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Expert Report

Brisbane City Council
Moorooka Bus Driver Fatality Incident

20 April, 2017

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TABLE OF CONTENTS

PREPARED BY:

Trevor Love

AusSafe Consulting

20 April, 2017

1.0 EXECUTIVE SUMMARY

1. On Friday 28 October 2016 Manmeet Sharma a Brisbane City Council (BCC) bus driver was tragically killed at Moorooka after a member of the public boarded the stopped bus and threw an incendiary device at the driver and set it alight. Passengers were trapped on the bus and did not self-evacuate. The passengers were released from the bus by passers-by. The driver was apparently killed instantaneously in his bus seat and appears to have had no chance of escape.

2. I have been engaged as a subject matter expert relating to the incident, in which I have been requested to prepare an expert report in relation to work health and safety (WHS) and risk related matters for the purposes of Chief Legal Counsel, BCC, providing legal advice to BCC on how to deal with the ramifications of the incident, including advice on how to deal with the WHS obligations of BCC with respect to the incident and the potential for similar incidents in the future. This Report is limited to the matters identified in the circumstances of the Incident as set out in the Report and does not make broader comment or findings on BCC's health and safety management system.

3. In particular, as part of the terms of reference for the inquiry, I have been asked to respond to a number of questions related to the incident. These are set out in detail in section 4.0 Background and Scope.

4. From inquiries into the incident, two main issues/matters arise for consideration, these pertain to the:

   a. protection and safety of the driver and all BCC bus drivers from personal attack; and
   b. safe and effective means of evacuation for passengers on BCC buses in the event of an emergency.

5. BCC's current controls should be reviewed in light of the new information that has arisen from the inquiries into this incident and the changed circumstances identified by the incident that are consequently raised in this Report, particularly in relation to the:

   a. protection and safety of the driver and all BCC bus drivers from personal attack; and
   b. safe and effective means of evacuation for passengers on BCC buses in the event of an emergency.

6. There are opportunities for improvement in both of these areas. These are further detailed below. These opportunities should be reviewed and considered by BCC and an implementation plan adopted that takes account of the nominated priorities.

7. As the incident was an isolated and rare event, any changes to controls (other than as identified at Recommendation 3 (i to iii), which may be undertaken as an interim measure), considered to be required by the BCC, need to be implemented after completion of the assessment processes recommended at Recommendations 1, 2 and 3. The reviews relevant to these recommendations have been allocated a high priority for implementation.

8. The events involving the death of Mr Sharma were at the extreme end of human behaviour and while an attack on a driver is a foreseeable risk, the nature and extent of the attack was not readily foreseeable at the time. (BCC's specific control measures in relation to the risk of attack

on a bus driver are outlined in the response to one of the questions put to me in relation to the scope of this report - Question 10).

9. The absence of available published empirical data that indicates at least one other incident of this type (that is an incident with complementary circumstances) has occurred in the past, leads to a conclusion that this has been an isolated incident.

Driver safety

10. The BCC's inability to know the intent of the perpetrator and the limitations of preventative measures in discouraging the crime from being carried out suggest that there was no action the BCC could have reasonably been expected to have taken to prevent 'an' incident such as what happened from occurring.

11. However, the occurrence and publication of this incident gives rise to an increased risk of a repeat and future occurrence by others copycatting and thereby raising the BCC's allocation of likelihood of risk, as per the BCC's risk procedures.

12. The driver's position and seat on the bus at the time was open to physical contact and potential attack by passengers and others who may board or be on the bus. This is the case for all BCC buses.

13. A potential control measure to improve driver safety that is worthy of further consideration is the installation of an impervious barrier between the driver and passengers. This control must be considered within the review mentioned in Recommendation 1 to ensure it does not in and of itself introduce further risk.

14. An impervious barrier is one of many ways that may be suitable in managing the risk to driver safety (in isolation or in combination with other ways). Consideration of other controls is equally necessary and would be advised before a determination of this or any control is made. Consideration will also need to be given to available data. One control in isolation will be unlikely to be successful in achieving the BCC's transport safety objectives.

15. A fully enclosed driver's cabin may protect drivers from physical abuse and assault from passengers and others on the bus but must be considered against other hazards that may be introduced by the installation of the barrier, including control measures in place for passenger safety. Further, dependent upon the design characteristics of the encapsulation/enclosure, it may only serve to protect against moderate level attacks and violence. There is merit in also focussing on developing drivers' skill in diffusing and controlling situations that may escalate into physical assault or that have immediately presented physical assault. Controls for rendering improved external assistance in the event of an assault consistent across all buses is also worthy of consideration. Studies on the subject of protection of drivers from threat of violence and attack, available at the time of my inquiry, were not conclusive on the benefits of fully enclosed cabins.

16. Other alternate measures to protective cabins are also generally in use by bus transport authorities, including BCC, through training of drivers to diffuse escalating encounters with irate passengers and others with grievances against a driver, coupled with duress alarms and other means of communication to render assistance.

17. The particular circumstances of the attack and the perpetrator concerned with the Moorooka incident was a unique situation, which would have been very unlikely to have been able to be prevented at the time. However, there are valuable lessons that can be learned from the event,

including reflecting upon the overall safety of BCC bus drivers in relation to threat of attack as well as passenger safety in the context of timely and easy evacuation in an emergency situation. These lessons are captured in Recommendations 1, 2 and 3 below.

Emergency evacuation

18. A review involving the identification of situations that may give rise for passengers exiting a bus in an emergency should be undertaken and the adequacy of controls for such emergencies should be conducted.

19. As a result of the findings of this Report, there is a need to improve and modify emergency evacuation provisions for passengers on BCC buses, particularly with respect to the means of escape from the back half of the bus, as well as clearer directions, signage and communication.

20. Relative to emergency evacuation for passengers on the bus at the time of the incident, passengers were placed at risk due to the delay in evacuating. At the time of the incident, passengers were unable to open the rear door on the bus without the assistance and aid of witnesses and bystanders on the street.

21. The door is not likely to have malfunctioned, but rather, attempts to open it were counter to the sliding movement and direction required to manually open the door. The door cannot be physically forced open by hand, without significant difficulty, without the emergency door release button being activated. There is no evidence to support the proposition that passengers could not see and did not push the emergency release button. The button would in all probability have been pushed for the door to release and be opened. Kicking and forcing the door is extremely unlikely to have been able to defeat or bypass the locking mechanism of the door, without the emergency door release button being pressed.

22. Nevertheless, one of the findings of this report is that the available information and signage for passengers on evacuating the bus requires improvement. This includes better and more clear pictogram instructions on what to do and how to open doors once the emergency door release button is pushed as well as ensuring the decals clearly point to the location of the emergency door release button. I am informed that BCC has already undertaken action on this point as a priority.

23. While unlikely to have been a major factor with the Moorooka bus incident, there is also the opportunity to improve the identification, location and illumination of the emergency door release button, having regard for human factors.

24. Another matter that has become apparent from the incident is the means of evacuation from the back of the bus. In such cases as occurred with the Moorooka incident where there was a threat or danger at the front of the bus and requiring emergency evacuation, there is only one available means of exit – out the rear service door. Whilst the bus has an array of emergency exits and escape as required by the Australian Design Rules, these are mainly at the front of the bus or inaccessible unless the bus has rolled over (via roof hatches), i.e. front door and two emergency window exits behind the driver and front door. The one piece of firefighting equipment on the bus (a fire extinguisher) is also positioned at the front door. I am informed the location has been informed by BCC's assessment of the likely location of a fire.

25. This matter needs greater assessment, taking into account human factors within the context of formal safety in design and risk assessment processes as recommended at Recommendation 2 in relation to BCC bus design.

26. In relation to the investigations and findings of this report, the following recommendations are made, albeit little could have been done to save Mr Manmeet Sharma in regards to the circumstances involving his death.

Driver Safety Recommendation

Recommendation 1*: Conduct a review of BCC's safety in design processes for bus design and ensure that an adequate design review is undertaken in relation to driver protection measures (Safety in Design Review – Driver Protection).*

As a high priority, a specific and special 'safety in design' process needs to be undertaken. BCC should ensure that a review and analysis for provisions and arrangements necessary to protect drivers on BCC buses is conducted. The review and analysis should include, but not be limited to, identified issues pertaining to threat of violence and attack and the new revised risk level associated with bus transport operations as a consequence of the Moorooka incident, including the question of protected/enclosed driver cabins. The review will include for consideration:

a. a determination of future design requirements for new buses;

b. if new design requirements prove necessary:

   i. a determination of the interim measures, if any, required for the current fleet, such as improved administrative controls (non-engineering/physical changes to driver position); and
   ii. the necessity for retrofitted (redesigned) changes to be installed within the existing bus fleet (which may include a cost benefit analysis).

Post completion of the Safety in Design Review – Driver Protection, BCC should review its relevant risk assessments to capture any additional information that would change or impact current controls.

Emergency Response Recommendation

Recommendation 2*: Conduct a review of BCC's safety in design processes for bus design and ensure that consistent with those processes an adequate design review is undertaken in relation to bus emergency provisions (Safety in Design Review – Emergency Evacuation).*

As a high priority, a specific and special 'safety in design' process needs to be undertaken. BCC should ensure that a review and analysis for emergency provisions and arrangements on BCC buses is conducted. The review and analysis will include consideration of, including but not be limited to, identified issues pertaining to Moorooka incident and the new revised risk level associated with bus transport operations as a consequence of the incident, such as:

a. fire, explosion and engulfment, including provisions for firefighting equipment, if deemed necessary;

b. emergency exits, including type, nature, location and accessibility and whether that should include windscreen and back window exits; and

c. nature and location of emergency door and exit handles and buttons, in which consideration should also be given to:

i. human factors, including potential redesign of emergency door manual opening function to be more intuitive;

ii. fail safe and/or power opening of doors in emergency;

iii. the means of activation of emergency door release/open, including type, nature, location and accessibility, which ought to consist of illuminated buttons;

iv. determining interim measures that may be required, such as improved signage/decals etc, communication strategy and information dissemination to passengers; and

v. necessity for retrofitted (redesigned) changes to emergency door release buttons to be installed within the bus fleet (which may include a cost benefit analysis in association with a risk assessment) and if so, priority/timing for installation.

Recommendation 1 and 2 may be undertaken together.

Post completion of the Safety in Design Review – Emergency Evacuation, BCC should review its relevant risk assessments to capture any additional information that would change or impact current controls.

General Recommendation

Recommendation 3*: Review BCC's current process and conduct an overall risk assessment of the BCC bus transport system.*

As a high priority and to be completed prior to Recommendations 1 and 2, it is recommended that BCC reviews its current process/es for risk assessment and then conducts a new risk assessment, of its current bus operations based on the additional information provided in this Report, from industry consultation including with suppliers, manufacturers and designers and from industry reviews. This review will include for consideration, but not be limited to, identified issues pertaining to the Moorooka incident and the new revised risk level associated with bus transport operations as a consequence of the incident, as well as ensuring consistency across all BCC buses, such as:

a. additional firefighting controls, eg, provision of additional fire extinguishers. As part of its risk assessment BCC should also review the current number and location of fire extinguishers on buses and any other firefighting controls to determine whether these are appropriate, including taking into consideration any additional hazards which may be created by these further controls;

b. better signage for emergency door openings – pictogram/decal information and instructions to be installed on all BCC buses to clearly demonstrate what to do and how to open doors in an emergency. This includes hand print signs/decals showing where to push and/or pull the door. I am informed that this recommendation has been actioned as a priority;

c. more and easier to see identifying signage for emergency door release buttons – Large and more accurate and prominent signage/decals in relation to the location of emergency door release (opening) buttons need to be installed in all buses. This includes placing such

signage/decals at eye level and above where the buttons may be below, but showing the location to be below, or off to the side etc. Further, this should be viewed as an interim measure until a decision is made, based on the further risk assessments, investigation and ongoing industry consultation, on whether any retrofitted changes are required for emergency access button locations. Note: I am informed that this recommendation has been actioned as a priority;

d. additional specific and specialised training for drivers in handling disputes and threats – Evaluate the pilot resilience training and other BCC driver training and develop and deliver an on-going program to all drivers for specific and specialised training for drivers to handle disputes and threats, including additional personal skills in conflict and confrontation avoidance and de-escalation. The programs should then be delivered on a regular basis as refresher training, as well as be incorporated in the new driver training program. A program to monitor the effectiveness of the training program should also be initiated;

e. promotional and advertising campaign promoting harmony amongst BCC drivers and the public – A means of promoting a more harmonious existence between BCC bus drivers and passengers and the public would likely be beneficial in reducing the threat and risk of violence on BCC buses. This may be just an extension and/or verification of the programs that BCC already has in place with respect to its operational objectives, but as well as this, it should be promoting what to do in any emergency and/or what to do when there are signs of a bus in distress. A community wide campaign may assist with diffusing the rising incidence of anger and aggression posed against bus drivers, much like the campaigns currently in play with respect to emergency services personnel in an effort to curb violence and threats against them. As this is not solely an area of concern for BCC, any campaign should be done in conjunction with other industry stakeholders at state and national level;

f. messaging on buses or other mediums – BCC should consider appropriate means of communication on buses and any resultant risks for instructional messaging and dissemination of information relative to driver and passenger safety, including on emergency provisions and evacuation etc. This could be done in a variety of ways, for example, installation of video screens on buses, posters, social media, screen messages on buses and so on; and

g. means of external warning alarms for duress and needing assistance on buses – Whilst it is acknowledged that there are in-bus duress alarms and communications to the NCC and emergency services etc, there is still an issue in relation to the time for a response and assistance to a driver or bus. With this in mind consideration should be given to ensuring all buses have a system of external alarms and warning signals to passers by and motorists etc of a bus in distress and requiring assistance.

2.0 INTRODUCTION

27. This report has been commissioned and prepared at the request of Mr David Askern, Chief Legal Counsel, Office of the Lord Mayor & CEO, Brisbane City Council (**BCC**).

28. I, Mr Trevor Love, Principal of AusSafe Consulting, have been commissioned to provide an expert report in relation to work health and safety (WHS) risk related matters regarding the circumstances surrounding the death of BCC bus driver Manmeet Sharma at Moorooka at 9am on Friday 28 October, 2016. This is for the purposes of Mr Askern providing legal advice to the BCC on how to deal with the ramifications of the incident, including advice on how to deal with the WHS obligations of BCC with respect to the incident and the potential for similar incidents in the future. This Report is limited to the matters identified in the circumstances of the incident as set out in the Report and does not make broader comment on findings on BCC's health and safety management system.

29. In particular, as the terms of reference for the enquiry, I have been asked to respond to a number of questions related to the incident on 28 October 2016 in which BCC bus driver, Mr Manmeet Sharma, was killed when a person who boarded the bus at a Moorooka bus stop attacked him.

- Q1. Were the actions of the alleged perpetrator reasonably foreseeable?
- Q2. Was the driver targeted for some reason including his employment with Council?
- Q3. Was there any action that could have been taken at the time that would have prevented the incident occurring or prevent the death of the driver?
- Q4. Was there any way that the driver could have predicted the behaviour of the alleged perpetrator and prevented the incident from happening?
- Q5. Was there any action that Council could have taken to prevent the incident occurring?
- Q6. Was this an isolated incident or is there a significant risk that this type of incident will be repeated?
- Q7. Are there implications for other council employees who interact with members of the public for a similar attack?
- Q8. Was Council's response to the incident in accordance with established Council procedures including requirement regarding escalation of issues to the Lord Mayor, E&C, relevant Chair, CEO and senior management?
- Q9. Was there appropriate interaction with the Network Coordination Centre, the QPS and QFRS?
- Q10. What were the existing controls of Council in relation to the safety of drivers and passengers?
- Q11. Do any of those controls need to be reviewed or updated?

- Q12. Should the driver's position in the bus be protected by some form of partition impervious to the type of attack that occurred or other possible attacks?
- Q13. Should the driver have some other form of escape mechanism from the driver's position (e.g. emergency windows)?
- Q14. Is there some other form of protection that could be available to the driver?
- Q15. Should the safety of the passengers be the subject of a review, particularly with respect to:
    a. the passengers' ability to exit the bus when the driver's entrance to the bus is compromised for some reason?
    b. any legislated design requirements in relation to the type of bus which is the subject of the incident?
- Q16. Should there be education training for passengers on how to deal with emergency situations?
- Q17. Should there be a general review of the safety of buses?
- Q18. Is there any training that would assist drivers to be better prepared for this type of situation?

30. On the basis of the instructions and my investigations, the following is what I understand to be the facts:

    a. At 9.00am on Friday 28 October 2016, a BCC bus driver Manmeet Sharma, operating a BCC bus service, stopped at a bus stop in Moorooka. [redacted]

    [redacted]

    [redacted]

    d. The bus caught on fire and passengers on the bus were unable to exit the bus through the front door because of the blaze.

    e. The passengers were able to exit through the rear but were delayed for unknown reasons, but which was likely induced by panic. Initial thoughts, at the time of the incident, about the delay in alighting from the back exit point (door) were that the trapped passengers did not use the emergency open button situated at that exit. The driver of course was in no position to open the door from his control panel.

    f. However, for the reasons outlined within my report below, I am of the view that the emergency release button is likely to have been activated.

    g. Two witnesses to the incident forced open the doors from the outside and released the passengers.

[redacted]

31. I have inspected the bus involved in the incident, as well as another bus of identical make and model in service by the BCC, in addition to another bus type also in service with the BCC - three buses in all.

32. Of particular relevance to the matters and issues pertaining to this report, I inspected the driver's seat and position, including controls. I also inspected and took measurements etc of the rear door exit and emergency open buttons and identifying signage.

33. Apart from the normal operating controls for any vehicle, the bus driver also has hand (buttons and switches) and foot activated mechanisms for:

    a. opening and closing doors; and

    b. communicating an emergency to the control room, via radio.

34. With respect to emergency exits etc, the bus has two emergency 'push out in an emergency' windows, which are at the front of the bus. The roof air vents also serve as an emergency exit in the event of the bus rolling over. None of these emergency exists were available to the passengers on the bus at the time of the incident, due to their respective positions – on the ceiling (because the bus was in an upright position) and at the front of the bus (because of the fire on the bus).

35. The only emergency exit for passengers on the bus at the time was via the rear passenger door, which the passengers eventually exited from. There are no emergency exits at the back of the bus; only the rear door and roof hatch.

