IN THE CORONERS COURT
OF VICTORIA
AT MELBOURNE

Court Reference: COR 2014 0888

FINDING INTO DEATH WITH INQUEST

Form 37 Rule 60(1)

Section 67 of the Coroners Act 2008

Deceased:	Garry Montgomery THEOBOLD
Delivered on:	11 July 2017
Delivered at:	Coroners Court of Victoria, 65 Kavanagh Street, Southbank
Hearing date:	Directions Hearing on 25 November 2015 Inquest on 26 and 27 September 2016
Findings of:	Coroner Paresa Antoniadis SPANOS
Counsel assisting the Coroner:	Acting Sergeant Remo ANTOLINI Police Coronial Support Unit
Representation	Ms R. KAYE and Ms S. CHAN appeared on behalf of VicRoads
Catchwords	Double fatality, motor vehicle collision involving heavy vehicle & 4WD, excessive speed in circumstances, wet road, road surface imperfection, SCRIM testing, differential friction

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I, PARESA ANTONIADIS SPANOS, Coroner,

having investigated the death of GARRY MONTGOMERY THEOBOLD

and having held an inquest in relation to this death at Melbourne on 26 and 27 September 2016:

find that the identity of the deceased was GARRY MONTGOMERY THEOBOLD

born on 26 March 1963, aged 50

and that the death occurred on 15 February 2014

at Healesville-Kinglake Road, Steels Creek, Victoria 3775

from:

I (a) MULTIPLE INJURIES

in the following circumstances:

INTRODUCTION[1]

1. Garry Montgomery Theobold was a 50 year old man who resided in Yarra Junction. He is survived by his first wife Paula and their children Chloe, Dylan and Shannon and his second partner Fiona and their children Hayley and Lachlan.

2. On the morning of Saturday 15 February 2014, Mr Theobold was taking his two youngest children Chloe and Hayley and Hayley's best friend Chloe Blackney to Hayley's birthday celebration at Whittlesea Funfields. Mr Theobold was driving his silver Toyota Prado four wheel drive vehicle [the 4WD] west along Healesville-Kinglake Road, Steels Creek. His son Lachlan was in the front passenger seat.

3. About 50 metres east of the intersection of Healesville-Kinglake Road and Gordons Bridge Road, there was a tragic motor vehicle collision between the 4WD and a 2004 model white Mack tipper truck [the truck] being driven east along Healesville-Kinglake Road by Wayne Kortholt. The way in which the collision occurred will be discussed in detail below.

4. Suffice for present purposes to say that the truck rotated in an anti-clockwise direction causing the driver's side rear corner of the truck to move laterally into the path of the 4WD and impact the driver's side where Mr Theobold and Chloe were seated. While the truck sustained only minor damage, the 4WD sustained major side impact damage and Mr Theobold and Chloe suffered severe injuries. Mr Theobold was ejected from the vehicle and Chloe was flung into the rear compartment.

[1] This section is a summary of facts that were uncontentious, and provide a context for those circumstances that were contentious and will be discussed in some detail below.

5. Chloe died at the scene despite the ministrations of other road users who came to her immediate assistance and Ambulance Victoria paramedics who arrived a short time after the collision. Mr Theobold died in the road ambulance, en route to the air ambulance.

INVESTIGATION & SOURCES OF EVIDENCE

6. This finding is based on the totality of the material the product of the coronial investigation of Mr Theobold's death. That is, the brief of evidence compiled by Detective Leading Senior Constable Michael Hardiman from the Major Collision Investigation Unit of Victoria Police, additional statements obtained by my assistant Acting Sergeant Remo Antolini from the Police Coronial Support Unit, the statements, reports and testimony of those witnesses who testified at inquest and any documents tendered through them, and the final submissions of Counsel.

7. All of this material, together with the inquest transcript, will remain on the coronial file.[2] In writing this finding, I do not purport to summarise all the material and evidence, but will refer to it only in such detail as is warranted by its forensic significance and in the interests of narrative clarity.

PURPOSE OF A CORONIAL INVESTIGATION

8. The purpose of a coronial investigation of a *reportable death*[3] is to ascertain, if possible, the identity of the deceased person, the cause of death and the circumstances in which death occurred.[4] It is self-evident that Mr Theobold's death fell within the definition of a reportable death.

