										
							3	Earth leakage protection equipment	Electrical Standards	Infrastructure Manager										
							4	Worker competencies		Workshop Manager										
4.6.2.2			Inappropriate access to equipment	4	B	High	1	All RSW's receive training/peer review		Workshop Manager	3	C	Med.	Yes						
							2	Workers rostered and managed according to competency		Workshop Manager										
4.6.3.1		Asbestos exposure	Insulation in tramcars	4	B	High	1	Components containing asbestos known		Workshop Manager	2	C	Med.	Yes						
							2	Asbestos removal carried out by persons with competencies to do so		Workshop Manager										
							3	Where possible asbestos replaced during overhaul with non-asbestos products or sealed with insulating varnish		Workshop Manager										
4.6.4.1		Person injured using tools	Inappropriate use of tools	4	B	High	1	All RSW's receive training/peer review		Workshop Manager	2	D	Low	Yes						
							2	Workers rostered and managed according to competency		Workshop Manager										
							3	Some power tools have control by keys		Workshop Manager										
4.6.4.2			Person not properly trained	4	B	High	1	All RSW's receive training/peer review		Workshop Manager	2	D	Low	Yes						
							2	Workers rostered and managed according to competency		Workshop Manager										
							3	Some power tools have control by keys		Workshop Manager										
4.6.5.1		Fire or explosion occurs in Workshop or Depot	Defective equipment	4	B	High	1	Automatic sprinklers in major buildings		Chief Engineer	2	D	Low	Yes						
							2	Fire extinguishers and hose reels installed.		Infrastructure Manager										
							3	Electrical wiring installed to AS3000.	Electrical Standards	Infrastructure Manager										
							4	Hot work and metal work separated from timberwork and from paint shop.		Workshop Manager										
							5	Emergency egresses identified and evacuation procedures in place.	STM6034	Rail Safety Manager										
							6	Annual fire safety certificate to Sutherland Shire Council		Chief Engineer										
							7	Worker competencies		Workshop Manager										
4.6.5.2			Inappropriate use of tools	4	B	High	1	All RSW's receive training/peer review		Workshop Manager	3	C	Med.	Yes						
							2	Workers rostered and managed according to competency		Workshop Manager										
							3	Fire extinguishers installed in buildings		Infrastructure Manager										
4.6.5.3			Worker ignites flammable gas or fumes, or inhales toxic gas or fumes while working	4	B	High	1	Worker competences		Workshop Manager	3	C	Med.	Yes						
							2	Signage around workshop		Workshop Manager										