36. From the inspection conducted of the two buses in service (i.e. operating buses), it was found that there are two emergency buttons prominently displayed and identified by markings etc, including being coloured red for an emergency button. However, under a similar simulated circumstance for how things happened at the time with the incident, the door would not readily or easily open, which seems to have been the same likely scenario for the delay the passengers experienced at the time of the Moorooka incident.

37. The actions of the people from the bus (passengers) at the time and the two external witnesses assisting to open the rear door for the passengers inside the burning bus who were trapped, was replicated from CCTV taken of the incident. The interaction with the door was in opposition to the manual opening arc of the door and thus acted against and prevented the door from opening. This is why it was only when one of the two witnesses who were external to the bus and helping to open the door (the taxi driver), kicked the door (which turned out to be the 'sweet spot' for the opening arc of the door) that it opened.

38. By the time passengers had congregated at the rear door and attempted to exit at this position, the bus had already filled with thick black smoke, making internal vision via CCTV recording difficult to distinguish what happened and was going on with respect to the passengers attempts to open the rear door. It cannot be seen if and when the emergency release button positioned above the rear door was activated. However, the inspection and tests, conducted by me and the BCC, of the two in-service buses showed that the door is very unlikely to be

opened with force without the button being pushed. Therefore, the emergency release button is likely to have been activated.

39. The CCTV footage of the incident is a lot clearer for the external area of the bus and the rear door, in which the two witnesses can clearly be seen in their attempt to open the rear door for the passengers on the bus. There is also an external emergency door release button positioned next to the rear door on the outside of the bus. It is identified by a small worded sign 85mm x 60mm in size and positioned in a recessed position at the bottom of the bus (body) and offset about 400mm from the rear door.

40. In relation to the driver and the driver's seat and position on the bus, the driver's layout and configuration is typical of the driving arrangement for most heavy vehicles. The driver has a console with steering wheel, in addition to other side located switches and buttons, including the communication systems (internal and external) and other operating controls, such as for opening and closing doors. Apart from a back partition behind the driver's seat and a small half door to the entry side that extends up to the underside of the seat, the driver is in an open position inside the bus, albeit they are enclosed on all 4 sides - at the front (by the windscreen), sides and back. But, which there is no barrier or partition between the driver and passengers, particularly for those hopping on or alighting the bus through the front door. Other than the little half door up to seat level.

41. Therefore, the bus driver is not fully enclosed on BCC buses and in the case pertaining to this report, the perpetrator at the time of the incident had open access to the driver to throw the lit and burning fuel container over him.

42. There is a small fire extinguisher on the bus – positioned at the front entry of the bus where passengers alight and adjacent to the driver. I am informed that the location and number of fire extinguishers has been determined by an assessment by BCC that the most likely risk of fire on a bus is in the bus engine and taking into account other risk factors including the risk of interference by other passengers, including children, as well as the potential for the extinguisher to be used as a weapon.

43. Given the location of the fire in this incident, the extinguisher would not have been accessible at the time of the fire.

3.0 EXPERT'S QUALIFICATIONS & EXPERIENCE

3.1 EXPERT'S QUALIFICATIONS AS AN EXPERT ON THE ISSUE OF THE SUBJECT OF THE REPORT

44. My name is Trevor Love. I am the Principal of AusSafe Consulting. I have professional qualifications in occupational health and safety (OHS) and safety risk in general, including as Adjunct Associate Professor at the University of Queensland, Fellow and Life Member of the Safety Institute of Australia, Member of the Safety Institute of Australia College of Fellows, Registered Safety Professional (Aust), Certified Lead OHS Auditor with RABQSA and a Member of the Risk Management Institution of Australasia. I also held the position of Federal Safety Officer with the Australian Government between 2006 - 2015.

45. I have had extensive experience in OHS and risk management over the past 36 years or so. I have been involved in providing health and safety consulting services in a variety of industries for 30 years, as well as being a designated safety expert in the Cole Royal Commission into the Building and Construction Industry and as a lecturer in the field for the Faculty of Built Environment and Engineering at the Queensland University of Technology and more recently at the University of Queensland.

46. Of particular relevance to this matter and issues that relate, I have experience and expertise in human factors relating to safety and risk, as well as safety in design.

47. In my role and capacity as a safety consultant, auditor and Federal Safety Officer, amongst many other things, I am required to know the relevant standards and minimum requirements for the safe use, design and operation of machinery and equipment, including from a human factors perspective.

48. In arriving at my opinion as detailed within this Expert Report, I have relied upon my general experience and expertise as a qualified safety professional over a period of more than 36 years, as set out in my summary CV (refer to APPENDIX 3 herein), and where necessary I have had regard to and relied upon the documentation and submissions referred to within the following section (Section 5.0) and discussed later on within this report.

49. This report is prepared as an independent and impartial opinion, in which the opinion contained within is given independently to assist instructing counsel (Mr Askern) in the matter.

50. In this regard:

- the factual matters stated in this report are, as far as I am aware, true;
- I have made appropriate enquiries relative to the scope and nature of the request for this expert report;
- the opinions stated in this report are genuine;
- this report contains reference to all matters I consider significant; and
- I understand my duty as an expert to be impartial and I have complied with this duty.

3.2 ISSUES OUTSIDE THE EXPERT'S FIELD OF EXPERTISE

51. This report and opinions contained within it, does not attempt to address any matter outside of my field of expertise and qualifications.

3.3 CONFLICT OF INTEREST DECLARATION

52. I do not have any potential conflict of interest with respect to providing an expert report in this matter on behalf of BCC.

4.0 BACKGROUND & SCOPE

53. The facts, assumptions and opinions upon which this report is based are set out within the body of this report.

5.0 LITERATURE AND OTHER MATERIALS UTILISED IN SUPPORT OF THE EXPERT OPINION GIVEN

54. Further to the information and material provided in the Brief, as referred to in this report and listed in Appendix 1, I have researched, consulted and referred to relevant further literature and information to support the expert opinion given and findings for the report.

55. In particular, the relevant provisions from the abovementioned that apply and have been considered with respect to this matter and the expert opinion given is shown in Appendix 2.

6.0 DISCUSSION AND FINDINGS

56. When a BCC bus driver Manmeet Sharma, operating a BCC bus service stopped at a bus stop in Moorooka, a person boarded the stopped bus and spilled fuel over the driver and set it alight. [redacted]

57. The front driver's section of the bus caught on fire and passengers on the bus were unable to exit the bus through the front door because of the blaze. The passengers were able to exit through the rear but it has been suggested that they, for unknown reasons (probably panic), did not use the emergency open button situated at that exit. The driver of course was in no position to open the door from his control panel.

58. Whilst, for the reasons outlined further within my report below, I am of the view that the emergency release button is likely to have been activated by the passengers in the bus, two witnesses to the incident opened the rear door and released the passengers.

59. This report has been prepared at the request of the Chief Legal Counsel for the BCC.

60. I have been asked to enquire into the circumstances of the incident and in particular address some specific questions and lines of inquiry put by the Chief Legal Counsel for the BCC. However, in summary, the main issues and matters for consideration in this report pertain to the protection and safety of the driver and all BCC bus drivers from personal attack and the safe and effective means of evacuation for passengers on the bus and BCC buses.

61. Furthermore and subsequent to the letter of instructions and Brief to me from the Chief Legal Counsel for the BCC, I have been asked to also consider and provide my expert opinion on the matters raised by the Regulator, Workplace Health and Safety Queensland (WHSQ), namely:

    a. That with respect to emergency door release (button) decals within the bus, the front door decal indicated to the reader/user to perform an action at height 'above head' when actually the front internal emergency button is located only 220mm above floor surface. Furthermore, it was established that the model of bus involved in the incident does not have an additional emergency release/open button located above the front access door;

    b. Also, WHSQ found upon further inspection of a new Volvo Bus (V2801) observed at the Toowong Bus Workshops (in Pre delivery stage to Bus Fleet from Volgren) demonstrated that the front door decals indicate to the reader/user to perform an action 'above head' towards the right of the graphic figure, whereas the actual emergency door release button is located to the far left side of overhead section, an incorrect and misleading graphic orientation. I am informed that the BCC has taken steps to remedy the location and placement of emergency evacuation decals to ensure they are consistent with the location of the emergency release button.

    c. That with regard to existing Emergency Buttons located in 'above head' positions, researched anthropometric data indicates that most 'above head' measurements referred to in Table 1 would be deemed too high for most of the passenger population likely to ride on BCC buses e.g. only Males in the top 5 percentile of reviewed data could easily reach emergency buttons located in 'above head' positions. It should be noted that Inspections also demonstrated that several bus models permitted additional height

purchase to the 'above head' Emergency Button positions via nearby elevated floor surfaces, steps and passenger seats.

d. With regard to Emergency Buttons observed to be located externally, inspections demonstrated that externally placed buttons varied in placed position ranging from surface mount through to being placed up to 55mm recessed behind the relevant bus's side panel. Distances between Bus side metal panels and actual Button locations were measured and recorded which varied as follows –

   i. Approximately level with metal surface;

   ii. Surface Mount Button; and

   iii. 8mm; 40mm; 45mm; 46mm; 50mm & 55mm

62. I am informed by the BCC that, as an interim measure pending the completion of the reviews recommended in this Report, the BCC has undertaken an interim risk assessment in relation to emergency button location and access and is currently liaising with suppliers, manufacturers, designers and broader industry as a matter of priority in regard to the location of the emergency release buttons on its bus fleet with specific consideration of additional risks that may arise as a result of any relocation.

Discussion on Driver Safety

63. Firstly in regards to the driver, the driver was exposed and in an unprotected position relative to passengers entering the bus at the front entry door and/or others on the bus who may wish to attack the driver. There is no shield or barrier separating the driver from passengers.

64. With other modes of public transport, such as trains and light rail (trams), drivers are enclosed or encapsulated within a cabin, or in some cases with other buses or taxis, within a pod. In taxi cabs in other parts of the world, it is standard for the driver to be partitioned off from passengers in the back.

65. Some buses in other parts of Australia and the world also have a shield unit/window partially partitioning and protecting the driver from a direct attack. However, in this case a would be attacker can still reach around, or in the case of the attack on Mr Manmeet Sharma, can merely throw a burning fuel container around the partition/panel at him, with no likely interference on the effect it would have had on the driver.

66. BCC has conveyed that it is conscious that the institution of screens would have other implications that would need to be more fully considered before implementation. The implications include the potential impact on harmonious and friendly relations between drivers and passengers. I am informed that the BCC has trialled screens in the past with trial outcomes indicating division in opinion amongst drivers. Notwithstanding this, the changed circumstances and additional information now available means that consideration should be revisited.

67. Providing a segregated driver's cabin, or encapsulating drivers, either partially or fully, may introduce other issues that would need to be overcome in regards to drivers safety, including emergency evacuation for the driver, where this could be necessary. Therefore, the introduction of encapsulated cabins would need a careful consideration as part of a safety in design review, including an assessment of any additional hazards that may be introduced and

the potential reduction in effectiveness of current controls. The implication of any changes would need consideration in the context of the BCC's other public facing roles and current risk management strategies, which have been adopted based on current risk information.

68. Having said this, I have not been able to find any quantitative research or studies into the negative impact on social interaction between drivers and passengers, or indeed any customer service type circumstance with customers etc relating to partitioning or encapsulation of drivers. It may therefore not have any significant adverse impact on harmonious and friendly relationships between bus drivers and bus patrons. Further detailed assessment is therefore needed in this regard, including consideration as to whether speech and visibility can still be effectively maintained with partitioning and/or encapsulation, i.e. whilst also meeting the objectives of BCC for maintaining a harmonious relationship between driver and passenger/s in this regard.

69. The only way that Mr Manmeet Sharma could have been protected from the type of attack involved with his death, is by a segregated drivers' cabin or encapsulation. However, in such circumstances as that involving the perpetrator on the day of the incident, had he been confronted with an encapsulated and fully protected driver, may very well have turned on the passengers in the bus. Information on the BCC's controls for managing driver safety, at the time of the incident, is provided in the response to Question 10.

70. Segregated drivers' cabins, or encapsulation would also not necessarily cover all situations of violence that could be presented to a driver, unless of course if it were blast and bullet proof, but the standard form of glass or perspex cabin/pod would nonetheless likely protect them from the most likely and common forms of attack and violence perpetrated against them.

Discussion on Emergency Evacuation

71. In relation to emergency evacuation of passengers from the bus, it was found upon my inspection that the passengers in the bus, as well as one of the witnesses that came to assist outside from the street, were acting upon the door in a way that was opposite to what was required and the sliding motion of the rear door and thus working against the door manually opening. It was not until the taxi driver pushed (kicked) the door in the correct place that it opened. In other words, whilst the other witness and initially the taxi driver were pulling on the right hand side of the door, as well as passengers inside the bus possibly pushing in the same direction at the same place (on the left hand side of the door as they were viewing it facing the door – the same action as the two outside pulling on it), this was against the sliding and opening motion needed for the door to open. It wasn't until the taxi driver applied the same directional movement, but at an opposing spot on the door (on the left hand side) that the door slid open with ease.

72. Furthermore, in the emergency situation, the passengers intuitively looked to push open the rear door, which they believed to be a means of escape. But no amount of pushing on the door by the passengers would ever have opened that rear door on the bus, as was the case with the outside witnesses joining in by pulling on the door. It could not and was never going to open that way. Pushing, not pulling, is an instinctive action for humans when fleeing a threatening situation. Yet, the rear door would not be able to be opened in this intuitive way.

73. Opening the door in manual mode in the way it needs to be manipulated (pulled and slid open – from inside, or pushed on the left from outside) so as to open is not necessarily intuitive to the human brain, especially in panic and haste mode.

74. The decals on the bus for opening the door in an emergency do not provide any information on how the door can be opened manually in an emergency, i.e. where and how to push or pull and slide the door open. It merely provides information on locating and depressing the emergency door release button. Which, as WHSQ has queried, may be misleading in some cases – although I am informed by the BCC that this issue has been rectified.

75. I also tested whether the door could be opened without the emergency door release button being depressed, which would not seem possible without significant difficulty. Therefore, whilst it may have appeared otherwise by the door appearing jammed and not opening and requiring to be kicked opened by the taxi driver, the emergency door release button most certainly would have had to have been depressed and would have had to have been working at the time of the incident and passengers were attempting to evacuate and alight from the bus. The problem, in my opinion and as discovered by my inspection and testing, was with the way in which people were attempting to manually open the door rather than the emergency door release button not being depressed or activating or with the signage in regard to their identification.

76. With respect to the emergency door release buttons on the bus and in particular in regards to the rear door buttons, these are not conspicuous, especially the external button on the outside of the bus, which in circumstances such as that which occurred at the time of the incident would not necessarily be apparent to the external witnesses who rushed to the aid of the passengers appearing trapped in the bus at the rear door and thus attempting to free and open the door for the passengers to escape.

77. The position of the external emergency door release button and identifying sign would have been at shin height and behind them. I am informed that the buttons are placed in this location and height deliberately to reduce the risk of misuse. The BCC have indicated that the likelihood and consequences of misuse are high. However, in the panic and mayhem that beset the situation, there may have been little prospect of the two witnesses being able to see a small recessed button with small 85mm x 60mm sign/decal positioned way below them at shin height and behind them and off to the side from where they were standing and focussed at the time. However, as highlighted earlier, it is likely that the emergency button had already been depressed and so is unlikely to have contributed to the difficulty experienced in opening the door.

78. The button inside the bus for passengers to depress and evacuate the bus through the rear door is somewhat more conspicuous, but more than likely became less conspicuous when in a smoked filled environment such as at the time of the incident pertaining to this case in point. Due to the amount of smoke quickly filling the bus at the time, it is difficult to tell from the CCTV recording, if and when the emergency door release button was depressed by the passengers. But, in my opinion, it would seem that at some point, if not at the beginning, that the emergency door release button was depressed, which would have freed the door, allowing it to be manually opened.

79. It is therefore likely to be a secondary issue with respect to the issue of the passengers being delayed in their effort and ability to exit the bus at the time. Whilst timely and easy escape is necessary for passengers to evacuate the bus, issues pertaining to the location of the emergency door release button/s and decals identifying the buttons and their intended purpose and use, are more an issue for improvements that can be made, rather than critical factors requiring urgent attention and would need to be considered in light of other relevant hazards.

80. I also took measurements of the bus, as well as other BCC buses and similarly (to WHSQ) found that the rear door internal emergency door release button would generally only be accessible to taller adult passengers. It would however be considered to be at eye height or

above for most adults. The fact is that, in all likelihood the button was depressed by one or more passengers on the bus at the time and as such it is not a case of the button not being accessible or identifiable at the time. As stated earlier, the problem is likely to have arisen with the way in which people were trying to open the door subsequent to the emergency button being depressed.

81. Nevertheless, the nature, location and signage (information) for all emergency door release buttons on BCC buses can and ought to be standardised and improved. Given that this is not a critical issue (in my opinion) and has not been shown to be one by way of an experienced based approach in justifying the need, a proper, proportionate and practicable response by the BCC would be to improve signage and information to passengers regarding the current emergency door release button arrangements on its fleet of buses and progressively improve and fix the physical design of the buttons on new and upgraded buses in the future. I am informed that steps are being taken by the BCC in this response to this issue.

82. In support of this view and to substantiate such an approach, many risks encountered by BCC as a transport system operator may be managed qualitatively, using a conventional likelihood-consequence risk analysis, but some risks need the greater understanding (and justification/support) that can be obtained from using quantitative risk assessment (QRA). An outcome of which for BCC will be enhancement of its current risk profile/register via a detailed preliminary hazard analysis and compilation of a comprehensive operating risk register that looks at the entire life cycle of a vehicle or mode of transport used in a public transport system from definition and planning phase through to asset disposal.

83. From this, an operator (BCC in this case) can establish and set safety standards and specifications based upon quantitative risk assessment, particularly for critical safety risks. There are a number of techniques that may be used, such as cause-consequence analysis, fault tree analysis, cost-benefit analysis etc.

84. As a minimum, BCC should review its risk assessment processes and ensure that it:

    a. documents the upper limit for individual or collective risks of equivalent fatality*; and

    b. documented limits are consistent with the relevant operator's (Transport Operator) safety management system (SMS).

** Note: 'equivalent fatality', or otherwise known as 'potential equivalent fatality' is a term used in the UK rail industry and others that describes the convention for aggregating harm to people by regarding major and minor injuries as being equivalent to a certain fraction of a fatality. The Rail Safety Standards Board (RSSB) in the UK, for instance, proposes a ratio of 1:10:100 in this regard. Other sectors also use similar approaches and similar relative values.*

85. Quantitative risk assessment and setting of risk limits is heavily reliant upon incident related data, which places emphasis in determining (and assessing) risk, safety risk acceptability/tolerability and risk limits. Therefore to properly address this (emergency evacuation) and all safety related issues and risk associated with BCC buses, having regard for the points above, the BCC may consider whether a quantitative risk assessment is a more appropriate risk approach..

