

Safety Investigation Report

Electric Shock Occurrence

Intersection of Ultimo Road and George Streets Sydney

10 June 2018



Transport
for NSW

Prepared for The Secretary
Transport for NSW
2 August 2018

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1. Executive Summary

During the late afternoon of 10 June 2018, a member of the public was walking southbound along George Street Sydney towards Central Railway Station. On approaching the northern side of the Ultimo Road intersection, this person was suddenly affected by a serious electric shock that rendered her unable to move. As the shock sequence continued, two bystanders attempted to assist, and were in turn, subjected to electric shock. This situation continued for almost two minutes until the person collapsed on the footpath and the electric shock diminished in intensity.

The person was treated and stabilised at the scene by ambulance paramedics and transferred to hospital where she remained under observation for five hours before being discharged. Police attendance followed and prevented access to the area. Police subsequently requested the presence of the electrical distribution company to assess the site. It was eventually determined that an RMS traffic control pit lid had become energised and created this hazardous situation. An RMS contracted maintenance organisation later attended the site to effect repairs and declare the area safe.

This investigation was initiated by the Secretary, Transport for NSW and issued with terms of reference that required a series of issues to be examined and reported on within the framework of a just culture. It was supplemented by an examination of the site by an independent electrical specialist, retained by RMS.

The primary contributory factor to this occurrence was that a power cable, crushed between the pit lid and its supporting frame, had shed insulation to the extent that it conducted a current flow in a way that energised the pit lid without rupturing a high capacity fuse. It merely required the presence of water to conduct the flow of electricity. Sixty-six millimetres of rain was recorded within the CBD during the preceding seven days.

This occurrence was without precedent within the NSW Transport Cluster and, given there are more than thirty thousand such pits in NSW, created an urgent need for investigation and rectification to prevent recurrence.

The investigation determined multiple issues associated with awareness, detection and protection that might have prevented this occurrence. Through a process of interview and document review it became apparent that a number of weaknesses had also existed within the NSW Transport Cluster.

Elements of human involvement were similarly identified that contributed to this situation. The last recorded pit opening took place in February 2018. In the absence of any other evidence related to access, it is possible that this situation may have lain dormant since that time.

The context under which it occurred was a further contribution to the scenario. The awareness of individuals was likely influenced by the gaps in time, between arrivals and departures of responders to the occurrence. As the member of the public was transported from the site much earlier than some organisational responses, there was no continuity of information flow. This supported the lack of alertness to the gravity of the situation and generated a number of assumptions made, that it was a relatively minor occurrence.

A number of organisational factors were identified that related to obligatory safety assurance functions. These functions exist to demonstrate that systems such as traffic control systems can operate safely and efficiently in a populous area, in any natural weather conditions and do so reliably.

Medical and Police responses were timely and effective and benefitted from an ability to physically witness the more complete situation unfolding. They were not aware however, of the source of the electric shock or able to determine which agency may have been accountable for its rectification. To remove the hazard as soon as possible, Police contacted the electrical distribution agency in the first instance.

On their arrival however, the member of the public that had suffered the electric shock, had already been transferred to hospital and, apart from a Police tape barrier around the pit area, the site appeared normal. This was also the case for the traffic signals maintenance organisation. At the time of their arrival, the Police had also left the scene, further eroding the overall knowledge of the sequence of events.

At the same time two suspected homeless persons, without shoes, advised maintenance personnel of an electric shock event at the same site a week earlier. This fact introduced substantial confusion to the overall interpretation of events and set the scene for multiple mixed messages that influenced the communication processes.

Subsequent responses across the Transport for NSW Cluster suffered from this lack of current information and an appreciation of the real situation. This reduced situational awareness hampered the overall escalation of the response by all parties and led to a lack of timely coordination between individual agencies.

The mother of the victim, who held a more complete awareness of the events, was communicating directly with the media at the same time. This fact enabled mainstream media outlets being able to report the situation publicly, in advance of Transport Cluster representatives and their senior management.

Timely rectification actions by RMS management have since provided an assurance that this situation is highly unlikely to ever reoccur.

In addition to three interim safety actions delivered immediately following the occurrence, a further six were introduced and committed to by RMS prior to the conclusion of this investigation.

This investigation recommends a further five safety actions that will serve to strengthen systemic safety structures and communication processes.



Image 1: Ultimo Road Looking South West - 10 June 2018



Image 2: Damaged Cable TCS 1837

2. Recommendations

The investigation recommends that the TfNSW Secretary:

- 1) *Considers strengthening independent safety assurance activities within the Roads and Maritime Services - Intelligent Transport Systems Maintenance Services.*
- 2) *Considers enhancing safety assurance support such as through an incremental expansion of the TfNSW Asset Standards Authority, utilising its existing charter.*
- 3) *Reviews the Transport Cluster communication and safety incident escalation management procedures and training to ensure communication channels and incident management are capable of a measured response at all times, particularly in relation to processes where there are accountabilities for shared assets and involving subcontractors.*
- 4) *Tasks Transport Cluster accountable managers with a role that encompasses customer liaison and support as required in the event of any serious occurrence within the transport cluster.*
- 5) *Mandates that the regular incident response exercises, undertaken throughout the transport cluster to measure the effectiveness of internal and external responses to serious safety occurrences, be facilitated and debriefed for lessons learnt by an external expert. Such exercises may incorporate intermediate desktop activities.*

3. Terms of Reference

Terms of reference were provided to the investigation on 15 June 2018. The Deputy Secretary, Freight, Planning and Strategy required that:

A report is to be prepared to respond to the Secretary for Transport's requirement for an independent investigation into an incident that occurred at approximately 1700 on Sunday 10th June 2018, whereby a member of the public reportedly received an electric shock whilst walking along George Street, in the vicinity of the intersection with Ultimo Road

The investigation will examine and report on:

- A chronology and timeline of events leading up to and after the incident, including notification, reporting and site safety management;
- All works taking place in the vicinity of the incident, and the impact on, and relationship to, those works to the occurrence of electric shock;
- The causal and contributing factors associated with the incident;
- The parties involved, and their various responsibilities and accountabilities in relation to the possible cause of the incident;
- The relationships between any concurrent duty-holders;
- The adequacy and timeliness of the incident reporting, response arrangements, management and dissemination within the transport cluster;
- The adequacy of the safety and quality management systems of the parties involved;
- Any recommendations, opportunities for improvement or actions to prevent recurrence and;
- Any general recommendations.

Ausgrid is to be consulted as part of the investigation. Other parties deemed to be of relevance to the matter should also be consulted / interviewed.

The investigation will be conducted within a Just Culture framework, whereby the aim will not be to apportion blame, but to identify the organisational and human factors, examine individual and team actions and determine the lessons learnt, with appropriate recommendations.

4. Background

4.1. Operating Context

George Street Sydney is the major thoroughfare in the Sydney Central Business District (CBD). Since 1788 this street has formed the basis for major north – south access and in particular, is the link between the Central Railway Station and the Sydney Harbour at Circular Quay.

The intersection of Ultimo Road with George Street provides a direct route to other high-density areas owing to the proximity of the Paddy’s Markets and Chinatown areas. Each one of these areas generates large crowds of local citizens and tourists, particularly on weekends and public holidays.

5. Factual Information

5.1. Pre-Occurrence

Traffic lights at the intersection of Ultimo Road and George Street Sydney regulate the movement of road traffic and pedestrians. These lights are controlled by electrical equipment installed within Traffic Control System 1837 (TCS1837).

TCS1837 is located within a pit inside the pedestrian movement area containing a power, a waterproof fuse box assembly and associated control cabling. The equipment within the pit is covered with a lid of flagstone material, encased in a metal frame consistent with the City of Sydney streetscape.

The policy to mandate this paving material was adopted by the City of Sydney in August 1996¹.

5.2. Works Associated with the Site

Immediately prior to the occurrence, there were no scheduled or non – scheduled works in progress. Hoardings and signage associated with the light rail project were in place.

Only two recent records have been determined that relate to recent work on the TCS1837 pit. Lend Lease Tyco Joint Venture (LT JV) maintenance records state that the pit was accessed on 9 January 2018 to connect an uninterruptable power supply to the signals at the site. This activity was performed in conjunction with the six-monthly functional check as prescribed in the Maintenance of Traffic Control Signals QA Specification R301.

The remaining record states that the pit was accessed by a contractor to Altrac Light Rail on 26 February 2018 in order to fulfil a cable detection program. Photographic evidence exists that indicates that the fuse box and cabling were physically removed from the pit and placed on the adjacent paving. RMS was unaware of this activity until 14 June 2018.

¹ The Central Sydney Paving Design Policy - 1996

5.3. Environmental Conditions

5.3.1. Weather

At the time of the occurrence the Sydney CBD was experiencing typical mid-winter weather conditions. A relatively strong south westerly airstream was creating atmospheric instability.

This situation saw a continuation of moist air and passing light showers, sufficient to maintain a damp surface on the granite flagstone paving at the site.

An overcast sky and the approach of last light at 1654 meant that natural light was diminishing; however, this reducing visibility had no impact on the occurrence.

Bureau of Meteorology records for the period 1 June to 14 June 2018 confirm this situation.

Sydney, New South Wales June 2018 Daily Weather Observations

Most observations from Observatory Hill, but some from Fort Denison and Sydney Airport.

Date	Day	Temps		Rain	Evap	Sun	Max wind gust		9 am					3 pm							
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours	km/h	local	°C	%	g th	km/h	hPa	°C	%	g th	km/h	hPa			
1	Fr	11.7	16.4	0	5.0	3.2	SW	57	03:15	12.9	67	6	SW	30	1023.2	15.6	55	5	S	24	1022.0
2	Sa	10.9	16.0	0.4	3.8	1.1	SW	70	10:50	14.0	62	7	SW	31	1019.0	15.5	70	7	SW	24	1017.6
3	Su	13.3	19.4	0.4	0.8	5.6	SW	43	01:43	15.6	70	6	SSW	24	1020.5	17.0	64	2	SSW	24	1018.8
4	Mo	10.7	18.9	3.6	3.0	4.8	SSE	48	16:55	12.8	76	3	W	17	1020.1	16.1	65	6	SSW	24	1019.6
5	Tu	10.8	15.1	2.8	2.0	0.1	SSW	35	11:20	11.3	82	7	W	17	1025.7	14.8	80	7	SSW	20	1025.6
6	We	11.3	16.8	32.6	0.0	0.0	ENE	37	22:09	12.6	90	7	WNW	11	1030.4	14.4	84	8	SE	4	1030.0
7	Th	10.2	19.5	16.6	1.2	5.4	WNW	26	00:01	11.3	92	5	W	15	1032.4	19.2	46	1	NNE	17	1029.2
8	Fr	11.2	17.0	0	2.8	0.0	NW	22	21:44	14.0	70	8	NNW	9	1026.2	17.0	60	8	N	11	1021.4
9	Sa	12.5	15.5	6.8	0.4	0.2	NNW	26	01:09	13.4	82	8	W	17	1022.8	15.1	74	8	W	13	1020.8
10	Su	10.2	17.1	4.0	0.4	2.5	SSW	46	12:56	12.3	86	3	W	20	1025.2	15.2	77	7	SSW	26	1024.1
11	Mo	10.3	18.9	11.4	2.8	6.4	SSW	37	12:44	11.9	81	1	WNW	22	1023.9	17.3	62	6	SE	22	1020.6
12	Tu	8.5	18.2	0	2.6	5.4	N	26	15:03	10.7	85	7	W	11	1014.5	18.1	56	1	NE	11	1008.4
13	We	10.7	19.7	0	0.8	8.0	WNW	26	12:21	12.5	66	7	W	15	1010.8	18.8	44	6	WNW	13	1009.2
14	Th	10.6		0	2.8					12.2	64	1	NW	15	1014.7	19.6	31	1	NW	20	1013.6
Statistics for the first 14 days of June 2018																					
Mean		10.9	17.6		2.2	3.3				12.7	76	5		18	1022.1	16.7	62	5		18	1020.1
Lowest		8.5	15.1	0	0.4	0.0				10.7	62	1	NNW	9	1010.8	14.4	31	1	SE	4	1008.4
Highest		13.3	19.7	32.6	5.0	8.0	SW	70		15.6	92	8	SW	31	1032.4	19.6	84	8	SSW	26	1030.0
Total				78.6	28.4	42.7															

IDCJDW2124.201806 Prepared at 05:36 UTC on Thursday 14 June 2018

Table 1: Bureau of Meteorology extract – Sydney CBD

5.3.2. Road Traffic Disposition

Road traffic was light, consistent with a public holiday inside the CBD.