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				L	C	RR					L	C	RR				L	C	RR	
							3	Storage, handling, labeling and transport of dangerous goods as per regulations		Workshop Manager										
							4	Fire extinguishers and hose reels installed.	STM6111	Infrastructure Manager										
							5	Automatic sprinklers in major buildings		Infrastructure Manager										
							4	Hot work and metal work separated from timberwork and from paint shop.		Workshop Manager										
4.6.5.4			RSW under the influence of drug/alcohol	4	B	High	1	Manager checks staff when signing on	STM6070	Workshop Manager	3	C	Med.	Yes						
							2	Drug and alcohol policy	STM6130	Rail Safety Manager										
							3	Random D&A testing by ONRSR	Rail Safety Act	ONRSR										
							4	Drug testing as part of health standards	STM6066	Rail Safety Manager										
							5	Vigilance and awareness of other workers		Workshop Manager										
4.6.5.5			RSW having a "health incident"	3	A	High	1	Manager checks staff when signing on	STM6070	Workshop Manager	3	C	Med.	Yes						
							2	Vigilance and awareness of other workers during day		Workshop Manager										
4.6.6.1		Contractor performs unsafe act	Performs unsafe activity through lack of awareness of process requirements	4	B	High	1	Induction of contractors to the site	STM6017 STM6147	Infrastructure Manager Workshop Manager	3	C	Med.	Yes						
							2	"Site Access Permit" in place	STM6158	Infrastructure Manager										
							3	Occupancy of line given to contractors where feasible		Infrastructure Manager										
							4	Contractors mainly used on non traffic days		Infrastructure Manager										
							5	Tram crews notified of contractors seen near tramlines		Infrastructure Manager										
4.7.1.1	Substation	Person received electric shock	Inappropriate use of tools	4	A	High	1	Equipment installed to current wiring rules	Electrical Standards	Infrastructure Manager	2	D	Low	Yes						
							2	Substation access restricted to authorised personnel		Infrastructure Manager										
							3	Tram crews do not need to access substation to turn power on/off		Infrastructure Manager										
							4	Procedure for isolation	Electrical Standards	Infrastructure Manager										
							5	Worker competencies		Workshop Manager										
4.7.1.2			Illegal Access to substation	4	A	High	1	Substation off limits to visitors		Infrastructure Manager	2	C	Med.	Yes						
							2	Substation access restricted to authorised personnel		Infrastructure Manager										
							3	Equipment installed to current wiring rules		Infrastructure Manager										
4.7.2.1		Fire occurs in Substation	Defective equipment	4	B	High	1	Fire extinguishers installed.		Infrastructure Manager	2	D	Low	Yes						
							2	Electrical wiring installed to AS3000.	Electrical Standards	Infrastructure Manager										
							3	Emergency egresses identified and evacuation procedures in place.	STM6034	Rail Safety Manager										
							4	Procedure for isolation	Electrical Standards	Infrastructure Manager										
4.7.2.2			Lightning strike	4	B	High	1	Fire extinguishers installed.	STM6111	Infrastructure Manager	2	D	Low	Yes						

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				L	C	RR					L	C	RR				L	C	RR	
							2	Emergency egresses identified and evacuation procedures in place.	STM6034	Rail Safety Manager										
4.7.2.3			Inappropriate use of tools	4	A	High	1	Substation access restricted to authorised personnel		Infrastructure Manager	2	D	Low	Yes						
							2	Procedure for isolation		Infrastructure Manager										
							3	Worker competencies		Workshop Manager										
TOTALS	7	35	51																	