86. The way to manage and control this issue is for BCC to place an emphasis on human factor-related risks that must be managed throughout the asset lifecycle and that similar to all risks, the greatest opportunity to eliminate or minimise such risks occurs during the initial phases of new design of buses, in which, planning of a phase-in of new retrofitting design is a critical step in delivering effective and safe outcomes based upon appropriate quantitative risk analysis. As

such, BCC Transport should prepare a human factors integration plan covering all phases of the asset lifecycle and which considers cognitive ergonomics, for example:

a. human reliability analysis;

b. human-system interface assessment;

c. risk-based needs assessment; and

d. consideration of normal and degraded operations.

87. It is important to recognise the role of BCC Transport and its obligations. BCC purchases buses as part of conducting its undertaking. The BCC has obligations under the work health and safety legislation, as does the designer, manufacturer and supplier. There are also obligations for the obligation holders to consult, cooperate and coordinate with each other. Therefore, each party has a role in ensuring work health and safety.

88. With respect to the nature and level of protection for drivers on BCC buses, the BCC should conduct a review of its safety in design processes for bus design and ensure that, consistent with those processes, an adequate design review is undertaken in relation to driver protection measures.

89. Finally, with respect to general discussion points and findings, the incident on the bus at Moorooka identified a number of areas for improvement, which once again ought to undergo proper and formal assessment, as part of the broader review process, and analysis, such as:

a. The concentration of emergency exits at the front half of the bus. There is no means of escape through any designated emergency exit at the back of the bus. The circumstance, such as that which occurred with the Moorooka incident, whereby access to the majority and main points of emergency egress off the bus were blocked and restricted for passengers on the bus is not good and could have proved fatal to passengers on the bus. Consideration should be given to whether it is possible to have additional and alternative means of emergency egress and exits off the bus at the back of the bus and whether these would introduce any additional hazards.

b. Similarly the same applies with respect to firefighting equipment. The one piece of firefighting equipment (fire extinguisher) on the bus was located at the front of the bus reportedly on the basis of the BCC's assessment of the most likely location that a fire could occur. However, consideration should be given as to whether there should be additional firefighting equipment or controls as well as consideration of any additional hazards that may be introduced by such additional controls.

90. The answers to the questions posed in the letter of instructions have been provided with the following understanding and on the following basis:

1. the alleged perpetrator was not known to the employer;

[redacted]

Q1. Were the actions of the alleged perpetrator reasonably foreseeable?

Consideration

91. In responding to this question it is necessary to consider:

    a. the employer's state of knowledge about the alleged perpetrator and the alleged perpetrator's intended actions;

    b. the victim's state knowledge about the alleged perpetrator prior to and at the time of the incident; and

    c. the general state of knowledge about similar attacks on bus drivers.

93. It is understood that neither the employer nor the driver knew the alleged perpetrator before the event occurred. BCC has a security function, in which the head has conducted a review of relevant records and found no record of the perpetrator prior to the incident, who was therefore unknown to the BCC at the time of the attack.

94. What is known about the events that occurred immediately prior to the attack suggest that there was no obvious signs of the alleged perpetrator's intentions prior to the execution of the attack against the driver commencing.

95. In determining the general state of knowledge about similar attacks on drivers, it was identified that there is an abundance of information available highlighting the risk of violence against workers, particularly those in public contact roles. This information is available from a range of sources, including work health and safety regulators (at a State/Territory, national and international level), academic papers, trade unions and media coverage of events. A number of these information sources specifically address public transport staff risks with some drilling down to risks of violence against bus drivers.

96. The literature indicates that, generally, forms of abuse arise more regularly from organisational outsiders than organisational insiders (LeBlanc and Kelloway, 2002 as reported by Lincoln and Gregory 2015)). Forms of threats or verbal abuse, rather than one-off acts of physical violence are reported as more common with client-initiated violence.

97. Lincoln and Gregory (2015) identify that four broad categories are used when distinguishing the relationship of a perpetrator with the organisation ('criminal intruder', 'client or customer', 'worker to worker' and 'personal relationship'). From the information that is known about the perpetrator it seems reasonable to categorise the incident into a criminal intruder category, which arises when a perpetrator with no legitimate relationship to the organisation enters the workplace to commit a criminal act (an armed robbery is another example of such act).

98. There is a dearth of published information available on the extent of events that involve a criminal intruder and intended violence against a bus driver (or similar public transport service occupations). A person intentionally directing negative actions toward a vehicle (for example, stone throwing) would likely fit within the category of 'criminal intruder'. However, the characteristics of such an event was not considered related to the circumstances surrounding the 28 October incident.

99. This dearth of information is in contrast to client or customer related events for which there is a contemporary and growing evidence base for understanding causes, contributors, driver outcomes and opportunities for addressing violence in these circumstances.

100. The absence of this information is at a time when there is a:

- growing acknowledgement of the extent of mental illness within our communities and public health policies favouring reduced institutionalisation of mental health sufferers (Swanton 1989);
- growing understanding of the use of drugs that are known to increase the risk of aggressive behaviour (such as ice); and
- heightened fear of targeted terrorist attacks.

101. The question of mental illness has been explored to some extent in the Stanley 2015 report *Prevention of Aggression to Bus Drivers* – a report for Bus Association Victoria. However, it is explored only in the context of client or customer events and so provides no greater insight for foreseeability of events involving criminal intruders with a mental illness.

102. Some of the reports reviewed during research identified a high proportion of the perpetrators of violence against drivers were young (predominantly male) (Lincoln and Gregory 2015).

103. The data published by the Australian Alcohol and Drug Foundation identifies that:

- cannabis is the most commonly used drug of people aged 14 year and over;
- cannabis or meth/amphetamines are used more regularly than ecstasy or cocaine;
- 27% of people who had used illicit drugs in the previous 12 months were aged 20-29. However, older people are increasingly using illicit drugs;
- while there was no increase in the number of users of meth/amphetamines between 2010 and 2013, there was a marked increase in the number of people who use meth/amphetamine (including ice) once or more a week – from 12.4% in 2010 to 25.3% in 2013;
- illicit drugs use was more prevalent, in the previous twelve months, among unemployed people, with meth/amphetamine being 2.4 times more likely to be used than by employed people.

104. Intoxication from alcohol is also a recognised factor in assaults with Lincoln and Gregory (2015) noting the following conclusions from past research:

- one-third of assaults on transport workers involves alcohol (Jochelson 1994);
- alcohol is particularly a factor in assaults that occur on Friday or Saturday nights – late evening or early morning (Morgan and Smith 2006); and
- intoxicated passengers travelling together in large groups (to/from night time economy precincts and sporting events) increases the prevalence of problems (Boyd 2002).

105. In terms of potential violence arising from terrorism, it is broadly accepted that terrorism aims to:

- punish an enemy for their crime (real or perceived) against the perpetrator;
- attack representatives or leaders of an enemy; and
- create a commitment to the terrorist's cause by those not yet committed.

106. A perpetrator of a terrorist attack would clearly be operating within the realm of a 'criminal intruder'. The nature of terrorist attacks, with their high investment of planning and intention toward collateral damage that will achieve 'public focus', makes their consideration in an occupational setting equally, if not more problematic than the consideration of the actions of persons with mental illness.

107. There are varying views expressed by academics (based on their selected research methodology) as to whether there is an increase or decrease in the number of physical assaults on bus drivers. However, there seems a common view that the severity of all violent events are increasing (refer Lincoln and Gregory 2015).

Conclusion

108. On the more general question of foreseeability of physical violence against a bus driver, publicly available information on violence against bus drivers points to a clear evidence base for bus driver exposure to client-initiated violence. This is supported by data collected by the BCC.

[redacted]

[redacted] Therefore, given the employer's lack of knowledge about the alleged perpetrator, and the driver's lack of knowledge of the alleged perpetrator's intention it is viewed that 'the actions of the alleged perpetrator were not reasonably foreseeable' to the employer or the driver. The specific tactics employed by the alleged perpetrator in committing the attack could also not have been reasonably foreseen.

109. A determination of 'foreseeability' does not require any consideration of its likelihood of occurring but rather it needs to be reasonably possible that it could occur, i.e. not 'far fetched or fanciful'. Therefore, now that this event has occurred and despite the lack of published data on the extent of similar events, there would seem no doubt that it is now reasonably foreseeable that an event with similar characteristics could occur again.

Q2. Was the driver targeted for some reason including his employment with Council?

Consideration

[redacted]

Conclusion

113. Whilst the perpetrator may have gone ahead with his attack on Mr Manmeet Sharma because he was the driver of the bus that turned up at the stop where he was waiting, it is unlikely that the driver was personally targeted because of any personal characteristic, or because of his employment.

[redacted]

[redacted]

Q3. Was there any action that could have been taken at the time that would have prevented the incident occurring or prevent the death of the driver?

Consideration

116. The question is directed to actions 'at the time' of the incident rather than actions prior to any incident occurring (the latter is addressed in question 5). It has been assumed that the question is about actions that could have been taken by the employer or driver (rather than any agency enforcing the law or providing ongoing care for patients of mental illness).

117. Stanley quotes Clarke, R (1997) when introducing commentary on prevention of aggression:
"*For a criminal event to take place, a motivated perpetrator, a suitable target and the absence of a capable guardian need to be present*."

118. Stanley goes on to indicate that:
"*All these aspects need to be addressed in the prevention approach. The approach involves the management or design of the immediate environment where the event takes place and causing the behaviour to be more difficult and risky, for the target of the aggression to be more protected and to maximise the opportunities for the target to receive back-up support. The model is based on the idea that a perpetrator weighs up the benefits derived from offending, the potential risks of being apprehended and the associated costs of apprehension*."

119. Very importantly, Stanley identifies that:
"*The assumption is that the perpetrator is able to make these judgements, which may not be the case where there is cognitive impairment, such as intellectual disability, intoxication or some forms of mental illness*."

[redacted]

121. Would increasing risks of the crime have had some effect on the alleged perpetrator's decision to target the bus? It is generally held in regulatory theory that both the risk of detection and the consequences if detected are key factors in achieving statutory compliance. It's also acknowledged that the risk of detection is generally weighted more highly in the mind of a potential offender (Swanton (1989). [redacted]

122. Some of the controls that have been canvassed in published papers as potentially being available to mitigate the risk of violence against drivers include:

- refusing entry onto the bus if a person appears under the influence of alcohol and drugs; and

- removal of loose heavy objects on the bus (potential weapons).

123. The BCC's specific control measures are outlined in the response to question 10.

[redacted]

125. In terms of the prevention of the death of the driver, it is worth considering the extent to which the use of firefighting equipment may have assisted in preserving the life of the victim.

126. The bus was equipped with a fire extinguisher but it was located at the front of the bus, which was engulfed in flames and smoke following the weapon being employed. The mixture used for the weapon caused the extent of flame and smoke [redacted] which made it unsafe for passengers on the bus to approach the front of the bus where the victim was located.

127. It has not been possible to definitely determine whether the driver made any attempts to escape once the fire had engulfed him, but from the CCTV footage of the event I viewed, Mr Manmeet Sharma did not appear to make any attempt to escape. [redacted]

128. A factor to be considered in responding to this question is the pathophysiological response of the victim's body on exposure to the particular substance used by the perpetrator. The autopsy report, or advice from the pathologist that conducted the autopsy, may offer more insight into the possibility that the:

- victim's death may have been prevented with a quick response by an emergency responder had one chosen to take such action; and/or

- victim may have been physically capable of retreating from the bus while engulfed in flames (with the view that emergency response may then have been available).

129. But from the CCTV footage and the very short timeframe involved from ignition to the driver being motionless and the intensity of the fire in this very short timeframe, it would seem very unlikely that anything could have been done to save Mr Manmeet Sharma, once the fire started and he was engulfed. [redacted]

Conclusion

130. In the absence of specialist advice indicating that the driver may have been capable of taking action once engulfed in flames, it would appear that no action could have been taken by the employer or the driver, at the time of the event, that would have prevented the incident occurring or that would have prevented the death of the driver. [redacted]

[redacted]

Q4. Was there any way that the driver could have predicted the behaviour of the alleged perpetrator and prevented the incident from happening?

Considerations

131. Factors associated with predicting the behaviour of the alleged perpetrator have been canvassed in the response to Question 3. Whilst the CCTV footage of the perpetrator waiting to board the bus and boarding the bus indicate a very normal and non-threatening situation for the driver, there is insufficient information available to me about the specific actions of the perpetrator as portrayed to the driver, in the driver's opinion, and consequential thoughts of the driver from the moment that the driver sighted him and the perpetrator alighted the bus.

132. Furthermore, the extent to which those actions are consistent with the actions of a person with the mind to commit the crime committed and how that is perceived by a person such as Mr Manmeet Sharma is beyond my expertise. These matters would be best directed to suitably qualified experts such as criminologists and psychologists with experience in crime committed by persons with a history of mental illness similar to that of the alleged perpetrator.

133. But, from my opinion, based upon reviewing the CCTV footage of the bus stop scene at the time the driver stopped the bus there, it all seemed a normal everyday scenario, with the normal range of passengers waiting to board and boarding the bus. There was nothing to indicate or signal to a bus driver what was about to happen.

Conclusion

134. I have no way of definitely knowing what was going through the mind of the driver and what he perceived at the time relative to the behaviours of the perpetrator that were observed by the victim on approaching the bus stop or while the perpetrator alighted the bus.

135. Review of investigation material, including the CCTV footage referred to, does not present any behaviours out of the ordinary for an ordinary passenger catching a bus, let alone anything that would indicate the perpetrator's intentions. However, for a more informed (expert) opinion and more definite answer to this question, if so needed over and above this report, deferral to appropriate criminology and psychological experts is recommended should a further robust theoretical response to the question be required.

Q5. Was there any action that Council could have taken to prevent the incident occurring?

Consideration

136. Prevention of the incident from occurring would have required some form of impediment being deployed to stop the perpetrator from carrying out the specific crime (after the employer having reached a conclusion that the circumstances could eventuate).

[redacted]

138. As highlighted in the response to Question 1, a criminal intruder committed the incident, i.e. a perpetrator with no relationship to the organisation intent on committing a crime. [redacted]

139. The third edition of the Violence at work publication (2006) released by the International Labour Office identifies that 'random' aggression perpetrated by persons with a history of violence or dangerous mental illness or who are intoxicated is very difficult to predict and can lead to serious incidents. The report offers no preventative strategies for such circumstances. Further information in the publication on British bus, train and subway worker experiences points to customer perceptions of inadequate standard of transport, disputes involving cost of fares, hooliganism, traffic incidents, passenger to passenger conflict and vandalism to property being the causes of transport related aggression – there is no evidence to suggest these were pertinent in the circumstances surrounding this incident.

140. [redacted] The installation of means of totally separating the driver from the perpetrator (target hardening) may have achieved any of the following alternative outcomes:

- if the means of total separation of the driver from passengers was known to the perpetrator –
    a. the perpetrator rationalising that alighting the bus to target a driver would be ineffective in achieving the perpetrator's intent and so not continuing on the path of alighting the bus;
    b. the perpetrator continuing on the intended path but the weapon being ineffective in achieving the desired outcome; or
    c. the perpetrator alighting the bus to instead target one or more passengers;
- if the means of total separation of the driver from passengers was not foreseen by the perpetrator –
    d. the perpetrator continuing on the intended path but the weapon being ineffective in achieving the desired outcome;
    e. the perpetrator getting off the bus, once this was discovered, to pursue a different target or possibly aborting the intended action; or
    f. the perpetrator targeting a passenger when the installation of effective preventative screens was discovered.

141. The considerations have not unpackaged the potential risks associated with these potential alternative outcomes, which could have resulted in a similar outcome (death of one individual) or multiple fatalities. [redacted]

[redacted]Any impediment experienced in relation to the bus driver being the target, may have resulted in yet another aborting of an intended victim and thus possibly moving onto another.

142. Furthermore, in considering the question about what BCC could have done to prevent the incident and attack from occurring, it denotes that BCC would have to have foreseen it and thus how it might have been able to prevent it. Without foreseeability then this question is too broad to provide a proper and useful answer. Relative to the question of foreseeability, it has been discussed and determined earlier in this report, that the incident prior to it happening was not reasonably foreseeable to BCC. Therefore, it is difficult to try and propose a preventative measure for something that cannot be foreseen. So, the more pertinent issue and question, what could have been done to reasonable foresee the threat and potential for such an incident to alert the BCC to the need for a preventative measure, which once again has been discussed and addressed earlier within this report.

Conclusion

143. The BCC's inability to know the intent of the perpetrator, the limitations of preventative measures in discouraging the crime from being carried out and the unknown outcomes that may have arisen from the installation of screens suggest that there was no action the BCC could have taken to prevent 'an' incident such as what happened from occurring. However, it is possible that the installation of a barrier (at least perceived by the alleged perpetrator to not be penetrable by an incendiary device) between the driver and passengers may have prevented such an incident occurring in which the driver was the target.

Q6. Was this an isolated incident or is there a significant risk that this type of incident will be repeated?

Consideration

144. The response to question 1 has identified that the majority of studies have concentrated on violence against bus drivers arising from client initiated aggression and that there is a dearth of information regarding criminal intruders that commit violence against workers.

145. There are numerous references within published papers to persons whose faculties are impeded, through factors such as drug use and mental illness, committing violence against workers (Swanton (2015), Lincoln and Gregory (2015), Burrell (2007), Weiser Easteal and Wilson (1991) and Stanley (2015). However, quantitative data was not identified, within published research and/or data or data supplied by the BCC that indicates such persons have set out to commit a non-personal benefitting crime of violence against a public transport worker and none have caused the fatal injury of a worker while at work. A broad environmental web based scan was also unable to detect any such events.

146. A consideration of the application of risk management principles is necessary to respond to any question of the extent of risk of the incident being repeated.

147. For the purposes of answering this question, application of *ISO 31000:2009 Risk management – Principles and guidelines* and the supporting *SA/SNZ HB 436:2013 Risk management guidelines – Companion to AS/NZS ISO 31000:2009* has been utilised. It must be highlighted that these documents do not set the definitive way in which risk must be managed but provides an example framework, which is globally recognised and supported, for persons seeking to manage risk. A further assessment by the BCC of the conclusions from applying this Standard

and Guidelines is necessary to ensure the conclusions align with the risk allocation, assessment and acceptance/tolerability framework applied by the BCC.

