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CORONER'S COURT
OF NEW SOUTH WALES

Inquest:	Inquest into the death of Liam Wolf
Hearing dates:	10 to 12 May 2021
Date of findings:	26 May 2021
Place of findings:	Coroner's Court of New South Wales at Lidcombe
Findings of:	Magistrate Derek Lee, Deputy State Coroner
Catchwords:	CORONIAL LAW – cause and manner of death, sudden unexpected cardiac death, Army Recruit Course, Australian Defence Force, Army Recruit Training Centre, Kapooka, Exercise Challenge, Tunnel Obstacle, risk assessment, emergency extraction, delivery of medical treatment, electrocardiogram testing
File number:	2019/126740
Representation:	Ms S Callan SC & Mr A Oakes, Counsel Assisting, instructed by Mr P Armstrong (Crown Solicitor's Office) Mr M Fordham SC for the Australian Defence Force, instructed by Ms J Windsor (Norton Rose Fulbright)

Findings:	PTE Liam Wolf died on 23 April 2019 at St George Hospital, Kogarah NSW 2217. The cause of PTE Wolf's death was an unexpected arrhythmogenic event leading to a fall from height, blunt force head injury and hypoxic cerebral injury. Whilst it is most likely that PTE Wolf had an underlying cardiac predisposition that led to the unexpected arrhythmogenic event, the available evidence does not allow for the precise nature of this predisposition to be identified. PTE Wolf fell whilst negotiating a tunnel obstacle within an obstacle course whilst completing the Exercise Challenge component of the Army Recruit Training Course at Kapooka. PTE Wolf's sudden and unexpected loss of consciousness whilst negotiating the obstacle and resultant fall from height, together with his subsequent cardiac arrest and difficulties associated with delivery of effective cardiopulmonary resuscitation and extraction from the obstacle all contributed to death.
Recommendations:	See Appendix A

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1. Introduction

1.1 In February 2019 Private (**PTE**) Liam Wolf commenced the Army Recruit Course at the Army Recruit Training Centre at Kapooka, near Wagga Wagga. On 19 April 2019 PTE Wolf was in the final stages of his training and, together with his fellow recruits, was completing an obstacle course as part of a final field exercise.

1.2 Whilst climbing up a ladder from an underground tunnel obstacle PTE Wolf suddenly and unexpectedly fell a distance of almost four metres, striking his head in the process. PTE Wolf subsequently became unconscious and went into cardiac arrest. Resuscitation efforts were initiated and emergency services were called. PTE Wolf was eventually extracted from the tunnel and conveyed to hospital. However, despite being in a critical but stable condition, PTE Wolf's prognosis remained poor. PTE Wolf's condition later deteriorated and he was tragically pronounced life extinct on 23 April 2019, having died in honourable service to his nation.

2. Why was an inquest held?

2.1 Under the *Coroners Act 2009* (**the Act**) a Coroner has the responsibility to investigate all reportable deaths. This investigation is conducted primarily so that a Coroner can answer questions that they are required to answer pursuant to the Act, namely: the identity of the person who died, when and where they died, and the cause and the manner of that person's death.

2.2 Certain deaths are reportable to a Coroner. Some examples of reportable deaths are where the cause of a person's death is not due to natural causes, or where the cause or manner of person's death may not immediately be known. In PTE Wolf's case, the circumstances of his fall from the ladder, and any matter which might have contributed to it, were not immediately clear. Further, the fall itself raised the possibility that PTE Wolf's death may not have been entirely due to natural causes. Finally, the subsequent coronial investigation raise questions as to whether any aspect of the Army Recruit Course that PTE Wolf had been undertaking might have contributed to his death. For all of these reasons, an inquest was required to be held.

2.3 In this context it should be recognised at the outset that the operation of the Act, and the coronial process in general, represents an intrusion by the State into what is usually one of the most traumatic events in the lives of family members who have lost a loved one. At such times, it is reasonably expected that families will want to grieve and attempt to cope with their enormous loss in private. That grieving and loss does not diminish significantly over time. Therefore, it should be acknowledged that the coronial process and an inquest by their very nature unfortunately compels a family to re-live distressing memories several years after the trauma experienced as a result of a death, and to do so in a public forum. This is an entirely uncommon, and usually foreign, experience for families who have lost a loved one.

2.4 It should also be recognised that for deaths which result in an inquest being held, the coronial process is often a lengthy one. The impact that such a process has on family members who have

many unanswered questions regarding the circumstances in which a loved one has died cannot be overstated.

2.5 Inquests have a forward-thinking, preventative focus. At the end of many inquests Coroners often exercise a power, provided for by section 82 of the Act, to make recommendations. These recommendations are made to organisations and individuals in order to draw attention to systemic issues that are identified during a coronial investigation, and examined during the course of an inquest. Recommendations in relation to any matter connected with a person's death may be made if a Coroner considers them to be necessary or desirable. Where an inquest is able to identify issues that may potentially adversely impact upon the safety and well-being of the wider community, recommendations are made in the hope that, if implemented after careful consideration, they will reduce the likelihood of other adverse or life-threatening outcomes.

3. Recognition of Private Wolf's life

3.1 Inquests and the coronial process are as much about life as they are about death. A coronial system exists because we, as a community, recognise the fragility of human life and value enormously the preciousness of it. Recognising the impact that a death of a person has, and continues to have, on the family and loved ones of that person can only serve to strengthen the resolve we share as a community to strive to reduce the risk of preventable deaths in the future.

3.2 Understanding the impact that the death of a person has had on their family only comes from knowing something of that person's life and how the loss of that life has affected those who loved that person the most. Therefore it is extremely important to recognise and acknowledge PTE Wolf's life in a brief, but hopefully meaningful, way.

3.3 PTE Wolf[1] was born to his parents, Susan Devine and Nathan Wolf. He had much love for his siblings: his older brother, Isaak, and his younger sister, Alanah. PTE Wolf held much adoration for his brother; indeed, PTE Wolf's first word was, "Isaak". Whilst PTE Wolf was fond of teasing his younger sister, he was also devoted to her and always there for her in any time of need.

3.4 As a child PTE Wolf was athletic and talented at sports. He played soccer in primary school, played rugby league in high school and was an exceptional long-distance runner. PTE Wolf also loved the outdoors and his mother fondly recalls that it was often a challenge for her to get him to come inside their house. PTE Wolf also had an aptitude for mathematics and science, and an innate ability to solve complex equations. He was known to be a thinker and to surprise even his family with the depth of his intelligence.

3.5 PTE Wolf had a competitive nature and was never daunted by the prospect of a true challenge. He enjoyed playing video games and had a dream to own his own motorbike, much to his mother's consternation. Nonetheless, every Christmas PTE Wolf enjoyed the speed, excitement and thrill of fearlessly trail riding with his father.

3.6 Whilst in Year 12 PTE Wolf and his friends decided to join the Army. Together they made a dedicated and impressive effort to improve their strength and fitness in preparation for the recruitment process.

3.7 Shortly before PTE Wolf left to begin Army recruit training his mother describes him as being in the prime of his teenage life and with his enthusiasm at an all-time high. During his recruit training PTE Wolf was known to have excellent weaponry skills and to excel in the field. It is a fitting testament to PTE Wolf that an award has been dedicated in his honour to the recruit who demonstrates the best rifle shot in weapons proficiency training during the Army Recruit Course. Further a memorial plaque has been placed outside the chapel at Kapooka to honour the loss of PTE Wolf. PTE Wolf's family will always treasure the precious keepsake of his journal, which provides an insight into his experience at Kapooka.

[1] At the request of his family, PTE Wolf has been referred to by his Australian Defence Force title and rank during the inquest and in these Findings.

3.8 PTE Wolf's mother describes him as a fighter, a soldier who kept on giving, and a remarkable person who had a brief but amazing and fulfilling life. It is a further testament to PTE Wolf's qualities that one of the legacies that he left behind was the gift of organ donation, selflessly allowing to another person to live and to take such a positive away from an otherwise tragic outcome.

3.9 PTE Wolf was known to have a presence like no other, and to always have an affirmative impact on all those around him, and those he came in contact with. There is no doubt that his memory and legacy will shine bright, and not be easily forgotten. It is truly devastating to know that PTE Wolf's life ended so prematurely and in such unexpected circumstances.

4. Background to the events of 19 April 2019[2]

The Army Recruit Course

4.1 In 2018 PTE Wolf commenced the recruitment process for enlistment in the Australian Army. This process involved a series of aptitude and psychological tests together with a pre-entry fitness assessment. PTE Wolf was eventually successful in this process and enlisted in the Australian Army. As a result, on 5 February 2019 PTE Wolf commenced the Army Recruit Course (**the Recruit Course**) at the Army Recruit Training Centre, located at Blamey Barracks, Kapooka.

4.2 The Recruit Course is a 12-week course. It involves an initial week comprised of administrative tasks, followed by a number of weeks incorporating a range of physical activities (for example, general physical fitness, marching and high ropes activities), with weapons training, first aid training and classroom lessons. The 1st Recruit Training Battalion (**1 RTB**) is responsible for performing the administrative and training functions of the Recruit Course, in order to progress recruits in their Australian Defence Force (**ADF**) career. The Recruit Course culminates in the Exercise Challenge that takes place over the final 10 days.

The Exercise Challenge

4.3 The Australian Army *Exercise Instruction 02/2018 – Exercise Challenge* (**the Exercise Instruction**) provides the following:

> "*[Exercise Challenge]" seeks to reinforce and confirm the combative behaviours as well as courage, respect, initiative and teamwork of the foundation combatant. Further, it is designed to expose [Recruit Course] trainees to a protracted and physically arduous training activity, whereby individual resilience and their commitment to working for the team is tested*".

4.4 The Exercise Challenge consists of a number of scenarios including the following:

(a) A weight loaded walk (**WLW**) from the Camp Blue within the Kapooka Training Area, where recruits carry a combined equipment weight not exceeding 25 kilograms (but do not carry additional/excess rations).

(b) An obstacle course;

(c) A Tactical Field Care Activity;

(d) Marksmanship training at a live fire range; and

(e) A Stretcher Carry, which requires recruit participants to evacuate a casualty while maintaining section security.

[2] Part of this factual background has been drawn from the helpful opening address of Counsel Assisting.

Medical care provided to PTE Wolf

4.5 During the Recruit Course PTE Wolf received medical care at the Kapooka Medical Centre on two occasions prior to 19 April 2019:

(a) On 15th February 2019 (Week Three of the Recruit Course) PTE Wolf presented to the Kapooka Medical Centre with a productive cough, temperature of 39.2 degrees and BP 108/73. He was diagnosed with a viral illness, treated with paracetamol and pseudoephedrine, and remained for observation overnight. The following day PTE Wolf was noted to be afebrile and he reported feeling better. PTE Wolf's mother was contacted by the Kapooka Medical Centre and informed of her son's admission.

(b) On 6 April 2019 (Week Nine of the Recruit Course) PTE Wolf was admitted to the Kapooka Medical Centre at around 9:00pm on a background of vomiting and diarrhoea. His temperature was noted to be 38.5 degrees, with a blood pressure of 115/65. PTE Wolf was diagnosed with a viral illness and treated with paracetamol, Zofran and Gastrostop. He was placed in isolation and his condition monitored.

The following day PTE Wolf's temperature had returned to normal but his blood pressure had dropped to 95/45. He complained of headache, was given additional paracetamol and advised to rest. At around 10:20pm it was noted that PTE Wolf had tolerated good dietary and fluid intake and was no longer experiencing nausea, vomiting or diarrhoea.