5.3.3. Pedestrian Traffic Disposition

At the time of the occurrence, pedestrian activity within the Sydney CBD was influenced by the Vivid Festival. Additional visitors from intrastate and interstate served to further increase the usual pedestrian density.

Witnesses indicated that approximately fifteen persons were in the vicinity of the occurrence site.

5.4. The Occurrence Sequence

Having disembarked from a light rail journey at Capitol Square, two members of the public were walking in a southerly direction on the western side of George Street in the late afternoon of 10 June 2018. The couple was proceeding towards Central Railway Station to return home following a city visit. As they approached the intersection of Ultimo Road at 1627, one person suffered an electrical shock after contacting an electrically energised traffic control system pit cover. This situation occurred without warning. The person was not wearing shoes and the paved surface was damp.

At the time of the electric shock, the companion attempted to assist the person by supporting the person's left arm however, they in turn suffered an electric shock after touching the person. A further attempt was made to assist the person by an unknown member of the public, however they too suffered electric shock and discontinued their effort.

The person collapsed onto the footpath and ultimately manoeuvred into a foetal position with their back onto the paving. The severe shock diminished at this point however a lesser current, described as 'heavy tingling' was still flowing. Further physical manoeuvring led to a cessation of the electric shock.

The person was initially cared for by the companion and other bystanders and remained in a shocked state. She was treated by ambulance personnel ten minutes after the occurrence.

Following medical assessment, the person was transported to hospital by ambulance for further treatment and observation.

5.5. Injuries and Damage

The female teenager suffered from the receipt of an electric shock and was treated at the scene by Central District Ambulance personnel. The teenager was subsequently transferred to the Royal Prince Alfred Hospital for observation, where she remained for five hours before being discharged to the care of her mother, a Registered Nurse.

On Monday 11th June, the teenager suffered muscular difficulties that rendered her unable to support her own body weight without assistance. She was taken to the St. George Hospital where she underwent further diagnosis and testing.

Initial medical discharge records revealed that the patient displayed tachycardia². The discharge document identified an unusual medical presentation for electric shock, suggesting that it was *'possibly greater than standard domestic injury'*.

It was stated that if the tachycardia situation was not resolved, a troponin test may be required. A troponin test measures the levels of troponin protein in the bloodstream. Elevated levels of Troponin are found in cases of muscle damage.

No damage to equipment or property took place.

5.6. Immediate Response

NSW Ambulance personnel arrived at the site approximately ten minutes after being notified of the event by the companion of the affected member of the public. Paramedics immediately commenced treatment.

NSW Police despatched from the Day Street Police Station arrived forty-five minutes after the occurrence and subsequently notified the electrical distribution organisation, Ausgrid, of the power situation. The attending police officers took immediate steps to prevent any access to the site by placing tape barriers. The Police Event Number assigned to this occurrence was E132714902.

Ausgrid technicians arrived at the site and identified a wiring issue associated with TCS1837. The technicians took immediate steps to erect physical barriers to prevent further pedestrian activity in the area. Two hours and twenty-six minutes after the occurrence, the Transport Management Centre (TMC) was advised of the situation by Ausgrid technical personnel.

TMC advised the maintenance contractor, Lend Lease Tyco Joint Venture (LT JV), of the situation and technicians were despatched to the site to assess the situation and to effect repairs.

The site was repaired and subsequently declared safe by the maintenance contractor approximately three hours after the occurrence.

Information provided by the maintenance organisation on 30 July 2018 stated that one of its technicians was approached by two alleged homeless persons, and neither wore shoes. They stated that they had each received electric shocks around the same site in the previous week, however they did not know who to report it to. No contact details were sought from either of these people.

TfNSW maintains a Serious Incident Guide³ focussing on activities within the first five minutes following notification of an occurrence. It was designed for actions by NSW transport operators and was therefore not considered for this unique event.

² Tachycardia means that the heart is beating much faster than normal, usually more than 100 beats per minute.
<https://www.healthdirect.gov.au/tachycardia>

³ Version 2.1

5.7. Post – Occurrence Response

The Secretary, TfNSW ordered an immediate shut down of the adjacent worksite pending an initial investigation.

The Safety Branch within Roads and Maritime Services reported the incident to SafeWork NSW at 09:30 on 12 June 2018 and received SafeWork NSW reference number 2-136882. Subsequently, an Inspector contacted members of the Roads and Maritime Work Health Safety Branch on 12 June 2018 to obtain further details on the incident in order to initiate the response.

RMS verbally directed its maintenance contractor, the Lend Lease Tyco Joint Venture (LT JV) to initiate electrical safety inspections of all TCS pits associated with the Light Rail corridor between Circular Quay and Central Station. This activity commenced at 0700 on 14 June. RMS advised that no electrical hazards were discovered through this process. This activity was completed on 15 June.

The Sydney Light Rail Project also requested that this action be completed within the light rail corridor.

No repeats of the electrical safety hazard were found.

Four non-safety defects were identified and were prioritised for rectification.

They comprised;

- TCS 249 Whereby a foreign cable with an abundance of spare cable has been installed in the pit adjacent to post 2 and a redundant 29 core cable cut and left in the pit
- TCS 277 Had a supply pit lid broken and patched with plastic and rags
- TCS 300 Contained damaged sheathing on the 6mm² SDI supply cable
- TCS 271 Supply changes had been made to the Ausgrid side and out of date drawings were discovered

5.8. Occurrence Stakeholders

Key stakeholders associated with this occurrence comprised:

- Roads and Maritime Services
- Transport for NSW
- NSW Ambulance Service
- NSW Police Force
- SafeWork NSW
- Ausgrid
- Lend Lease Tyco Joint Venture
- Sydney Light Rail Project
- Altrac Light Rail Consortium
- Acciona

5.9. Inter-Agency Protocols – Transport for NSW

5.9.1. Introduction

Transport and its associated infrastructure is an aggregation of entities within New South Wales. The product is referred to as the Transport cluster.

TfNSW sets the strategic direction for transport and works in partnership with government transport operating agencies and private service providers to deliver improved transport outcomes for the community and economy of NSW.

The relationship between the cluster organisations appears below.

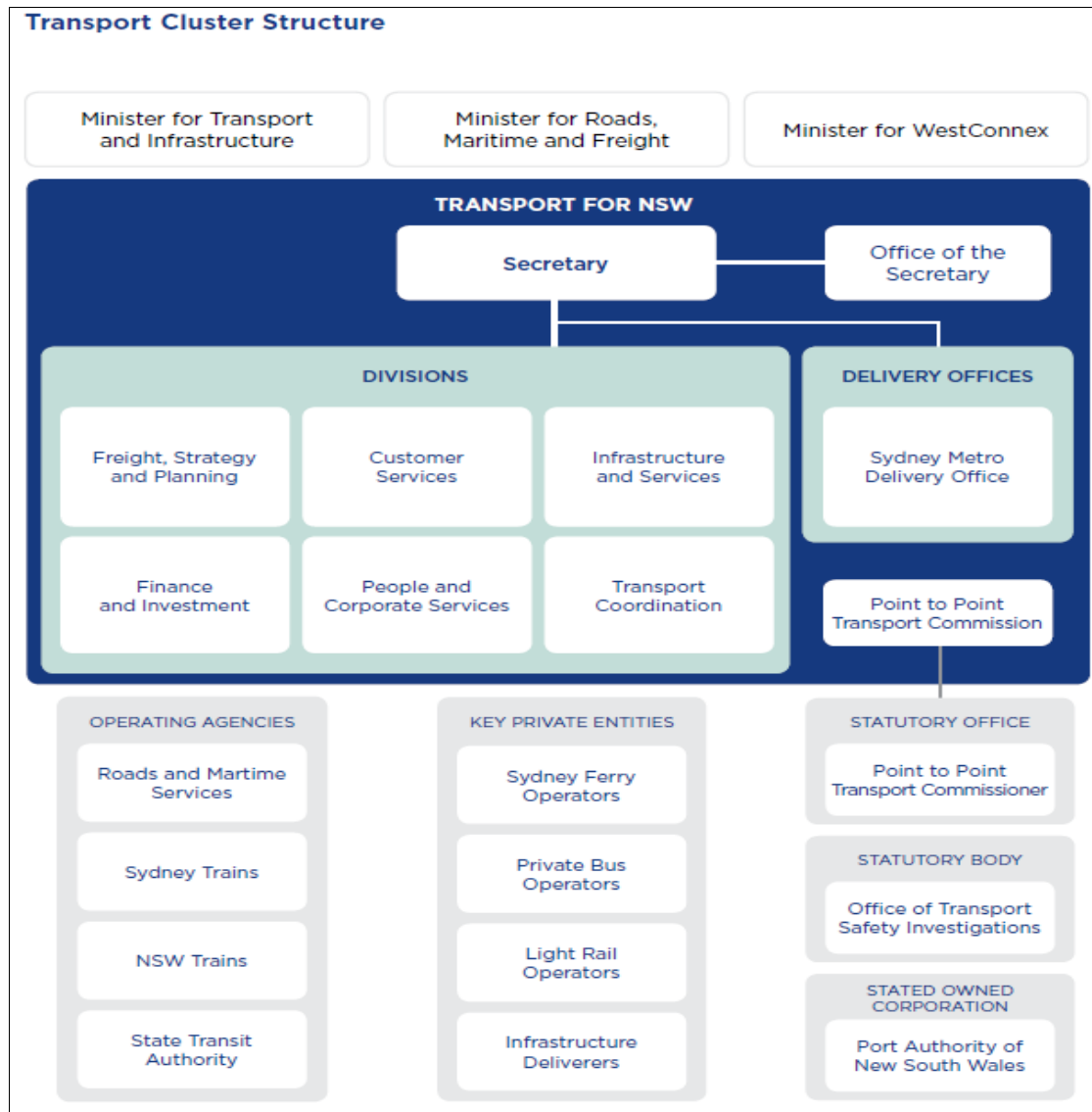


Table 2: NSW Transport Cluster Structure as at 10 June 2018

5.9.2. Media and Communications Management

The TfNSW media team *only* is authorised to deal with media enquiries⁴. It takes the lead role for the Transport cluster in communication activities.