148. Risk is defined as the uncertainty on objectives. An objective of 'preventing work related deaths' has been utilised for the purposes of undertaking this risk analysis. Risk analysis is defined as the process to comprehend the nature of risk and to determine the level of risk. In the particular circumstances being analysed, the nature of the risk has been identified as a driver being harmed as a result of the actions of a criminal intruder.

149. Given the circumstances underpinning the question posed, the consequence for the purposes of undertaking this analysis has been identified as 'death of the driver'. The two illustrative examples of consequence scales within the Guidelines conclude a consequence level of 5 from the five level scale at Table C2 (one or more fatalities or severe irreversible disability to one or more people) and 5 from the six level scale used in Table C3 (single fatality or severe irreversible disability to one or more persons) would be relevant to the outcome of a death of a driver. Once again, it is necessary to highlight that the selection of consequence level categories are dependent on an organisation's own risk context and hence the earlier discussion in this report on Quantitative Risk Assessment (QRA).

150. The Guidelines offer at Table C4 a seven scale table that incorporates descriptors, frequency and probability as follows:

Descriptor	Description	Indicative return period*	Indicative probability (over the time frame or activity of interest)
Almost certain	The consequence expected to occur on an annual basis	Every year or more frequently	>0.9
Likely	The event has occurred several times or more in your career	Every three years	>0.3, >0.9
Possible	The event might occur once in your career	Every ten years	>0.1, >0.3
Unlikely	The event does occur somewhere from time to time	Every thirty years	>0.03, >0.1
Very unlikely	Heard of something like that occurring elsewhere	Every 100 years	>0.01, >0.03
Extremely unlikely	Have never heard of this happening	Every 1 000 years	>0.001, >0.01
Incredibly rare	Theoretically possible but not expected to occur	Every 10 000 years	<0.001

* Return period is an estimate of the likelihood of an outcome occurring. It is also known as recurrence interval.

151. The guidelines highlights that the scale is used as an illustrative example only and that care is needed when developing likelihood scales "to avoid a natural bias assuming that high consequences are more likely to occur than available evidence suggests, or to be unduly influenced by the recent occurrence of a high consequence low likelihood event".

152. To undertake a clinical assessment of likelihood, for the particular circumstances of this matter, it is necessary to understand metrics such as:

- the number of people in society who have an intent at any one time to commit a crime involving severe or fatal harm to a person;

- the number of people above who may choose to direct the intent to the driver of a bus; and

- the number of people who choose to direct the intent to the driver of a bus who have the necessary opportunity (by physical force/weapon) to create the desired outcome of severe or fatal harm to the driver.

153. An analysis of available data on BCC bus incidents involving physical violence against bus drivers may provide an avenue to undertake such an assessment, if the data is sufficiently coded to enable the required information to be extracted and extrapolated. The BCC has indicated such data is available. Therefore, it should be considered as part of the review referenced in Recommendation 1.

154. While there is an absence of published data on events with similar characteristics, the following is known:

- while not quantified, published research has identified that events are committed by criminal intruders; and

- at least one event has occurred (the event in question) in which a criminal intruder has alighted a bus and committed an action that was intended to critically harm the driver.

155. From these factors it would be reasonable to conclude a likelihood level of somewhere between 'unlikely' and 'very unlikely'.

156. In determining the level of risk, a consideration is given to the consequence and its likelihood of eventuating. The Standard and Guideline does not offer a table that enables a marrying of conclusions from application of the illustrative likelihood scale with the consequence tables provided. Despite this, it is common practice that a consequence of 'death' will generally result in a minimum risk level classification of 'high' regardless of the conclusion of likelihood. The fact that a conclusion of unlikely has been reached, i.e. a conclusion of more than 'incredibly rare' and 'extremely unlikely', increases the validity of a risk level allocation of at least 'high'.

157. The next consideration to answer the question posed is the alignment of 'significant' with the risk levels derived from the assessment. Contemporary technical standards for risk management do not currently define 'significant'. Therefore, it is necessary to rely on the ordinary meaning of the word. The Macquarie dictionary (used for the interpretation of statutes where the *Acts Interpretation Act 1954* is silent) defines significant as:

1. Important; of consequence.

2. Expressing a meaning; indicative.

3. Having a special or covert meaning; suggestive.

158. The consideration of issues associated with this question has not sought to give any consideration to the principles of managing the risk so far as is reasonably practicable, rather, it has focused on the considerations necessary to determine the level of risk.

159. Furthermore, the consideration has not sought to analyse the impact of the incident on passengers as this has been seen as a secondary outcome that only arose as a consequence of the particular incident that occurred.

Conclusion

160. While research indicates that workers may be exposed to physical assault from criminal intruders, the absence of available published empirical data that indicates at least one other incident of this type (that is an incident with complementary circumstances) has occurred in the past, leads to a conclusion that this has been an isolated incident.

161. The analysis of risk has identified that, assuming a risk level of high or above is considered by the organisation to be a 'significant' risk, there is a significant risk of a driver being harmed as a consequence of the actions of a criminal intruder.

162. Furthermore, that such an incident has now occurred and been publicised, gives rise to an increased risk of a repeat and future occurrence by others seeing it as something that can be done and which they might therefore now have in their mind as a thing to do. In other words, now that it has happened, the issue of foreseeability has been established, for which there is further risk of it happening again. This will remain the case whilst conditions and factors related to the cause and reason for this incident remain unchanged or increase.

Q7. Are there implications for other council employees who interact with members of the public for a similar attack?

Consideration

163. As outlined in the responses to earlier questions, a criminal intruder to the organisation perpetrated the attack against the driver. The decision to target a driver of a BCC bus appears, on the face of facts known about the event, to have been indiscriminate.

164. The responses to earlier questions have highlighted the difficulty in predicting the behaviour of aggressors with a history of violence or dangerous mental illness or who are intoxicated.

165. The response to question 6 has identified that while the likelihood of a similar incident occurring is 'unlikely' (event does occur somewhere from time to time) or 'very unlikely' (heard of something like that occurring elsewhere), the risk could be determined as 'significant'.

166. However, the response to question 5 has identified, notwithstanding the potential for other equally serious outcomes, that the particular outcome from this incident (driver death) may have been averted had there been total separation between the driver and the perpetrator (for example, through installation of a barrier not penetrable by the incendiary device) and a suitable mechanism for escaping the fire that would ensue.

167. It is generally acknowledged that it is the unprotected isolation and confinement of the driver that make drivers particularly vulnerable to risk of physical assault (Stanley (2015) and Lincoln and Gregory (2015)).

Conclusion

168. It seems reasonable to conclude that other BCC employees who interact with members of the public:

- are at risk of attack from a criminal intruder (as was the case for the bus driver attack); and

- any responses to the risk of the event being repeated may be relevant to other employees that have contact with the public depending on the:

    - extent to which the employees are already separated from members of the public; and

    - ease with which they are able to retreat from contact with a member of the public during their interaction.

169. This will remain the case whilst conditions and factors related to the cause and reason for this incident remain unchanged or increase.

Q8. Was Council's response to the incident in accordance with established Council procedures including requirement regarding escalation of issues to the Lord Mayor, E&C, relevant Chair, CEO and senior management?

Consideration

170. The BCC Health Safety and Environment Handbook nominates that for all critical incidents involving bus operators, NCC (Network Coordination Centre) must initiate the Critical Incident Procedure.

171. A copy of the Critical Incident Procedure has not been provided to me so as to allow an assessment against compliance with the Critical Incident Procedure. However, I have met with and interviewed the Head of Security for BCC and also with senior management of BCC Transport and it would appear that there is no issue with BCC's response to and reporting of the incident.

Conclusion

172. It seems reasonable to conclude that the response to the incident was satisfactory under the circumstances.

Q9. Was there appropriate interaction with the Network Coordination Centre' the QPS and QFRS?

Consideration

173. My investigations have not extended to speaking with the QPS and QFRS, but rather has confined the investigation on this matter to that of discussions with and interview with the BCC Head of Security, in which liaison between the BCC and the relevant authorities has been conducted and progressed in a natural and expected way.

174. There appears to be no problem in regards to how the parties have worked together.

Conclusion

175. It seems reasonable to conclude that the interaction with the NCC and relevant authorities has been appropriate.

Q10. What were the existing controls of Council in relation, to the safety of drivers and passengers?

Consideration

176. From the information available to me, the controls established for:

a. the safety of drivers, with respect to a potential attack on the driver, included:

i. use of contracted security guards on late night buses (NightLink and Glider services), at some interchanges and at certain stops – deterrence, detection and assistance in de-escalating events;

ii. bus duress alarms, enabling communication with Network Co-ordinator, request police support and inform public – response;

iii. on-bus two way radio – response;

iv. illumination to depot perimeters, including coverage of employee car parking – deterrence;

v. security fencing – deterrence;

vi. site security signage – deterrence;

vii. security lighting at bus operator toilets – deterrence and detection;

viii. Nextbus GPS-based system that enables NCC to track and locate bus locations in real time – detection;

ix. closed-circuit television in buses, bus depots, garages and bus workshops – deterrence and detection;

x. security awareness training in bus operator induction – detection;

xi. reduced cash carried by bus operators – deterrence (for robbery related assault); and

xii. resilience training, which included understanding impact of personal responses to situations – detection and de-escalation.

b. the safety of passengers, with respect to a potential attack on passenger/s, included:

i. Health and Safety Handbook instructions to assist passengers (without placing self in harm's way);

ii. security awareness training in bus operator induction – detection;

iii. use of contracted security guards on late night buses (NightLink and Glider services), at some interchanges and at certain stops – deterrence, detection and assistance in de-escalating events;

iv. bus duress alarms, enabling communication with Network Co-ordinator, request police support and inform public – response;

v. on-bus two way radio – response;

vi. Nextbus GPS-based system that enables NCC to track and locate bus locations in real time – detection;

vii. closed-circuit television in buses – deterrence and detection;

viii. security awareness training in bus operator induction – detection; and

ix. resilience training, which included understanding impact of personal responses to situations – detection and de-escalation.

c. the safety of passengers, with respect to potential fire in a bus:

i. bus design specification for:

1. compliance with Australian Design Rules – response (emergency exits);

2. body and chassis supplier nomination of fire prevention and detection features in buses – prevention and minimisation;

ii. emergency exits, marking of exits, interior arrangements, signs, markings - response; and

iii. fire extinguisher – response.

Conclusion

177. There were a combination of security measures, provisions and controls in place at the time directed towards the safety of drivers and passengers with respect the potential threats posed by an attack or fire.

Q11. Do any of those controls need to be reviewed or updated?

Consideration

178. In short, yes. Notwithstanding that it is a requirement under WHS legislation to do so with respect to risk management provisions, it is nevertheless always prudent to review the effectiveness of controls post incident.

179. Given the fatal outcome from this incident, and the potential risk that the outcome could have been even worse (through harm to more people), it would be appropriate to consider each control in terms of:

a. the control's intended objective with respect to the potential risks it is aiming to address;

b. the control's capacity to achieve the intended objective;

c. residual risks and potential for additional controls; and

d. any risks that could arise as a consequence of using any additional control.

180. In terms of the first and second point it would be appropriate to consider the potential location of a fire and the ability of those the control is intended to protect in being able to utilise the control in the way it was intended. As an example for the third and last point, it would be pertinent when considering a control such as security screens, to consider:

a. the potential residual risks to drivers, such as entrapment and an inability to escape harm intended toward them;

b. the potential opportunity for a person intending harm to redirect attention to another person on or nearby the bus. Examples include, a person intending harm toward a:

i. driver redirecting harm at a passenger, or other person nearby because the screen prevents the intended harm from being achieved;

ii. passenger redirecting harm to the driver or another passenger as a result of the driver or other passenger seeking to intervene in the matter.

181. The categorisation of the controls, such as has been done and provided in answering question 10, will be helpful in identifying the extent of preventative controls that have in fact been considered/implemented.

Conclusion

182. Whilst the particular circumstances of the attack and the perpetrator concerned for the Moorooka incident was a unique situation which would have been very unlikely to have been prevented at the time, there are valuable lessons that can be learned from the event, including reflecting upon the overall safety of BCC bus drivers in relation to threat of attack, as well as for passengers, including quick and easy evacuation in an emergency.

Q12. Should the driver's position in the bus be protected by some form of partition impervious to the type of attack that occurred or other possible attacks?

Consideration

183. This is a complex question, to which there is no simple answer. The introduction of impervious partitions should be considered as part of the overall recommended safety in design assessment along with a consideration of the potential subsequent introduction of new hazards and the impact on the effectiveness of current passenger safety controls.

184. A response to this question requires a consideration of:

- what other 'types' of attacks are 'possible' (the question provides no indication that the outcome of such is to be factored into the response);

- whether a non-impervious protective partition would be effective in preventing harm to drivers; and

- what needs to be considered to determine whether screens 'should' be installed.

185. The responses to previous questions have dealt primarily with the incident in the context of it relating to a criminal intruder. This question has sought to expand consideration to 'other possible attacks'.

186. The literature that has been reviewed has primarily commented on client-initiated attacks in the forms of both verbal and physical abuse. The question has referenced a particular control, which is directed to protection from a physical assault (and potentially subsequent psychological injury that may otherwise arise from the absence of the protection).

187. Research indicates that reporting of incidents by bus drivers has been low (Lincoln and Gregory 2015) and that very few verbal threats are recorded in an official capacity. The Lincoln and Gregory (2015) study of a random sample of drivers on the only 24-hour bus route of the study population was conducted for the period of July to December 2013. The study utilised software to capture observational data via on-board smartphones or tablets.

188. The report of the study identified the precipitating factors associated with the incidents (such as fare conflict and late running of buses – reportedly the prevalent factors in incivility) as well as the behaviour of the aggressive party (talking loudly, using bad language) and state of the aggressive party (under the influence of alcohol or drugs). The report did not identify the occurrence of any physical assault.

189. The Lincoln and Gregory (2015) report did acknowledge the ongoing issue of under-reporting of incidents and concluded that it appeared incidents of incivility and violence against bus drivers has declined between 2010 and 2013 but that the severity of the most serious form of abuse may have elevated (also highlighted by Weiser Easteal and Wilson (1991)) and that physical assaults occur most often as a result of escalation of verbal abuse.

190. There is direct evidence of this relating to an incident with a cyclist and BCC bus driver [redacted], whereby an aggrieved and agitated cyclist boarded the bus with a grievance against the bus driver. The cyclist was verbally abusive to driver and as he was leaving the bus, having said his piece, struck out at the driver with an open hand. The driver however escalated the situation by pulling the cyclist back and striking the cyclist back in retaliation, rather than allowing the altercation to end and the cyclist to leave. The action of the bus driver escalated the situation whereby it developed into a more violent physical confrontation where he was the subject of a violent physical attack.

191. The Stanley (2015) report presents data on Transport Safety Victoria bus related incidents over the period of 2008 to June 2014. Of the 152 incidents over this period, 75 (49%) were identified in the report as meeting a classification of 'physical assault' while 14 (9%) met a classification of 'verbal assault'. No definition is offered as to what constitutes a 'physical assault'. The reporting of annual totals suggests there has been a steady annual increase in reported physical assaults, with there being five times more reports made in 2013 (16 reported physical assaults) than in 2008 (3 reported physical assaults).

192. The Stanley (2015) report also notes the results of the 2014 BusVic survey, which is reported on in the Creating Safe, Mentally Healthy, Resilient and Supportive Work Environments for Victoria's Bus Industry Report. Ninety-nine respondents (25%) of the BusVic survey identified as having been physically assaulted by a passenger, with 21% of these respondents indicating they had been physically assaulted by a passenger at least once. Caution has been expressed in the report about reliance on this data due to the definition applied by some respondents (analysis identifying descriptions associated with threat against their person rather than 'experience' of assault and witnessing of violence rather than 'personally experiencing' physical assault). Sixteen per cent of respondents identified the physical assault as involving expectorating (spitting).

193. Burrell (2007) reported on violent crime on buses in the West Midlands, Britain. However, the data was not segregated between violence against drivers and violence against others (passengers).

194. Research on post-traumatic stress disorder experienced by British bus drivers, by Tse et al (2006) identified that the risk of assault from passengers was the highest reported stressor of bus drivers involved in the study – paralleled with data from the relevant Department of Transport indicating that there was a reported 1500 assaults on bus crews in the UK in one year.

195. The Transport Workers Union (Victoria/Tasmania Branch) asserts that Transport Safety Victoria recorded that more than 100 Victorian bus drivers had been physically assaulted between 2011 and 2016, with 16 having been reported in 2016.

196. The BCC has access to data on physical assaults of bus drivers. This data, along with other broader data sets from other relevant transport system environments, should also be consulted and will be helpful for the considerations necessary to implement recommendation 1.

197. In terms of understanding the nature of physical assaults experienced by bus drivers, the following is informative:

- respondents of the BusVic survey (as reported by Stanley (2015) indicated assaults involved:
    - 'punched after intervening in a fight between a young man and woman';
    - 'punched by a lady assumed to be drug affected';
    - 'king hit in the chest';
    - 'knocked unconscious….woke up to find the boot being laid in'
    - 'attempted robbery with a knife';
    - 'passenger tried to hi-jack the bus by holding a knife to my neck';
    - 'hit with an umbrella as a passenger was moving off the bus';
    - 'glasses pushed off victim's face and phone slapped out of victim's hand';
- the 2014 statewide survey of Queensland bus drivers by the Queensland Branch of the Transport Workers Union identifies of the respondents to their survey:

- 81% have been threatened with physical harm (with 54% reporting that it happened regularly);
- 27% have been spat on;
- 21% have been physically attacked at the wheel;

- the Queensland *myPolice* website publishes the following examples of physical assaults:
  - 13 January 2013 – Palm Beach – male bus driver punched in head after asking a group of youths to exit the bus around 11:45pm;
  - 21 March 2013 – Southport - male bus driver received minor facial injuries and was taken to hospital for treatment after being punched a number of times in the head;
  - 25 November 2016 – Woollongabba – bus driver struck in the arm after a verbal disagreement;

- the following incidents have been reported in the media:
  - January 2014 – Cairns – bus driver cut by the installed half-protection glass screen after it was broken by a passenger smashing it;
  - 12 October 2016 – Melbourne (Vic) - female bus driver suffered black eye, 'golf ball-sized' haematoma behind the ear, bruised ribs, arm, shoulder and eyeball and self-inflicted tongue bite while being punched (The Age); and
  - 21 November 2016 – male bus driver suffered facial injuries after being punched in the face by a cyclist who boarded the bus (Brisbane News).