PTE Wolf remained under observation until he was discharged at 10:00am on 8 April 2019. His temperature was noted to be 37 degrees and blood pressure 130/70. A Medical Fitness Advice form was issued upon discharge, which stated that PTE Wolf was fit for limited duty for two days, to do physical training at his own pace, and that he was unfit for food handling.

4.6 Following his discharge, PTE Wolf immediately resumed the Recruit Course on 8 April 2019, including physical training, attending the following training sessions:

(a) Perform basic bayonet fighting movements;

(b) Perform basic bayonet fighting combinations;

(c) Assault static targets;

(d) Assaulted multiple targets with the bayonet in complex terrain;

(e) Refurb of the BAC and clean; and

(f) Battle Prep.

4.7 It appears that the instructors in the above training sessions mistakenly understood that PTE Wolf was fit for duty with nil restrictions.

The Exercise Foundation Combatant

4.8 On 9 April 2019, PTE Wolf, together with his fellow recruits, commenced the main effort of the field training component of the Recruit Course, known as the Exercise Foundation Combatant. PTE Wolf was a member of 4 Section of 14 Platoon, Bravo Company, 1 RTB. The Exercise Foundation Combatant is a tactical Field activity designed to practice and consolidate individual and section level skills taught during the Recruit Course.

4.9 At the outset of the Exercise Foundation Combatant component all recruits were issued with ration packs for their daily meals and snacks, together with water available to fill bottles and camel backs. Between 9 April and 11 April 2019 the recruits were housed at Camp Blue. The purpose of Camp Blue is to provide an intermediate training environment between barracks and the field, with areas for platoon sections to confirm, practice and rehearse field activities prior to deploying to the Field Training Area.

4.10 Upon leaving Camp Blue PTE Wolf and his fellow recruits camped in the field for six nights, putting into practice the theory taught in the preceding weeks, including patrolling, field craft, navigation and teamwork. During this period PTE Wolf was assessed as performing to a very good standard and displaying a positive attitude.

Commencement of the Exercise Challenge

4.11 On the evening of 18 April 2019 (Week Ten of the Recruit Course), all recruits, including PTE Wolf, were in bed by 8:00pm with a scheduled wake up time of 4:20am the following morning to commence the Exercise Challenge. Recruits were instructed to eat prior to beginning the Exercise, Challenge, and to carry their own water and rations.

4.12 At around 4:45 AM on 19 April 2019 Captain (**CPT**) John Dunn, the 2IC of 1 RTB and Officer-in-Charge (**OIC**) of the Exercise Challenge, delivered a safety briefing to PTE Wolf and the rest of his cohort. Following this the recruits commenced a five kilometre WLW to the location of the Kapooka Military Area Obstacle Course (**the Obstacle Course**), the next component of the Exercise Challenge.

4.13 PTE Wolf's section commenced the Exercise Challenge at 7:00am and was the last section to do so. As a gunner, PTE Wolf was carrying an F89 Minimi Light Support Weapon, a gas-operated, fully automatic light machine gun. Other recruits in PTE Wolf's section were carrying a F88 Austeyr assault rifle. As the F89 Minimi is a heavier weapon than the F88 Austeyr, PTE Wolf was carrying les weight in his pack so as not to exceed the total weight carrying limit for recruits of 25 kilograms. During the WLW, PTE Wolf was noted to be one of the lead members in the formation, and did not appear to be experiencing any difficulties.

5. The nature and composition of the Obstacle Course and the Tunnel Obstacle

5.1 The Obstacle Course consists of a series of obstacles aligned in two lanes, known as the left-side lane and right-side lane. In practice, only one lane is conducted as a complete activity, with individual obstacles in either lane utilised for teaching and practice purposes. On 19 April 2019 the right-side lane was used for the Obstacle Course. It consisted of a total of 10 obstacles including a balance beam, double rope swing, cargo net and cable crossover.

5.2 The eighth obstacle in the course is an underground tunnel, known as the Tunnel Obstacle. The Tunnel Obstacle is actually comprised of two underground tunnel systems, known as the eastern and western tunnel. During the conduct of the Obstacle Course, each recruit section divides up and navigates both the eastern and western tunnels simultaneously. On 19 April 2019 PTE Wolf and some recruits in his section were using the eastern tunnel. Recruits undertaking the Tunnel Obstacle are required to do the following:

(a) climb down a shaft (**the Entry Shaft**) using a four meter vertical metal ladder fixed to one wall of the shaft in order to reach the tunnel entrance;

(b) navigate through a 25 metre long concrete tunnel, 1500 millimetres in diameter with a dogleg so that the tunnel exit is not immediately visible; and

(c) climb up a shaft (**the Exit Shaft**) using another four meter vertical metal ladder fixed to one wall of the shaft in order to exit the Tunnel Obstacle.

5.3 The ladders located within the Entry Shaft and Exit Shaft consist of 15 corrugated metal rungs. The Entry Shaft and Exit Shaft themselves measure 1500 millimetres by 1500 millimetres.

5.4 Prior to recruits attempting the Obstacle Course, the Tunnel Obstacle is partially filled with water. This water is fed into the Tunnel Obstacle via an outlet in the roof near the Exit Shaft. Due to a moderate incline in the Tunnel Obstacle there is a water depth of about 30 centimetres at the base of the Entry Shaft, and about 20 centimetres at the base of the Exit Shaft. A water overflow drain is located in the wall at the base of the Entrance Shaft. A release valve is located near this overflow drain which can be manually opened in order to drain all the water from the Tunnel Obstacle.

5.5 When completing the Tunnel Obstacle recruits utilise different components of the Tunnel Obstacle in turn. For example, before a recruit begins climbing down the Entry Shaft ladder, the recruit will wait until a verbal cue is received from the recruit ahead of them to indicate that the recruit is off the ladder and about to enter the tunnel. Similarly, after navigating through the tunnel a recruit will wait at the tunnel exit until a similar verbal cue is received from the recruit ahead of them indicating that the recruit has completed climbing the Exit Shaft ladder, before beginning to climb up.

5.6 Following completion of the WLW, and before commencing the Obstacle Course, recruits are given a 10 minute break to drink water, eat food, and go to the toilet. Recruits remove their pack (which is transported to another location within the barracks) but still wear their webbing and carry their weapons whilst completing the Obstacle Course.

5.7 Lieutenant Colonel (**LTCOL**) Roger McMurray, the Commanding Officer of 1 RTB, explained that the purpose of the Obstacle Course "*is to exercise functional military skills and develop physical fitness*". Further, LTCOL McMurray explained that the purpose of the Tunnel Obstacle, and the training outcomes are sought to be achieved as part of the Exercise Challenge, are to exercise motor skills, practice teamwork and cognition by requiring employment of correct technique during a period of physical exertion, and to develop confidence and motor skills associated with agility, balance and coordination.

6. What happened on 19 April 2019?

6.1 Upon completing the WLW and arriving at the Obstacle Course PTE Wolf and other recruits in 4 Section removed their packs in preparation for commencing the Obstacle Course. The recruits took a 10 minute break in order to drink, eat food and go to the toilet.

6.2 The first obstacle of the Obstacle Course was a traverse ropes obstacle. The 4 Section recruit instructor, Corporal (**CPL**) Andrew Wastell, complimented PTE Wolf about the speed in which he negotiated this particular obstacle.

6.3 Following this, PTE Wolf's section negotiated some further obstacles before arriving at the first of three fixed rest positions in the Obstacle Course. CPL Wastell noted that PTE Wolf was tired, but no more so than expected, and showing no difficulties with any of the obstacles. Following a brief rest, PTE Wolf and his section negotiated some further obstacles before arriving at the Tunnel Obstacle. On arrival CPL Wastell checked, and received confirmation that the recruits within 4 Section were ready to begin the Tunnel Obstacle.

6.4 The recruits in 4 Section then began making their way through the Tunnel Obstacle. PTE Gabrielle Worth climbed down the Entry Shaft ladder and entered the tunnel immediately ahead of PTE Wolf. As PTE Worth reached the base of the Entry Shaft she called out, "*Check height, off ladder*", in order to indicate to PTE Wolf that it was safe for him to proceed down the ladder. PTE Worth proceeded through the tunnel and began to climb up the Exit Shaft ladder. Upon reaching the top of the latter, PTE Worth, as instructed, took up a position next to the Exit Shaft and looked down in order to watch PTE Wolf climb up the ladder.

PTE Wolf's fall

6.5 Upon receiving the verbal cue from PTE Worth that she had climbed out of the Exit Shaft, PTE Wolf began climbing up the Exit Shaft ladder. Initially, PTE Worth could not see PTE Wolf's face as he was looking forward whilst climbing. However, as PTE Wolf approached the top of the ladder, PTE Worth was able to see his face and noted that he appeared tired and was climbing the ladder "*slower than usual*". PTE Worth describes PTE Wolf's face as going blank and expressionless, with his eyes wide open but not looking at anything. PTE Worth saw PTE Wolf suddenly let go of the ladder and fall backwards down the Exit Shaft, with his head possibly striking the side wall of the shaft opposite the ladder. PTE Worth saw PTE Wolf fall horizontally onto his back with his weapon on top of him.

6.6 PTE Dario Moran-Arnold was located inside the tunnel exit, waiting for PTE Wolf to reach the top of the ladder and indicate that it was safe for him to proceed. PTE Moran-Arnold saw PTE Wolf fall down the Exit Shaft and land in front of him, and onto his weapon that was slung around his back, with his head striking the concrete floor below the water level. PTE Moran-Arnold saw that PTE Wolf was lying on the ground with his head turned sideways and his face in the water. PTE Moran-Arnold grabbed the strap on the back of PTE Wolf's webbing and pulled him out of the water, partially sitting PTE Wolf up against him. PTE Moran-Arnold saw that whilst PTE Wolf's eyes were open, he was unresponsive. Concerned for the possibility of a spinal injury, PTE Moran-Arnold kept PTE Wolf's head immobile. After approximately 20 seconds, with PTE Wolf remaining unresponsive,

PTE Moran-Arnold saw PTE Wolf take a deep breath and begin to move his arms, and to also attempt to move his head.

6.7 CPL Bobby Wilson, the recruit instructor for another section, was located near the Tunnel Obstacle when he heard PTE Worth scream out following PTE Wolf's fall. CPL Bobby Wilson looked back and saw PTE Wolf holding onto the ladder, but appearing to pass out with his eyes rolling to the back of his head. CPL Bobby Wilson saw PTE Wolf fall off the ladder to the base of the Exit Shaft. In response, CPL Bobby Wilson climbed down the ladder and called out to CPL Presslea Cowan to call Triple Zero. CPL Cowan used her mobile phone to make a call to Triple Zero at about 8:31am. She then moved to the top of the Exit Shaft in order to relay information from persons at the base of the Exit Shaft to the Triple Zero operator.

First Aid and resuscitation efforts

6.8 By this time CPL Bobby Wilson had made his way down the ladder and was providing first aid to PTE Wolf. He noted that PTE Wolf was unresponsive, drifting in and out of consciousness, and making groaning noises. PTE Wolf's weapon was removed and his webbing was cut off. CPL Brad Wilson had also climbed down the ladder by this stage and noted that PTE Wolf had stopped breathing and was showing no signs of a pulse. CPL Bobby Wilson and CPL Brad Wilson commenced cardiopulmonary resuscitation (**CPR**) with PTE Moran-Arnold holding PTE Wolf's head above water. After about five or six compressions PTE Wolf took a breath and he was placed in the recovery position. PTE Wolf was then moved back into the tunnel and onto more level ground to assist with the CPR efforts, whilst his head and neck were kept immobile to prevent possible spinal injury.