Incoming media enquiries are sourced through a central email address and distributed through the cluster as required.

⁴ Media Enquiry Process – TfNSW Intranet accessed 6 July 2018

This occurrence generated substantial public interest, initially from the two major Sydney newspapers, The Daily Telegraph and The Sydney Morning Herald. The story became topical through syndicated organisations.

Initial requests for information commenced with a request from the Daily Telegraph at 1.18 PM on Monday (nearly twenty one hours after the occurrence). This was responded to shortly afterwards with a request for the journalist's deadline, which was said to be 1700.

The Sydney Morning Herald followed with a phone call, and shortly afterwards, a written request at 1400. This journalist possessed a distinct awareness of the event, to the extent that they stated that:

'A representative from the light rail has since called the family to say a loose wire or loose connection was found in the area, but it's now been fixed'.

This journalist held a deadline for completion of 1730.

5.10. Management of Safety

Transport cluster agencies maintain contemporary Safety Management Systems (SMS). Each contains the policies, standards, procedures, tools and forms and supporting documents required to manage and improve safety and business performance.

Each SMS is adequate in its own right; however, some variations are notable between agencies in their depth.

As a component part of the NSW Transport cluster, Sydney Trains maintains a substantial and robust SMS. Many of its elements have been derived and honed through substantial experience with major occurrences since 1999. Where applicable, this SMS provides a useful model for future harmonisation within the Transport cluster.

Specific observations follow:

5.10.1. TfNSW

TfNSW SMS information is targeted at TfNSW staff responsible for managing safety. It cites⁵ that:

'At TfNSW we know that safe outcomes are not just a matter of luck. Safe outcomes occur because we plan our business to ensure the safe delivery of services to the community.'

Managing safety is a legislative requirement for us as an organisation and Safety is one of our core values. This keeps it top of mind and drives us to integrate it into everything we do'.

⁵ TfNSW Intranet – Accessed 17 July 2018

The elements of this SMS accommodate the full range of safety structures necessary to assure the initiation and continuation of transport services and protect public and staff from harm.

It professes this through the TfNSW Safety Policy which states:

‘Transport for NSW is committed to creating a working environment that enables proactive safety management which strives to improve the health, safety and wellbeing of our employees, consultants and contractors, and assures the safety of our visitors and members of the public’.

The investigation noted however that although this policy exists, it currently holds the signed endorsement (July 2015) of the former departmental Secretary. It is understood that this matter is in the process of rectification.

Subsequent to preliminary details of this occurrence becoming available, the Secretary published a personal message to senior management within the Transport cluster on 13 June 2018. This document provided his personal expectations, in plain English and succinct terminology, titled *‘The Importance of Safety and Incident Response in the Transport Cluster’*.

This document was widely promulgated and focussed senior management on the principles of safety versus production. The Secretary forcefully highlighted elements related to reporting mechanisms, support for affected parties and the principles of a consolidated transport voice when responding to safety events.

This initiative has set the scene for a review of current procedures that will be determined through consultative mechanisms across the Transport cluster.

5.10.2. RMS

RMS maintains a contemporary SMS and promulgates the contents through the *OneRMS Safety Management System Manual*⁶. This document states that:

‘Risk management and safety assurance processes are at the centre of a safety management system. They must be driven by organisational commitment and leadership and by effectively implemented processes that address assets, people and quality. Consultation, cooperation and coordination are integral to all elements of the OneRMS SMS’.

⁶ OneRMS (17.069) Version 2

In addition to the OneRMS manual, there exists another titled Safety Assurance⁷. This document states that:

Traditionally, safety assurance has been limited to inspection and audit activities, which are a snapshot view at a point in time. These quality assurance processes focus on compliance with regulatory or other requirements and do not provide the overall picture of the safety risk.

The RMS safety policy is current and fully endorsed by the Chief Executive. This policy affirms a personal commitment to safety at an organisational level and is attached at Appendix 10.5.

5.10.3. Lend Lease Tyco Joint Venture

The Lend Lease Tyco Joint Venture is the entity that provides the maintenance functions for traffic control signals for RMS. It commenced the service in October 2014.

This organisation initially chose not to participate in this investigation due to a claim to legal privilege.

Information, in the form of statements however was provided to the investigation by their legal representatives only on 30 July 2018. As the investigation was essentially concluded only key elements were considered due to imposed deadlines. Consequently, no assessment of safety management items was conducted.

The initial lack of communication led the investigation to seek some form of validation that RMS had reviewed and endorsed the LT JV SMS, prior to contract award. This was provided on 26 July.

5.10.4. Sydney Light Rail Project

The Sydney Light Rail (SLR) project was established under a Project Deed, between TfNSW and Altrac Light Rail Partnership (Altrac).

TfNSW – engaged Altrac to deliver, operate and maintain the SLR project. Altrac, in turn engaged a joint venture between Acciona Infrastructure Australia Pty Ltd (Acciona) and Alstom Transport Australia Pty Ltd (Alstom) for the design and construction of the SLR project. Acciona is the designated Principal Contractor for any construction work carried out as part of the SLR project.

⁷ Safety Assurance (17.074) Version 2

The Project Deed sets out the WHS system requirements and Safety Management Plan for Altrac.

5.10.5. Altrac Light Rail

Although ultimately remote from the investigation, Altrac Light Rail provided an oversight of the safety related activities associated with the project. Altrac further provided a high-level precis of the safety governance utilised.

It stated:

ALTRAC (OpCo) is fully committed to safety and delivers this commitment and safety duties through comprehensive safety leadership, governance and assurance activities across the CSELR and Inner West Light Rail (IWLR). We have put in place an Integrated Safety Management System (ISMS) which has been reviewed on several occasions by the Office of the National Rail Safety Regulator (ONRSR) as part of the Accreditation of ALTRAC under the Rail Safety National Law. Acciona is required to comply with the ISMS.

We also monitor Acciona performance and key performance indicators through the monthly reports made to the Safety Assurance Committee and Acciona / Altrac Management meetings. Our assurance activities include an integrated and collaborative risk-based audit program.

Incident investigations are carried out in accordance with the ISMS. Acciona corrective actions, arising from both audits and investigations are the subject of targeted verification of completion by ALTRAC.

5.10.6. Post Occurrence Review

Following the occurrence on 10 June 2018, RMS conducted a 'Preliminary Facts and Initial Findings' exercise which culminated in an interim report. This document has laid the foundation for RMS to conduct an internal Incident Cause Analysis Method (ICAM) investigation.

Simultaneous investigations were also initiated by SafeWork NSW and TfNSW.

Although there are regular security exercises of differing magnitude, there are currently no specific exercises, either individual or joint that are utilised to test the communications, media and allied responses within TfNSW in their own right.

Recent relevant exercises included a Transport Cluster Crisis Communications Exercise in May 2017. A discussion exercise (Exercise Footboard) was held to confirm operator and agency responses to a significant event in the Sydney CBD in September 2015.

5.11. Role of the Transport Management Centre

The Transport Management Centre (TMC) works closely with other NSW government agencies and service providers to maximise the safety and efficiency of the NSW transport network.

It manages the NSW State road network, 24 hours a day, seven days a week and the handling of 200,000 calls each year reporting road, rail or ferry incidents.

The TMC received the initial notification of the occurrence at 1853. This notification was provided by an Ausgrid technician and was received two hours and twenty-six minutes after the occurrence.

TMC Incident Number 238 was generated and the TMC immediately contacted the LT JV Control Centre, which indicated a response crew would be despatched as soon as possible. This response crew did not arrive on site to effect repairs until 1935 (thirty-eight minutes after notification, but three hours and eight minutes after the occurrence). The TMC Central Management Computer System (CMCS) log⁸ stated that 'It was an LT JV cable'. It further stated that 'They have advised their managers in LT JV'. The log record stated that an LT JV employee reportedly advised that the pit lid 'was arcing' however this situation could not be verified due to constraints of accessing records from the LT JV.

LT JV SWMS 602 (*Electricity – Working around Live*) identifies the hazard of 'Live Electricity'. A listed control for this occurrence required the TMC to be notified of any potentially hazardous work area and to obtain the service of Police Officers to perform a point duty function.

It is significant that any interpretation of events requires an awareness that the member of the public, affected by the electric shock, had been transported to hospital by ambulance over two hours prior to the arrival of the LT JV crew. As the Ausgrid and LT JV technicians were at the site together, it was possible that reference to Ausgrid calling the TMC was made and accepted as being fulfilled.

5.12. Video Recordings

The TMC has substantial surveillance capacity through an array of cameras at strategic locations through Sydney. This vision is dynamic and is not recorded, unless the trained operators observe an unusual situation or are alerted to an event by other agencies such as police. No recordings were made of this occurrence.

The City of Sydney (CoS) also possesses a substantial surveillance camera capacity within the Sydney CBD and vision is recorded and stored for set periods. This vision is obtained through routine cycling toward fixed points, unless the operator is alerted to an event by approved agencies.

Two CoS cameras recorded such cycling vision at the location of the occurrence. One camera was immediately west of the site and the other was located to the north-east, on the eastern side of George Street. The imagery was distant and subject to the diminishing light conditions. Consequently, the benefits of this evidence were inconclusive. They served to validate some event times only.

The site of the occurrence was immediately outside the entrance to a branch of the St. George Bank. The investigation initially sought to obtain security vision through the bank, and then through the NSW Police. Despite written requests and several telephone conversations this material was not available

⁸ CMCS 238

as ultimately, NSW Police elected not to investigate this matter. Alternative mechanisms, through SafeWork NSW were attempted however SafeWork NSW have elected not to pursue the vision files.

5.13. Data Sharing during Investigation

Significant difficulty was encountered throughout this investigation as a result of legal privilege obligations utilised by the LT JV and, to a much lesser extent Ausgrid.

Despite introductory statements by the investigator, advising that no formal statements were required during interviews, or that any recordings would be made, this lack of information has limited both the timeliness and effectiveness of the processes necessary to properly interpret the likely contributing factors to this occurrence.

6. Analysis and Conclusions

6.1. Introduction

The analysis of this occurrence is focussed upon key elements derived during the gathering of available evidence.

Given the imposition of legal privilege, timeframe obligations, and the Terms of Reference requirements, a complete analysis of all components was not available. However, the investigation has accessed sufficient information to determine the key areas necessary for systems safety improvement. Explanatory notes to this effect have been provided.

6.2. Asset Management

The delivery of any high profile publicly funded project is an opportunity for numerous interests to rally around assorted issues. In a climate of media scrutiny there is usually a level of urgency to deliver tangible evidence to the public that projects are being managed ‘on-time and on-budget’.