9. The *cause* of death refers to the *medical* cause of death, incorporating where possible the *mode* or *mechanism* of death. For coronial purposes, the *circumstances* in which death occurred refers to the context or background and surrounding circumstances, but is confined to those circumstances sufficiently proximate and causally relevant to the death, and not all those circumstances which might form part of a narrative culminating in death.[5]

10. The broader purpose of any coronial investigation is to contribute to the reduction of the number of preventable deaths through the findings of the investigation and the making of

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[2] From the commencement of the ***Coroners Act 2008*** (the Act), that is 1 November 2009, access to documents held by the Coroners Court of Victoria is governed by section 115 of the Act: Unless otherwise stipulated, all references to legislation that follow are to provisions of the Act.

[3] The term is exhaustively defined in section 4. Apart from a jurisdictional nexus with the State of Victoria (see section 4(1)), reportable death includes *"a death that appears to have been unexpected, unnatural of violent or to have resulted, directly or indirectly, from an accident or injury"* (see section 4(2)(a)).

[4] Section 67(1).

[5] This is the effect of the authorities – see for example Harmsworth v The State Coroner [1989] VR 989; Clancy v West (Unreported 17/08/1994, Supreme Court of Victoria, Harper J.)

recommendations by coroners, generally referred to as the *prevention* role.[6] Coroners are empowered to report to the Attorney-General in relation to a death; to comment on any matter connected with the death they have investigated, including matters of public health or safety and the administration of justice; and to make recommendations to any Minister or public statutory authority on any matter connected with the death, including public health or safety or the administration of justice.[7] These are effectively the vehicles by which the coroner's prevention role can be advanced.[8]

11. It is important to stress that coroners are not empowered to determine the civil or criminal liability arising from the investigation of a reportable death, and are specifically prohibited from including in a finding or comment any statement that a person is, or may be, guilty of an offence.[9]

FINDINGS AS TO UNCONTENTIOUS MATTERS

12. In relation to Mt Theobold's death, most of the matters I am required to ascertain, if possible, were uncontentious from the outset. His identity and the date and place of death were not at issue. I find, as a matter of formality, that Garry Montgomery Theobold, born on 26 March 1963, aged 50, died a short distance from the collision scene, en route to the air ambulance, on 15 February 2014.

MEDICAL CAUSE OF DEATH

13. Nor was there any contention about the medical cause of death. Senior Forensic Pathologist Dr Michael Burke from the Victorian Institute of Forensic Medicine (VIFM) reviewed the circumstances as reported by the police to the coroner, reviewed post-mortem CT scanning of the whole body undertaken at VIFM and performed a full post-mortem examination or autopsy.[10]

14. Dr Burke's main findings at autopsy were of cardiac contusion, brain injury with subarachnoid haemorrhage, fat embolism and multiple fractures. He noted that the results of routine post-mortem toxicological analysis detected no alcohol or other commonly

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[6] The 'prevention' role is now explicitly articulated in the Preamble and purposes of the Act, cf the *Coroners Act 1985* where this role was generally accepted as 'implicit'.
[7] See sections 72(1), 67(3) and 72(2) regarding reports, comments and recommendations respectively.
[8] See also sections 73(1) and 72(5) which requires publication of coronial findings, comments and recommendations and responses respectively; section 72(3) and (4) which oblige the recipient of a coronial recommendation to respond within three months, specifying a statement of action which has or will be taken in relation to the recommendation.
[9] Section 69(1). However, a coroner may include a statement relating to a notification to the Director of Public Prosecutions if they believe an indictable offence may have been committed in connection with the death. See sections 69 (2) and 49(1).
[10] Dr Burke's nine page report which includes details of his formal qualifications and experience commences at page 35 of the brief.

encountered drugs or poisons apart from a trace of the analgesic ketamine likely administered by attending ambulance paramedics.

15. I find that the medical cause of Mr Theobold's death is multiple injuries.

FOCUS OF THE CORONIAL INVESTIGATION AND INQUEST

16. In common with many coronial investigations, the focus of the investigation and inquest was on the circumstances in which the deaths occurred, in this case the cause or contributing causes of the collision between the 4WD and the truck. It has to be said at the outset that there is no suggestion that Mr Theobold's driving caused or contributed to the collision in any way. The focus was squarely on the way that Mr Kortholt drove the truck and the condition of the road surface, specifically at the point where he lost control of the truck immediately before the impact with the 4WD.