6.9 CPL Bobby Wilson noted that PTE Wolf was taking slow and deep breaths. However he then stopped breathing again and became unconscious. CPR was reinitiated and CPL Brad Wilson called out to personnel at the top of the Exit Shaft for an oropharyngeal airway[3] (**OPA**) and a mask to assist with ventilating PTE Wolf. No OPA was available but a mask was provided. However the mask proved to be ineffective as, after becoming wet due to the presence of water, it became difficult to obtain a seal around PTE Wolf's mouth.

6.10 After a period of CPR, PTE Wolf began breathing again and was placed in the recovery position. However a short time later PTE Wolf again stopped breathing and lost consciousness, with CPR recommenced. At some point a stretcher was passed down the Exit Shaft ladder so that PTE Wolf could be placed on it, and out of the water. Over the next approximately 30 minutes PTE Wolf lapsed in and out of consciousness, with CPR commencing again each time he stopped breathing. Other ADF personnel also climbed down into the Exit Shaft in order to assist with the resuscitation efforts, and to ensure that PTE Wolf's head was held out of the water.

Arrival of NSW Ambulance and NSW Fire & Rescue personnel

6.11 NSW Ambulance personnel responded to the Triple Zero call at 8:37am. Paramedics Mitchell Hayes and John Tarrant proceeded from Forest Hill to Kapooka under lights and sirens, arriving at 8:50am. They were escorted from the Blamey Barracks entrance to the Tunnel Obstacle. Paramedic

[3] A medical device used to open or maintain a patient's airway.

Hayes climbed down the Exit Shaft and found that PTE Wolf had no pulse and was not breathing. Paramedic Hayes commenced chest compressions and saw PTE Wolf cough up an amount of fluid from his mouth. Paramedic Hayes called out for some further equipment and used a Yankauer Sucker in order to suction PTE Wolf's airway. Paramedic Hayes noted that a significant amount of fluid came from PTE Wolf's airway.

6.12 Following this, Paramedic Hayes used a bag valve mask in order to ventilate PTE Wolf. CPR was continued until a Fire & Rescue NSW unit arrived on the scene a short time later. A spinal board was lowered down the Exit Shaft and PTE Wolf was placed onto the board. With the assistance of persons present, and ropes attached to the spinal board, PTE Wolf was lifted out of the Exit Shaft and to the surface.

6.13 Once outside the Exit Shaft, PTE Wolf was placed on a stretcher, with resuscitation efforts continuing. PTE Wolf was dried off using towels, and Paramedic Hayes placed defibrillator pads from an automated external defibrillator (**AED**) on PTE Wolf's chest whilst Paramedic Timothy Nulty (who had arrived on scene in a separate NSW Ambulance crew by this time) inserted an OPA. PTE Wolf was found to be in ventricular fibrillation[4] and was given a 200 joules shock at 9:03am. CPR and suctioning continued and more fluid was observed to come out of PTE Wolf's mouth.

6.14 PTE Wolf was then moved into an ambulance where bag valve mask ventilation continued. PTE Wolf was intubated at about 9:10am and cannulated, and subsequently given a dose of adrenaline. Paramedics continued to monitor PTE Wolf's heart rhythm and found him to have pulseless electrical activity[5] (**PEA**). CPR was continued and a further dose of adrenaline was administered.

6.15 At about 9:20am the ambulance containing PTE Wolf left Kapooka and proceeded to Wagga Wagga Base Hospital. At about 9:25am Paramedic Hayes noted that PTE Wolf had achieved a return of spontaneous circulation and so CPR was ceased. PTE Wolf was noted to have an irregular pulse of 80 beats per minute, with a blood pressure of 82/44. His temperature was noted to be 33.4 degrees, with a Glasgow Coma Scale[6] score of three. PTE Wolf was given a further dose of adrenaline before the ambulance arrived at Wagga Wagga Emergency Department at about 9:32am.

Arrival at Wagga Wagga Base Hospital

6.16 Investigations at Wagga Wagga Hospital revealed multiple small subarachnoid haemorrhages, possibly traumatic in nature, and pulmonary contusions. A transthoracic echocardiogram showed non-dilated severe global impairment with a critically low ejection fraction of 10 to 15 percent, consistent with an underlying severe cardiac problem. A decision was made to transfer PTE Wolf to a tertiary trauma centre with a neurosurgical unit. Accordingly, arrangements were made for PTE Wolf to be transferred by air ambulance to St George Hospital in Sydney.

[4] A serious, life-threatening cardiac disturbance that causes an abnormal heart rhythm.
[5] A clinical condition of cardiac arrest where organised cardiac electrical activity is present, without a palpable pulse, leading to loss of cardiac output and interruption of blood supply to the brain.
[6] An objective medical scoring system used to describe the level of consciousness in a person following a traumatic brain injury, and to guide immediate medical care.

Transfer to St George Hospital

6.17 PTE Wolf arrived at St George Hospital shortly after midnight on 20 April 2019. He was intubated and ventilated, and noted to be within normal haemodynamic range off adrenaline. At around 2:30am PTE Wolf was taken to the operating theatre for insertion of an extra ventricular drain in order to relieve elevated intracranial pressure.

6.18 At around 4:00am on 20 April 2019 PTE Wolf remained sedated, with his heart and breathing stabilised. A CT brain scan showed progression of cerebral oedema[7] and it was considered highly likely that PTE Wolf had suffered a hypoxic brain injury, with the extent of injury not yet known.

6.19 A repeat CT brain scan the following day on 21 April 2019 revealed a loss of grey-white differentiation and significant cerebral oedema, consistent with severe cerebral injury. It was noted that intracranial pressure remained high despite maximal medical management. Consideration was given to further surgical intervention (an emergency bifrontal craniotomy) to relieve intracranial pressure. However, following discussion between PTE Wolf's family and treating clinicians from both the intensive care unit and neurosurgical team, a decision was made to not proceed with further surgical intervention. PTE Wolf was subsequently transitioned to an end-of-life care pathway. Following the withdrawal of advanced life support measures, PTE Wolf was pronounced life extinct at 8:49am on 23 April 2019. With the consent of PTE Wolf's family arrangements were made for organ donation.

6.20 At St George Hospital a form was completed by Dr Rohit Paliwal, who opined that the cause of death was "*a possible primary arrhythmic, cardiomyopathy, contribution from [subarachnoid haemorrhage]*".

7. Initial postmortem examination

7.1 A postmortem examination was later performed at the Department of Forensic Medicine in Sydney by Dr Rianie Janse Van Vuuren, forensic pathologist, on 30 April 2019. A postmortem CT scan confirmed the findings from antemortem CT scans. The postmortem examination confirmed bilateral traumatic subarachnoid haemorrhage, together with right middle lobe lung consolidation.

7.2 In her autopsy report dated 8 November 2019 October Dr Van Vuuren opined that the cause of PTE Wolf's death was blunt force head injury.

[7] A life-threatening condition involving swelling of the brain caused by the abnormal accumulation of fluid.

8. What issues did the inquest examine?

8.1 Prior to the commencement of the inquest a list of issues was circulated amongst the sufficiently interested parties, identifying the scope of the inquest and the issues to be considered. That list identified the following issues:

(1) Why did PTE Wolf fall in the Tunnel Obstacle on 19 April 2019 while undertaking the recruit Training Course at Kapooka?

(2) Did PTE Wolf suffer from a pre-existing heart condition? If so:

(a) What was it?

(b) Should it have been identified by the Australian Defence Force during the recruitment process or at the Kapooka Medical Centre during recruit training?

(c) Did it contribute to PTE Wolf's fall on 19 April 2019?

(3) In relation to the Exercise Foundation Combatant and Exercise Challenge, including the Tunnel Obstacle:

(a) Were recruits specially prepared for the Exercise Foundation Combatant and Exercise Challenge?

(b) Were recruits officially monitored for developing medical issues during their progress through the Exercise Foundation Combatant and Exercise Challenge?

(c) Were reasonable safety precautions taken by the ADF in relation to the Tunnel Obstacle, including:

(i) in respect of the risks arising from the presence of water in the Tunnel Obstacle?

(ii) Should safety helmets or other protective equipment have been utilised by recruits negotiating the Tunnel Obstacle?

(4) How effective was first aid and resuscitation attempts conducted by ADF members on 19 April 2019? In this regard:

(a) Were the ADF members adequately trained to provide resuscitation?

(b) Was appropriate equipment available for the purposes of resuscitation?

(c) What impact if any did ingress of water into PTE Wolf's lungs have?

(d) Should PTE Wolf have been removed from the Exit Shaft more quickly, and would this have had an effect on the outcome?

(e) Should PTE Wolf have been conveyed to hospital more quickly and, if so, did the delay have an effect on the outcome?

8.2 Each of the above issues is discussed in detail below. In order to assist with consideration of some of these issues, opinion was sought from the following experts as part of the coronial investigation. Each of the experts provided reports which were included in the brief of evidence, and each expert also gave evidence during the inquest:

(a) Associate Professor Mark Adams, consultant cardiologist; and

(b) Professor Anthony Brown, consultant emergency physician.

8.3 Further, as part of the coronial investigation and in preparation for the inquest, a view was conducted at the Army Recruit Training Centre at Kapooka on 28 April 2021. The Counsel Assisting team, the legal representatives for the ADF, Detective Senior Constable Marc Lawrence (the police officer in charge, together with other police investigators from Wagga Wagga), ADF personnel posted to Blamey Barracks and I all attended the view.

8.4 During the course of the view ADF personnel provided a demonstration of the manner in which the Tunnel Obstacle (and other obstacles in the Obstacle Course) is completed. Further, those in attendance were provided with an opportunity to climb up and down the Exit Shaft and Entry Shaft ladders and negotiate the tunnel. The Tunnel Obstacle was also filled with water to allow for a visualisation of the nature of the tunnel with water present. Finally, as part of the view, those in attendance were taken to Camp Blue so as to gain an appreciation of the staging area prior to recruits undertaking the Exercise Challenge.

9. Did PTE Wolf suffer from a pre-existing heart condition and did it contribute to his fall?

9.1 During the early stages of the police investigation following the events of 19 April 2019 it was initially unclear whether PTE slipped and fell whilst climbing the Exit Shaft ladder, or whether his fall was due to an unexpected medical episode. As to the latter, consideration was given to whether PTE Wolf suffered from a pre-existing heart condition that might have contributed to his fall.

9.2 Investigating police conducted a walkthrough interview with PTE Worth at the site of the Tunnel Obstacle on 24 April 2019. During the course of the interview PTE Worth was asked whether she felt the exit ladder to be slippery when she climbed it on 19 April 2019. In response PTE Worth noted that the ladder was constructed of metal and had water on it, but said that she did not feel that she was "*ever going to slip off it*". PTE Worth went on to state, "*I can guarantee that, watching him, [PTE Wolf] did not slip off the ladder. He blanked out and let go. He did not slip*". This is consistent with both PTE Worth's answers earlier in the walkthrough interview, and with the statement which she provided to Military Police on the afternoon of 19 April 2019. In both the interview and the statement PTE Worth described seeing a blank look on PTE Wolf's face, then seeing his head go back, letting go of his hold of the ladder, and then falling backwards.