In the case of the Sydney Light Rail project, numerous and diverse elements have surfaced since contract award. These issues are outside the terms of reference of this investigation however they are pressures that influence the ongoing project delivery process.

Issues associated with ownership of assets, access to particular sites and formal handover and takeover processes have been identified by the cluster agencies and acted upon with uniform agreement.

6.2.1. Conclusion

On 13 July 2018, a joint position was arrived at between RMS and SLR management.

This activity provided the basis for resolution and led to the rectification initiatives presented to SafeWork NSW on 13 July 2018. The investigation deemed them to be subsequent safety actions.

6.3. Asset Maintenance

TCS1837 is maintained under a contract awarded to the Lend Lease Tyco Joint Venture in June 2014.

In a specification titled *ITS Maintenance Services – General Requirements*⁹, requirements for the Maintenance of Intelligent Transport Systems (ITS) were promulgated in 2014.

The intent of the specification was to provide a structured approach to all aspects of ITS maintenance services including asset management, fault management, maintenance planning, asset inspection, defect identification, planned maintenance, reactive maintenance, incident support and associated services.

Complementary to this specification was the additional document R301 titled '*Maintenance of Traffic Control Signals*'. This document established the special requirements for the Maintenance of Traffic Control Signals. It specified the requirement and intervals for planned maintenance:

PLANNED MAINTENANCE

Planned Maintenance Services must include a:

a) Functional Check Service at least

- three (3) monthly frequency or as specified, whichever is more frequent for Power Backup Systems.
- six (6) monthly for all other TCS Equipment.
- with submission of the checklists in Annexure R301/B, and

b) Routine Maintenance Service at least

- three (3) monthly or as specified, whichever is more frequent for Power Backup Systems.
- twelve (12) monthly every year, for all other TCS Equipment,
with submission of the cover page and checklists in **Annexure R301/C**.

Contained within this document is a requirement titled '*Routine Maintenance Service Report*' which specifies at item 13, an obligation to:

⁹ R300

‘Check AC supply fuse box equipment for water ingress or damage. Ensure intact and undamaged’. Repair or report as necessary.

These obligations are, once again, reinforced the within the ‘Scope of Services (Maintenance) which states that ‘All TCS works under this program shall be carried out in accordance with the TCS maintenance specifications R301.

Documentation to validate the maintenance regime for TCS 1837 appears to reside in Clause 5 of QA Specification R301. This documentation takes the form of a monthly report process to RMS and permits the use of Service Report Form 301/C, unless another agreed electronic reporting system was developed.

Notwithstanding this clause, a sample of ten documents, titled ‘Preventative Maintenance Checklist’ was provided. The sample ranged chronologically from October 2003 until August 2014.

RMS has advised that no other validation documentation is held by RMS. It is stated to sit within the LT JV and therefore, has not been made available for assessment.

The history of this the TCS1837 pit was also sought through historical works order records, in order to ascertain the decision process that saw it installed in its current state. RMS has advised that this information is unable to be located.

Despite there being no national standard for TCS pits, TCS1837 presents as an ‘orphan’ structure. There are over thirty thousand TCS pits in NSW and RMS records state this to be the only one within the Sydney CBD.

TCS 1837 is:

- 300mm deep as opposed to a normal depth of 600mm
- The width is greater than other CBD pits
- The cover thickness is greater than other CBD pits, and;
- The location is within the pedestrian area

- The pit cover weighs in excess of 15Kg owing to the granite flagstone material specified by the City of Sydney Streetscape requirements¹⁰
- The pit design utilises tapered sides which make removal and replacement difficult as well as creating a 'pinch point' should fingers or cables become trapped
- The pit has no markings to indicate contents, ownership or potential hazards

Two LT JV Safe Work Method Statements (SWMS) were assessed to determine the availability of guidance material in the removal and replacement of TCS pit lids.

SWMS 611 – *Accessing Road Pits*¹¹ provides comprehensive guidance for the tasks involved. Amongst other items, it lists hazards related to injuries associated with manual handling as well as proximity to snakes and spiders. Controls are listed citing correct handling procedure and visual inspection of the work area.

In addition, a specific hazard is identified for the task '*Closing the access chamber using short arm lifting key or long arm lifting key*'. The control measure employed requires the technician to:

'Plan the placement path of the access cover; ensure the work area is clear of obstructions and cables safely secured in the pit away from pit lid surround'.

This singular control held the potential to prevent the occurrence of 10 June.

This SWMS was produced in March 2018 however the last known pit opening took place in February 2018. A request made for the previous SWMS document has not yet been provided to RMS by the LT JV.

The investigation noted a further contributing aspect related to pit lid handling of the in the process of lid replacement. A listed control states:

'A 25mm piece of water pipe may be used as an aid to roll the cover over it, if there are no restrictions'.

This method was observed during the CBD pit sampling and inspection exercise on 27 June 2018, where a highly experienced RMS technician was observed replacing the pit lid TCS1837. Despite using the optional water pipe method, the technician was noted to have difficulty in replacing the pit lid owing to its weight (approximately 15 Kg) and the lack of manoeuvrability.

¹⁰ See 4.1

¹¹ 14 March 2018

It is conceivable that a lesser experienced technician, operating in adverse conditions of weather and visibility could suffer significant difficulty in this task. There is no prescribed method requiring two persons to conduct this removal or replacement function.

The Bureau of Meteorology recorded weather at the time of the last known pit opening (26 February 2018), was; rain, complete overcast conditions, a strong southerly wind and the lowest temperature of the month (19.9°).

RMS distributed information related to the recognition of updated electrical assets and pit structures on 13 July 2018. It indicated that contemporary components under review may well provide a greater level of protection against environmental impacts and subsequent damage.

The images below illustrate the visible differences between components and their relationship to each other.



Image 3: TCS 1837 and adjacent (larger) pit

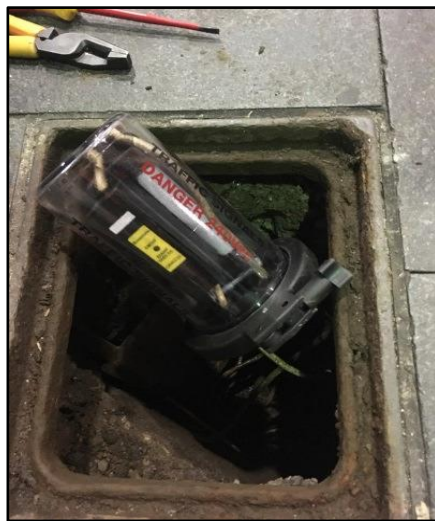


Image 4: Contemporary Fuse Holder



Image 5: Current TCS Fuse Holder

6.3.1. Conclusion

The investigation is unable to validate that the maintenance obligations of the LT JV are conducted within the specifications required. An experienced workforce and timely response to unscheduled issues are critical to the transport management functions of a major city.

The visibilities of the processes underpinning this situation however were unable to be fully assessed.

The application of both service provision and regulatory oversight within one organisation can lead to complacency within any organisation. The investigation considers a need for external scrutiny, either regular or random, would do much to illuminate the issues noted.

6.4. Impact of the Environment

The topography of the Sydney CBD results in a relatively low-lying surface area along the north south axis of George Street. In periods of persistent or heavy rainfall, this situation is conducive to the immersion of underground infrastructure.

The intersection of George Street and Ultimo Road in particular is routinely affected by seasonal flooding. In spite of instances of water depth to 1.5 metres, predictable impacts on road and pedestrian traffic are usually short lived, however the impact beneath the roads and footpaths can be longer lasting and detrimental to safety critical installations owing to a lack of effective drainage and exposure to sunlight to support the evaporation of moisture. This factor alone provides a major impetus for reliable and maintainable weatherproof componentry to deliver the integrity necessary for a major city.



Image 6: Campbell Street Haymarket. February 2017

At the time of the occurrence, despite recent rain and passing showers there was no issue associated with flooding. The last instance of flooding in this area took place in February 2017. The cumulative effects of flooding however, over many years provided a deteriorating environment that was hostile to the infrastructure in place at the site. This situation was exacerbated by the fact that the subject pit was a non-standard installation.

The state of this equipment was consistent with a number of other pits, within and outside of the light rail corridor, sampled by SafeWork NSW and RMS officers on 27 June 2018.



Image 7: Pit layout - TCS 1837 to the right

In the preceding week to 10 June 2018, 66.4 mm of rain was recorded for the area by the Bureau of Meteorology. This precipitation served to ensure a damp pedestrian walking surface and a moisture laden atmosphere with a relative humidity of 77%.

At the time of the occurrence, natural light was diminishing however this played no part in the sequence of events.

6.4.1. Conclusion

The investigation concluded that the Traffic Control Signal 1837 pit, and others sampled in the adjacent areas were vulnerable to predictable environmental factors created by water immersion and silting processes over time. Evidence of this was determined through the observation of moisture and water inside several IP67 fuse boxes. Consequently, the maintenance and inspection regimes associated with this critical infrastructure requires robust and regular inspection processes in order to deliver the assurance necessary for the needs of a growing major city.

6.5. Media and Communications Management

6.5.1. Transport for NSW

Response to all cross-cluster media enquiries is conducted through the communications team in TfNSW Customer Services Division (CSD). It ensures that the Transport Cluster speaks with one voice and that the information provided to customers through the media is accurate and up to date.

6.5.2. Roads and Maritime Services

The RMS Media team cites itself to be ‘one of the busiest within NSW Government and is responsible for all comment provided to the media including metropolitan, regional, interstate and international media requests’¹².

A key responsibility is the preparation of accurate and timely responses to media enquiries. It maintains a capacity to respond 24 hours a day.

On Monday 11 June, at 1405, the enquiry from the Sydney Morning Herald was referred to the CBD Media Team as well as to the TfNSW Customer Services Division.

Immediately after this, at 1406, an officer from the Minister for Transport and Infrastructure’s office was contacted by email and advised ‘this may be an RMS one – they are just getting some advice’. Shortly afterwards, the Sydney Morning Herald was notified that a response would be provided soon, if it was related to light rail.

At 1429 (22hrs:02 mins after the occurrence) the CBD Coordination Office advised TfNSW Media of two issues:

- That Altrac Light Rail had confirmed that the event was not related to light rail construction, and;
- That CBD South Eastern Light Rail understood that safety rectification works were being undertaken by the LT JV on behalf of RMS. Furthermore, the correspondence stated that the work had been rectified the previous evening at 2118.

The CBD Coordination Office asked TfNSW Media pass on this information to RMS at 1429, however at this point, the Daily Telegraph had already contacted Altrac and been advised that the issue was unrelated to the Light Rail Project.

At 1435 TfNSW Media referred the issue to RMS Media and requested that RMS media respond directly to the Daily Telegraph. Furthermore, they stated (incorrectly) that the electric shock event was related to RMS works conducted by the LT JV.

CBD Media contacted the Sydney Morning Herald at 1517 and stated, ‘We understand that this was a private contractor undertaking works on behalf of RMS and not related to light rail’.

Ultimately, at 1703 (two hours twenty-eight minutes after RMS media were advised of the media enquiry, but over twenty-four hours after the event) RMS provided a response to the Sydney Morning Herald.