198. A review of data available to the BCC should be included as part of the review processes undertaken in line with Recommendation 1.

199. Having gleaned some understanding of the incidents currently experienced by bus drivers in Australia and beyond, the question turns to the next element of determining whether a non-impervious protective partition would be effective in preventing harm to drivers.

200. The response to question 5 has identified that the separation of the driver from the perpetrator would likely have prevented the driver being the target of the perpetrator's intentions. Noting the design of such separation would have needed to be such that, had the weapon still been employed, contact with the driver would not have been made and contact with the screen would not have generated a subsequent risk, for example, entrapment of the driver that would lead to harm.

201. Furthermore, this is assuming that any opening/s in the capsule/module weren't open at the time and/or able to allow any significant quantity of fuel to pass through onto the driver. Unless a completely enclosed capsule/module, the driver could still be vulnerable to such an attack from a liquid, including acid.

202. The selection of any protective barrier to be installed would need to have full regard for the potential outcomes that it is attempting to prevent. The Cairns incident referred above and other events as outlined below highlight the potential limitations of protective barriers.

- 20 November 2016 – Preston (Vic) – male passenger boarded a bus in Preston and punched the Perspex security screen, causing it to break, after threatening the bus driver; and

- First Leads Bus Company (Yorkshire) – as reported in Health and Safety Executive publication – fireworks thrown at driver, causing explosion that damaged the assault screen and shattering both front windscreens – driver managed to exit cabin before the explosion.

203. Weiser Easteel and Wilson (1991) provides an analysis of the effectiveness of protective screens at that time – noting the information is quite dated and approaches may have changed since the report was produced. Weiser Easteal and Wilson identified, from other researchers, that:

    - the installation of a screen around London drivers resulted in approximately a 30 per cent decrease in assaults;

    - partitions on night buses in New South Wales were not employed during peak hours when they proved to be in the way and were ultimately discarded after determining the deterrent value did not outweigh other variables – this experience may be somewhat different now with the reduction in cash transactions arising from the advent of cashless ticketing; and

    - British evaluations identified issues of glare and reflections at night, separation from passengers giving rise to difficult communications and claustrophobia as challenges with the fitting of screens but the new screens with a new fare system that reduced passenger/driver conflict was found to significantly reduce assaults on drivers.

204. Weiser Easteel and Wilson (1991) also noted the position of France at that time, which was one that protective screens was not perceived to be beneficial to the driver and were perceived negatively by passengers. It has not been possible to determine whether this position is reflective of current practice and thinking in France.

205. Lincoln and Gregory (2015) reports that, at the time of the study, drivers appraised security screens as 'poor' (seemingly linked to a valued element of the role being one of customer interaction) but were supportive of driver training courses. Lincoln and Huntingdon (2013) identified that concerns about screens also emanated from fear that the screen may provide protection to the perpetrator while still giving aggressors capacity to harm the driver. This perception may have changed following the events associated with the 28 October Brisbane bus driver fatality.

206. There has been a recent decision in Victorian to install every passenger bus in Victoria with a security screen to protect drivers from the risk of violent assault. The initiative is expected to take approximately three years to complete, at a cost of approximately $10 million. It is reported that the costs will be shared between the bus operators and Public Transport Victoria.

207. Given the cost of this initiative, one would hope that arriving at this decision will likely have been supported by a thorough analysis of the:

    - types of assaults that have and could occur in Victoria; and

    - design of security screens in preventing harm from these types of assaults.

208. Obtaining such analysis data, if it exists, would be extremely useful to the BCC in determining:

- whether there are any differences in the types of assaults experienced in Victoria and Brisbane; and
- the limitations and protections offered by the types of screens that were considered prior to reaching the decision (such as driver escape).

209. The last element of the question, which questions whether this form of protection 'should' be installed, will require the BCC's consideration of factors such as:

- statutory obligations for such events;
- likely common law liability for such events;
- the organisation's risk tolerability – which would likely give some consideration to societal tolerability of risk for such events; and
- evidence supporting the effectiveness of the separation that will be achieved.

210. In terms of statutory obligations associated with the bus drivers engaged by the BCC, the primary duty of care for the BCC, is to ensure, so far as is reasonably practicable, the health and safety of those workers while the workers are at work in the business or undertaking. With respect to determinations about the installation of protective screens, the following supporting duties are relevant –

- provision and maintenance of a work environment without risks to health and safety;
- provision and maintenance of safe systems of work;
- provision of any information, training, instruction or supervision necessary to protect the drivers from work health and safety risk;
- monitoring of the health of workers and workplace conditions to prevent illness or injury from the conduct of the BCC.

211. There are a number of elements to be applied in determining what is reasonably practicable (refer *Interpretive Guideline – Model Work Health and Safety Act, The meaning of 'reasonably practicable'*, Safe Work Australia). A thorough analysis has not been undertaken with respect to the protective screens. However, the following table illustrates how a conclusion on this issue could be reached.

The likelihood of the hazard or the risk concerned occurring	An incident with the same characteristics of the incident at Moorooka has been determined in earlier responses to be 'unlikely' or 'very unlikely' to occur. However, with respect of other possible attacks, the information provided above indicates that such attacks are 'likely'. This element would be more accurately assessed having regard for particular incidents associated with BCC bus drivers (through analysis or incident reports and bus driver feedback (such as facilitated through a survey)).
The degree of harm that might result from the hazard or the risk	The harm that might result from attacks could be physical or psychological or both. It is difficult to

	predict the extent of harm that may be inflicted in these events – certainly in the context of what 'could' be inflicted a conclusion of an 'extensive injury or impairment' would seem reasonable.
What the person concerned knows, or ought reasonably to know, about the hazard or risk and ways of eliminating or minimising the risk	The responses to the questions addressed by this paper have highlighted that while foreseeability of an event such as that which occurred on 28 October would be limited, the available data on physical assaults of bus drivers and actions by other service providers in instituting new controls would result in a likely finding that the BCC knows or ought reasonably know (could 'foresee') about the hazard/risk and ways those hazards/risks can be controlled.
The availability and suitability of ways to eliminate or minimise the risk	The use of an impervious partition has been canvassed as a way of eliminating or minimising the risk. This is one of many ways that may be suitable in managing the risk (in isolation or combination with other ways, which could be risk preventative in nature and incident reactive). A consideration of other controls is also necessary and would be advised before a determination of this one control is made as would a full assessment of subsequent risks that may arise from the use of the controls being considered. Consideration will need to be given to available data – such as whether the identified target attacks occur while the driver is seated at the wheel or while moving around on the bus. One control in isolation will be unlikely to be successful in achieving the BCC's transport safety objectives.
After assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.	The cost of installing the suggested 'impervious partitions' has not been provided. Regardless, as outlined in the response to the earlier element, an understanding of all controls would be necessary before any question of proportionality to risk is explored.

212. The need to consider situational crime prevention models for the type of assaults being experienced has been canvassed in response to earlier questions. The following table draws out some potential controls that could be deployed for the various aspects of such prevention model.

213. It is important to note that these are not offered as a 'recommended' control but rather controls worthy of consideration against the prevention approach element – the limitations of some of these controls have been identified by Stanley (2015).

Prevention approach	Potential controls
Immediate environment management/design	• Good service standards achieved – timetable met, professional looking drivers, clean bus, smooth driving, timetable information available, clean, comfortable and well lit bus shelters, waiting time information • Rotation of staff on demanding routes, avoidance of long shifts, provision of adequate rest breaks • Driver training on minimising and de-escalating aggression • Discretionary fare enforcement policy • Set rules, post instructions and assist compliance
Cause the behaviour to be more difficult	• Deny benefits, eg. driver insistence of cessation of smoking – although also recognised as a potential escalator of aggressive

	behaviour • Deny bus rides (facilitated through clear vision of bus stops on approach and night lighting) • Reduce the presence of potential weapons – loose heavy objects and litter (supported by passenger targeted posters highlighting potential for litter to be used as a weapon) • Require passenger exit via centre doors
Cause the behaviour to be more risky	• Closed circuit television • Public Transport Police, particularly for routes and timetables known to involved difficult customers • Driver emergency communication devices (e.g., two-way radios, alarms) • Management reporting of incidents • Passenger and witness reporting through phone apps • Media campaigns – advertising offender prosecutions, highlighting impact on drivers, zero tolerance to aggression against drivers, rewards for information leading to arrests
Protection of the target	• Separation of the driver from passengers – separate compartment, barrier installation, ticket validation on outside of bus
Backup support for the target	• Roaming transport officers – to act as deterrent, enable fines to be issued, collect evidence for subsequent prosecutions • Radios back to base • Attack alarms verbalising request to passengers to alert police to present event

214. Information on the BCC's controls for managing driver safety, at the time of the incident, is provided in the response to Question 10

215. These elements of a prevention approach are similar to those espoused by Clarke as part of situational crime prevention – opportunity reduction: surveillance of potential offending behaviour; target hardening, eg, locks on doors; and environment management, i.e. manipulation of social and physical factors to either eliminate or reduce targets of crime (Swanton (1989)).

216. The use of some of the situational crime prevention controls has been canvassed as part of previous studies, with varying driver perspectives being expressed (Lincoln and Huntingdon 2013):

Screens	Can't hear, still accessible, disrupts interaction with passengers
Spit kits	Reactive only, lack of faith in justice processes, may be no match
CCTV	Reactive only, often not operational, rarely monitored
Signs	Mostly ignored, not attractive/hard to read, too many/cluttered
Alarms	Too few units to respond, only useful if quick response time
Security	Need to be on-board, often poor personnel choice
Fare cards	Few machines, increased cash handling, frequent small top-ups

217. Any consideration of controls going forward should seek to identify the strengths (and limitations) of the controls in eliminating the risk or minimising the risk where elimination is not practicable.

218. Information in Attachment 1 provides some insight into an evaluation on the use of partitions (assault screens) for bus drivers in the United Kingdom. This and other information, such as

that available for the Victorian decision to install barriers will be useful in considering the adequacy of control measures including whether 'impervious partitions' should be installed.

Conclusion

219. Impervious partitions are likely to be effective in preventing serious harm from a physical assault on a driver while the driver is seated, if:

- they have been designed such that the deployment of any likely weapon will not still be effective in causing harm to the driver; and
- the enclosure of the driver in the partitioned area does not introduce an unintended consequence, such as the entrapment of a driver in an event or risk to driving safety.

220. On the face of an assessment of statutory obligations, it is necessary for the BCC to review its controls. However, the BCC should consider the potential for installation of impervious partitions only after a full assessment that considers:

- suite of options available to manage the risk; and
- relative effectiveness of the design of the partition being considered – having regard for any information that may be available from the recent Victorian decision to install protective screens.

221. Depending on the assessment of any information made available from the Victorian decision, if the installation of partitions is pursued, consideration should be given to piloting their use to assist in the evaluation of effectiveness prior to a full roll out – noting that I am now informed by the BCC that such a trial has previously occurred (albeit before the 28 October incident). Such piloting will provide an opportunity to consider both driver and customer experience and could be conducted in known hotspots.

Q13. Should the driver have some other form of escape mechanism from the driver's position (eg, emergency windows)?

Consideration

222. The difficulties associated with the driver's position on the bus (having the potential aggressor between the driver and the exit) have been canvassed by a number of researchers – refer Stanley (2015).

223. Given the circumstances (as outlined and discussed in this report), the driver in the 28 October 2016 event would not likely have had an opportunity to retreat from his driver's seat/cabin had an escape mechanism been available and/or would have used it had it been available. It all happened so quickly, in which it appears the driver did not even attempt to get out of his seat.

224. As highlighted in earlier responses, consideration of a means of escape would be required should security partitions be pursued.

225. Data on reported incidents may yield some information to assist understanding of the potential effectiveness of an escape mechanism but further exploration of the topic with drivers would be required before a more definitive response can be provided.

Conclusion

226. A definitive response on this question cannot be provided until:

- reported incident data has been analysed; and
- related issues have been explored with drivers (or their representatives).

227. However, the driver's seating arrangement in its current form and driving position for BCC buses is vulnerable to attack from the direction and position of their only means of escape and exit, i.e. the front entry door. But, whether this risk is mitigated by an alternative means of escape/exit, such as a side door/window needs further assessment and consideration within the context of an assessment and determination of driver encapsulation and partitioning, as has been addressed earlier within this report.

228. In the case of the incident involving Mr Manmeet Sharma, having an alternative escape mechanism would likely have not made any difference with respect to the current form of driver's position and cabin.

Q14. Is there some other form of protection that could be available to the driver?

229. This question has been already been addressed as part of the response to question 12.

Q15. Should the safety of the passengers be the subject of a review particularly with respect to:
a) the passenger's ability to exit the bus when the drivers entrance to the bus is compromised for some reason?
b) Any legislated design requirements in relation to the type of bus the subject of the incident?

Consideration for Q15(a)

230. The BCC's duty of care extends to ensuring that so far as is reasonably practicable, the health and safety of other persons other than workers is not put at risk from work carried out as part of the conduct of the business or undertaking. The nature of the undertaking is such that there is the potential for emergencies to arise (which could arise from situations such as assaults on drivers or external forces, such as attacks on the vehicle or collisions). In this regard it is the BCC's responsibility to:

- attempt to understand all potential emergencies; and
- ensure suitable controls are in place to effectively manage the risk.

231. The 28 October event has clearly identified that a fire on a bus presents a serious risk to passengers and that the ability to safely exit in such circumstances is a key control to minimising the risk of injury. The challenges of exiting the bus experienced by passengers during this incident gives rise to questions about the adequacy of controls in place for emergency. Furthermore, the exploration of issues in this report highlight the potential need for passengers to exit a bus in other circumstances, such as an assault on a driver or another passenger/s, and the possibility that the aggressor's position on the bus may impede safe exit by passengers.

232. Considerations for emergency management should take into account the design of the bus as well as issues such as signage and communication/education strategies (such as those canvased below in question 16).

Conclusion for Q15a

233. A review involving the identification of situations that may give rise for passengers to exit a bus should be undertaken and the adequacy of controls for such emergencies should be conducted.

234. However, from that experienced at the time of the incident on 28 October, 2016, there is an opportunity to improve and modify emergency evacuation provisions for passengers on BCC buses, particularly with respect to reviewing alternate means of escape from the back half of the bus, as well as clearer directions, signage and communication. (See Recommendation 2 and 3 within the *Summary Conclusions & Recommendations* and *Executive Summary* of this report)

Consideration for Q15(b)

235. Vehicles newly manufactured in Australia or imported as new are subject to the Australian Design Rules (ADR), which are national standards for vehicle safety, anti-theft and emissions.

236. *Vehicle Standard (Australian Design Rule 44/02 – Specific Purpose Vehicle Requirements) 2006* ('ADR 44/02) applied to the category of 'Heavy omnibus' (ADR category code ME) from 1 July 1993. Section 44.9 of ADR 44/02 deals with emergency exits on omnibuses.

237. The Queensland Code of Practice - Vehicle Modifications July 2006 also sets out requirements relating to emergency exits. However, the Code clearly states that it is intended to supplement recommendations of the original vehicle manufacturer with respect to vehicle modification techniques or standards and provide guidelines where vehicle manufacturer's specifications do not exist. The Code is clear in it's advice that modifications must remain compliant with the requirements of the ADRs and original vehicle manufacturer specifications.

238. ADR 68 Occupant protection in buses deals only with the protection of the public on impact (focusing on the provision of seatbelts). This ADR supersedes the requirements for seat strength, seat anchorage strength and padding in omnibuses that was previously dealt with in ADR 66.

239. Elements of ADR 44 were addressed in the former ADR 66.

240. Section 44.9 of the ADR provides a degree of flexibility on the:

- type of exits that may be used; and
- siting of the emergency exits.

241. However, section 44.9 of the ADR provides direction on the following:

- the number of emergency 'exits' that must be installed;
- the minimum dimension for exits;

- technical conditions associated with the three types of emergency exits (doors, windows and escape hatches);
- the markings required for emergency exits;
- the requirements for internal signs about the exits;
- the requirements of emergency controls for exits;
- requirements for posting of instructions about operating emergency exits;
- the requirements for ensuring access to emergency doors; and
- the requirements associated with the construction of the doors and their operation.

** Refer to Attachment 2 in Appendix 1 for the specific details of ADR 44.9.*

242. The extent to which these requirements will apply will depend on the date of manufacture/import of the bus and the extent to which the State regulated such requirements prior to the Australian Government taking jurisdiction over vehicle standards in July 1989.

243. It is worth noting that the establishment of these Design Rules were in part triggered by the Kempsey bus crash of 22 December 1989 in which two coaches collided on the Pacific Highway killing 35 people and injuring another 41. The coroner investigating the matter made recommendations relating to coach seats, seat anchorages, seatbelts and emergency exits. It is understood those relating to emergency exits were in response to the difficulty rescuers experienced in entering the wreckage due to the exits being positioned 2.4m above ground level.

244. The Australian Design Rules have been developed within a policy framework of harmonisation with United Nations Economic Commission for Europe (UNECE) regulations. It is understood the Rules are under review. The outcome of any review must be fed into the more fulsome reviews recommended by this report at Recommendations 1 and 2.

245. The useability of different types of emergency exits for differing 'accident' scenarios has been the subject of review by the United Nations Economic Commission of Europe through the Regulation 107 Informal Working Group on Service Doors, Windows and Emergency Exits of buses and Coach in as recent as 2011. The issue of the value of particular exits has principally been led by the work of Dr Matyas Matolcsy (Hungary), who has challenged the appropriateness of the related regulations in light of research on the emergency exits deployed in accident situations since the initial regulations were created. Dr Matolcsy focuses on evacuation and escape as means of leaving a bus but not rescue (occupants taken out by skilled, outside help after a severe accident).

246. Matolcsy (2009) recognises two particular areas that require particular consideration when looking at potential improvements to the requirements of emergency exits on buses:

- rollover - recognising the bus may land on either side, on its roof or on its wheels; and
- fire in the bus, considering different fire initiation locations.

247. The area of fire is recognised due to the time limitation for successful evacuation or escape. The generation of smoke, poisoning gases and heat are all identified as potential factors that may block evacuation/escape. Matolcsy references the results of fire tests undertaken on buses in Hungary, which indicate that the available time for evacuation was in the range of 200-300 seconds, with gas and smoke concentrations creating the most threat to life.