9.3 **Conclusions:** The clear and direct observations of PTE Worth, and the contents of her contemporaneous statement made on 19 April 2019, establish that PTE Wolf did not slip and fall whilst climbing up the Exit Shaft ladder. Rather, PTE Worth's observations of PTE Wolf's demeanour immediately prior to the fall, indicate that PTE Wolf experienced a sudden and unexpected medical episode which caused him to fall from the ladder.

9.4 As the available evidence indicated that PTE Wolf had experienced a medical episode on 19 April 2019, most likely cardiac in nature, Associate Professor Adams was asked to consider the description of events provided by PTE Worth, together with other evidence gathered during the coronial investigation. Professor Brown similarly expressed the view that given the suddenness of PTE's Wolf's syncopal episode and resultant fall it is most likely that PTE Wolf experienced a primary cardiac arrhythmia. Associate Professor Adams considered that PTE Worth's description above is suggestive of a sudden loss of consciousness due to lack of cerebral perfusion as a result of low blood pressure or loss of cardiac output.

9.5 Associate Professor Adams explained that many cases of sudden cardiac death in young adults are due to structural disease (such as hypertrophic cardiomyopathy[8]) or anomalous coronary arteries. However, in PTE Wolf's case Associate Professor Adams noted that "*there was no identifiable underlying structural cardiac cause, nor was there any known familial disorder that may have led to sudden cardiac death*". Associate Professor Adams explained that anomalous coronary anatomy would only have been visible on open autopsy, CT angiography or invasive coronary angiography. Associate Professor Adams went on to explain that although anomalous coronary anatomy could not be ruled out, he considered that the "*most likely scenario leading to [PTE Wolf's] death was the*

[8] A genetic condition that causes abnormal thickening of the heart muscle, which may impede normal blood flow out of the heart and cause electrical conduction problems.

occurrence of an unexpected ventricular arrhythmia[9] *leading to his fall and to his fatal hypoxic cerebral injury*". As to the likelihood of ventricular arrhythmia, Associate Professor Adams noted the following:

(a) the events post-fall, of PTE Wolf intermittently losing consciousness and requiring CPR, suggest that he may have had an ongoing arrhythmia, such as ventricular tachycardia;

(b) ventricular fibrillation, which was detected upon the arrival of paramedics at the scene on 19 April 2019, commonly develops after periods of ventricular tachycardia;

(c) electrocardiogram (**ECG**) monitoring at both Wagga Wagga Base Hospital and St George Hospital identified periods of non-sustained ventricular tachycardia, which is further supporting evidence of ventricular tachycardia as a primary event leading to PTE Wolf's cardiac arrest; and

(d) an echocardiogram performed at St George Hospital on 22 April 2019 showed normal left ventricular and right ventricular function with no valvular pathology, thus ruling out dilated or hypertrophic cardiomyopathy, two types of structural disease that can result in sudden cardiac death.

9.6 Having opined that PTE's Wolf's fall was most likely a consequence of a primary arrhythmic cause, Associate Professor Adams went on to note that there are a number of conditions that may cause arrhythmias leading to sudden cardiac death. Some of these conditions include Brugada syndrome[10] and catecholaminergic polymorphic ventricular tachycardia[11] (**CPVT**). Associate Professor Adams explained that diagnosis of Brugada syndrome could only have been confirmed during life with the use of ECG monitoring, and that in a post-mortem setting only genetic testing would be potentially diagnostic (whilst acknowledging that the majority of genes associated with Brugada syndrome remain unrecognised). In this regard, Associate Professor Adams noted that an ECG taken on the morning of 21 April 2019 showed some ST segment elevation[12] in a Saddleback pattern, suggestive of type II Brugada pattern, although not completely fitting the criteria for this diagnosis. Associate Professor Adams also noted that sudden death is often the first sign of CPVT and that it is frequently triggered by strenuous exercise. In this regard, Professor Adams noted that "*given that [PTE Wolf's] cardiac arrest occurred in the setting of fairly intense physical activity it is possible that this acted as a trigger for the occurrence of an arrhythmia*".

9.7 In conclusion, whilst noting that it is impossible to determine the exact cause of the unexpected ventricular arrhythmia that led to PTE Wolf's fall, Associate Professor Adams considered that "*given that a sudden unexpected arrhythmia most likely occurred it is very likely that [PTE Wolf] had an underlying predisposition such as Brugada syndrome or CPVT*". Associate Professor Adams explained that, given the limitations associated with the available clinical information, identification of these potential predispositions is largely based on the fact that they are the most common and well known.

[9] Abnormal heart rhythms that originate in the ventricles, the lower chambers of the heart.
[10] A rare genetic cardiac disorder where electrical activity within the heart is abnormal, increasing the risk of life-threatening abnormal heart rhythms.
[11] A rare, potentially life-threatening genetic cardiac disorder that causes the heart to beat abnormally fast, particularly during exercise.
[12] An electrocardiogram finding where a trace involving a segment of the heart's electrical waves is abnormally high above the baseline.

9.8 It should be noted that postmortem genetic analysis did not assist with determining the nature of any likely underlying predisposition. Associate Professor Adams explained that this is because there were no abnormal genetic findings to suggest an inherited disorder that causes arrhythmias (such as long QT syndrome[13] or Brugada syndrome). However, Associate Professor Adams noted that the absence of such findings does not necessarily exclude this as a diagnosis "*because only a fraction of the genetic mutations responsible for these conditions have so far been identified*".

9.9 **Conclusions:** The available expert evidence establishes that PTE Wolf most likely had a pre-existing heart condition as at 19 April 2019. This pre-existing heart condition caused PTE Wolf to experience a sudden and unexpected arrhythmia whilst climbing up the Exit Shaft ladder on 19 April 2019. This in turn caused the cardiac arrest which PTE Wolf suffered and that led to his fall and to hypoxic encephalopathy. The available evidence does not allow for the nature of the pre-existing heart condition to be precisely identified. However given the common occurrence of both Brugada syndrome and CPVT, it is very likely that PTE Wolf suffered from one of these underlying predispositions.

10. Should PTE Wolf's pre-existing heart condition have been identified by the ADF?

10.1 Having concluded that PTE Wolf most likely had a pre-existing heart condition which caused him to fall on 19 April 2019, the question that arises is whether there was an opportunity for such a condition to be identified either during the ADF recruitment process, or from PTE Wolf's two presentations to the Kapooka Medical Centre during the conduct of the Recruit Course.

10.2 Associate Professor Adams noted that there was nothing in PTE Wolf's medical history to suggest that he had a pre-existing heart condition which might have been detected during his initial recruitment process. Whilst PTE Wolf's sister died shortly after birth with a cardiac rhabdomyoma, which can be associated with arrhythmias, PTE Wolf did not have this condition himself. Further, whilst PTE Wolf was noted to have a cardiac murmur at birth, this was not pathological and a subsequent echocardiogram was normal. Overall, Associate Professor Adams considered that, noting that PTE Wolf's history and examination were unremarkable, PTE Wolf did not have "*any condition that would have been picked up with a more rigorous assessment*".

10.3 As to PTE Wolf's two presentations to the Kapooka Medical Centre prior to 19 April 2019, Associate Professor Adams considered that these presentations were unrelated to a potential underlying cardiac condition. Associate Professor Adams considered the first admission to be due to an upper respiratory tract infection, with the second admission due to possible gastroenteritis. Overall, Associate Professor Adams noted that there were no features of either admission to suggest a cardiac condition such as myocarditis or cardiomyopathy. Indeed, associate Professor Adams noted two matters supportive of such a conclusion:

(a) if PTE Wolf had myocarditis on either of these two presentations it is unlikely that he would have been able to complete the physical activity performed on the days leading up to 19 April 2019; and

[13] A disorder of the heart's electrical system that can cause fast, erratic heartbeats leading to fainting, seizures and, potentially, sudden death.

(b) if PTE Wolf had an underlying myocarditis or cardiomyopathy then the echocardiogram at St George Hospital on 21 April 2019 would likely have been abnormal.

10.4 **Conclusions:** The evidence establishes that there was no opportunity, either during the initial recruitment process or from PTE Wolf's two presentations to the Kapooka Medical Centre prior to 19 April 2019, for his underlying cardiac condition to be identified.

10.5 Although there was no opportunity for the ADF to identify that PTE was suffering from a potentially life threatening underlying cardiac condition, this issue raised a further matter for consideration during the inquest. This matter arises from statistics from the US military, referred to by Associate Professor Adams, which show that sudden cardiac death occurs in recruits at a higher rate compared to athletes. Accordingly, Associate Professor Adams expressed the view that "*given that often military recruits are often [sic] undertaking arduous tasks involving physical exertion probably at a similar level to athletes I think serious consideration should be given to the routine screening of recruits with an ECG*".

10.6 Associate Professor Adams elaborated on this issue during the course of the inquest. He gave evidence that use of an ECG as a screening tool is controversial with varied uptake, both by defence forces and by professional sports teams and organisations. Further, Associate Professor Adams acknowledged three limitations associated with ECG screening :

(a) first, such screening may detect abnormalities that may eventually have little or no clinical significance;

(b) second, such screening may have less utility in a cohort of young and healthy persons, such as might be expected to be found in an Army recruit cohort; and

(c) third, that any potential cost-benefit ratio would be an important matter to consider prior to there being any uptake of such a screening process.

10.7 Notwithstanding the above, Associate Professor Adams gave evidence that it is important to recall that whilst an ECG may not be diagnostic, as a screening tool it may identify clinical signs that warrant further investigation.

10.8 Senior Counsel for the ADF suggested to Associate Professor Adams in evidence that an ECG is point-in-time specific, and therefore of limited utility as a screening tool. This suggestion appears to be based on a response provided by Brigadier Gerald Ryan, Director General Training and Doctrine – Army, to an enquiry made by the Crown Solicitor's Office. In his response, Brigadier Ryan noted that he is not medically qualified, but that his response is "*based on advice from senior medical officers within the ADF. Army takes advice from senior medical clinician's (from surgeons through to mental health experts) to understand health issues when screening potential candidates for enlistment in army*". Further, Brigadier Ryan noted that "*screening tests by definition are not diagnostic and thus are inherently less accurate, generating uncertainty for candidates and doctors*". Brigadier Ryan went on to note that, "*unfortunately the*

electrocardiogram is unable to screen or diagnose all conditions and simply provides a snapshot in time of the electrophysiological activity of the heart. The electrocardiogram is not the optimal test for identifying quiescent cardiac conditions in young people. For young people the optimal test is the echocardiogram which is impractical and expensive as a general population screening tool".

10.9 Associate Professor Adams acknowledged that an ECG might be point in time specific, depending on the nature of the use of the ECG and what clinical symptoms or pathology that the ECG might be used to potentially identify. However, Professor Adams explained that whilst some changes in cardiac pathology might be temporary and therefore missed by an ECG at a particular point in time, other changes in cardiac pathology (such as hypertrophic cardiomyopathy) might be permanent and therefore detectable. Ultimately, Associate Professor Adams invited consideration of potential ECG screening as an extension of the physical examination which potential recruits undertaken during the recruitment process. In both cases the investigations are subjective, occur at particular points in time, and findings from such investigations may subsequently change.

10.10 Senior Counsel for the ADF submitted that the disproportionality between the resources required to establish the use of ECG testing as a screening tool during the recruitment process, and the likelihood of such testing to reveal any potential significant pathology means that there is little utility in implementing such testing. On this basis, Senior Counsel for the ADF also submitted that a recommendation is therefore not necessary or desirable.