It stated:

¹² RMS Intranet accessed 13 July 2018

Please quote a Roads and Maritime Services spokesperson as below:

Roads and Maritime Services is investigating an incident which occurred yesterday at the intersection of Ultimo Road and George Street.

Once Roads and Maritime was made aware of the incident, staff attended the site and made the area safe after identifying an issue with an exposed wire.

Roads and Maritime will ensure a thorough investigation is carried out.

6.5.3. Conclusion

The overall media and communications response suffered a lack of initial understanding of the serious nature of this occurrence. The terminology utilised by all participants, and promulgated by means of email, further minimised the significance and consequently failed to transmit the overall impact of the situation.

A witness at the site spoke of ‘heart rending screams’ that lasted in excess of two minutes. A video recording, made by a passer-by and published on social media, confirmed this account.

The subsequent telephone calls made by Altrac Light Rail representatives to the mother, however were initially interpreted as downplaying the severity of the event. The representatives allegedly utilised the terminology of a ‘loose wire’ or a ‘loose connection’ but that it had been repaired, to the mother, however this terminology was denied by both representatives.

Within the collective of Transport media, it was apparent that a considerable amount of time was expended on determining which agency was involved and who should lead the response. The RMS Director – Maintenance was unaware of any media interest until 1509 and the Executive Director – Sydney was also unaware until 1539. The issue was briefly referred to RMS legal personnel prior to release. The formal RMS response was provided to the Sydney Morning Herald at 1703 on 11 June.

The detached nature of the response to the mother was further exacerbated by the fact that, upon a request for RMS contact details, that was made by a journalist, the mother was provided with the generic email address of media@rms.nsw.gov.au . The mother’s stated responses to this lack of feedback were those of measured anger and an increasing frustration which drove her search for a more complete response.

In overall terms, the single voice philosophy was not achieved, and the message, although ultimately correct was delayed.

6.6. Notification and Escalation Processes

By its own procedure¹³, RMS defines a ‘Significant Incident’ to be:

An incident which has (or has the potential to have) a critical consequence is classified as a ‘significant’ incident when it involves **any one** of the following factors:

- A fatality and/or a person is (or multiple persons are) hospitalised due to the serious nature of the injuries incurred,
- A failure of, or that resulted in major damage to, Roads and Maritime infrastructure or an asset;
- Highly visible to the public or media;
- A major Roads and Maritime network service disruption; or
- A serious incident near miss – an incident that could have resulted in any of the above.

The fact that a member of the public was hospitalised immediately, meant the occurrence was in fact, significant. This categorisation however was dependent on RMS officers being aware of the situation and acting in accordance with the published procedure. In this case, the sequence of events was clouded by the lack of any real knowledge of the situation. It was *believed*, rather than confirmed that hospitalisation had taken place. A fine line exists between these two states.

In a formal statement received on 30 July 2018, a supervisor for the maintenance organisation advised LT JV management at approximately 2000 that:

‘There has been a report of a member of the public who has received an electrical shock at TCS 1837 and was taken to hospital. There has also been a report that another member of the public has received an electrical shock while trying to assist.’

In turn, management escalated this advice of the electric shock event and the possibility of another person being affected. This information also stated that hospitalisation had taken place.

‘... a member of the public has received an electric shock and been taken to hospital, and apparently another person has reported electric shock from assisting the person’.

The RMS Director – Maintenance was advised by the LT JV of this situation at 2118, almost five hours after the occurrence and after all parties had vacated the site. Due to the legal privilege situation, no definitive conclusion as to whether hospitalisation was confirmed, or only suspected, could be made.

This is a critical point in the analysis as there were no real means of interpretation or comprehensive understanding of the significance of the event at that time. Overall information was sparse and

¹³ Hazard and Incident Management Version 2.0 (27 June 2018)

obliquely suggested that an unnamed homeless person may have been affected. Without any lead or contact information, as well as the issue of being able to access personal information by contacting hospitals or the ambulance service, police would need to have been followed up to track down any facts related to the event.

This scene would have been legitimately compounded by the context and traditional inertia of the long weekend holiday period.

Notwithstanding the fact that the Executive Director – Sydney initiated an investigation within ten minutes of being advised of the occurrence, the information remained within the RMS until 2237.

The RMS escalation procedure at the time¹⁴ required that the Director Safety, Quality, Environment and Risk at TfNSW be notified. On being notified, the RMS - Director Safety sent a text message advice at 2237 to the Director Safety, Quality, Environment and Risk at TfNSW. The lack of any confirmed information about the member of the public meant that the message did not convey a situation of physical gravity to that officer. The likelihood of adverse media coverage was not interpreted by the Director Safety, Quality, Environment and Risk at the time, despite the intention of the RMS Director - Safety.

Had this shared vision of the true situation been appreciated, this parallel communication channel would have been opened, leading to the Secretary TfNSW and then the Minister being informed of the emerging situation.

Ultimately, it was not responded to until 0927 the following day (seventeen hours after the occurrence). There was no formal obligation for the Director Safety, Quality, Environment and Risk to respond unless a more serious account was interpreted, or the implications of media interest understood.

The only clear picture of the occurrence began to emerge following media requests to the TfNSW media office that commenced from 1318 on 11 June (almost twenty-one hours after the occurrence). By this stage, the mother of the member of the public, who had the more comprehensive overview of events, had conducted an assertive campaign to seek advice from numerous sources, including SafeWork NSW and mainstream media agencies.

Ultimately SafeWork NSW was not advised by any agency of this occurrence until 0928 on Tuesday 12 June. RMS finally took this initiative (forty-one hours after the occurrence) to ensure that at least one agency of the transport cluster had delivered such a notification.

Prior to this formal notification by RMS, SafeWork NSW was only ever advised by the mother.

¹⁴ Hazard and Incident Management Version 1.0 (21 May 2018)

The investigation became aware of an information distribution process known as the Person in Charge Phone (PiC Phone). This messaging system was managed by Acciona, the construction contractors to advise a designated list of people of significant events, through text messaging.

This system was activated on 10 June at 1925 (almost three hours after the occurrence) to advise of the electric shock occurrence, albeit in limited detail. Twenty people within the transport cluster were addressees on this list. The composition included several Light Rail project staff, several media staff and a sole RMS officer. The investigation is aware of only one person that acted to escalate this information. This action however did not result in any overall escalation activity.

This system is an information only process that imposes no duty for any officer to act in accordance with a checklist or assigned function. The example gives further visibility into the existence of multiple communication failures across the organisations during this occurrence and afterwards.

6.6.1. Conclusion

This occurrence met the criterion of ‘significant’ because hospitalisation actually took place. Despite this trigger, the correct escalation process was not enacted because of a lack of consolidated confirmation. It is likely that a lack of clarity on who was the responsible party, who was the asset owner and the roles of sub-contractors managing the construction site surrounds, contributed to this confusion.

The combination of the competing influences of lack of information and holiday period timing, served to diminish the sensitivity of the stakeholders. This situation was exacerbated by the time that elapsed between the occurrence and the ultimate realisation of the true circumstances.

Ultimately, it was only on Tuesday 12 June, when all parties were aware of the factual information, that the RMS Significant Incident Response Procedure was initiated by the Executive Director- Sydney. This action commenced the necessary rectification activities.

The investigation noted a growing reliance was placed upon the TMC to be the receivers of occurrence information and to disseminate it as necessary. As it stands, this reliance is misplaced as the primary role of the TMC serves to identify and resolve network disruptions.

This was not the case on 10 June as the TMC were only advised incidentally by Ausgrid, who had no formal obligation to do so. On receipt of the advice (at 1853), the TMC responded promptly in calling out the LT JV response crew at 1855. Information was provided to the TMC by the LT JV at 2014 advising the status, including more precise details of the sequence of events.

The RMS escalation process in existence on 10 June called for the Chief Executive RMS or the TfNSW Director, Safety, Quality, Environment and Risk to communicate this event to the Secretary. Neither officer delivered this information to the Secretary. In any case, TfNSW procedures require the Deputy Secretary – Freight, Strategy and Planning to be the communication conduit to the Secretary.

It was not relayed to the Chief Executive RMS and the occurrence was not presented, as a critical occurrence, to the TfNSW Director Safety, Quality, Environment and Risk. Subsequently the situation occurred where information was not distributed prior to media awareness.

The information path and the blockage points appear below in image 8.

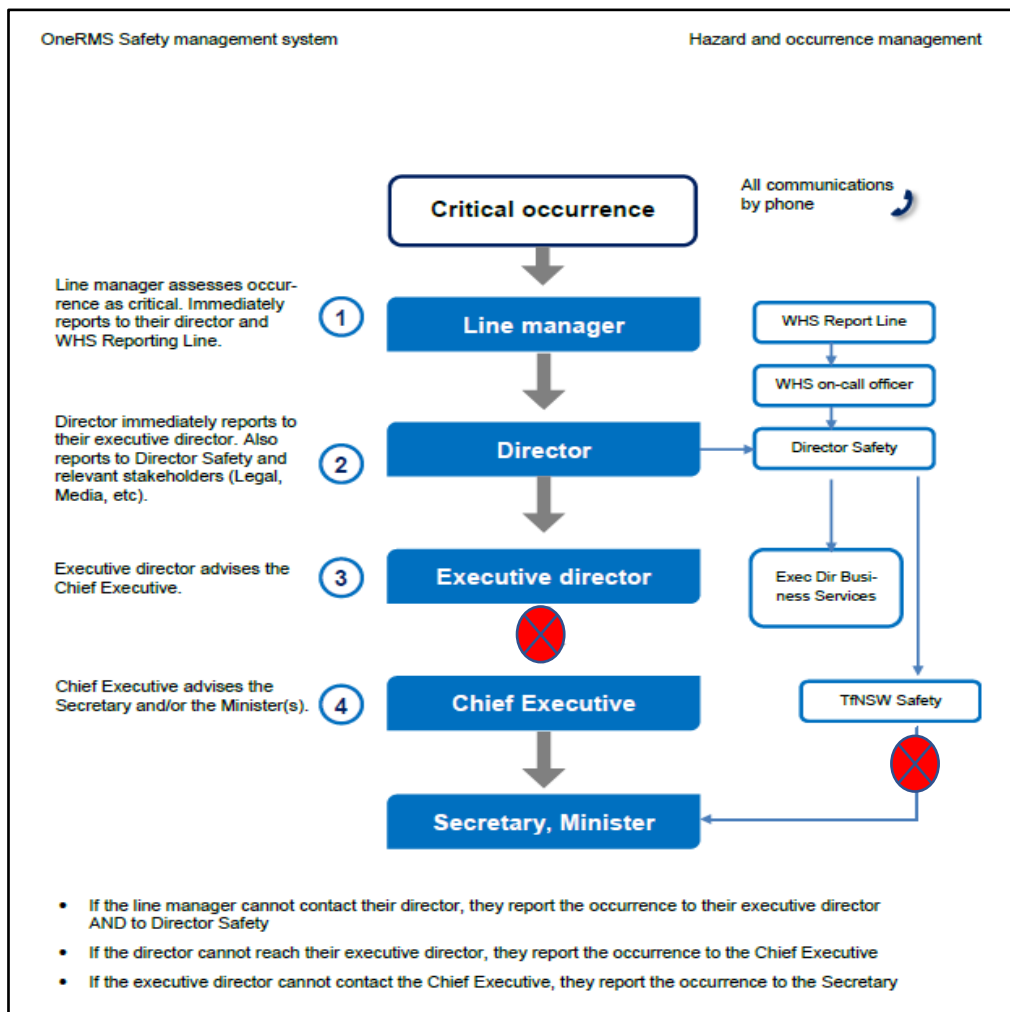


Image 8: RMS Escalation Procedure 10 June 2018

The investigation is aware of work in progress to address incident reporting and notification protocols within the transport cluster, through the Transport Cluster Leadership Committee. This is expected to further strengthen obligations related to reporting and escalation.