248. Matolcsy reports that a side emergency window is a very useful exit in the case of low floor buses and that in a useability scale, of unusable, very weak, weak, acceptable, good, very good, an emergency exit should be considered 'good' for accident situations in which a bus is standing on its wheels. However, in his more global recommendations on future regulation of emergency exits on buses and coaches, Matolcsy advocates that emergency side exits not be counted in the 'required' emergency exits (i.e. they may be installed as an optional additional exit) asserting that the rear window and windscreen offer a stronger 'usability' for all 'accident' scenarios.

249. From the minutes, it appears that Matolcsy's position on side emergency exits does not have international acceptance on the UNECE Regulation 107 Informal Working Group. Furthermore, no publicly available policy papers have been identified that indicate any discussion on a move away from the current Australian Design Rules, with respect to emergency exits.

250. The design requirements with respect to emergency exits for buses in Australia provide a degree of flexibility. The BCC has reported that there are currently 11 bus models in use in Brisbane (manufactured by MAN, Scania and Volvo with bodies built primarily by Volgren). The extent to which the BCC has considered all potential accident scenarios in terms of its specification of emergency exits in these buses is not known and has not been investigated for the purposes of this report.

Conclusion for Q15b

251. A review of the learnings from the evacuation/escape of passengers on the bus associated with the 28 October 2016 event and current national and international considerations on the suitability and operation of emergency exits should be undertaken with a view to assessing the suitability of specifications for future bus design and actions needed to address the current fleet of buses given the new information and changed circumstances arising from the incident.

Q16 Should there be education training for passengers on how to deal with emergency situations?

Consideration

252. The literature review conducted with respect to this enquiry and report did not identify any examples of passenger education or training on emergency situations (other than the example of an attack alarm incorporating a synthesised voice instruction to call police because the bus is under attack). However, Moore (2010) did explore the implementation and results from *The Considerate Traveller Campaign* delivered by Transport for London, which aimed to promote the values of reciprocity, respect and tolerance by placing a 'space' between crime and low level anti-social behaviour.

253. On similar lines, Lincoln and Gregory (2015) has identified the need for greater emphasis on educating the public about the rights of drivers and the consequences that violence and abuse can have for both the perpetrator and the drivers.

254. The circumstances that arose in the 28 October event gives reasonable grounds to conclude that better educated passengers would minimise risk to the passengers, for example, by being able to effectively make an escape from the bus. Furthermore, education of passengers to be alert to the signs of potential emergencies that may arise because of driver and passenger interaction and advice on responding would likely be of benefit. Although it is also recognised that the former version of signage and information was not as effective as it could and should be for passengers seeking to evacuate in an emergency situation (I am informed by the BCC that the former signage and information has been replaced).

255. The means of delivering such education/training would need careful consideration as the literature does identify that the quantity and 'frame' of messaging has an impact on a person's response (Jenkin (2006)). Models of such delivery should be sought out and advice on evaluation obtained wherever possible before they are pursued – models should not be limited to the public transport domain. It is noted however, that on other transport systems throughout Australia there are examples of information to passengers being streamed on a continuous basis, such as illuminated digital message boards and/or audible announcements/messages, on Sydney Trains and the Gold Coast Light Rail for example. Another example is info messages in amongst 'infotainment' on television/video screens within public transport vehicles, such as the MTR in Hong Kong. In some cases, emergency and safety information is constantly streaming to passengers in transit.

Conclusion

256. The delivery of training for passengers on how to deal with emergency situations may deliver health and safety risk minimisation if it is suitably designed and delivered, particularly where state of art technology and solutions are employed, such as streaming video etc. However, it should not be considered in isolation or given greater emphasis than consideration to the situations that could give rise to emergencies and the effectiveness of existing controls to manage such emergencies.

257. I am informed by the BCC that better information and instructional signage (decals) has been placed in BCC buses in regards to emergency evacuation, including effective and quick activation of emergency door release and opening for exiting the bus.

Q17. Should there be a general review of the safety of buses?

Consideration

258. Questions about the design of buses has arisen in answering a number of the questions presented. Some go to the design impacting the driver (position in the context of potential aggressors and potential for persons to assault a driver on exiting the front door of a bus) but it is pertinent to note that the 28 October incident has raised cause for concern about the ability for passengers to quickly and safely exit a bus in which occupation is no longer safe.

259. The potential for external missiles to impact bus safety has also been identified when answering the questions.

260. The delivery of the bus service and the safety of drivers is somewhat entwined. Perceptions of the community about the acceptable treatment of bus drivers will also influence safety 'on' buses and more physical controls will direct the safety 'of' buses. Both aspects are considered equally important in terms of the persons being protected.

Conclusion

261. It is believed that a review of bus safety would be beneficial to ensure the BCC has a full understanding of the health and safety risks, applicable to both the drivers and passengers, which arise from the delivery of the bus service.

Q18. Is there any training that would assist drivers to be better prepared for this type of situation?

Consideration

262. The UK Health and Safety Executive (HSE) case study highlighted earlier, identifies that the delivery of driver training was a key strategy in their attempts to overcome the risk of driver injury from occupational violence. The specific points addressed are outlined in Topic 1 of Attachment 1 of Appendix 1. The approach appears to try and embed a combination of risk communication strategies, aggression management and safety controls selected to minimise the risk of exposure to risk. Unlike other controls, the control of driver training was not seen to have any particular disadvantages.

263. This approach is also canvased by Lincoln and Gregory (2015) whereby they identify that there is a need for a greater emphasis on educating drivers (and the public) about the rights of drivers and the consequences that violence and abuse can have for both the perpetrator and the drivers.

264. Weiser Easteal and Wilson (1991) also identified that training has been used as a means of minimising exposure to risk with driver training incorporating information on ways that employees can defuse potentially aggressive interactions, specifically Paris drivers gained insight into the types of passengers likely to be carried and used role-playing and transactional analysis to increase awareness and skills in managing interactions.

265. The published literature is bountiful in its recognition of the:

- importance of driver ability to manage difficult customers; and
- role that a driver's response can play in the potential escalation or otherwise of an interaction.

Conclusion

266. Whilst training is a low order control, there is no doubt it can be a very powerful control if it has been suitably designed to the training objectives and the characteristics of the intended audience. The UK HSE case study would be a useful starting point for the development of a suitable training course for drivers.

267. Whilst it is understood and acknowledged to be a broader question to the specific circumstances relating the attack on Mr Manmeet Sharma, it ought to nevertheless be noted that under the circumstances relating to the incident involving him and the perpetrator, no training of the driver could have helped Mr Manmeet Sharma in that instance.

268. Furthermore, if, as part of the recommended review process, the BCC makes the determination that partitioning or encapsulation of drivers on its buses is not the preferred approach to

protecting drivers from potential attacks, training will be an essential element and factor in other alternative control measures being effective.

7.0 SUMMARY CONCLUSIONS & RECOMMENDATIONS

269. [redacted]

270. [redacted]

271. The BCC's inability to know the intent of the perpetrator and the limitations of preventative measures in discouraging the crime from being carried out suggest that there was no action the BCC could have reasonably been expected to have taken to prevent 'an' incident such as what happened from occurring.

272. However, the occurrence and publication of this incident gives rise to an increased risk of a repeat and future occurrence by others copycatting and thereby raising the BCC's allocation of likelihood of risk, as per the BCC's risk procedures.

273. BCC's current controls should be reviewed in light of the new information that has arisen from the inquiries into this incident and that are consequently raised in this Report, particularly in relation to the:

    a. protection and safety of the driver and all BCC bus drivers from personal attack; and
    b. safe and effective means of evacuation for passengers on BCC buses in the event of an emergency.

274. There are opportunities for improvement in both of these areas. These are further detailed below. These opportunities should be reviewed and considered by BCC and an implementation plan adopted that takes account of the nominated priorities.

275. As the incident was an isolated and rare event, any changes to controls (other than as identified at Recommendation 3 (i to iii), which may be undertaken as an interim measure), considered to be required by the BCC, need to be implemented after completion of the assessment processes recommended at Recommendations 1, 2 and 3. The reviews relevant to these recommendations have been allocated a high priority for implementation.

Driver Safety

276. The driver's position and seat on the bus at the time was open to physical contact and potential attack by passengers and others who may board or be on the bus. This is the case for all BCC buses. Drivers are exposed to threats of violence and attack in an unprotected position in the drivers seat of the bus.

277. A potential control measure to improve driver safety that is worthy of further consideration is the installation of an impervious barrier between the driver and passengers. This control must be

considered within the review mentioned in Recommendation 1 to ensure it does not in and of itself introduce further risk.

278. An impervious barrier is one of many ways that may be suitable in managing the risk to driver safety (in isolation or in combination with other ways). Consideration of other controls is equally necessary and would be advised before a determination of this or any control is made. Consideration will also need to be given to available data. One control in isolation will be unlikely to be successful in achieving the BCC's transport safety objectives.

279. A fully enclosed driver's cabin may protect drivers from physical abuse and assault from passengers and others on the bus but must be considered against other hazards that may be introduced by the installation of the barrier, including control measures in place for passenger safety. Further, dependent upon the design characteristics of the encapsulation/enclosure, it may only serve to protect against moderate level attacks and violence. There is merit in also focussing on developing drivers' skill in diffusing and controlling situations that may escalate into physical assault or that have immediately presented physical assault. The introduction of controls for rendering improved external assistance in the event of an assault is also worthy of consideration. Studies on the subject of protection of drivers from threat of violence and attack, available at the time of my inquiry, were not conclusive on the benefits of fully enclosed cabins.

280. Other alternate measures to protective cabins are in use by bus transport authorities, including BCC, through training of drivers to diffuse escalating encounters with irate passengers and others with grievances against a driver, coupled with duress alarms and other means of communication to render assistance.

281. The particular circumstances of the attack and the perpetrator concerned with the Moorooka incident was a very rare, if not unique situation, which would have been very unlikely to have been able to be prevented at the time. However, there are valuable lessons that can be learned from the event, including reflecting upon the overall safety of BCC bus drivers in relation to threat of attack as well as passenger safety in the context of timely and easy evacuation in an emergency situation.

Emergency Evacuation

282. A review involving the identification of situations that may give rise for passengers to exit a bus should be undertaken and the adequacy of controls for such emergencies should be conducted.

283. As a result of the findings of this Report, there is most definitely a need to improve and modify emergency evacuation provisions for passengers on BCC buses, particularly with respect to the means of escape from the back half of the bus, as well as clearer directions, signage and communication.

284. Relative to emergency evacuation for passengers on the bus at the time of the incident, passengers were placed at risk due to the delay in evacuating. At the time of the incident, passengers were unable to open the rear door on the bus and witnesses and bystanders on the street came to their aid.

285. At the time of the incident, passengers were unable to open the rear door on the bus, in which witnesses and bystanders on the street had to came to their aid. The door was nevertheless opened – probably by the action of one of the witnesses (a taxi driver) kicking the door in the right spot and likely negating the opposing forces being exerted on the door by passengers and the other witness, preventing it from opening.

286. The door is not likely to have malfunctioned, but rather, attempts to open it once the emergency door release button had been depressed were counter to the sliding movement and direction required to manually open the door. The door cannot be physically forced opened by hand without the emergency door release button being activated. Therefore, it is not the case and there is no evidence to support the proposition, as has been alleged, that passengers could not see and did not push the button. The button would in all probability have been pushed for the door to release and be opened. Kicking and forcing the door would not have usually been able to defeat or bypass the locking mechanism of the door, without the emergency door release button being pressed.

287. Nevertheless, one of the findings of this report is that the available information and signage for passengers on evacuating the bus requires improvement. This include better and more clear pictogram instructions on what to do and how to open doors once the emergency door release button is pushed as well as ensuring that the decals clearly point to the location of the emergency door release button. I am informed by the BCC that this is being addressed as a priority.

288. While unlikely to have been a major factor with the Moorooka bus incident, there is also an opportunity to improve identification, location and illumination of the emergency door release buttons.

289. Another matter that has become apparent from the incident is the means of evacuation from the back of the bus. In such cases as occurred with the Moorooka incident where there was a threat or danger at the front of the bus and requiring emergency evacuation, there is only one available means of exit – out the rear service door. Whilst the bus has an array of emergency exits and escape, consistent with the Australian Design Rules, these are mainly at the front of the bus or inaccessible unless the bus has rolled over (via roof hatches) and not landed on its roof, i.e. front door and two emergency window exits behind the driver and front door. The one piece of firefighting equipment on the bus (a fire extinguisher) is also positioned at the front door in response to the BCC's assessment that this would be the most likely location of a fire.

290. This matter needs greater assessment, taking into account human factors within the context of formal safety in design and risk assessment processes as recommended at Recommendation 2 in relation to BCC bus design.

291. In relation to the investigations and findings of this Report, the following recommendations are made, albeit little could have been done to save Mr Manmeet Sharma in regards to the circumstances involving his death.

***Recommendation 1**: Conduct a review of BCC's safety in design processes for bus design and ensure that consistent with those processes an adequate design review is undertaken in relation to driver protection measures (Safety in Design Review – Driver Protection).*

As a high priority, a specific and special 'safety in design' process needs to be undertaken. BCC should ensure that a review and analysis for provisions and arrangements necessary to protect drivers on BCC buses is conducted. The review and analysis should include, but not be limited to, identified issues pertaining to threat of violence and attack and the new revised risk level associated with bus transport operations as a consequence of the Moorooka incident, including the question of protected/enclosed driver cabins. The review will include for consideration:

a. a determination of future design requirements for new buses;

b. if new design requirements prove necessary:

    i. a determination of the interim measures, if any, required for the current fleet, such as improved administrative controls (non-engineering/physical changes to driver position); and
    ii. the necessity for retrofitted (redesigned) changes to be installed within the existing bus fleet (which may include a cost benefit analysis).

Post completion of the Safety in Design Review – Driver Protection BCC should review its relevant risk assessments to capture any additional information would change or impact current controls.

Recommendation 2*: Conduct a review of BCC's safety in design processes for bus design and ensure that consistent with those processes an adequate design review is undertaken in relation to bus emergency provisions (Safety in Design Review – Emergency Evacuation).*

As a high priority, a specific and special 'safety in design' process needs to be undertaken. BCC should ensure that a review and analysis for emergency provisions and arrangements on BCC buses is conducted. The review and analysis will include consideration of, including but not be limited to, identified issues pertaining to Moorooka incident and the new revised risk level associated with bus transport operations as a consequence of the incident, such as:

a. fire, explosion and engulfment, including provisions for firefighting equipment, if deemed necessary;
b. emergency exits, including type, nature, location and accessibility and whether that should include windscreen and back window exits; and
c. nature and location of emergency door and exit handles and buttons, in which consideration should also be given to:

    i. human factors, including potential redesign of emergency door manual opening function to be more intuitive;

    ii. fail safe and/or power opening of doors in emergency;

    iii. the means of activation of emergency door release/open, including type, nature, location and accessibility, which out to consist of illuminated buttons;

    iv. determining interim measures that may be required, such as improved signage/decals etc, communication strategy and information dissemination to passengers; and

    v. necessity for retrofitted (redesigned) changes to emergency door release buttons to be installed within the bus fleet (which may include a cost benefit analysis in association with a risk assessment) and if so, priority/timing for installation.

Recommendation 1 and two may be undertaken together.

Post completion of the Safety in Design Review – Emergency Evacuation, BCC should review its relevant risk assessments to capture any additional information that would change or impact current controls.

***Recommendation 3**: Review BCC's current process and conduct an overall risk assessment of the BCC bus transport system.*

As a high priority and to be completed prior to Recommendations 1 and 2, it is recommended that BCC review's its current process/es for risk assessment and then conducts a new risk assessment, of its current bus operations based on the additional information provided in this Report, for industry consultation including with suppliers, manufacturers and designers and from industry reviews. This review will include for consideration, but not be limited to, identified issues pertaining to the Moorooka incident and the new revised risk level associated with bus transport operations as a consequence of the incident such as:

a. additional firefighting controls, eg, provision of additional fire extinguishers. As part of its risk assessment BCC should also review the current number and location of fire extinguishers on buses and any other firefighting controls to determine whether these are appropriate, including taking into consideration any additional hazards which may be created by these further controls;

b. better signage for emergency door openings – pictogram/decal information and instructions to be installed on all BCC buses to clearly demonstrate what to do and how to open doors in an emergency. This includes hand print signs/decals showing where to push and/or pull the door. I am informed that this recommendation has been actioned as a priority;

c. more and easier to see identifying signage for emergency door release buttons – Large and more accurate and prominent signage/decals in relation to the location of emergency door release (opening) buttons need to be installed in all buses. This includes placing such signage/decals at eye level and above where the buttons may be below, but showing the location to be below, or off to the side etc. Further, this should be viewed as an interim measure until a decision is made, based on the further risk assessments, investigation and ongoing industry consultation, on whether any retrofitted changes are required for emergency access button locations. I am informed that this recommendation has been actioned as a priority;

d. additional specific and specialised training for drivers in handling disputes and threats – Evaluate the pilot resilience training and other BCC driver training and develop and deliver an on-going program to all drivers for specific and specialised training for drivers to handle disputes and threats, including additional personal skills in conflict and confrontation avoidance and de-escalation. The programs should then be delivered on a regular basis as refresher training, as well as be incorporated in the new driver training program. A program to monitor the effectiveness of the training program should also be initiated;

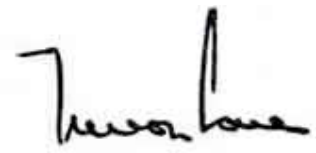
e. promotional and advertising campaign promoting harmony amongst BCC drivers and the public – A means of promoting a more harmonious existence between BCC bus drivers and passengers and the public would likely be beneficial in reducing the threat and risk of violence on BCC buses. This may be just an extension and/or verification of the programs that BCC already has in place with respect to its operational objectives, but as well as this, it should be promoting what to do in any emergency and/or what to do when there are signs of a bus in distress. A community wide campaign may assist with diffusing the rising incidence of anger and aggression posed against bus drivers, much like the campaigns currently in play with respect to emergency services personnel in an effort to curb violence and threats against them. As this is not solely an area of concern for BCC, any campaign should be done in conjunction with other industry stakeholders at state and national level;

f. messaging on buses or other mediums – BCC should consider appropriate means of communication on buses and any resultant risks for instructional messaging and dissemination of information relative to driver and passenger safety, including on emergency provisions and evacuation etc. this could be done in a variety of ways, for example, installation of video screens on buses, posters, YouTube videos, screen messages on buses and so on; and

g. establishing a means of external warning alarms for duress and needing assistance on buses – Whilst it is acknowledged that there are in-bus duress alarms and communications to the NCC and emergency services etc, there is still an issue in relation to the time for a response and assistance to a driver or bus. With this in mind consideration should be given to and investigations made into creating a system of external alarms and warning signals to passersby and motorists etc of a bus in distress and requiring assistance. This could entail utilisation of existing equipment on buses, such as horns, flashing headlight and hazard lights and route message board/sign.