10.11 One matter which emerged from the evidence was that Brigadier Ryan's response was provided only shortly before the inquest commenced on 10 May 2021. In evidence, Brigadier Ryan explained that the medical advice which had been sought, and which subsequently formed the basis of much of his response, only occurred on or about 5 May 2021, in the week preceding the inquest. Brigadier Ryan gave evidence that he had not personally sought this advice himself, rather, it had been provided to him by third parties. Further, Brigadier Ryan gave evidence that he was not personally aware of any consideration that the ADF had given to the use of ECG testing as a screening tool for recruits outside the context of the inquest. Despite attempts to do so (which are appreciated) Senior Counsel for the ADF was unable to provide any further information as to the nature and extent of any such consideration by the ADF in this regard. Nonetheless, Brigadier Ryan gave evidence that he was not personally aware of any reluctance or resistance within the ADF to giving such consideration to the use of ECG testing in such a capacity.

10.12 **Conclusions:** It is acknowledged that the use of ECG testing as a screening tool is not without its limitations. However it is clear that the greatest benefit of such testing is that, rather than being diagnostic, it may result in the identification of potential pathology that warrants further investigation. This in turn may potentially prevent the possibility of a sudden and unexpected life threatening cardiac event from occurring.

10.13 Whilst it is evident that the ADF has previously given consideration to the potential use of ECG testing as a screening tool, the nature and extent of this consideration is unclear on the available evidence. The timing of the provision of Brigadier Ryan's statement tends to suggest that only limited consideration has been given to this issue, and only in response to the matter having been raised in general terms by associate Professor Adams. If this is correct, then the available evidence suggests that some further, more detailed consideration is warranted. It would be expected that such an approach would appropriately consider issues such as utility. However, the potential utility or otherwise does not, in any way, preclude the necessity or desirability of a recommendation being made in this regard. Therefore, it is desirable to make the following recommendation.

10.14 **Recommendation 1:** I recommend to the Chief of the Defence Force, Australian Defence Force that consideration be given to the use of electrocardiogram testing as a screening tool to identify cardiac pathology that may potentially place a recruit undertaking the Army Recruit Training Course at risk of an adverse health outcome.

11. Issues in relation to the Exercise Challenge

Were recruits sufficiently prepared?

11.1 At 4:45am on 19 April 2019 CPT Dunn provided a safety briefing to all recruits, Bravo Company staff and platoon commanders observing the Exercise Challenge. This briefing was taken verbatim from the *Safety and Risk Management* section of the Exercise Instruction, and relevantly provides that:

(a) The OIC is to ensure all participants (recruits and platoon staff) are conversant with the medical requirements;

(b) The OIC is to ensure that the medical and CASEVAC plan is adhered to, with activity Exercise Observers Trainers (**OT**) to ensure their respective activities maintain the required medical support;

(c) The OIC Is to monitor environmental considerations such as heat management and ensure that work rest ratios are adhered to;

(d) participants are to have the ability to carry two litres of water, and the OIC is to ensure sufficient water is available to recruits for resupply throughout the conduct of [Exercise Challenge]; and

(e) participants are to consume food prior to the commencement of the activity.

11.2 The Exercise Instruction also relevantly provides that "*all staff conducting, supporting or participating in [Exercise Challenge] are to ensure the exercise is conducted in a safe, efficient and professional manner*".

11.3 Annex F to the Exercise Instruction is a Medical and CASEVAC Plan. It relevantly provides for the following to occur in the event of an injury or incidents during all components of the Exercise Challenge:

(a) the nearest army first aid or staff member is to render immediate first aid to the casualty;

(b) the nearest staff member or OT is to inform the OIC with details of the injury to be provided in a format to ensure clear passage of information;

(c) the OIC is to coordinate evacuation of the casualty and provision of medical aid according to the following priority protocols:

(i) for Priority One (regarded as urgent and life-threatening) and priority two (where life or limb is in serious jeopardy), the OIC is to direct the nearest staff member to the casualty to call 000, a medical response officer (depending on availability) is to be dispatched to the location of the casualty, notify the Kapooka Medical Centre on the medical response phone and all Exercise Challenge activities are to be stopped.

(ii) for Priority Two (defined as minor casualties where neither life nor limb is in serious jeopardy) the OIC is to task the safety vehicle to move to the casualty's location and move the casualty to the Kapooka Medical Centre as required, with Exercise Challenge activities to be stopped if required.

11.4 Apart from reading the relevant provisions of the Exercise Instruction CPT Dunn gave evidence that his briefing as a minimum would also include instructions regarding other matters as needed, such as whether environmental considerations were likely to impact upon the operation of the Exercise Challenge. Further, CPT Dunn gave evidence that following the briefing he took staff aside to explain the terms of the Medical and CASEVAC Plan, and in particular the priority categories described above.

11.5 CPT Dunn also gave evidence that all recruits undertaking the Exercise Challenge had previously completed the Obstacle Course as part of the Recruit Course. In other words, CPT Dunn explained that by 19 April 2019, the recruits had previously:

(a) seen each obstacle in the Obstacle Course;

(b) been provided with instructions from Physical Training Instructors as to the techniques required to complete each obstacle;

(c) been provided with more than one opportunity to complete each obstacle as part of their section, and with their section commander;

(d) been provided with an opportunity to discuss, as a section, strategies on how to approach and complete each obstacle.

11.6 In this regard, the *Army Recruit Training Centre, Physical Training, Lesson Plan PT34, Obstacle Course* (**the Physical Training Lesson Plan**) governs instruction provided to recruits. The objective of the Physical Training Lesson Plan notes that its aim is "*to teach the skills and techniques required for negotiating obstacles in the field or operational environment*". The Physical Training Lesson Plan also provides for a 1:24 instructor-to-student ratio during the conduct of any such lessons. Relevantly, the Physical Training Lesson Plan provides the following for the Tunnel Obstacle:

(a) the weapon carried by a recruit is to be tactically slung;

(b) whilst descending and ascending the ladder in the Entry Shaft and Exit Shaft, a recruit's hands are to be placed on the vertical components of the ladder, with feet on the horizontal rungs;

(c) only one person is to be on the ladder at any time;

(d) a recruit is to call "*Off ladder*" upon entering the tunnel and upon reaching the top of the Exit Shaft.

11.7 Further, CPT Dunn gave evidence that prior to recruits embarking upon the Obstacle Course, it is checked by Physical Training Instructors to ensure that the physical components are serviceable. In this regard, an examination of the Obstacle Course was conducted on 17 April 2019. Following this examination an inspection and maintenance report was completed which identified a number of defects in relation to a number of obstacles. This report also identified the action taken, or to be taken, in order to rectify any defects. Relevantly, no defects were identified in relation to the Tunnel Obstacle.

11.8 More generally, the *Army Standing Instruction (Personnel), Part 8, Chapter 4 – Physical Training* (**the Physical Training Instruction**) provides that "*physical fitness is an essential prerequisite for military service. Therefore the ability of a person to conduct the tasks for which they have been trained under arduous conditions will be more readily achieved by a person who is physically fit… The preparation of personnel for complex military operations requires participation in a structured, graduated and appropriately developed conditioning process. This process should be configured to transform individuals with varying degrees of fitness into functionally fit soldiers capable of performing military activities in extremely unpredictable circumstances*".

11.9 **Conclusions:** It is evident that by 19 April 2019 PTE Wolf and his recruit cohort were sufficiently prepared to undertake the Exercise Challenge, and the Obstacle Course in particular. First, the recruits had been provided with instructions on how to complete each obstacle, together with a number of opportunities to put these instructions into practice on each obstacle. Second, the recruits were provided with an appropriate briefing regarding relevant aspects of the Exercise Instruction. Third, the Exercise Instruction itself documented in clear terms the procedure to be followed in the event of a participant sustaining an injury during completion of the Exercise Challenge. Fourth, the recruits were well rested, hydrated, and provided with sufficient rations prior to the commencement of both the Exercise Challenge and Obstacle Course. Finally, the Exercise Challenge was conducted during the final weeks of the Recruit Course, consistent with the graduated approach to training which was applied to the Recruit Course as a whole. Overall, it cannot be said that any deficiency in the preparation of recruits to undertake the Exercise Challenge and Obstacle Course contributed to the events of 19 April 2019.

Were recruits sufficiently monitored for developing medical issues during their progress through the Exercise Challenge?

11.10 The Exercise Instruction does not, in terms, specifically provide for recruits to be monitored for the development of a medical issue whilst completing the Exercise Challenge in general, or the Obstacle Course in particular. Rather, observation of recruits appears to be focused on their conduct and performance. For example, paragraph [28] of the Exercise Instruction states that the Exercise Challenge "*provides the final opportunity for recruits to demonstrate their understanding of basic, behaviours, field craft and the SKA-B required of a soldier in all the corps environment. This performance is to be closely observed and any recruit not demonstrating the required SKA-B is to have this recorded on their ARC ROA and IET Minute*".

11.11 The Medical Plan annexed to the Exercise Instruction provides that the OIC is required to confirm that activity OTs "*ensure the required medical support for the activity is maintained*". Curiously, the Exercise Instruction makes no mention of this in paragraph [22], which governs the responsibilities of an OT. It only provides that an OT is to "*move and prepare resources for the conduct of the allocated scenario, provide an initial scenario brief to the section commander, provide direction to the section commander when they are approved to commence the scenario, provide direction to the section commander when they are approved to depart and move to the next scenario, and provide observations to Field Training Cell at the conclusion of [Exercise Challenge] for inclusion into the [Exercise Challenge] trend report*".

11.12 As to safety, Chapter 8 of the Physical Training Instruction provides that "*the aim of PT is to develop, assess and maintain an individual's physical capacity to perform the demands of routine and mission specific duties effectively. Any PT activity that resulted in injuries is detrimental to this goal. Commanders must ensure all PT activities are conducted safely and in accordance with the Chief of Army's obligations under Work Health and Safety Act 2011*". Annex 4C of the Physical Training Instruction details a number of safety requirements for the conduct of physical training and provides guidelines for the planning, conduct, supervision and safety aspects related to the outcomes of fitness.

11.13 Relevantly, Annex 4C provides for the following matters:

(a) identification and treatment of risks in accordance with the *Army Standing Instruction Chapter 1 & 2 - Military Risk Management*;

(b) the level of supervision required to conduct physical training activities to ensure that all participants are observed at all times;

(c) physical activities conducted in accordance with a defined lesson plan;

(d) identification of risk factors such as employment restrictions and medication;

(e) environmental factors; and

(f) a level of health support during all physical activities commensurate with the level of risk for the activity.

11.14 In addition, prior to the conduct of all physical training sessions the individual conducting the activity is to provide a Work Health and Safety Policy Statement to all participants. This statement reminds participants that they are to:

(a) provide details of any temporary or permanent employment restrictions (and are to participate only within the limits of such restrictions);

(b) stop and advise the individual conducting the physical training session immediately if they begin to feel unwell; and

(c) advise if they are recovering from a health condition.

11.15 Two matters emerge from the above. First, it can be seen that the relevant procedural documents underlying the conduct of physical training in general, and the Exercise Challenge in particular, were primarily focused on observing recruits to ensure that the training provided was correctly applied in practice. Second, the relevant procedural documents recognised the risk that employment restrictions and adverse health conditions posed to the conduct of physical training.