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				L	C	RR					L	C	RR				L	C	RR	
<b>Hazard Category :-</b>		<b>5 - Security</b>																		
5.1.1.1	Assault	Physical Assault of passenger and/or crews	Disagreement	3	C	Med.	1	Crew training	STM6062B	Operations Manager	2	D	Low	Yes						
							2	Staff vigilance	STM6062B	Operations Manager										
							3	Mobile phones carried on trams	STM6081	Tram Crew										
5.1.1.2			Motorists/bike riders upset	4	C	Med.	1	Crew training	STM6034	Traffic Manager	2	D	Low	Yes						20/12/2016
							2	Staff vigilance	STM6062B	Operations Manager										
							3	Mobile phones carried on trams	STM6081	Tram Crew										20/12/2016
5.2.1.1	Robbery	Conductor or ticket seller robbed	Cash sought from passenger or crew	4	C	Med.	1	Crew training	STM6034	Operations Manager	2	D	Low	Yes						
							2	Staff vigilance	STM6062B	Operations Manager										
							3	Minimum cash held		Traffic Manager										
							4	Mobile phones carried on trams	STM6081	Tram Crew										20/12/2016
							5	Many Staff onsite		Traffic Manager										
5.2.2.1		In Traffic Office	Cash sought from crew	4	C	Med.	1	Crew training	STM6062B	Operations Manager	2	D	Low	Yes						
							2	Staff vigilance	STM6062B	Operations Manager										
							3	Many Staff onsite		Traffic Manager										
5.3.1.1	Bomb Threat	Museum give a bomb threat	Telephone call to Museum	3	A	High	1	STM Emergency procedures	STM6034	Rail Safety Manager	2	D	Low	Yes						
							2	Staff vigilance	STM6062B	Operations Manager										
							3	Tram crews carry mobile phone	STM6081 STM6019	Tram Crew										20/12/2016
							4	Easy access to all lines by Emergency services		Infrastructure Manager										
5.3.1.2			Suspicious package left on tram or on site.	3	A	High	1	STM Emergency procedures	STM6034	Rail Safety Manager	2	D	Low	Yes						
							2	Staff vigilance	STM6062B	Operations Manager										
							3	Tram crews carry mobile phone	STM6081 STM6019	Tram Crew										20/12/2016
							4	Easy access to all lines by Emergency services		Infrastructure Manager										
5.4.1.1	Burglary	Theft of infrastructure	Property stolen	4	D	Low	1	CCTV being installed		Infrastructure Manager	2	D	Low	Yes						
							2	Buildings kept locked when not in use		Infrastructure Manager										
							3	Buildings alarmed		Infrastructure Manager										
							4	Register of keys and codes		Chief Engineer										
5.5.1.1	Vandalism	Break-in of Museum Buildings	Goods stolen or Artifacts damaged	4	D	Low	1	Buildings kept locked when not in use		Infrastructure Manager	3	D	Low	Yes						
							2	CCTV being installed		Infrastructure Manager										
5.5.2.1		Tram Damage	Tram left unattended at terminus during the day	4	D	Low	1	Trams visible by crew at all times	STM6062B & TSN1602	Operations Manager	1	D	Low	Yes						22/11/2016
							2	CCTV being installed		Infrastructure Manager										
							3	Only 1 set of driving tools per tram kept by driver	STM6062B	Tram Crew										20/12/2016
							4	Crew vigilance	STM6062B & TSN1607	Tram Crew										22/11/2016 20/12/2016
							5	All trams are chocked	STM6062B	Tram Crew										22/11/2016 20/12/2016
							6	Trams parked on level sites	STM6062B & TSN1607	Tram Crew										22/11/2016 20/12/2016
							7	Crew remain with tram unless properly secured against movement	STM6062B & TSN1607	Tram Crew										22/11/2016 20/12/2016
5.5.3.1		Damage of Infrastructure	Persons enter site to paint Graffiti	4	D	Low	1	CCTV being installed		Infrastructure Manager	3	D	Low	Yes						
							2	Buildings alarmed		Infrastructure Manager										
							3	Buildings kept locked when not in use		Infrastructure Manager										

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RISK REGISTER**

Document Version: 6.4

Risk No.	Hazard	Event	Cause / Mechanism	Inherent Risk			No.	Risk Controls	Reference for controls	Responsible Person	Residual Risk			SFAIRP	Additional Controls	Responsible Person	Amended Risk			Date Added / Adjusted
				L	C	RR					L	C	RR				L	C	RR	
5.6.1.1	Bush Fires	Fires in Royal National Park close to tramline	Fires in Royal National Park when trams are operating	4	B	Med.	1	Museum liaises with National Parks & RFS		OIC on the day	2	D	Low	Yes						
							2	STM Emergency procedures	STM6034	Rail Safety Manager										
							3	Vegetation controlled beside tracks	STM6063	Infrastructure Manager										
							4	Fire appliances can access full length of line		Infrastructure Manager										
							5	Services on RNP suspended during high fire danger.		Operations Manager										
							6	Good visibility of tram line	STM6063	Infrastructure Manager										
5.6.2.1		Bushfire in area spreads to Museum site	Fire entering from outside property	4	B	Med.	1	Grounds maintained and cleared	STM6063	Infrastructure Manager	2	D	Low	Yes						
							2	STM Emergency procedures	STM6034	Rail Safety Manager										
							3	Sprinkler systems and Fire extinguishers and reels installed in buildings		Infrastructure Manager										
							4	Fire reels installed around site		Infrastructure Manager										
							5	Emergency egresses identified and evacuation procedures in place.	STM6034	Rail Safety Manager										
							6	Annual fire safety certificate to Sutherland Shire Council		Chief Engineer										
TOTALS	6	10	12																	