292. This report is prepared as an independent and impartial opinion, in which the opinion contained within, is given independently to assist instructing counsel (Mr Askern) provide advice in the matter. In this regard:

- the factual matters stated in this report are, as far as I am aware, true;
- I have made appropriate enquiries relative to the scope and nature of the request for this expert report;
- the opinions stated in this report are genuine;
- this report contains reference to all matters I consider significant; and
- I understand my duty as an expert to be impartial and I have complied with this duty.



Trevor Love
Adj. Assoc. Professor. (UQ)
FSIA & Life Member, MRMIA, RSP (Aust)
RABQSA Lead OHS Auditor

20 April, 2017

APPENDIX 1- REFERENCE DOCUMENTATION

Attachment 1

Source: Health and Safety Executive

Health and Safety Executive publication of work-related violence case study involving a bus company in the Yorkshire Division identified the deployment of the following successful measures:

1. Drivers undertake training that covers the following techniques and messages:
   Defusion techniques and interpersonal skills:
   - importance of self-control;
   - non-aggression towards customers;
   - assertive communication;
   - acknowledging custom concerns and what they say;
   - using humour to defuse a situation.

   When carrying cash:
   - don't carry it in an obvious cash bag;
   - while driving, do not tell other drivers how much cash has been taken - people might be listening;
   - when depositing money, use well-lit streets – don't take short cuts.

   Liaison with police:
   - the organisations worked with to prevent violence.

   Incident reporting:
   - categorised by type – assaults due to robbery or fare dispute; assaults involving motorists; assaults involving spitting, vandalism and missile throwing.
   - verbal abuse not recorded.
   - figures used to assist detection of assault patterns.

2. Work environment and equipment
   Attack alarms fitted on buses:
   - pressing button in driver's cab activates an alarm and synthesised voice says "This vehicle is under attack: dial 999"
   - loud speaker in the cab points towards the door, so it is loud and frightening to a potential assailant

   Assault screens:
   - fitted in all new buses to separate driver from the public;
   - assault screens are see-through barriers which normally cover the area from the left of the driver to the ticket machine;
   - the screens prevent 'random' punches from the public and are effective if the driver sits back as far as possible in the cab;
   - assailants are at the limit of their reach when trying to hit the driver and are forced to use their left hand (which is normally the weaker) – both factors reducing power of a punch.

   Communications:
   - drivers initially allowed to use their own mobile phones but at time of publication special communications device was being explored for installation in every vehicle – at time radio was nominated as likely;

- radio connects to a central contact point at the depot from which messages can be sent to all drivers.

Digital CCTV installed in some buses – 24-hour cycle recording.

3. Other measures

Safety film:

- Company was considering use of a laminate adhesive high-security safety film on driver cab windows to prevent missiles or shattered glass harming the driver.

Company sick pay scheme:

- Drivers assaulted in the course of their work through no fault of their own entitled to up to six months on full pay.

4. Limitations of the controls:

Attack alarms:

- Some drivers reluctant to use them in certain locations because they attract trouble – conventional alarm activating the horn of the bus was ignored by persons it sought to create alarm for escalation of assistance.

Assault screens:

- Concerns that screens not covering ticket machines are less effective if assailant is determined to reach driver. Such screens since fitted for older buses.
- Full screen fitting from door to front windscreen not fitted because of concern, particularly from trade unions, about reducing drivers' traffic visibility. Also concerns that drivers may act more aggressively if they feel well protected by the assault screen.

Radios:

- Mostly used after an incident;

10. Difficult to get assistance to a driver en route so immediate responses are unlikely.

Driver discretion is needed:

- Hard to enforce strict rules such as 'not leaving cab under any circumstances' due to incidents sometime requiring a driver's involvement and human nature to get involved to help calm a situation.

Company sick pay scheme:

- Helps reduce risk of compensation claims from drivers but can mean less incentive for driver return to work. May affect number '+3 days off work' incidents, which are reported to the Board and the enforcing authority.

5. Company assessment of benefits arising from the measures

- happy staff – indicated through feedback from trade union meetings;
- improved morale – identified through attitude surveys; unsure if helping address staff turnover;
- declining assault rate – illustrated in driver reporting;
- effective police liaison – better relationships and greater police intelligence on bus crime;
- demonstration to others – peer leader in safety focus;
- financial gain – fewer assaults leading to less sickness absence;
- fewer compensation claims.

Knowledge log for BCC fatality incident

Request	Type of Information Supplied/ Obtained	Comment
BCC corporate policies and procedures dealing with angry and/or threatening or violent situations or people	Zero Harm Protocol, 7.2 Occupational Violence Prevention and Management.	Protocol calls for completion of occupational violence hazard identification checklist and completion of a risk assessment (generic) form. The protocol appears directed to non-bus operators with references to barriers that are more relevant to staff working at office based static counters.
BCC Transport and Buses policies and procedures dealing with angry and/or threatening or violent situations or people	Job Analysis: Brisbane Transport: Bus Operator (Nov 2010)	Document references work involving interaction with public to provide customer service as a psychosocial emotive demand. However, the document is directed to a functional task analyses relevant to the inherent physical demands of the job. Therefore, it is not surprising that customer aggression has not been identified as a general risk factor.
	Brisbane Bus Operator HSE Handbook	Handbook doesn't touch on occupational aggression in context of aggression of customer to bus operator
Information on training that is offered and/or has been delivered to BCC staff on dealing with threatening, angry and/or violent situations or people and BCC policies in this regard	Nil	
Information on training that is offered and/or has been delivered to BCC Transport and Buses staff on dealing with threatening, angry and/or violent situations or people and BCC policies in this regard	70 resilience training provided Feb – Oct 16. Further 7 scheduled for March.	Training was aimed at building employee capability to adapt in face of adversity, threats and significant sources of stress.
	Summary of security measures – author unknown (assume it is Brisbane Transport)	Security awareness training provided as part of bus operator induction program.
Contents of induction training for bus drivers	Nil provided	
Safe operating procedures for bus drivers/operations	Nil provided – see above for bus operator job analysis comments	
Documented risk assessments relating to the activities and operations of a bus driver enroute, or in general pertaining to the duties of a bus driver	Brisbane Transport WH&S Risk Register (includes summary of work groups and key activities) – consultation occurred second half of 2016.	Does not identify occupational aggression as a potential risk for bus operators
	BCC Divisional Risk Assessment (Generic) Testing regime of panic and attack switches in	Difficult to appreciate the basis for the risk assessment and rigor of its completion. Leads to conclusion about controls that are not assigned for implementation and not signed off –

Request	Type of Information Supplied/ Obtained	Comment
	buses	despite document having assigned a risk level of high.
Documented plant risk assessments for the bus involved in the incident (type will do – if different for different bus models)	Nil provided	
Documented design criteria and/or process for designing BCC buses	Engineering Management Plan – Bus Fleet Request for New Bus Chassis, Complete Buses and OEM Spare Parts, Part 3 Specifications.	BT advises that OEM is responsible for design. BT defines technical and functional specification to meet operational requirements (which forms part of tender documentation), for example, design of glazing is OEM responsibility but BT nominates factors to be considered such as passenger comfort in Brisbane climate (4.9.1). Process for development of specifications and modification, approval and implementation is stated in Engineering Management Plan. Specification refers to compliance with Australian Design Rules (ADRs).
Documented design criteria for design of bus involved in the Moorooka bus incident	Engineering Management Plan – Bus Fleet	RFP nominates compliance with, in addition other requirements, the ADRs.
	Request for proposal (RFP) – specifications. Contract number A80049-2007/2008	Specifications extend to items such as the glazing film on windows and the emergency exits (side windows and two roof hatches), driver cabin features such as duress alarm foot switch, drivers door with a detachable style security screen or similar and two-way radio installation and door functionality (such as driver control for independent operation of front and rear doors, emergency internal release mechanisms at each door), activation of doors on activation of emergency release button and fire extinguisher that is cabinet mounted and readily accessible by driver.
Testing regimes and verification of emergency systems and functions on buses	Fleet Management Services, Technical Instruction No:0603, Periodic Testing of Front and Rear Doors – Volgren Optimum Buses	Similar instruction for buses other than Volvo B7RLE Optimum buses under development – draft copies available on request. Protocol includes testing of internal emergency exit buttons at a standing position and in motion and testing of external emergency exit buttons.
Documented assessments and/or papers/reports on the protection of bus drivers	Refer above re: job analysis and WHS risk register.	Nil
Details (designs) on the various prototypes trialled and/or considered for encapsulating bus drivers	Photograph of wide screen and narrow screen available for Volgren buses.	No information made available on trials of use – offer to inspect (through Fleet Management Services)
Documented assessments and/or papers/reports on the encapsulation	Nil	

Request	Type of Information Supplied/ Obtained	Comment
and/or protection of bus drivers		
Correspondence or recorded notes pertaining to threat of violence to bus drivers, as well as pertaining to the encapsulation of bus drivers – including union or worker originating concern	Nil	
Details on the means and criteria by which labelling and signs are determined for emergency warnings and information on and or within the bus/es	Fleet management Services. Bus Decal Specification – Volvo B7RLE Optimus.	ADR 44/02 stipules required warning and signage in buses. Document appears in draft (no date nominated). Document states it is intended to standardise placement of decals and stickers across the bus fleet. The document includes placement of emergency related decals.

Attachment 2

Source: *Vehicle Standard (Australian Design Rule 44/02 – Specific Purpose Vehicle Requirements) 2006* ('ADR 44/02)

44.8.3. **Fire Extinguisher**

Motorhomes and '*Caravans*' shall be provided with a fire extinguisher(s) selected and located in accordance with the Australian Standard referred to in clause 44.2.5.

44.9. **EMERGENCY EXITS FOR OMNIBUSES**

Required for MD3, MD4 and ME vehicles designed for more than 16 passengers in addition to the driver and crew.

44.9.0 **Types of Emergency Exit:**

Emergency Door; Emergency Window; and Escape Hatch.

44.9.1. **Number**

44.9.1.1. Every vehicle shall have at least either, one *'Service Door'* and one emergency door, or two separate *'Service Doors'*.

44.9.1.2. The minimum number of emergency exits for each deck or section of a vehicle, or each separate passenger compartment of a rigid vehicle (other than toilet, service areas, etc.) shall be such that the total number in each compartment, deck or section is as follows:

Number of occupants, including the driver & standees for each component deck or section	Number of emergency exits
less than 26	4
26–36	5
greater than 36	6

44.9.1.2.1. Each rigid section of an articulated bus shall be treated as a separate section for the purpose of calculating the minimum number of emergency exits to be provided.

44.9.1.2.2. In the case of a multi-deck vehicle, an articulated or a multi-section vehicle, access between decks or sections may be considered as an emergency exit for each deck or section.

44.9.1.3. Each escape hatch may count only as one of the above mentioned number of emergency exits.

44.9.1.4. If the driver's compartment is not accessible from the inside of vehicle it shall have two emergency exits, both of which shall not be in the same surface; where one of the exits is a window it shall comply with the requirements set out in clause 44.9.4.2 for emergency windows.

44.9.1.5. A *'Service Door'* with an aperture width of at least 600 mm may count as two emergency exits and a emergency window of at least 0.8 m^2 area and with an aperture width of at least 1,000 mm wide may count as two emergency windows.

44.9.1.6. A window may serve as an emergency exit provided that it meets the emergency exit requirements.

44.9.1.7. Every *'Service Door'* shall be capable of being easily opened from inside and from outside the vehicle when the vehicle is stationary (but not necessarily

when the vehicle is moving). However, this requirement shall not be construed as precluding the possibility of locking the door from outside, provided that the door can always be opened from the inside.

44.9.2. **Minimum dimensions**

The three types of emergency exit set out in clause 44.9.0 shall have the following minimum dimensions:

Aperture of emergency door	Height	1,250 mm
	Width	550 mm
Aperture of emergency window		
	Area	0.4 m^2
	Height	500 mm
	Width	600 mm
Aperture of escape hatch		
	Area	0.4 m^2
	Width	500 mm
	Length	600 mm

44.9.3. **Siting of Emergency Exits**

44.9.3.1. Each passenger compartment, deck or section shall have an emergency exit placed in three out of the following surfaces - roof, front face, rear face, *'Right-hand Side'* and *'Left-hand Side'* and, in the case of the top deck of a double deck vehicle, the floor.

44.9.3.2. In the case of a double deck vehicle there shall be an emergency exit in either the front face or rear face of each deck.

44.9.3.3. Where access between decks or sections is used as an emergency exit for each deck or section that access can be considered as one of the required surfaces.

44.9.4. **Technical Conditions**

44.9.4.1. **Emergency doors**

44.9.4.1.1. Emergency doors shall be capable of being easily opened manually from inside and from outside. However, this requirement shall not be construed as precluding the possibility of locking the door from the outside for the purpose of securing the vehicle when unattended, provided that the door can always be opened from the inside by the use of the normal opening mechanism.

44.9.4.1.2. Emergency doors shall not be of the slide-in-cavity type.

44.9.4.1.3. Emergency doors shall not be equipped with a power-operated control system unless they can be readily opened manually.

44.9.4.1.4. The outside handles of emergency doors shall be not more than 1,800 mm above the ground when the vehicle is standing unladen on level ground.

44.9.4.1.5. Emergency doors shall open outwards. Check straps, chains or other restraining devices are permitted, provided that they do not prevent the door from opening to and remaining open at an angle of at least 100 degrees.

44.9.4.1.5.1. The requirement in clause 44.9.4.1.5 is not intended to preclude the use of power operated doors which do not normally open to 100 degrees but which can be made to open to at least 100 degrees by the operation of a device by one single movement

44.9.4.1.6. The internal opening operation of emergency doors which are not also *'Service Door's'* shall include sequential movement of 2 separate devices, with the primary opening device being designed to prevent inadvertent operation.

44.9.4.1.7. If the emergency door is fitted with latches, they shall be of the two-stage type, i.e. they shall have a fully-latched and a secondary position.

44.9.4.1.8. Each emergency door with a bottom edge between 1,000 mm and 2,000 mm above the ground shall have a means to assist the occupants in descending to the ground, such as footrests, with no more than 500 mm between successive footrests with the bottom tread not more than 1,000 mm above the ground. A footrest may be a vehicle component.

44.9.4.1.9. Each emergency door with a bottom edge over 2,000 mm above the ground shall be equipped with self-supporting steps or equivalent to provide safe evacuation of occupants to the ground. The bottom step of the evacuation device shall be no more than 1000 mm above the around.

44.9.4.2. **Emergency windows**

44.9.4.2.1. Each emergency window (which may include the windscreen) shall be capable of operation from both inside and from outside the vehicle and shall:

44.9.4.2.1.1. be equipped with a window-ejecting device and/or

44.9.4.2.1.2. be capable of being easily and instantaneously operated by one adult by means of a device which can be non-destructively tested in-service; and/or

44.9.4.2.1.3. be made of readily-breakable safety glass. In this case, a securely-attached means of breaking the glass shall be provided in close proximity to the emergency window on the inside of the vehicle.

44.9.4.2.2. Emergency windows which can be locked from the outside for the purpose of securing the vehicle when unattended shall be constructed in such a way that they can always be opened from the inside of the vehicle.

44.9.4.2.3. If the emergency window is of a type horizontally hinged at the top edge, an appropriate device shall be provided to hold it open. Emergency windows which open or eject shall do so towards the exterior.

44.9.4.2.4. The height of the lower edge of an emergency window from the level of the floor immediately below it shall be not more than 1,000 mm.

44.9.4.2.5. Each emergency window with a bottom edge between 1,000 mm and 2,000 mm above the ground shall have a means to assist the occupants in descending to the ground, such as footrests, with no more than 500 mm between successive footrests and the bottom tread not more than 1000 mm above the ground. A footrest may be a vehicle component.

44.9.4.2.6. Each emergency window with a bottom edge over 2,000 mm above the ground shall be equipped with self-supporting steps or equivalent to provide safe evacuation of occupants to the ground. The bottom step of the evacuation device shall not be more than 1,000 mm above the ground.

44.9.4.3. **Escape hatches**

44.9.4.3.1. Escape hatches shall be of the sliding or erectable type. A sliding panel shall be acceptable provided that the force required to open it does not exceed 500 N. Hinged hatches allowed if hinged on the leading edge. Every escape hatch

shall operate so as not to obstruct clear access from inside and outside the vehicle.

44.9.4.3.2. Escape hatches shall be capable of being easily opened from the inside and from the outside. However, this requirement shall not be construed as precluding the possibility of locking the escape hatch for the purpose of securing the vehicle when unattended, provided that the escape hatch can always be opened from the inside by the use of the normal opening mechanism.

44.9.4.3.3. Escape hatches shall be located along the longitudinal centre line of the vehicle.

44.9.5. **Marking of Emergency Exits**

44.9.5.1. Each emergency door (other than a *'Service Door')* and each emergency window shall be conspicuously marked in a colour which contrasts with the background by an inscription reading "EMERGENCY EXIT" inside the vehicle in letters at least 25 mm high and outside the vehicle in letters at least 50 mm high.

The marking on the outside of the vehicle shall be on retroreflective material.

Each escape hatch shall be likewise marked inside the vehicle.

44.9.5.2. **Internal signs**

Conspicuous signs indicating the location of all emergency exits shall be visible from the *'Aisle'*. The signs shall:

44.9.5.2.1. include the word "EXIT" in letters at least 25 mm high;

44.9.5.2.2. be red on a white background or vice versa; and

44.9.5.2.3. be permanently illuminated whilst the vehicle is in operation. It shall be either illuminated or *'Self-illuminating'* for at least 15 minutes after the vehicle ceases operation or 15 minutes after loss of battery power.

44.9.5.3. **Marking of controls**

The emergency controls of *'Service Doors'* and of all emergency exits shall be marked in a colour which contrasts with the background and at least 10 mm in size on *'Self-illuminating'* material on the inside and on retroreflective material on the outside of the vehicle either by a representative symbol or by a clearly-worded inscription.