11.16 However, neither the Exercise Instruction nor the Physical Training Instruction specifically provided for recruits to be monitored for the development of a potential medical condition or adverse health outcome during the conduct of the Exercise Challenge. Instead, this type of monitoring from a medical perspective appears to be an incidental to the monitoring of the conduct and performance of recruits from a physical training competency perspective.

11.17 However, this does not mean that this type of monitoring is necessarily ineffective. Four examples lend support to this view:

(a) First, it is evident that section commanders closely monitored the conduct and performance of recruits within their sections. CPL Wastell noted no physical issues with PTE Wolf during the

Exercise Challenge. Indeed, CPL Wastell recalls PTE Wolf commenting that the task of carrying the F89 Minimi, a heavier weapon, had been easier than he had imagined. Further, prior to arriving at the Tunnel Obstacle on 19 April 2019 CPL Wastell performed a check to see how the recruits in his section were faring, to ensure that they were ready to commence the Tunnel Obstacle. In particular, CPL Wastell noted that PTE Wolf displayed no difficulties in being able to complete the Obstacle Course.

(b) Second, whilst PTE Wolf and other recruits were completing the Obstacle Course on 19 April 2019, they were observed by Physical Training Instructors following the movement of each section through the Obstacle Course, and by senior platoon staff. This is evident by the rapid first aid response provided following PTE Wolf's fall in the Exit Shaft, and in particular by the speed with which first responders such as CPL Bobby Wilson and CPL Brad Wilson entered the Exit Shaft to provide assistance.

(c) Third, when completing the Tunnel Obstacle recruits were instructed to take up a position next to the Exit Shaft after climbing out of it in order to observe the progress of the recruit immediately following. PTE Worth followed these instructions on 19 April 2019 and was able to directly observe PTE Wolf's fall. There is no evidence to suggest that PTE Worth, or any other member of PTE Wolf's section or any Physical Training Instructor, had any earlier opportunity to observe an indication that might have in some way predicted the incident which occurred in the Tunnel Obstacle on 19 April 2019. Indeed, in this regard, PTE Worth gave evidence that she noticed PTE Wolf earlier in the day to be moving through the WLW more slowly than usual and to be more quiet than usual. However, PTE Worth explained that this was only an afterthought that came to her when she reflected back on the events of 19 April 2019.

(d) Fourth, PTE Wolf's condition was appropriately assessed and monitored when he presented, and was subsequently admitted, to the Kapooka Medical Centre on two occasions prior to 19 April 2019. On both occasions appropriate investigations were performed in order to diagnose and treat the presenting complaints, and to ensure that PTE Wolf was medically able to continue with the Recruit Course. Although, as noted above, PTE Wolf returned to the Recruit Course following his second presentation contrary to the terms of his discharge from Kapooka Medical Centre, there is no evidence that this premature resumption of training had any adverse health consequences, or was connected in any way to the events of 19 April 2019.

11.18 **Conclusions:** The Exercise Instruction and the Physical Training Instruction, the two procedural documents underlying the conduct of the Exercise Challenge, did not specifically provide for recruits to be monitored for the development of any medical condition. Rather, the terms of each document were primarily concerned with recruit conduct and performance from a training, rather than medical, perspective. Notwithstanding, it is evident that this approach still provided some degree of effective monitoring for the possibility of a sudden and unexpected medical event occurring. So much is clear from PTE Worth being in a position to directly observe the circumstances preceding PTE Wolf's fall, and the fall itself, and the timeliness of the first aid response by those in and near the Tunnel Obstacle following the fall.

12. Were reasonable safety precautions taken by the ADF in relation to the Tunnel Obstacle?

12.1 The Tunnel Obstacle in its present form was constructed in 2000. As part of the overall conduct of physical training at 1 RTB, a physical training risk assessment was conducted which identified a fall from height as a risk. This risk was identified in relation to high ropes and rappelling activities conducted as part of the Recruit Course, as well as with the Obstacle Course itself. This risk was mitigated through a variety of controls including:

(a) ensuring the serviceability of relevant equipment;

(b) providing a safety briefing to participants prior to any activity;

(c) adopting a graduated approach to the physical training program;

(d) providing recruits with instruction and demonstration of all required exercises/actions;

(e) ensuring that instructor-to-student ratios are commensurate with the level of complexity; and

(f) checking training areas prior to their use.

12.2 As to the instruction and demonstration provided to recruits, and further to [11.5] above, the available evidence indicates that the recruits in PTE Wolf's section had a number of opportunities to use the Obstacle Course, and the Tunnel Obstacle, prior to 19 April 2019. PTE Moran-Arnold gave evidence that his section had undertaken up to 7 trial runs of the Obstacle Course, and at least two trial runs on a less challenging obstacle course, prior to the Exercise Challenge. Similarly, CPL Bobby Wilson gave evidence that prior to the Exercise Challenge, Physical Training Instructors had conducted three training sessions which involved demonstrating the actions required to complete each obstacle, allowing recruits to perform each obstacle at their own pace, and finally allowing each section to work through each obstacle together and collectively strategise, together with their section commander, as how to approach each obstacle.

12.3 Further, there was available at the Army Recruit Training Centre a full-time, dedicated Safety Officer whose role was to review all incidents which occurred during the conduct of the Recruit Course. Since 2014 such incidents, and incidents of near misses, relating to safety issues have been recorded on a database known as Sentinel. In addition, it was the Safety Officer's responsibility to provide LTCOL McMurray with a briefing in relation to any such incidents. LTCOL McMurray gave evidence that the purpose of this briefing is to identify emerging trends or patterns that might warrant further review from a safety perspective. LTCOL McMurray recognised that recruit training is inherently dangerous and that part of his role was to ensure that appropriate mechanisms are in place to make this less so. LTCOL McMurray explained that these mechanisms centred around ensuring that recruits possess the minimum requirements to reach a foundational level of fitness, and ensuring that a graduated approach is taken so as to conduct physical training safely.

12.4 Therefore, the evidence establishes that, as a general proposition, certain safety precautions were taken in relation to the conduct of the Recruit Course and the Obstacle Course. These precautions were focused primarily on ensuring that recruits were provided with the necessary instructions and

equipped with the necessary skills to complete the relevant physical training aspects of the Recruit Course. However, there is no evidence that the ADF as an organisation identified the need for any safety precautions specific to the Tunnel Obstacle.

12.5 Indeed, in evidence, LTCOL McMurray acknowledged that prior to 19 April 2019 no risk assessment had been conducted of the Obstacle Course as whole, nor had any risk assessment been conducted in relation to any individual obstacle, including the Tunnel Obstacle. Further, Brigadier Ryan made the frank concession that the nature of any risk assessment that had been performed in relation to the Recruit Course up to April 2019 did not accord with his understanding of ADF policy in relation to the proper assessment of safety, and any associated risks, in the workplace.

12.6 It should be noted that LTCOL McMurray gave evidence that since April 2019 a risk assessment has now been conducted in relation to each individual obstacle in the Obstacle Course, apart from the Tunnel Obstacle. LTCOL McMurray explained that any such risk assessment has been deferred pending the outcome of the inquest. In this regard, Brigadier Ryan gave evidence in agreement with Counsel Assisting that:

(a) any such risk assessment would be informed by evidence-based practice and research;

(b) it is ADF policy to consider all layers of safety and any associated risks to be mitigated; and

(c) any such risk assessment would include appropriate consideration being given to the presence of water, the mechanism of extraction of any recruit requiring medical treatment, and the use of appropriate personal protection equipment (**PPE**).

12.7 **Conclusions:** The evidence establishes that the ADF did not perform any specific risk assessment of the Obstacle Course or the Tunnel Obstacle prior to 19 April 2019. Instead, the only risk assessment that had been performed was in relation to the general nature of physical training as part of the Recruit Course. Whilst this assessment identified a fall from height as a risk to be mitigated, this assessment was not specific to the unique features and challenges that the Tunnel Obstacle posed in the event of a fall from height, and specifically a fall from either ladder at the Entry Shaft or Exit Shaft.

12.8 Therefore, whilst certain safety precautions had been taken by the ADF in relation to physical training aspects of the Recruit Course, none of these precautions specifically related to the Tunnel Obstacle. The evidence establishes that significant reliance was placed on the fact that in the five years preceding 19 April 2019 no incidents resulting in injury or near misses had been documented involving the Tunnel Obstacle. It is not entirely clear whether this created a false sense of reassurance that a specific risk assessment of the Obstacle Course was unnecessary. However, what is clear is that any appropriate risk assessment of any activity that carries inherent risk, such as the Tunnel Obstacle, requires consideration not only of demonstrated evidence of adverse outcomes, but also the potential for such adverse outcomes to occur. Therefore, it could not be said that as at 19 April 2019 entirely reasonable precautions had been taken by the ADF in relation to the Tunnel Obstacle.

12.9 The evidence establishes that since 19 April 2019 a risk assessment has been conducted of the Obstacle Course, and obstacles within it, with the exception of the Tunnel Obstacle. On this basis Senior Counsel for the ADF submitted that a recommendation in relation to any further risk assessment being conducted is therefore neither necessary nor desirable. Senior Counsel for the ADF submitted that there is no suggestion that such an assessment has not already taken place given the evidence of LTCOL McMurray.

12.10 However, the inquest did not receive any evidence as to the nature and extent of any such risk assessment. Further, the inquest also did not receive any evidence to demonstrate that any such risk assessment was performed using a scientific approach utilising evidence-based practice and research, and specific to the nature of the feature or obstacle being assessed. In these circumstances, it is desirable to make the following recommendation.

12.11 **Recommendation 2:** I recommend to the Chief of the Defence Force, Australian Defence Force that, informed by evidence-based practice and research, consideration be given to conducting a risk assessment of each obstacle used as part of the Obstacle Course during the Army Recruit Training Course in order to: (a) mitigate against the risk of any recruit experiencing a potential adverse health outcome; and (b) identify structural features of the Obstacle Course, and entry and exit points that may hinder or prevent the timely provision of medical treatment to any recruit who has experienced an adverse health outcome.

Use of personal protection equipment

12.12 Helmets are provided to recruits undertaking the Recruit Course in the following two instances:

(a) First, climbing helmets, whilst not part of the soldier combat ensemble, are worn as PPE by recruits whilst undertaking the high ropes course and associated rappelling activities. Such helmets are worn to provide protection to the head from rock fall and collision.

(b) Second, tiered combat helmets are worn during the conduct of standard grenade practice in order to provide ballistic protection, and during the conduct of the Physical Employment Standards Assessment and army combative program, in order to "*emphasise the physical demands and mobility restrictions associated with wearing body armour and helmet*".

12.13 LTCOL McMurray gave evidence that wearing a tiered combat helmet during the conduct of an outdoor obstacle course "*introduces additional risk*". Essentially, LTCOL Murray explained that the tiered combat helmet is designed to provide ballistic protection and not designed to provide protection to the head from "*scrapes, head knocks or clashes*" and does not meet Australian safety standards in that regard. Additionally, LTCOL McMurray noted that the tiered combat helmet is heavy and lacks ventilation, thereby increasing the risk of heat injury during the conduct of physically demanding activities. Finally, LTCOL McMurray sought to explain that "*wearing a helmet or other head guard provides an illusion of safety and can encourage risk-taking activity*". However, LTCOL McMurray acknowledged in evidence that this statement is not based on any specific research or other methodology, but rather on personal experience and the experience of subject matter experts such as Physical Training Instructors with a number of years of experience.