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				L	C	RR					L	C	RR				L	C	RR		
<b>Hazard Category :- 6 - Other Organisations Using STM for Training on its tram lines</b>																					
6.1.1.1	Tram operating during Training exercise	Derailment of tram during training exercise	Obstacle, person or equipment left on track	4	B	High	1	Training supervised by Workshop Manager		Workshop Manager										Dec-2016	
							2	Good visibility of tram line	STM6063	Infrastructure Manager										Dec-2016	
							3	Training Supervisors given a Toolbox talk before the exercise starts												Dec-2016	
6.1.1.2			Tram not proper secured during training exercise	4	B	High	1	Training supervised by Workshop Manager		Workshop Manager										Dec-2016	
							2	Crew training	STM6062B	Operations Manager										Dec-2016	
6.1.1.3			Trainees not familiar with the tram operations	4	B	High	1	Training supervised by Workshop Manager		Workshop Manager										Dec-2016	
6.2.1.1	Tramcar being lifted off the rails	Trams falls off the jacks	Not properly secured for the exercise	4	A	High	1	Training supervised by Workshop Manager		Workshop Manager										Dec-2016	
6.2.1.2			Training organisation not performing exercise in a safe manner	4	A	High	1	Training supervised by Workshop Manager		Workshop Manager										Dec-2016	
6.2.1.3			Trainees not familiar with the tram operations	4	A	High	1	Training supervised by Workshop Manager		Workshop Manager										Dec-2016	
6.3.1.1	Trips and Falls	Trainees walking on or beside the tracks	Trainees not following the instructions	4	B	High	1	Training supervised by Workshop Manager		Workshop Manager										Dec-2016	
6.3.1.2			Trainees not familiar with the tram operations	4	B	High	1	Training supervised by Workshop Manager		Workshop Manager										Dec-2016	
6.4.1.1	Electrician	Trainees working with overhead power ON	Trainees racing against "the clock" for the exercise	4	A	High	1	Training supervised by Workshop Manager		Workshop Manager										Dec-2016	
6.4.1.2			Trainees not familiar with the tram operations	3	A	High	1	Training supervised by Workshop Manager		Workshop Manager										Dec-2016	
6.5.1.1	Movement of tram not under the control of the tram driver	Trainees injured during the exercise	The use of road vehicles to pull the tram during the exercise	3	A	High	1	Training supervised by Workshop Manager		Workshop Manager										Dec-2016	
<b>TOTALS</b>																					
5		5		11																	
<b>Hazard Category :- 7 - Other</b>																					
7.01	Interface Agreement	Regular contacts with RMS Sutherland Shire Council																			
7.02																					
<b>TOTALS</b>																					
1		1		0																	

<b>RISK SUMMARY</b>									
HAZARDS	EVENTS	CAUSES							
218	35	99	219	4	24	191	219	Low	82
								Med.	125
								High	0
									207