6.7. Assurance

Safety assurance activities are at the core of any safety management system. Assurance includes ongoing systematic monitoring and recording of safety performance, as well as evaluating safety management processes and practices.

The following diagram gives a graphical representation of the assurance function. It utilises the concept of assurance being the ‘wedge’ that maintains a published standard or a necessary performance to meet a regulatory, commercial or social demand.

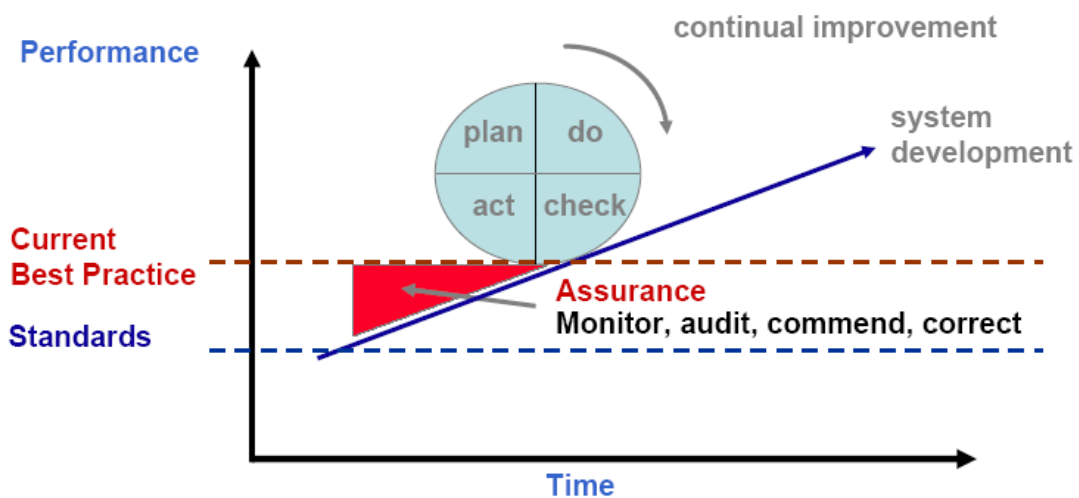


Image 9: The Role of Assurance

Since the commencement of contracted maintenance duties in October 2014, the LT JV has earned and retained the confidence of RMS management. A significant degree of expertise and corporate history was transferred from RMS to the joint venture in the process. This fact greatly assisted the transition.

The contracted service provides for specific performance objectives for the assets which support the RMS objectives. They are to:

- Support the safe and efficient operation of the road network for all road users.
- Support the enforceability of road traffic regulations, warn or alert road users of road conditions and hazards, and to provide clear information to road users in day, night and inclement weather conditions.
- Support the Transport Management Centre (TMC) in the management of incidents (in relation to ITS assets).

The investigation sought a number of documents related to the ongoing assurance function in order to validate the confidence expressed. As the joint venture has chosen not to participate in the investigation, corresponding material was sought through RMS.

Routine reports related to audits, inspections and associated surveillance activities were not available for review. It was stated that ‘these documents sit with LT JV’. A limited sample of ten inspection checklists was provided on 20 July 2018 however the documents covered random periods between October 2003 and August 2014.

A comprehensive document titled *LTJV Stewardship Monthly Progress Report*¹⁵ was provided by RMS on 25 July. This document was co-signed signed by representatives of the LT JV and RMS.

The following performance graphs were embedded within this document¹⁶. It was stated that this was meant to reflect the asset inspections conducted by the LT JV. The investigation was unable to obtain any measure of compliance from this document.

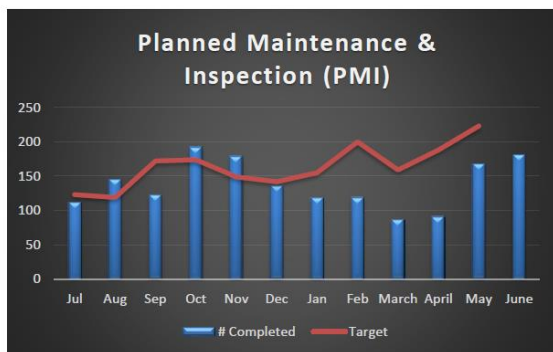


Figure 8 Planned Maintenance & Inspection



Figure 10 Planned Inspection

Image 10: LT JV Performance Charts

This does not infer that documentation including checklists does not exist; rather it indicates that the oversight function of a critical contracted function is not as transparent as might be desirable.

Two different versions of the *Maintenance of Traffic Control Signals QA Specification R301* were provided (Version 2 dated 6 May 2014 and Version 3 dated 3 October 2014) by different parts of the organisation. Although not materially significant, it generates unease about the fundamental details held that serve to provide system assurance.

Despite the potential for deterioration of TCS pits over time, there is no requirement for photographic evidence to be held as any part of the assurance program. The contractual obligation is around keeping

¹⁵ Metro Zone East – June 2018

¹⁶ At Page 18

RMS records manually up to date in the site log book and electronically in the RMS Fault Management System (FMan).

The Charter of the Asset Standards Authority (ASA)¹⁷ provides guidance in the concepts of assurance. Listed amongst the charter is an objective to

'promote and facilitate improvements in process efficiency, safety and performance in relation to the Asset Lifecycle of NSW Transport Assets'

It further identifies the key assurance elements of system safety and network integrity.

With respect to governance, the Executive Director of the ASA currently holds a 'dotted' reporting line to the Secretary. This existing situation could provide the Secretary with emerging systemic information in parallel with existing structures.

This information gathering is accommodated within the charter at Part 20 which states:

The ASA may, for the purposes of exercising its functions, as regards any Transport Agency:

(a) conduct reviews, surveillance and audits of the compliance of the Transport Agency with ASA Requirements;

Compliance is supported at Part 24, which states:

A Transport Agency must:

(a) co-operate fully with the ASA so that the ASA can carry out its functions effectively;

(b) implement and comply with ASA Requirements;

(c) have systems in place to require and monitor that all contract counterparties, contractors and access seekers implement and comply with ASA Requirements wherever applicable (existing projects will be subject to transitional arrangements);

(d) provide reasonable access to premises and resources as required by the ASA, including so that the ASA can effectively carry out its review, surveillance and audit functions;

(e) comply with decisions, instructions and requirements issued by the ASA, subject to the internal review process;

¹⁷ August 2015

(f) provide representation and collaborate with the ASA to ensure that ASA Requirements remain relevant and consistent with Transport for NSW values and industry developments;

(g) notify the ASA of any matter that could reasonably be expected to affect the exercise of the ASA's functions; and

(h) provide the ASA with any information relating to its activities or any documents or other things reasonably requested by the ASA in the exercise of its functions.

Although currently focussed on rail assets, the ASA charter accommodates non rail assets, including road assets. The charter defines transport assets:

Transport Assets means those assets listed in Schedule 1 which are vested in or owned, managed, controlled, commissioned or funded by the NSW Government, a NSW Government agency or a Transport Agency

6.7.1. Conclusion

Notwithstanding the currency of the RMS SMS documents, they focus strongly on customary WHS strategies. This focus has evolved from the traditional functions of design and construction activities. Technological changes and the advent of contracted outsourcing of functions demand, and will continue to progressively demand, a higher level of assurance that integrates with other elements of the transport cluster.

While espousing a contemporary approach to safety assurance, existing RMS policies appear to embrace the traditional WHS model and ultimately tend to diminish the necessary elements related to audit and inspection functions.

This situation becomes further clouded when the roles of a service provider and a regulator are combined within the one entity. In this case, the service provision side of RMS is focussed on the delivery of reliable and fault free signalling operations. Conversely, the regulatory side of RMS is not readily able to demonstrate fundamental assurance mechanisms traditionally sought by contemporary regulators in other industries.

Consequently, the Secretary TfNSW may not be able to provide fundamental assurance across the transport cluster.

6.8. Security

The investigation considered whether the pit may have been accessed by a party other than LT JV, Altrac Light Rail or Acciona personnel on 26 February 2018. There was no recorded access from that

time until the occurrence on 10 June and no evidence exists to indicate any unauthorised access has been made.

Despite the criticality of power, data and communication cabling within the CBD, no physical locking mechanisms exist on pits. Reasonable arguments have been tendered that suggest the legitimate need to access pits in cases of emergency, overrides aspects of physical security.

The investigation accepts that there is no real attraction for any person to access these pits. The more substantial pits (like TCS1837) require a substantial effort. A special tool is specified to open this type of pit however rudimentary tools are capable of achieving removal.

In the case of the historically earlier, and less substantial metal pit lids, many of these can be easily opened with a simple screwdriver. During the CBD pit sampling exercise, several pit lids were noted to have defective or missing screw down retainers.



Image 11: Metal Pit Lid

6.8.1. Conclusion

No evidence exists; however it is possible that an individual or organisation could have accessed this pit without any obligation to record their presence.

The investigation takes no position on this aspect of security; however, it flags this issue as worthy of consideration when matters of future city-based infrastructure integrity are reviewed.

6.9. Works Associated with the Site

No records exist of any works being conducted at the site on the day of the occurrence. This was confirmed by review of video recordings provided by the City of Sydney.

6.10. Post Occurrence Follow up

From the technical perspective, RMS sought the services of an independent electrical specialist organisation to assist it with its own investigation. This specialist was required to assess the conditions of the pit and surrounds at the time of the occurrence, determine the likely cause and any contributing factors to the occurrence. This report was provided to RMS on 13 July 2018.

A relevant extract of this report appears at Appendix 7.

The Sydney Light Rail project proactively sought to have samples of power cable insulation assessed for effectiveness and durability. Issues associated with the acquisition of an independent testing regime meant that this assessment did not take place.

From a communication and customer service perspective, other than the generic email address, offered through a journalist, no attempt was made to contact the family by either TfNSW or RMS until a telephone call from the TfNSW Deputy Secretary – Customer Services was made on Wednesday 13 June.

The Deputy Secretary – Customer Services made a series of four telephone calls to the mother offering support to the family and suggesting that, if she required further information or resolution to other matters he would assist, wherever possible. This included an attempt to obtain the Police report associated with the occurrence.

6.10.1. Conclusion

Fundamental to any incident response scenario is the need to provide regular and updated communication, however limited the content. Given the personnel and communication resources available within the TfNSW cluster, it seems incongruous that such a situation could have developed.