12.14 Senior Counsel for the ADF submitted that the making of any recommendation regarding the use of PPE by recruits during the Recruit Course is neither necessary nor desirable for two reasons: first, the evidence established that there is no causal relationship between the traumatic head injury that PTE Wolf suffered and the eventual outcome; and second, the evidence also established that even if PTE Wolf had been wearing a helmet this would not have made a difference to the eventual outcome.

12.15 The submissions are correct to the extent that the evidence of Professor Brown (discussed in greater detail below) established that:

(a) the traumatic head injury sustained by PTE Wolf was not independently fatal and would, in the ordinary course of events, likely be survivable in isolation; and

(b) Professor Brown was unable to express with any confidence that even if PTE Wolf had been wearing a helmet that this would have made any difference to the eventual outcome.

12.16 However, it is not entirely correct to submit that there is no causal relationship between the traumatic head injury that PTE Wolf suffered and the eventual outcome. This is because Professor Brown gave evidence that the challenge, from a medical treatment perspective, for any person who sustains a head injury, especially from a fall, is that there is an unknown, but quantifiable, risk of neck or cervical spine injury. In these circumstances consideration must be given to immobilisation, or at least support, for the person's head and neck. This in turn creates challenges so far as extraction and transfer to hospital is concerned. In PTE Wolf's case it is evident that the initial concern for possible or cervical spine injury was present, and was a factor in relation to the extraction process. The time taken to extract PTE Wolf from the Tunnel Obstacle (and noting that the evidence establishes that it could not have been done any more quickly) meant that there was a delay in using the AED and achieving the return of spontaneous circulation. Both of these matters were material to the eventual outcome.

12.17 **Conclusions:** Whilst it is not possible to conclude with certainty that personal protection equipment in the form of a helmet might have made a difference to the eventual outcome in PTE Wolf's case, it is evident that it is a relevant consideration to the conduct of physical training as part of the Recruit Course in general. The evidence of LTCOL McMurray established that whilst some consideration has already been given to this issue, that consideration has not been based on an evidence-based practice and research approach. Further, Brigadier Ryan gave evidence that it was his expectation that any appropriate risk assessment as to the extent to which the risk of a fall occurring during the conduct of the Recruit Course would involve consideration of the use of PPE such as helmets. In the circumstances, it is desirable to make the following recommendation.

12.18 **Recommendation 3:** I recommend to the Chief of the Defence Force, Australian Defence Force that, informed by evidence-based practice and research, consideration be given to providing recruits undertaking the Army Recruit Training Course with appropriate personal protection equipment whilst undertaking any physical training in order to mitigate against the risk of any potential adverse health outcome.

Risks arising from the presence of water in the Tunnel Obstacle

12.19 LTCOL Colonel McMurray described the presence of water as adding "*an additional dimension to moving through a confined space, and reinforces that subterranean movement through a tunnel system (such as a sewer) involves moving through water and getting feet/lower limbs wet*". LTCOL McMurray went on to emphasise that "*water is not used as a mechanism to reduce the impact from a fall for any element*" of the Obstacle Course.

12.20 As to the issue of risk assessment, LTCOL McMurray frankly conceded in evidence that he had never considered it to be a "*task or requirement*" to give any consideration to the possible consequences of water being present in the Tunnel Obstacle in the event that a person experienced a medical event whilst negotiating the obstacle. This was, LTCOL McMurray explained, a matter which he had simply never turned his mind to.

12.21 As will be explained in more detail below, the presence of water in the Tunnel Obstacle created a number of unique challenges if a recruit were to experience an adverse health outcome whilst completing the obstacle. In PTE Wolf's case these challenges may be summarised as follows:

(a) the presence of water reduced the effectiveness of CPR as PTE Wolf could not be placed completely supine on the ground to allow for chest compressions to be performed, as his head needed to be kept out of the water;

(b) ingress of water into PTE Wolf's mouth and lungs comprised the ability for him to be effectively ventilated;

(c) the use of an AED to deliver a DC shock was contraindicated until PTE could be removed from the water, extracted from the Tunnel Obstacle and dried off; and

(d) conversely, if water had not been present in the Tunnel Obstacle there would be no reason for an AED not to be used .

12.22 As at May 2021, it is unclear whether the Tunnel Obstacle in its present form will be utilised again as part of the Recruit Course. Any decision on this issue has been deferred pending the outcome of the inquest. The response provided by Brigadier Ryan indicates that whilst there is no current plan to reopen the Tunnel Obstacle, "*if the [Tunnel Obstacle] can be made safe and compliant with current [work health and safety] requirements it will be reopened*". Brigadier Ryan further explained that if the Tunnel Obstacle cannot be made safe then it will not be reopened. Finally, Brigadier Ryan noted that some consideration has been given to such features as a ramp and an aboveground containerised tunnel system to facilitate extraction in the event of an adverse health outcome.

12.23 **Conclusions:** The evidence established that prior to 19 April 2019 no consideration has been given to the presence of water in the Tunnel Obstacle from a safety perspective, and the risks that the presence of water created for medical treatment to be delivered and for a person requiring medical treatment to be extracted from the Tunnel Obstacle, in the event of an adverse health outcome.

12.24 Even without the benefit of hindsight, on any view of the obstacles within the Obstacle Course it is evident that the Tunnel Obstacle is unique in the sense that it is the only obstacle that is both subterranean and contains water as a feature. Having regard to these matters it could not be said that reasonable safety precautions had been taken by ADF regarding the risks arising from water being present in the Tunnel Obstacle in the event of an adverse health outcome. Tragically, this was clearly demonstrated by the events of 19 April 2019.

12.25 The future operation of the Tunnel Obstacle, in its current form or in a modified form, is presently unclear. Senior Counsel for the ADF submitted that it is unnecessary to make any recommendation in relation to the Tunnel Obstacle. This is because Brigadier Ryan in evidence who agreed with each proposition put by Counsel Assisting regarding the appropriate matters to consider as part of a comprehensive risk assessment prior to the reopening of the Tunnel Obstacle. Whilst such an acknowledgement is to be commended, and reflective of an appropriate level of seriousness with which the ADF proposes to approach any risk assessment, this does not obviate the necessity or desirability of a recommendation being made. This is for two reasons: first, the inquest has had the opportunity to closely examine the features of the Tunnel Obstacle, including receiving expert evidence, that adversely impacted upon the delivery of medical treatment to PTE Wolf and his extraction from the Tunnel Obstacle on 19 April 2019; and second, the evidence adduced during the inquest suggests that any previous risk assessment performed by the ADF has not always been informed by appropriate evidence-based practice and research. Therefore, it remains necessary to make the following recommendation

12.26 **Recommendation 4:** I recommend to the Chief of the Defence Force, Australian Defence Force that, in the event that a tunnel obstacle is to be included as part of the Obstacle Course during the Army Recruit Training Course, and informed by evidence-based practice and research, consideration be given to the following matters: (a) installing a mechanism by which, if filled with water, the tunnel obstacle can be drained in a timely manner; (b) providing instruction and training to Obstacle Course participants in relation to the manner in which a tunnel obstacle, if filled with water, is to be drained in the event of a recruit experiencing an adverse health outcome whilst completing the obstacle; (c) installing structural features to allow for a recruit, who has experienced an adverse health outcome whilst completing the obstacle, to be extracted from the obstacle in a timely manner so that effective medical treatment may be provided; (d) installing structural features that allow unhindered access for the delivery of medical treatment to a recruit who has experienced an adverse health outcome whilst completing the obstacle; and (e) ensuring that appropriate equipment is located on site to allow for a recruit, who has experienced an adverse health outcome whilst completing the obstacle, to be extracted from the obstacle in a timely manner, and provided with medical treatment in a timely manner.

13. How effective was first aid and resuscitation attempts on 19 April 2019?

13.1 Consideration of this issue raises a number of sub-issues which will be dealt with in turn below.

Were the ADF members adequately trained to provide resuscitation?

13.2 Professor Brown gave evidence that in the event of a person suffering an out-of-hospital cardiac arrest there are three factors which optimise the chance of survival:

(a) the collapse from the cardiac arrest being witnessed;

(b) immediate bystander CPR being provided; and

(c) where a person is in ventricular fibrillation, an immediate DC shock being delivered.

13.3 Further, Professor Brown explained that whilst a collapse being witnessed and bystander CPR increase the likelihood of survival, the only modality that has been shown to save lives in the event of cardiac arrest is defibrillation – the earlier that defibrillation is delivered, the greater the prospects of survival. Professor Brown also explained that in the event of a person sustaining a serious head injury there is an approximately 7% minimum likelihood of cervical spine or neck injury. In such circumstances caution needs to be exercised in relation to moving a person, which will in turn detract from the quality of CPR.

13.4 In his report Professor Brown opined that the resuscitation attempts by ADF members "*were of an entirely satisfactory standard in what was an extremely difficult situation*". In particular, Professor Brown noted that CPR was immediately commenced, and was performed, as soon as PTE Wolf's pulse was noted to be absent. Further, Professor Brown also noted that each time PTE Wolf appeared to improve he was placed in the recovery position, and each time PTE Wolf's pulse was lost CPR was correctly recommenced. Finally, Professor Brown noted that the use of a defibrillator whilst PTE Wolf was in the tunnel would have been a hazard and contraindicated by the presence of water.

13.5 In this regard, Professor Brown opined that the ADF members correctly waited until PTE Wolf had been extracted from the tunnel and dried down before using the defibrillator. In addition, the defibrillator was correctly used on only one occasion (when ventricular fibrillation was detected), as the ECG monitor subsequently demonstrated a PEA rhythm for which a DC shock is not indicated.

13.6 **Conclusions:** The evidence established that the ADF personnel were adequately trained to provide resuscitation to PTE Wolf. There is no evidence to suggest that any deficiency in first aid or CPR training adversely affected the initial response. Rather, the complications associated with the physical setting in which CPR was being delivered, and PTE's Wolf extraction from such a setting, had the greatest impact upon the delivery of effective and efficient CPR.

Was appropriate equipment available for the purpose of resuscitation?

13.7 Professor Brown noted that basic life support can be provided without complex equipment. In particular, Professor Brown opined that the absence of an OPA was immaterial to PTE Wolf's resuscitation efforts. This is because, Professor Brown explained, it is possible to hold a patient's airway open, and position the head in order to maintain a patent airway, without the need for an OPA.

13.8 As at 19 April 2019, there were three portable AEDs available at the Kapooka Recruit Training Centre, including one at the Kapooka Medical Centre. However, no attempt was made on 19 April 2019 by those ADF personnel present at the Obstacle Course to retrieve any of the available AEDs. Professor Brown was not critical of this and explained that the use of an AED was contraindicated whilst PTE Wolf was still wet. Further, Professor Brown explained that even if only a small amount of surface water was present, it would still be possible to transmit a shock from the AED, thereby posing a danger to the rescuers.

13.9 As at 19 April 2019 there was also a portable spinal board available at the Kapooka Medical Centre. Similarly, no attempt was made by those ADF personnel present at the obstacle course to retrieve it. Again, Professor Brown was not critical of this fact. He explained that the use of a specialised piece of equipment such as a spinal board depends on users of such equipment being appropriately trained. In PTE Wolf's case the available evidence indicates that even if the spinal board had been retrieved, and there were appropriately trained persons present at the Tunnel Obstacle, the extraction of PTE Wolf from the Tunnel Obstacle may not have been achieved any earlier. In this regard, Professor Brown noted that the challenge with use of such a piece of equipment is that it may be rarely, or never, used and that over time persons trained in its use become less confident due to degradation and infrequent use of such skills.