GENERAL ROAD CONDITIONS

17. In the general vicinity of the collision, Healesville-Kinglake Road runs approximately east to west through bushland and is a winding, undulating road with provision for two lanes of traffic, one in each direction separated by double white lines with a white painted 'fog' line delineating the outer edge of each lane. The posted speed limit is 80 km/hr subject to lesser advisory speed limits as appropriate to address a number of tight left and right hand bends.

18. The collision between the 4WD and the truck occurred immediately to the east of the intersection of Healesville-Kinglake Road and Gordons Bridge Road. Approaching the intersection from the west as Mr Kortholt did, the road is winding, and has a downhill gradient for approximately one kilometre. Just before the collision site, there is a 45 km/hr yellow advisory sign and also a 'slippery when wet' yellow advisory sign. At Gordons Bridge Road, Healesville-Kinglake Road turns sharply to the left and the gradient changes to uphill. Approaching the intersection from the east as Mr Theobold did, the road is generally straight with a downhill gradient with a '50km/hr right turn' advisory sign.[11]

19. At the time of the collision traffic was light, visibility was good and the road was wet and slippery, according to a number of road users, but it was probably not actually raining.[12] The recent rainfall had come after a dry spell so that the build-up of grease and other debris on the road surface made it even more slippery.[13]

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[11] See summary prepared by the coronial investigator DLSC Michael Hardiman at page 5 of the coronial brief.
[12] Coronial investigator's summary at page 6, Statements of David Whiteside at page 59 of the coronial brief, Shaun Baker at page 55, VARE interview of Lachlan Theobold at page 50, ROI of Wayne Kortholt at page 219.
[13] Statement of David Whiteside at page 58 of the coronial brief. See also transcript page 54 for DSC Hay's evidence in this regard.

EYE WITNESS ACCOUNTS

20. Mr Theobold's eight year old son Lachlan was interviewed by the police and a transcript of that interview forms part of the coronial brief.[14] He was the front seat passenger in the 4WD and was playing games on his iPad immediately before the collision. He recalled a truck sliding down the road and his father trying to get off the road when the collision occurred. He recalled the truck was turning the corner "then it slid and it was on its side and hit the car". He recalled that the road was wet, that just before the collision his father was taking about the wet road and that he said "watch out".[15] When asked again about the movement of the truck or what the truck was doing, he said "The truck was turning around the corner when it slid and it was coming down the road sidewards."[16]

21. Following the truck and immediately behind it as it approached the collision scene, was a Toyota Kluger [the Kluger], a sports utility vehicle being driven by Mr Kortholt's wife Julieanna. Also in this vehicle were their children. The plan was for Mr Kortholt to drive the truck to his mechanic in Kilsyth, to leave it there for some scheduled repairs and for the Kortholt's to leave all together in the Kluger.[17]

22. Immediately behind Ms Kortoholt's vehicle on the approach to the collision scene, was a Toyota Hilux twin cabin utility [the utility] being driven by Shaun Baker with his friends David and Jack Whiteside as front and rear passengers, respectively. They were heading to the Toolongi State Forest to do some trial bike riding.

23. Shaun Baker[18] recalled that it had been drizzling and he had his wipers on intermittent but that it had possibly stopped raining when the collision occurred. He recalled the road was wet and slippery and that he thought if he went any faster than the 70 km/hr he was doing, that he might slide off the road himself. He maintained a distance of about 20 metres from the Kluger which was maintaining a similar distance from the truck. Mr Baker was watching the two vehicles in front of him and 'did not believe that there was any trouble or anything wrong before the accident occurred'. He did not see the truck lose control and while he was not 100% sure, he thought the point of impact was the front quarter panel of the 4WD. He saw the truck move from right to left on impact.

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[14] Page 47 of the coronial brief and following.
[15] Pages 50-51, 54 of the coronial brief.
[16] Page 51 of the coronial brief.
[17] See summary at page 5 of the coronial brief and ROI of Mr Kortholt at page 209.
[18] Statement of Shaun Baker at page55 of the coronial brief.

24. David Whiteside also provided a statement to police detailing his observations.[19] He recalled that it started raining just as they left Whittlesea, that it had rained enough to wet the road and had stopped raining by the time they reached Kinglake West. He was familiar with the area where the collision occurred and stated that 'although the speed limit is 80 km/hr, you would be crazy to go anywhere near that in the wet, and that's in a car'.[20] He estimated that Mr Baker was driving at 60-70 km/hr on the downhill stretch approaching the collision scene and recalled that they were not gaining on the Kluger. He commented to the others about how wet the road was.