Despite any public holiday scenario, transport services were running in order to meet the demands imposed by the Vivid Festival. Support mechanisms, consistent with the ‘one voice’ philosophy are obliged to meet this demand across the transport spectrum.

7. Findings

The investigation found that:

- a) The member of the public was walking on wet paving without shoes immediately prior to this occurrence
- b) An uncontained discharge of electricity energised the metal frame of the TCS1837 pit cover
- c) The member of the public suffered a serious electric shock requiring two instances of hospitalisation after contacting this cover
- d) No evidence exists to indicate that any person or organisation accessed this pit since February 2018
- e) It is likely that this hazardous situation may have existed since February 2018 awaiting the presence of water to activate the circuit
- f) The pit lid of TCS1837 lay in the immediate pedestrian walking area and was not labelled to indicate its purpose or contents
- g) The depth of TCS1837 was conducive to the entrapment of cables under certain circumstances
- h) SafeWork NSW was not advised of this occurrence for forty-one hours
- i) Pits in the occurrence location are susceptible to seasonal flooding
- j) The TMC was notified of the electric shock occurrence by Ausgrid two hours and twenty-six minutes after it took place
- k) The site was secured in turn by Police, Ausgrid and the maintenance contractor to prevent pedestrian access
- l) Repairs were effected and the site declared safe by the maintenance contractor two hours and twenty one minutes after being notified by the TMC
- m) The family of the affected member of public was unable to obtain satisfaction from any agency within twenty-two hours, and did so through mainstream media channels
- n) The TfNSW One Voice concept was compromised by a focus on who was involved rather than those who needed to know
- o) Existing TfNSW media protocols exist, however enhancements to content, organisational promulgation and synchronisation are needed

- p) The Secretary TfNSW was not advised of the occurrence in a timely manner
- q) The Secretary, TfNSW, delivered firm safety and notification expectations to senior management following this occurrence
- r) The TfNSW Safety Policy is not formally endorsed by the current Secretary TfNSW
- s) Available video evidence through surveillance cameras was inconclusive
- t) NSW Police chose not to investigate this occurrence
- u) The Lend Lease Tyco Joint Venture did not participate in this investigation, and documentation requested from them was not made available to the independent investigator until 30 July 2018
- v) The Lend Lease Tyco Joint Venture was the maintenance contractor for the TCS1837 pit
- w) RMS assurance activities of the maintenance contractor could benefit from independent scrutiny
- x) RMS rectification processes provided to SafeWork NSW appear robust, timely and achievable

8. Safety Actions and Recommendations

8.1. Interim Safety Actions

- 1) After initial notification, the Secretary, TfNSW ordered an immediate shut down of the adjacent worksite pending an initial investigation.
- 2) RMS verbally directed the LT JV to initiate electrical safety inspections of all TCS pits associated with the Light Rail corridor between Circular Quay and Central Station on 12 June. RMS advised that no electrical hazards were discovered through this process. This activity was completed on 15 June. No repeats of the electrical safety hazard were found.

8.2. Subsequent Safety Actions

On 13 July the RMS Executive Director – Sydney provided an action plan to SafeWork NSW which included six elements of rectification.

The investigation considers each to be a safety action, in that they singularly and collectively, serve to mitigate or prevent a recurrence of this event.

They were:

- 1) Investigate relocating the subject electrical assets contained in the pit where the incident occurred to an area outside of the pedestrian footpath.
- 2) Conduct intrusive inspection of 123 pits on George Street along Sydney Light Rail corridor adjacent to works
- 3) Review adequacy and frequency of inspection regime for pits within City of Sydney using defect data outcomes from intrusive pit inspections to inform future asset lifecycle/maintenance strategy underpinned by Failure Mode, Effects and Criticality Analysis (FMECA) Reliability-Centred Maintenance (RCM) Methodology
- 4) Review and determine future pit Standard, recognising updated electrical assets and pit structures now available
- 5) Strengthen audit and assurance of the LTJV inspection/maintenance service delivery
- 6) PCBU¹⁸ obligations - to clarify contract demarcation of maintenance responsibilities, accountabilities and work, health and safety obligations – as single entity PCBU and as shared PCBUs. This will also include assurance.

¹⁸ Person Conducting Business Undertaking

9. Recommendations

The investigation recommends that the TfNSW Secretary:

- 1) *Considers strengthening independent safety assurance activities within the Roads and Maritime Services - Intelligent Transport Systems Maintenance Services.*
- 2) *Considers enhancing safety assurance support such as through an incremental expansion of the TfNSW Asset Standards Authority, utilising its existing charter.*
- 3) *Reviews the Transport Cluster communication and safety incident escalation management procedures and training to ensure communication channels and incident management are capable of a measured response at all times, particularly in relation to processes where there are accountabilities for shared assets and involving subcontractors.*
- 4) *Tasks Transport Cluster accountable managers with a role that encompasses customer liaison and support as required in the event of any serious occurrence within the transport cluster.*
- 5) *Mandates that the regular incident response exercises, undertaken throughout the transport cluster to measure the effectiveness of internal and external responses to serious safety occurrences, be facilitated and debriefed for lessons learnt by an external expert. Such exercises may incorporate intermediate desktop activities.*

9.1. Recommendation References

Recommendation	Key Target Area	Report Reference
1)	Safety Assurance ITS	6.3.1 6.7.1
2)	Safety Assurance Support	6.3.1 6.7.1
3)	Incident Communication and Escalation	6.5.3 6.6.1 6.10.1
4)	Customer Liaison and Support	6.6.1
5)	Incident Response Integration Exercises	6.5.3 6.6.1 6.10.1

10. Appendices

10.1. Appendix 1 Occurrence Chronology

Sunday 10th

<i>Elapsed Hours</i>	<i>Hour</i>	<i>Min</i>	
0.00	16	27	Electric Shock Occurrence
0.10		37	Ambulance Arrival
0.42	17	15	Police Arrival
0.56		23	Member of Public transferred to hospital by ambulance
1.04		31	Police Advise Ausgrid
1.23		50	Ausgrid Arrive, Identify Source & Secure site
2.26	18	53	TMC Advised by Ausgrid
2.30		55	TMC Advises LT JV
3.08	19	25	Altrac advised of occurrence by Person in Charge text message
		35	LT JV Arrival and Effect Repairs
4.46	21	13	Lt JV Vacate Site
4.51		18	LT JV Advise RMS Maintenance - Area Safe
4.55		22	Ausgrid District Operator Departs
5.07		34	RMS Maintenance Advises RMS Exec Dir. Sydney and RMS Media
5.15		42	RMS ED Initiates Investigation Process
5.17		44	LT JV provide photographs to RMS Maintenance, forwarded to RMS ED
5.28		55	RMS Maintenance confers with LT JV Program Manager

5.35	22	02	RMS Maintenance notifies RMS Dir. Safety
5.39		06	RMS Dir. Safety commences investigation, notifies RMS Business Services
6.10		37	Notifies TfNSW Director SQER
6.19		46	RMS Dir. Safety notifies RMS personnel of investigation

Monday 11th

16.48	09	15	Altrac Community Relations contacts mother by telephone
20.51	13	18	TfNSW receives media enquiry from Daily Telegraph
21.38	14	05	TfNSW sends enquiry to CBD Coordination Media Office
22.02		29	CBD Coordination Media sends it back to TfNSW Media
22.08		35	TfNSW Media forwards Sydney Morning Herald query to RMS Media
		45	Altrac Light Rail Community Relations Manager contacts mother to offer support
22.45	15	12	RMS Media seeks information from RMS Maintenance
23.12		39	RMS Maintenance advised RMS ED and RMS Director Safety of media interest
23.58	16	25	RMS Media construct draft media response
24.04		31	RMS Legal Branch consulted over inconsistencies in information
24.15		42	RMS Legal confers with RMS Media
24.33	17	00	RMS ED approves RMS Media response to Sydney Morning Herald

Tuesday 12th

38.32	06	59	RMS ED initiates Significant Incident Response procedure
39.33	08	00	RMS Significant Incident Response Team meets
40.12		39	RMS Safety updates TfNSW Director SQER to clarify SafeWork NSW status
41.01	09	28	RMS Safety formally notifies SafeWork NSW
45.34	14	01	RMS Safety advises TfNSW SQER of SafeWork NSW investigation
47.03	15	30	RMS Significant Incident Response Team convenes to review status

Wednesday 13th

69.03	13	30	SafeWork NSW attend site and meet with RMS and LT JV
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Thursday 14th

86.33	07	00	LT JV commence inspections of SLR corridor pits
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Friday 15th

115.15	11	42	Pit inspections completed by Lt JV
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10.2. Appendix 2 Information Sources

The mother of the member of the public was kept informed and provided relevant information in a highly cooperative manner throughout this investigation.

The following people provided information to the investigation through interview and discussion:

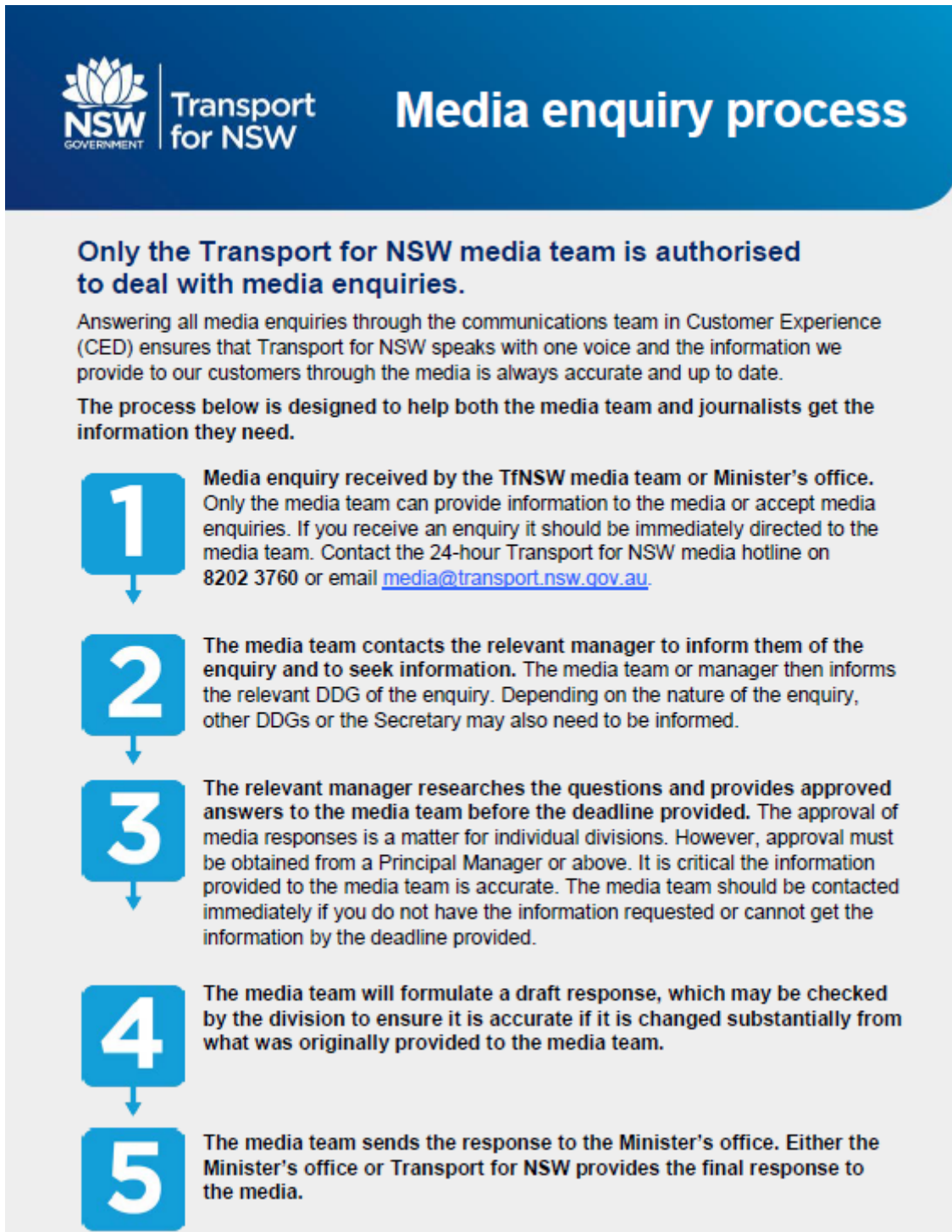
- Secretary Transport for NSW
- Chief Executive Roads and Maritime Services NSW
- Deputy Secretary Freight Strategy and Planning
- Deputy Secretary Customer Services
- Deputy Secretary Infrastructure and Services
- Deputy Secretary People and Corporate Services
- Coordinator - General Transport Coordination
- Executive Director Sydney Roads and Maritime Services NSW
- Director Maintenance Roads and Maritime Services NSW
- Executive Director Roads and Maritime Services NSW
Business Services
- Director of Safety Roads and Maritime Services NSW
- Senior Manager Contract Roads and Maritime Services NSW
Relationship
- A/Manager Safety, Roads and Maritime Services NSW
Continuous Improvement,
Assurance and Risk
- Senior Assurance and Roads and Maritime Services NSW
Investigations Specialist
- Principal Manager Safety Sydney Light Rail Project
- Chief of Legal Ausgrid
- Duty District Operator Ausgrid
- Project Manager Lend Lease Tyco Joint Venture
- Managing Partner Minter Ellison
Acting for Lend Lease Tyco Joint Venture


- Partner Minter Ellison
Acting for Lend Lease Tyco Joint Venture

- Attending Constable NSW Police Service
- Safety Manager Sydney Light Rail Project
- Safety and Systems Assurance Director Altrac Light Rail
- Safety Manager Acciona Infrastructure
- Director Security and Emergency Management TfNSW
- Manager Community Relations Altrac Light Rail
- Community Relations Coordinator Altrac Light Rail

- Site Foreman Acciona Infrastructure
- Director Safety and Engineering Systems TfNSW

10.3. Appendix 3 TfNSW Media Enquiry Process



 **Transport for NSW** **Media enquiry process**

Only the Transport for NSW media team is authorised to deal with media enquiries.

Answering all media enquiries through the communications team in Customer Experience (CED) ensures that Transport for NSW speaks with one voice and the information we provide to our customers through the media is always accurate and up to date.

The process below is designed to help both the media team and journalists get the information they need.

- 1** Media enquiry received by the TfNSW media team or Minister's office. Only the media team can provide information to the media or accept media enquiries. If you receive an enquiry it should be immediately directed to the media team. Contact the 24-hour Transport for NSW media hotline on 8202 3760 or email media@transport.nsw.gov.au.
- 2** The media team contacts the relevant manager to inform them of the enquiry and to seek information. The media team or manager then informs the relevant DDG of the enquiry. Depending on the nature of the enquiry, other DDGs or the Secretary may also need to be informed.
- 3** The relevant manager researches the questions and provides approved answers to the media team before the deadline provided. The approval of media responses is a matter for individual divisions. However, approval must be obtained from a Principal Manager or above. It is critical the information provided to the media team is accurate. The media team should be contacted immediately if you do not have the information requested or cannot get the information by the deadline provided.
- 4** The media team will formulate a draft response, which may be checked by the division to ensure it is accurate if it is changed substantially from what was originally provided to the media team.
- 5** The media team sends the response to the Minister's office. Either the Minister's office or Transport for NSW provides the final response to the media.

10.4. Appendix 5 RMS Safety Policy



Work Health and Safety Policy Statement



As Chief Executive of Roads and Maritime Services I affirm my personal commitment to safety as our primary value.

Our vision is to create a workplace where everyone goes home safe and healthy every day.

We aspire to lead better practice in work health and safety in partnership with industry.

We have a moral and legal duty to ensure the health and safety of our workers and others affected by our undertakings.

We recognise that safety enables efficiency and productivity. Safety drives better business outcomes.

Our work health and safety policy reflects our commitment to ensuring that health and safety at work is paramount to our organisation, and that an effective health and safety culture actively contributes to our success.

We make our workplaces healthier and safer by:

- Executives and managers committing to active leadership and sound safety governance
- Maintaining a contemporary safety management system that takes account of people's capabilities
- Managing risk - elimination before minimisation through early intervention in planning and design
- Creating a just and fair culture that encourages the reporting of hazards and occurrences – near-misses, incidents and accidents – to enable organisational learning
- Empowering workers to participate in creating and maintaining a safe and healthy workplace
- Consulting with workers on health and safety matters
- Consulting, cooperating and coordinating with our industry partners and others to achieve our common health and safety goals
- Committing to continuous improvement and assurance processes
- Planning, measuring and reviewing our performance against our objectives.

Health and safety is integral to everything we do.

The Hierarchy of Controls

Manage risk – eliminate before you minimise



Ken Kanofski
Chief Executive

September 2016
RMS 16.451

10.5. Appendix 6 RMS Definitions

Occurrence

A series of events and conditions that results in, or has the potential to result in, a non-trivial amount of damage or injury. An occurrence that could have resulted in damage or injury but did not is generally referred to as a *near-miss*.

Regulator ‘notifiable’ incidents

SafeWork NSW

A ‘notifiable incident’ is defined by the Work Health and Safety Act 2011 (NSW) in sections 35 to 37 as:

- The death of a person—whether an employee, contractor or member of the public;
- A serious injury or illness; or
- A dangerous incident that exposes any person to a serious risk, even if no one is injured.

See the Safe Work Australia’s Incident notification fact sheet for more information.

SafeWork NSW must be notified immediately of a notifiable incident arising out of the conduct of Roads and Maritime’s business or undertaking. Section 38 of the WHS Act requires notification immediately after becoming aware of such an incident “by the fastest possible means”.

10.6. Appendix 7 RMS Incident Escalation Protocol 27 June 2018

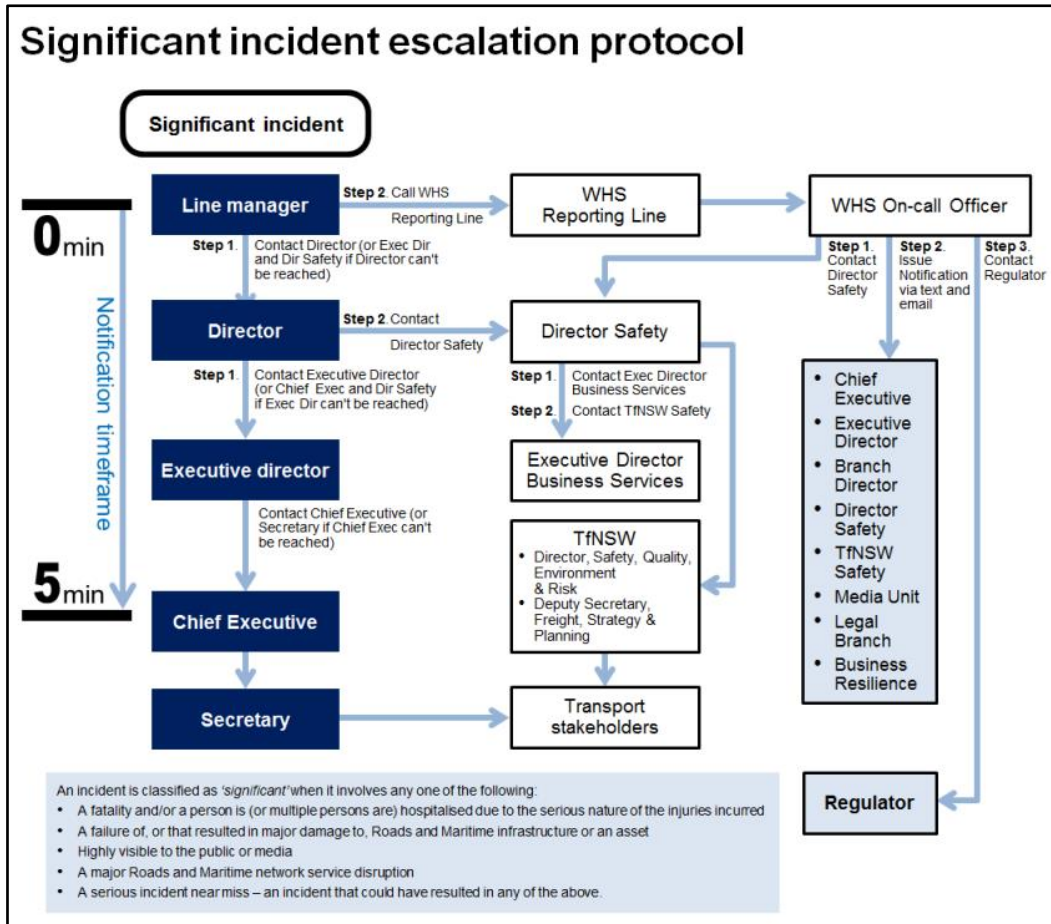


Image 12: RMS Escalation Procedure 27 June 2018

10.7. Appendix 7 RMS Electrical Specialist Report

The independent electrical specialist retained by RMS made the following statements with respect to the crushed cable:

2.2 Crushed Cable

In the wake of the incident, it was reported that a cable had been found tucked up between the pit wall and the lid. Following the incident this cable was removed and re-terminated in the fuse box.

The damaged section of cable is most likely the cause of current flow in a circuit other than design.

The cable exhibits the follows signs:

- The cable has been crushed and the insulation stretched and pierced, likely as a result of the weight of the put lid, jamming it between the pit lid and steel base
- A bare area on the cable of approximately 1cm² has been in contact with the metal pit frame. There is no evidence of burning or heating on the pit frame, however the cable insulation shows signs of heating having melted the insulation, and there are brown heat marks on the outer insulation near the damaged section
- The exposed copper conductors have some pitting, indicating an imperfect contact with the pit frame, resulting in some localised heating through this contact resistance
- The last recorded access to this pit (pit inspection by Altrac) was in February 2018, meaning that this pit frame may have been live for up to 4 months
- Other work parties may have accessed the pit since the last recorded date, potentially as a part of services searches, however no documented records exist to support or refute this possibility