**000000Sydney Tramway Museum**  
**Risk Register - Rejected Controls**

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Risk No.	Hazard	Event		Rejected Controls
<b>Hazard Category :- 1 - Museum Operations - Infrastructure</b>				
1.1.1.1	Operating a tram on the Museum's tramlines	Derailment of tram	1	Museum becomes a static Museum only
			2	Remove vegetation further from tramline - <i>unable on RNP.</i>
			3	Paramedics to be stationed at Museum on all operating days - <i>impractical</i>
			4	Walk the tramline before each running day
1.1.2.1		Tram hits obstacle	1	Only operate trams that have sealed windows and doors controlled by driver
			2	All Museum staff to have First Aid Certificate
			3	Remove gates across the line at North terminus.
1.1.3.1		Cyclist crossing RNP line	1	Install lights or Boom gates (crossing barriers) at level crossings – <i>Too expensive and cyclists would not wait.</i>
			2	Put speed humps on either side of the level crossings
			3	Ask Royal National Park to close bike tracks that cross tramline - <i>not feasible</i>
			4	Close the RNP line - <i>not feasible</i>
			5	Crossing lights installed at ALL level crossings – <i>Too expensive</i>
			6	Ask Royal National Park to close bike tracks that cross tramline
			7	Fence the entire line to stops bikes crossing tramline
			8	Install proper level crossing at cyclist crossing point.
1.1.4.1		Driver misinterprets bell or buzzer signal	1	Conductor always uses a whistle and driver ignores bell or buzzer
			2	Remove buzzer or bells from inside trams
1.1.5.1		Electrocution		
1.1.6.1		Derailment as a result of rail buckle	1	Increase frequency of inspections
1.1.7.1		Derailment as a result of points moving under tram	1	Increase frequency of inspections
1.1.8.1		Unauthorised movement at points	1	Increase frequency of inspections
1.1.9.1		Derailment due to degraded infrastructure condition	1	Replace all wooden sleepers with concrete sleepers or concreted track
1.1.10.1		Derailment due to component failure on tram	1	Increase frequency of inspections
1.1.11.1		Brakes fail	1	Increase frequency of inspections
1.1.12.1		Derailment due to unauthorised or improper use of handbrakes or other tram equipment by passengers or workers		
1.1.13.1		Collision of tram with buffer stop at RNP platform		
1.2.1.1	Overhead Wire	Person struck by falling trolley wire		
1.2.2.1			Electrocution from live overhead	
1.3.1.1	Level Crossings in general	Collision between tram and Road Vehicle	1	Install Boom gates (crossing barriers) at level crossings – <i>Too expensive</i>
			2	Close the tramline completely – <i>significantly reduce income to Museum</i>
			3	Put speed humps on either side of the level crossings
			4	Have police do more patrols at the level crossings
			5	Place reflective tapes on front and sides of tramcars - <i>destroy the historic looks</i>
			6	When multiple trams cross at the same time, couple all trams together when crossing the level crossings

**000000Sydney Tramway Museum**  
**Risk Register - Rejected Controls**

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Risk No.	Hazard	Event		Rejected Controls
			7	Only allow one tram to cross at the same time – <i>significantly reduce income to Museum</i>
			8	Confine tram operations to within Museum site - significant reduction of revenue
			9	Museum becomes a static Museum only
			10	Paramedics to be stationed at Museum on all operating days - <i>impractical</i>
			11	Do Not operate coupled tramcars
1.3.2.1		Pedestrian and tram collide	1	Put signage at the level crossings warning pedestrians of the trams operating
			2	Build proper pedestrian pathways at level crossings
			3	Erect signage showing when the trams operate
			4	Provide footpaths along side of tramline.
1.3.3.1		Derailment of tram on level crossing	1	Increase frequency of inspections
1.3.4.1		Overhead wire struck by overheight vehicle	1	Ban trucks from running across Princes Highway crossing
			2	Insist STM be involved in approval of “high” loads on trucks
			3	Insist “high” trucks take another route south
			4	Have RMS place high barriers across Princes Highway to stop high trucks hitting the overhead wire
			5	Have RMS install sensors to across the Princes Highway to warn trucks that they are too high
			6	Put signage to warn trucks of the height of the overhead
1.4.1.1	Unique to level crossings on Sutherland line	Collision between tram and Road Vehicle	1	Install crossing lights at TAFE and Pitt Street crossings – too expensive
			2	Close the TAFE crossing and make all TAFE traffic use Pitt Street
			3	Ban operating trams after dark – loss of revenue
			4	Put street lights at the crossings – too expensive
1.4.1.2	Collision between tram and Road Vehicle	SSC changed the signs from STOP to GIVE WAY	1	Have trams stop before crossing Pitt Street
			2	Install crossing lights and barriers for cars at the crossing
1.5.1.1	Unique to Princes Highway Level Crossing	Collision between tram and Road Vehicle	1	Crossing indicator lights replaced by Traffic lights on Princes Highway which motorists better understand - <i>not permitted by RMS</i>
			2	Tram tunnel under the Princes Highway – <i>too expensive</i>
			3	Road bridge over the RNP tramline - <i>Too expensive</i>
			4	Divert the Princes Highway around the Museum- <i>Too expensive</i>
			5	Reduce speed limit to a lower speed for motorists on Princes Highway to less than 80kph - <i>not permitted by RMS</i>
			6	Setup a “red light” camera on the RNP crossing
1.5.2.1		Pedestrian and tram collide	1	Provide pedestrian walkway beside tramline.
1.5.3.1		Manual control of crossing lights	1	Do not allow any manual operation - <i>impractical</i>
1.5.4.1		Derailment of tram on level crossing	1	
<b>Hazard Category :- 2 - Museum Operations - tram operating</b>				
2.1.1.1	Operating a tram on the Museum's tramlines	Tram involved in collision with another tram	1	Museum becomes a static Museum only
			2	Do not allow extra trams “Special” days
			3	Ban older drivers on special days - fatigue
2.1.2.1		Brakes fail		