13.10 **Conclusions:** The evidence established that as at 19 April 2019 appropriate equipment was available at the Tunnel Obstacle to allow for adequate resuscitation efforts to be performed. The absence of an oropharyngeal airway did not preclude maintenance of a patent airway and ventilation being delivered. Further, even if an AED and spinal board had been retrieved from the Kapooka Medical Centre, it is not possible to conclude that that PTE Wolf's extraction, and the return of spontaneous circulation, could have been achieved any earlier.

What impact, if any, did ingress of water into PTE Wolf's lungs have?

13.11 Professor Brown considered that the ingress of water was relevant in two respects so far as PTE Wolf's resuscitation was concerned:

(a) First, PTE Wolf needed to be held out of the water in order to prevent ongoing or further aspiration of water, thereby reducing the effectiveness of chest compressions and CPR overall;

(b) Second, and despite the above attempts, a considerable degree of aspiration of water into the lungs still occurred, with the consequent effect of reducing the amount of oxygen able to be absorbed with each breath.

13.12 Overall, Professor Brown indicated that "*it is not possible to say to what extent this soiling of the airway and lungs with water influenced the overall outcome compared to a timely reversal of the primary cardiac arrhythmia, and the presence of a head injury*".

13.13 **Conclusions:** The ingress of water had the combined effect of causing aspiration, thereby impeding the delivery of oxygen and making PTE Wolf's lungs less efficient in absorbing oxygen, and decreasing the effectiveness of the resuscitation efforts as efficient chest compressions cannot be performed. However, the extent to which the ingress of water had any bearing on the eventual outcome is not entirely clear on the available evidence.

Should PTE Wolf have been removed from the exit pit more quickly and would this have had an effect on the outcome?

13.14 Professor Brown considered that if paramedic assistance had been provided to PTE Wolf earlier this would have improved his prospects of survival. This is because where a patient displays ventricular fibrillation then the earlier that a DC shock is delivered, the better the prognosis. Professor Brown noted that there is a roughly 7% to 10% increase in the likelihood of death for every passing minute without successful resuscitation.

13.15 Professor Brown gave evidence that survival after 10 minutes without a pulse is unusual, with an overall likelihood of surviving any out-of-hospital cardiac arrest being less than 10%. In PTE Wolf's case Professor Brown opined that this likelihood was likely less than 1% due to a number of factors:

(a) the difficult access;

(b) difficulty in providing cardiac compressions in a confined space;

(c) the presence of water interfering with resuscitation efforts and causing a degree of aspiration;

(d) the head injury rendering PTE Wolf unconscious;

(e) difficulties in extraction; and

(f) the contraindication to use the defibrillator whilst PTE Wolf was still wet.

13.16 Overall, Professor Brown considered that whilst PTE Wolf's earlier extraction from the Tunnel Obstacle and attendance by paramedics could have potentially made some difference to the outcome, "*it is likely this would have been very small*".

13.17 Further, due to the possibility of PTE Wolf having sustained a neck or cervical spine injury as a consequence of his fall, PTE Wolf needed to be immobilised, or at least have his head and neck supported in a neutral position. Professor Brown explained that this in turn meant that he could not simply be extracted rapidly from the Exit Shaft, and that considerable care needed to be exercised in order to have him extracted on a spinal board due to the risk of potential neck injury.

Ultimately, Professor Brown opined that because the extraction needed to be performed correctly, it was not possible to extract PTE Wolf from the Exit Shaft any earlier.

13.18 One further point should be noted. There was a difference of opinion expressed by Professor Brown and Dr Mary Langcake, the Director of trauma at St George hospital who conducted a review of relevant medical records in order to provide an opinion during the police investigation. Dr Langcake considered that the breathing episodes that caused interruption of the CPR provided in the Tunnel Obstacle was agonal breathing. Dr Langcake explained that if breathing was detected during CPR of a young, fit person, such as PTE Wolf, it would be expected that the breathing and pulse would be sustained. However this was not the case for PTE Wolf. This made Dr Langcake wonder whether the breathing was agonal breathing.

13.19 Professor Brown explained that it was difficult to know whether the breathing observed whilst PTE Wolf was still in the Tunnel Obstacle was agonal breathing, or breathing episodes connected with the return of spontaneous circulation. Ultimately, Professor Brown explained that generally agonal breaths occur in the last few seconds of cardiac arrest and that it is unusual for such breathing to keep recurring. Therefore, Professor Brown's impression was that as PTE Wolf was observed to be breathing again on at least one or two occasions, he considered it to be unlikely that all of these episodes were agonal. Instead, Professor Brown expressed the belief that there were some periods of return of spontaneous circulation.

13.20 Ultimately however, the issue of whether PTE Wolf's breathing whilst in the Tunnel Obstacle was agonal breathing or representative of a return of spontaneous circulation is immaterial to the question of survival. This is because Professor Brown explained that even if a few breaths during the initial stages of CPR represented brief episodes of return of spontaneous circulation, PTE Wolf had still sustained a prolonged period of full cardiac arrest. The evidence indicates that PTE Wolf collapsed at around 8:31am and confirmed return of spontaneous circulation was not achieved until about 9:25am. Professor Brown explained that where cardiac arrest exceeds 10 minutes without pulse and respiration then survivability is well below 10 percent. However if there is ever a period of 54 minutes without sustained return of spontaneous circulation then this is 100 percent fatal and not survivable.

13.21 **Conclusions:** As a general proposition, if PTE Wolf had been extracted from the Tunnel Obstacle more quickly, and an AED used, this might have increased the prospects of his survival. However, due to the need to extract PTE Wolf correctly in order to avoid any potential neck or cervical spine injury it was not possible to perform the extraction in a more timely manner. Further, given the significant and prolonged period of PTE's cardiac arrest (even allowing for possible brief periods of return of spontaneous circulation) it is unlikely that earlier extraction would have materially affected the eventual outcome.

Should PTE Wolf have been conveyed to hospital more quickly and, if so did the delay have an effect on the outcome?

13.22 Professor Brown gave evidence that, in general terms, the earlier arrival of paramedic services at the scene of a cardiac arrest incident improves survivability. However, in PTE Wolf's case Professor

Brown considered that this would not have made a difference given that, in his view, the extraction of PTE Wolf could not have been performed any more quickly.

13.23 **Conclusions:** As noted above, by the time of arrival of paramedic services at the Tunnel Obstacle, and before transfer to hospital had commenced, PTE Wolf had already been in cardiac arrest for a significant period of time. This time, together with the obligations associated with delivery of CPR and extraction from the Tunnel Obstacle meant, tragically, that earlier transfer to hospital would have unlikely had any effect on the eventual outcome.

14. Findings pursuant to section 81 of the *Coroners Act 2009*

14.1 Before turning to the findings that I am required to make, I would like to acknowledge, and express my gratitude to Ms Sophie Callan SC and Mr Alistair Oakes, Counsel Assisting, and their instructing solicitor, Mr Paul Armstrong of the NSW Crown Solicitor's Office. The Assisting Team has provided invaluable assistance and demonstrated exceptional professionalism in preparing for the inquest, and conducting the inquest itself. I am also extremely grateful for the sensitivity and empathy that they have shown throughout the course of this particularly distressing matter.

14.2 I also thank Detective Senior Constable Marc Lawrence for his diligent efforts during the investigation into PTE Wolf's death and for compiling the initial comprehensive brief of evidence. I also acknowledge and thank the legal representatives for the ADF for their assistance during the course of the inquest.

14.3 The findings I make under section 81(1) of the Act are:

Identity
The person who died was PTE Liam Wolf.

Date of death
PTE Wolf died on 23 April 2019.

Place of death
PTE Wolf died at St George Hospital, Kogarah NSW 2217.

Cause of death
The cause of PTE Wolf's death was an unexpected arrhythmogenic event leading to a fall from height, blunt force head injury and hypoxic cerebral injury. Whilst it is most likely that PTE Wolf had an underlying cardiac predisposition that led to the unexpected arrhythmogenic event, the available evidence does not allow for the precise nature of this predisposition to be identified.

Manner of death

PTE Wolf fell whilst negotiating a tunnel obstacle within an obstacle course whilst completing the Exercise Challenge component of the Army Recruit Training Course. PTE Wolf's sudden and unexpected loss of consciousness whilst negotiating the obstacle and resultant fall from height, together with his subsequent cardiac arrest and difficulties associated with delivery of effective cardiopulmonary resuscitation and extraction from the obstacle all contributed to death.

15. Epilogue

15.1 On behalf of the Coroner's Court of New South Wales, I offer my deepest sympathies, and most sincere and respectful condolences, to PTE Wolf's parents, Susan Devine and Nathan Wolf; his siblings, Isaak and Alanah; and his other family and friends for their most painful and devastating loss.

15.2 According to his mother, after enlisting in the Army PTE Wolf found what was important to him and, tragically, lost his life doing what he loved to do. It is important to recognise not only the untimely and distressing loss of PTE Wolf as a son, brother, grandson, cousin and mate, but also the dedication and service of PTE Wolf to his country.

15.3 I close this inquest.

Magistrate Derek Lee
Deputy State Coroner
26 May 2021
Coroner's Court of New South Wales

Appendix A

Inquest into the death of PTE Liam Wolf

Recommendations made pursuant to section 82 *Coroners Act 2009*

To the Chief of the Defence Force, Australian Defence Force:

1. I recommend that consideration be given to the use of electrocardiogram testing as a screening tool to identify cardiac pathology that may potentially place a recruit undertaking the Army Recruit Training Course at risk of an adverse health outcome.

2. I recommend Force that, informed by evidence-based practice and research, consideration be given to conducting a risk assessment of each obstacle used as part of the Obstacle Course during the Army Recruit Training Course in order to:

   (a) mitigate against the risk of any recruit experiencing a potential adverse health outcome; and

   (b) identify structural features of the Obstacle Course, and entry and exit points that may hinder or prevent the timely provision of medical treatment to any recruit who has experienced an adverse health outcome.

3. I recommend that, informed by evidence-based practice and research, consideration be given to providing recruits undertaking the Army Recruit Training Course with appropriate personal protection equipment whilst undertaking any physical training in order to mitigate against the risk of any potential adverse health outcome.

4. I recommend that, in the event that a tunnel obstacle is to be included as part of the Obstacle Course during the Army Recruit Training Course, and informed by evidence-based practice and research, consideration be given to the following matters:

   (a) installing a mechanism by which, if filled with water, the tunnel obstacle can be drained in a timely manner;

   (b) providing instruction and training to Obstacle Course participants in relation to the manner in which a tunnel obstacle, if filled with water, is to be drained in the event of a recruit experiencing an adverse health outcome whilst completing the obstacle;

   (c) installing structural features to allow for a recruit, who has experienced an adverse health outcome whilst completing the obstacle, to be extracted from the obstacle in a timely manner so that effective medical treatment may be provided;

   (d) installing structural features that allow unhindered access for the delivery of medical treatment to a recruit who has experienced an adverse health outcome whilst completing the obstacle; and

(e) ensuring that appropriate equipment is located on site to allow for a recruit, who has experienced an adverse health outcome whilst completing the obstacle:

(i) to be extracted from the obstacle in a timely manner; and

(ii) to be provided with medical treatment in a timely manner.

Magistrate Derek Lee
Deputy State Coroner
26 May 2021
Coroner's Court of New South Wales