44.9.5.4. **Instructions for operation**

Clear instructions concerning the method of operation shall be placed on *'Self-illuminating'* material inside and on retroreflective material outside the vehicle, on or close to every control of an emergency exit.

44.9.6. **Interior Arrangements**

44.9.6.1. Interior access to emergency doors (see Figure 1)

44.9.6.1.1. The free space between the *'Aisle'* and the emergency door aperture shall permit the free passage to and through the aperture of a vertical cylinder 300 mm in diameter and 700 mm high and supporting a second vertical cylinder 550 mm in diameter, the aggregate height of the assembly being 1,250 mm.

It is permissible for this access to cross a *'Seat'*, wheel arch or similar fixture

and also for the cylinders to be tilted up to 25 degrees from the vertical in order to gain access to the aperture.

44.9.6.1.2. The base of the first cylinder shall be within the projection of the second cylinder.

44.9.6.1.3. Where hinged *'Seats'* are installed alongside this passage, the free space for the cylinder shall be required to be determined when the *'Seat'* is in the position in which it can be used as a *'Seat'*.

44.9.6.2. Interior access to emergency windows and hatches.

44.9.6.2.1. It shall be possible to move a test gauge from the *'Aisle'* to the exterior of the vehicle through every emergency window and hatch

44.9.6.2.2. The direction of motion of the test gauge shall be in the direction in which a passenger evacuating the vehicle would be expected to move.

The test gauge shall be kept perpendicular to that direction of motion.

44.9.6.2.3. The test gauge shall be in the form of a thin plate having a size of 600 mm x 400 mm with corners radiused by 300 mm. However, in the case of an emergency window in the rear face of the vehicle, the test gauge may alternatively have a size of 1,400 mm x 350 mm with the corners radiused by 175 mm.

44.9.6.2.4. If the driver's access door is to be counted as an emergency window, the aperture shall have the minimum dimensions of an emergency window extending from the passenger compartment past the driver's *'Seat'* and the steering assembly to the aperture.

44.9.7. **Construction of Emergency Exits**

All emergency exits shall be so constructed to minimise the probability of their jamming even if the body of the vehicle is distorted by impact.

44.9.8. Provision of Warning Devices for Emergency Exits other than 'Service Door(s)' which are also emergency doors or emergency windows

44.9.8.1. When the engine is started and/or the vehicle is in motion then a warning is given if:

44.9.8.1.1. activation of the primary opening device of an emergency door or the opening/ejection device of an emergency window has occurred;

44.9.8.1.2. an emergency door, emergency window or emergency hatch is locked from the outside; or

44.9.8.1.3. an emergency door or emergency window is not securely closed.

44.9.8.2. The warning device shall give a visible and audible warning at the driver's position.

44.9.8.3. The warning device of an emergency door or emergency window shall be operated by the movement of the door or window catch or other device and not only by the movement of the door or window itself.

APPENDIX 2 - RELEVANT LITERATURE AND OTHER MATERIAL SUPPORTING EXPERT OPINION

- Burrell, Amy (2007), *Violence on and around public transport*, UCL Jill Dando Institute of Crime Science, West Midlands, United Kingdom

- Drug Info, *Facts and resources about alcohol and drugs* (2016), Alcohol and Drug Foundation.

- International Labour Office (2006), *Violence at work*, Geneva.

- Jenkin, Clinton M (2006), *Risk Perception and Terrorism: Applying the Psychometric Paradigm, Homeland Security Affairs, Journal of the NPS Center for Homeland Defense and Security*), Monterey, United States.

- Lincoln, Robyn & Gregory, Adrienne (2015), *Moving Violations: A Study of Incivility and Violence against Urban Bus Drivers in Australia*, International Journal of Education and Social Science, Vol 2, No. 1.

- Lincoln, Robyn & Huntingdon, Yolande (2013), *Driver as flashpoint: Designing out crime in the Australian urban bus transport sector*, Design and Crime Conference, Sydney, New South Wales.

- Matolcsy, M (2009), *New Requirements to the Emergency Exits of Buses*, Scientific Society of Mechanical Engineers, Hungary.

- Moore, Stephen (2010), *Preventing anti-social behaviour on public transport: An alternative route?* Crime Prevention and Community Safety, Vol 12, 3, 176-193, Macmillan Publishers Ltd, United Kingdom.

- Paine, Michael (1995), *Bus Accidents in Australia 1970 – 93, Analysis of Mass Crash Data & Press Clippings*, Vehicle Design & Research Pty Ltd for the National Road Transport Commission, Australia.

- Stanley, Janet Robin (2015), *Prevention of Aggression to Bus Drivers*, Bus Association Victoria Inc, Victoria.

- Swanton, Bruce (1989), *Violence and public contact workers*, Australian Institute of Criminology, Canberra.

- Tse, John L.M.; Flin, Rhona; & Mearns, Kathryn (2006), *Bus driver well-being review: 50 years of research*, Transportation Research Part F, University of Aberdeen, Scotland, United Kingdom.

- United Nations Economic Commission of Europe (2011), *Draft Minutes of the meeting of 2-3 March 2011*, GRSG Informal Group on Service Doors, Windows and Emergency Exits of buses and coaches, Regulation No. 107 (SDWEE-05-06 11 0922), Paris.

- United Nations Economic Commission of Europe (2011), *Draft Report of the meeting of 7-8 September 2011*, GRSG Informal Group on Service Doors, Windows and Emergency Exits of buses and coaches, Regulation No. 107 (SDWEE-06-09 110922), Warsaw.

- United Nations Economic Commission of Europe (2012), *Background information to the problems of emergency exits and ejection of passengers in buses*, GRSG Informal Group on Service Doors, Windows and Emergency Exits of buses and coaches (Informal document GRSG-103-02 103rd CRSG, 2-5 October 2012, Warsaw.

- Weiser Easteal, Patricia & Wilson, Paul (1991), *Preventing Crime on Transport – Rail, Buses, Taxis, Planes*, Australian Institute of Criminology, Canberra.

- Safe Work Australia, *Interpretive Guideline – Model Work Health and Safety Act, The meaning of 'reasonably practicable'*.

APPENDIX 3 – SUMMARY CURRICULUM VITAE IN FIELD OF EXPERTISE FOR TREVOR LOVE

Key Qualifications and Professional Registration

- Adjunct Associate Professor, Faculty of Science, University of Queensland
- Life Member and Fellow of the Safety Institute of Australia
- Member of the College of Fellows, Safety Institute of Australia
- Registered Safety Professional - RSP (Aust.)
- Member of Risk Management Institution of Australasia
- Certified Lead OHS Auditor – RABQSA International
- Bachelor of Applied Science (Cons), QIT
- Member of The Australian Institute of Company Directors

Key Relevant Boards and Committees

- University of Queensland, School of Biomedical Sciences, Faculty of Medicine and Biomedical Sciences, OHSSc Steering Committee (2006 – 2014)
- University of Queensland, School of Geography, Planning & Environmental Management, Faculty of Science, OHSSc Undergraduate Program External Advisory Committee (2015 – present)
- Australian OHS Education Accreditation Board Assessment Panel (2013 – present)
- Federal Safety Officer – Office of the Federal Safety Commissioner, Commonwealth Department of Education, Employment and Workplace Relations (2005-2015)
- Lecturer, OHSSc Undergraduate and Masters Programs, University of Queensland (2011 – present)
- Safety Leadership at Work Expert Reference Group – Qld Office of Industrial Relations, Workplace Health and Safety Queensland (2015 – present)
- RISSB (ASA) Human Factors Standard Development Group (2015 – present)
- Electrical Stakeholder Reference Group - Committee reviewing recommendations of the QLD Coroner for amendments to electrical safety legislation (2003 – 2005)
- State Executive, Safety Institute of Australia (1991 – 2009)
- Member, Federal Council, Safety Institute of Australia (1991 – 1997)
- Director, National Board, Safety Institute of Australia (2000 – 2009)
- Lecturer, Faculty of Built Environment and Engineering, Queensland University of Technology (1987 – 1997)
- Lecturer (Sessional), Faculty of Health Sciences, Queensland University of Technology (1992 – 2010)
- Lecturer (Sessional), Faculty of Health Sciences, University of Queensland (2008 – 2011)
- Qld Master Builders Association, Workplace Health & Safety Industry Committee (1988 – 1998)
- Trustee, Australian Occupational Health and Safety Trust Fund (1998 – 2001)
- Founding Chair of the Quality Society of Australasia, working committee for the National OHS auditor accreditation scheme
- Founding Chair and member of the certifying panel for the Quality Society of Australasia, OHS auditor accreditation scheme

Example Key Professional Experience

- Sydney 2000 Olympic Games – Advisor and Consultant (1999-2000)
- A founding Federal Safety Officer with the Office of the Federal Safety Commissioner, including assisting with policy development and development of guidance material (2006-2015)
- Transport for NSW – Advisor and Consultant (2014-present)
- Industry advisor, including for Master Builders Association and Queensland Resources Council
- Leighton Holdings – Advisor and Consultant for the Board, including development of Corporate Global Minimum Standards – (2011-2013)
- Design safety & failure analysis of major structures and plant, including as a Professional Officer with the

Queensland Division of Occupational Safety (1981-1987) and as a Consultant investigating major incidents, including crane, scaffolding, trench & excavation and formwork collapses and explosions and fires, many involving fatalities (1987-present)

- Expert assisting a Royal Commission – safety related matters within the Building and Construction Industry Inquiry (2000)
- Gold Coast 2018 Commonwealth Games – Advisor and Consultant (2014-present)
- Qantas Airways, Ramp Services – Advisor and Consultant, including equipment safety in design initiatives (1998-2001)
- Expert Witness for defence of an Industrial Manslaughter matter
- Sydney Metro – Advisor and Consultant (2015-present)
- Leighton Contractors – Advisor and Consultant to the Executive Leadership Team, including development and implementation of corporate strategies, such as the 'Safety Essentials' – (2009-2013)
- Barclay Mowlem – Advisor to the Managing Director for conducting a complete corporate wide safety review, both within Australia and Hong Kong (2001)
- Expert Witness for Coronial Inquiries in Qld & NSW
- BP Bulwer Island – plant safety review (1996)
- North West Rail Link Project – WHS auditing and safety reviews, including design and commissioning reviews
- Public Transport Authority (WA) Forrestfield Airport Link – rail safety management & planning, including contract safety specifications, project risk review and transitioning for introduction of ONRSR requirements (2014-present)
- MTR/Leighton Asia – Hong Kong rail projects safety review (2010-2011)
- Pacific National – safety systems development for rail operations division (2011-2012)
- Queensland Rail – auditing and safety review program (1990-1992)
- Olympic Co-ordination Authority, Homebush Bay Infrastructure Project – oversight of construction activities on behalf of the client and NSW Government (1996-1999)
- Olympic Roads & Transport Authority – public safety and operational safety review of buses, roads & rail (1999-2000)
- Sydney Airports Corporation – coordination and review of construction activities airport interface at Sydney International Airport for airport rail link (1999)
- Queensland Rail – drivers stress and fatigue review (2001)
- Numerous NSW & Qld Electricity industry safety reviews, including for generators, distributors and transmission (2002-present)

Expert witness for numerous WHS related prosecution matters and civil liability matters for persons injured (in Qld, NSW & WA mainly), including workers and members of the public.

General Background

Trevor Love has 36 years experience as an Occupational Health and Safety professional, and is the Principal Partner of AusSafe Consulting. Prior to founding the firm, he had 7 years experience in a cadetship with the Queensland Government, Division of Occupational Safety, primarily as a Professional Officer in the Design Checking Section (design engineering analysis and review, failure analysis and method of work analysis). This has given him a highly developed knowledge of failure mode analysis and structural engineering analysis within the field of safety and risk and incident investigation.

Trevor's credentials as a safety professional include being recognised as a Life Member and Fellow of the Safety Institute of Australia. He is a former Federal Vice-President, State President, Queensland & Northern Territory Senior Vice-President and a National Director of the Safety Institute of Australia. He is also a Member of the Australian Institute of Company Directors and a Member of the Risk Management Institution of Australasia, as well as a Certified Lead Health & Safety Auditor (RABQSA International Register of Certified Safety Auditors). He has been appointed on numerous industry, government and ministerial advisory panels, boards and committees, including as a Member of the Qld Office of Industrial Relations, Workplace Health and Safety Qld, Safety Leadership at Work Expert Reference Group and the Qld Electrical Safety Office, Electrical Stakeholder Reference Group. He has been a Trustee of the Australian Occupational Health and Safety Trust Fund and Founding Chair of the Quality Society of Australasia, (now RABQSA), working committee for the National OHS auditor accreditation scheme and as Founding Chair of the certifying panel for the OHS auditor

accreditation scheme.

He has been a lecturer at the Queensland University of Technology for the Faculty of Health Science in Safety Auditing and Management; as well as for the Faculty of Built Environment and Engineering in a Safety Law and Management subject for 10 years from 1987-97 and as a lecturer for an Engineering (Formwork Design) subject. He has also undertaken Chemistry studies at QUT, as well as engineering safety management for the rail industry. He is currently a sessional lecturer in the OHSSc undergraduate and masters programs at the University of Queensland and is a member of the University of Queensland, OHSSc Undergraduate Program External Advisory Committee and OHSSc Steering Committee. He has held an appointment as Adjunct Associate Professor at the University of Queensland since 2008.

He has been nominated for the Australian Institute of Building 'Sir Manual Hornibrook Medallion' for excellence for his Research Thesis into Safety in the Construction Industry and awarded the first Safety Institute of Australia Medal for Achievement in Occupational Health and Safety. He has appeared as an expert at the Cole Royal Commission into the Building and Construction industry and is only one of three invited experts to be involved with the Royal Commission in addressing recommendations relating to health and safety issues and reforms for the building and construction industry. This led Trevor to be one of a founding group of Federal Safety Officers appointed in 2005 through the enactment of a Federal Safety Commissioner for the Commonwealth, emanating from the Royal Commission.

Trevor has been a participant of the International Symposiums of the ISSA Construction Section on occupational safety and health in the construction industry, including in the formulation of the (2009) "Brussels Declaration" and within his professional practice in the field has undertaken a vast array of work and projects related to health and safety consulting, auditing, coaching and mentoring and expert advice, with many varied and different industries and clients, both in Australia and overseas. He has a particular interest and experience in Transport, Rail, Airports and Ports; Mining and Resources; Oil & Gas; Energy and Utilities; Building and Construction; Electrical; Heavy Engineering, Manufacturing and Plant; Facilities, Building and Property Management; and Public Safety. He holds the position of special advisor for a number of executive leadership teams and management groups of multi-national companies and organisations operating within these fields.

In addition, he has substantial experience as an expert witness and with the investigation of major catastrophic industrial events in Australia, as well as very numerous other incidents that have occurred in industry and the general community relating to the public. His work in this regard has varied, as chief investigator, as crown expert, and to investigating and acting as an expert in coronial inquiries, prosecutions, insurance matters and personal injury claims. Trevor commenced his professional work as a professional officer with the Queensland Government Division of Occupational Safety, before moving into private practice as a consultant in the field. He has exceptional knowledge and experience of safety engineering and management and practices within the Asia Pacific region and every jurisdiction of Australia.

Key Expertise & Experiences

- WHS Due Diligence Reports for Boards and Asset Acquisitions
- Strategic analysis and development of corporate WHS initiatives
- Safety leadership and organisation safety culture reviews and strategy development
- Executive management and Board advisory roles in safety and risk
- Safety leadership mentoring and coaching, including Executive Leadership Programs
- Lead high level failure analysis and design safety reviews, including HAZOPs, process safety and major catastrophic collapses and incident investigations
- Extensive Auditing Experience to various standards including AS 4801, Qld Tri-Safe Auditing Guidelines, NSW Safety Management System Auditing Guidelines and as a Federal Safety Officer on behalf of the Australian Government and Federal Safety Commissioner
- Risk Management Reviews and Assessments for various industries including large scale infrastructure projects and operations
- Safety & Risk Management System review, development and implementation
- Project and organisational risk review and risk register formulation
- Identification and strategy formulation for project and organisational critical risk
- Restricted work system process development and review for high risk work activities, including 'Permit to Work' and isolation procedures

- Work method analysis and safe work method, practices and procedures development
- Safety in design analysis and facilitation
- Plant design review for compliance with minimum OHS standards
- Plant safeguarding reviews
- Rail safety engineering and management systems
- Accident investigation and critical incident analysis
- Expert witness in coronial inquiries, prosecutions and other litigation matters
- Dispute resolution related to OHS matters

Short Courses / Licences

- Chemistry (Chemistry I & Chemistry II - Qld University of Technology)
- Ergonomics (Qld University of Technology)
- Noise and Hearing Conservation (Worksafe Australia)
- Back Pain at Work (Worksafe Australia)
- (Rail) Engineering Safety Management Overview (iESM Hong Kong)
- Level 1 Coaching - Institute of Executive Coaching & Leadership
- Advanced Rigger
- Advanced Scaffolder
- Class 1 Demolisher
- Asbestos Remover
- Dogger
- Hoist Driver
- Explosive Powered Tool Operator
- Project Safety (Div. Occup. Safety)
- Trenching and Excavating (Div. Occup. Safety)

APPENDIX 4 – LETTER OF INSTRUCTIONS AND BRIEF FROM <INSERT>

Documents

1. Job Analysis Brisbane Transport Bus Operator (November 2010).
2. Brisbane City Council Health, Safety and Environment Handbook (2016).
3. Bus operator assaults Draft Report (2016)
4. BT WHS Risk Register.
5. Bus Operator Assaults IMS Data (September 2014 – August 2016).
6. Input to the DTMR Bus Driver Safety Review – Transport for Brisbane.
7. Inspector interaction re Oct 28.
8. Notes from Security Manager.
9. Protocol 7.2 – Occupational Violence Prevention and Management (2016).
10. Risk assessment – panic and attack switches 19082016.
11. Brisbane Transport Engineering Management Plan Bus Fleet (July 2015).
12. Fleet Management Services Technical Instruction No: 0603 Periodic Testing of Front and Rear Doors – Volgren Optimus Buses (July 2016).
13. Fleet Management Services Technical Instruction No: 0859 Bus Decal Specification – Volvo B7RLE Optimus.
14. Design Criteria.
15. Brisbane City Council Request for Proposal Provision of New Buses Specifications.
16. Brisbane City Council Request for Proposal Technical Specifications for Chasis and Body requirements.