**000000Sydney Tramway Museum**  
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Risk No.	Hazard	Event		Rejected Controls
2.1.3.1		Operate coupled trams in service	1	Ban using coupled sets at the Museum
2.2.1.1	Tram to road vehicle within Museum	Tram involved in collision with a road vehicle	1	Museum becomes a static Museum only
			2	Ban all road vehicles from Museum - <i>difficult for "disabled" passengers</i>
			3	Do not allow extra trams "Special" days
2.3.1.1	Tram to pedestrian	Tram involved in collision with a pedestrian	1	Museum becomes a static Museum only
			2	Customers not permitted to walk around site. Only travel by tram.
			3	Reduce the number of visitors by restricting those "coming through the gate".
			4	Do not operate "large event" days
			5	Do not allow different operations on "Special" days
			6	Do not allow extra trams "Special" days
			7	Limit areas customers can visit
			8	All Museum staff to have First Aid Certificate
			9	Insist all visitors wear safety apparel
			10	Paramedics to be stationed at Museum on all operating days - <i>impractical</i>
2.4.1.1	Fall in tram	Person falls inside tram	1	Museum becomes a static Museum only
			2	Fit seat belts to all seats. - <i>impractical</i>
			3	Ban standing passengers
			4	All Museum staff to have First Aid Certificate
2.5.1.1	Fall from tram	Person falls from moving tram	1	Museum becomes a static Museum only
			2	Customers not permitted to walk around site. Only travel by tram - <i>impractical</i>
			3	Install doors on all trams which close before moving - <i>impractical</i>
			4	Only operate trams which have doors controlled by tram drivers
			5	Fit seat belts to all seats. - <i>impractical</i>
			6	Conductors to be seated during tram travel
			7	Driver to check that "all is clear" before starting the journey
			8	All Museum staff to have First Aid Certificate
2.5.2.1		Person falls from stationary tram	1	Provide hand rails on boarding aids
2.6.1.1	Loose items in tram	Loose items move during tram trip	1	Do not allow passengers to board with any loose items (e.g. prams, etc.)
<b>Hazard Category :- 3 - Museum Operations - Passenger/Crew Safety</b>				
3.1.1.1	Trips and Falls	Person trips/falls within the Museum site including buildings	1	Customers not permitted to walk around site. Only travel by tram.
			2	Limit areas customers can visit
			3	All Museum staff to have First Aid Certificate
3.1.2.1		Crew climb onto roof of tramcar	1	Put handrails around roofs.
3.1.3.1		Passenger sustains injury from being dragged by moving tram	1	Museum becomes a static Museum only
3.1.4.1		Visitors in the Workshop	1	Not allow visitors into the Workshop area
			2	Insist all visitors wear safety apparel
3.2.1.1	On tram	Person received electric shock		
3.2.2.1		Fire on Tram	1	Museum becomes a static Museum only

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Risk No.	Hazard	Event		Rejected Controls
3.2.3.1		Passenger falls ill on tram		
3.2.4.1		Tram crew ignore the "DO NOT MOVE" sign and take a defective tram into traffic		
3.3.1.1	Substation	Person received electric shock		
3.4.1.1	Movement of defective tram	Person move tram "tagged" as defective		
3.5.1.1	Unusual activity occurring at Museum	Organisations using the STM Site for conducting an activity	1	Do not allow external organisations to perform activities on site.
<b>Hazard Category :- 4 - Worker Safety</b>				
4.1.1.1	Staff Issue	RSW acts/ works unsafely		
4.1.2.1		Inattention on part of RSW	1	No early start for special days.
			2	Ban older drivers on special days
4.2.1.1	On tram	Workers fall from tram		
4.2.2.1		Person trapped between trams	1	Do not operate coupled tramcars
4.2.3.1		Crews/workers working in the open air	1	No early start for special days.
4.2.4.1		Members shunt trams alone	1	Ban any shunting of trams alone
4.2.5.1		Use of Safety interlocking device (Dead Man)	1	Remove all Safety interlocking devices from trams
4.3.1.1	Trips and falls	Crew/workers working on ballasted track		
4.3.2.1		Falling from vehicle while working on overhead wires		RTO Assessed Training
4.3.3.1		Person trips/falls within the Workshop and depot area		
4.3.4.1		Falling from elevated platform or ladder		
4.3.5.1		Inattention on part of RSW		
4.4.1.1	Installing or replace Overhead Wire or Fitting	Electric shock		
4.4.2.1		Struck by displaced or falling overhead wire or fitting		
4.4.3.1		Falling from elevated platform or ladder		
4.5.1.1	Using Overhead Line vehicle	Collision Injury		
4.5.2.1		Exceeding Working Load Limit (WLL) of EWP		
4.5.3.1		Falling from height		
4.5.4.1		Falling objects		
4.4.5.1		Lifting & tensioning equipment unsafe		
4.6.1.1	Workshop environment	Person trips/falls within the workshop		
4.6.2.1		Person received electric shock		
4.6.3.1		Asbestos exposure		
4.6.4.1		Person injured using tools		
4.6.5.1		Fire or explosion occurs in Workshop or Depot		
4.6.6.1		Contractor performs unsafe act		
4.7.1.1	Substation	Person received electric shock	1	Museum becomes a static Museum only
4.7.2.1		Fire occurs in Substation		

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Risk No.	Hazard	Event		Rejected Controls
<b>Hazard Category :- 5 - Security</b>				
5.1.1.1	Assault	Physical Assault of passenger and/or crews		
5.2.1.1	Robbery	Conductor or ticket seller robbed		
5.2.2.1		In Traffic Office		
5.3.1.1	Bomb Threat	Museum give a bomb threat		
5.4.1.1	Burglary	Theft of infrastructure		
5.5.1.1	Vandalism	Break-in of Museum Buildings	1	Employ 24 hour security staff on site
5.5.2.1		Tram Damage		
5.5.3.1		Damage of Infrastructure		
5.6.1.1	Bush Fires	Fires in Royal National Park close to tramline	1	Museum becomes a static Museum only
5.6.2.1		Bushfire in area spreads to Museum site		
7.01	Interface Agreement	Contacts with RMS Sutherland Shire Council		
TOTALS	31	84		109



**000000SYDNEY TRAMWAY MUSEUM****RISK REGISTER**

Referenece (Document No.)	Description (SMS Document Name)
STM6013	Security Policy
STM6015	Managing RSW Health Assessment
STM6016	Health Risk Assessments - RSW
STM6017	General Safety Induction
STM6018	Orientation Program - for new members at the museum
STM6019	Starter's Journal
STM6020	Security Plan
STM6022	Safety in Tramcar Cabs Procedure
STM6023	Safe Working Method Statement Procedure
STM6024	Tramway Track Standard
STM6025	Tramway Overhead Manual
STM6026	Rolling Stock Mechanical Standard
STM6027	Track and Structure Inspection and Maintenance Report
STM6028	Track Inspection Procedure
STM6029	Tramway Overhead Inspection Procedure
STM6030	Hazard Reporting Form
STM6031	Tramcar Pre-operation and Stabling Inspection Checklist
STM6032	Interface Agreement with the Roads and Maritime Services
STM6033	Occurrence Report Form **
STM6034	Emergency Management Procedures
STM6035	RSW Health Records Management Procedure
STM6039	Fatigue Policy
STM6040	Health Policy
STM6042	Rail Safety Management plan
STM6043	Conductor Training Procedure
STM6044	Conductor Training Curriculum
STM6059	Officer In Charge training procedure
STM6062A	Tramway Operating Handbook - Non-Operations Book
STM6062B	Tramway Operating Handbook - Operations Book
STM6063	Vegetation Control Procedure
STM6066	Drug And Alcohol Program
STM6070	Attendance Sheet - Operations
STM6073	Visitors Indemnity form
STM6074	Tramcar Maintenance Manual
STM6076	Tramcar Registration Compliance Audit Record
STM6077	Incident/Accident Management Notification, Investigation and Reporting Procedure
STM6081	OIC Daily Traffic Operations
STM6083	Officer-in-Charge Day Checklist
STM6084	Tramcar Certificate of Safety
STM6085	Overhead Inspection/Maintenance Reports Register
STM6086	Tramway Overhead Inspection Schedule
STM6091	PCC car 1014 Manual
STM6096	Z2 class car 111 Manual
STM6104	Operational Tramcars Status

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Referenece (Document No.)	Description (SMS Document Name)
STM6110	Level crossing Operations Manual
STM6111	Fire Extinguish Register
STM6120	Fatigue Managing Procedure
STM6121	Driver Training and Assessment procedure
STM6124	Safety Inspection Procedure for Working on Poles
STM6130	Alcohol and Other Drugs Policy
STM6136	Driver Assessment Report
STM6138	D&A Document Kit for D&A Testing Officers
STM6141	Towing a Tram Across The RNP Level Crossing
STM6146	Historical Tram Operations On The Museum Tramway
STM6147	Induction Register
STM6148	Supplementary Traction Lead Procedure
STM6149	Proceed Order
STM6150	Proceed Order Procedure
STM6152	Disabled Tramcar procedure
STM6153	Notification of Proposed Activity At STM
STM6156	Rail Safety Watcher and Track Awareness Course
STM6157	Power Outage Diagnostic Check Procedure
STM6158	Site Access Permit
STM6160	Climbing Onto Roofs Of Trams Procedure
STM6161	Working On Elevated Platforms Procedure
STM6172	Safe Work Method Statement format
STM6176	Track Maintenance Procedures
STM6178	Checklist for OIC When An Accident Occurs at STM
STM6179	Track Work procedure
STM6180	Accident Report Form
STM6181	Assessment Form for Rail Safety Watcher and Track Awareness
STM6184	Register of ALL Locks at STM
STM6187	Safe Work Method Statements Register
STM6192	Brief Induction Document For Visitors (2 pages)
STM6193	Safety Interface Register
STM6194	Princes Highway Level Crossing Inspection Report
STM6197	Traffic and Safety Notices Format
STM6198	Traffic and Safety Notices Register

**Responsible Person**

Monitors, Supervisors or checking