25. In terms of how the collision occurred, Mr Whiteside saw the truck exit the corner well enough, but just as the road straightens up and goes uphill, the right hand rear of the truck 'kicked out' onto the wrong side of the road, the cabin and the rest of the truck remaining on the right side of the road. He recalled that truck driver was on the brakes before it kicked out and the whole way through, as he saw the truck brake lights on. He did not hear the screeching of brakes but attributed this to the wet conditions. Just before the truck kicked out, he noticed the 4WD coming down the hill in the opposite direction and 'it did not appear to be doing anything wrong'. Mr Whiteside recalled that when the truck encroached on the wrong side of the road, 'it collided with the driver's side of the 4WD, missing the front bull bar and hitting the driver's front quarter panel, just peeling that entire side of the car off, totally destroying that side of the car'.[21]

MR KORTHOLT'S ACCOUNT

26. Mr Kortholt was the 45 year old owner and driver of the 2004 model white Mack tipper truck involved in the collision. He resided in Kinglake and was self-employed undertaking road surfacing and re-surfacing works for VicRoads as a sub-contractor using the heavy rigid truck which has an aggregate stone spreader attached to its rear. It is accepted that it was in fact the aggregate spreader which impacted the 4WD and caused such severe damage to the driver's side of the 4WD and its occupants. Mr Kortholt was the holder of a full and current Victorian driver's licence and heavy rigid licence at the time of the collision.

27. Following the collision, Mr Kortholt was breathalysed, returning a negative reading for alcohol, provided a blood sample which was later analysed and showed no drugs in his system

[19] Statement of David Whiteside at page 58 of the coronial brief.
[20] Page 59 of the coronial brief.
[21] Pages 59-60 of the coronial brief.

and was interviewed by the police.[22] A full transcript of his interview forms part of the coronial brief.[23]

28. Of particular significance given the focus of the coronial investigation and inquest are the following aspects of Mr Kortholt's account –

    a. He worked long hours during the week but was well rested prior to the collision.[24]

    b. He had 20 years' experience driving trucks, the last ten years self-employed as an owner-driver and had only had one prior collision driving a truck. He purchased the truck new about ten years earlier, was familiar with its operation and everything was working perfectly prior to the collision.[25]

    c. For work purposes, the truck is loaded with stone that is pre-coated with diesel and some of that gets on the truck tyres and causes the truck to slide in the wet.[26]

    d. He didn't believe that he was going too fast as he was at the bottom of the hill and would not have made all the previous bends if he had been. He was not doing more than 30 km/hr coming down the hill as the truck was not even warm yet and didn't think his speed would have caused the truck to slide out.[27]

    e. He believed that the camber of the road caused the truck to slide out and that the fact the truck was unladen contributed as there was no weight on the rear of the truck. [28]

    f. It was not raining at the time of the collision but the road was a little bit wet and that this contributed to the truck sliding out.[29]

    g. He was familiar with the road, generally driving along it in the truck twice a week. He knew it was slippery when wet but had only previously experienced problems driving in the other direction – that is on the westbound carriageway.[30]

    h. The right rear of the truck slid out just past the bend. He was idling down letting the truck use its own momentum to get around the bend, using the brakes on and off (feathering) and had not even started to accelerate when the truck slid out.[31]

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[22] The results of this analysis appear at page 118 of the coronial brief.
[23] The transcript of the ROI is at pages 203-260 of the coronial brief. The police contemplated laying charges including dangerous driving causing death but the brief was not authorised, as I understand it, on the basis that the evidence was unlikely to support proof to the criminal standard, beyond reasonable doubt.
[24] Pages 217-218 of the coronial brief.
[25] Pages 218, 220, 226 of the coronial brief.
[26] Page 218-219 of the coronial brief.
[27] Pages 218-219, 229 of the coronial brief.
[28] Pages 219, 237 of the coronial brief.
[29] Pages 219, 240 of the coronial brief.
[30] Pages 228-229, 238, 252 of the coronial brief.
[31] Page 230-237 of the coronial brief.

EXPERT EVIDENCE – MECHANICAL & TYRE INSPECTION

29. The truck was taken into the possession of the police immediately following the collision and, on 25 February 2014, underwent a mechanical inspection by Sergeant Leigh Booth, a fully qualified motor mechanic and mechanical investigator from the Mechanical Investigation Unit of Victoria Police. Sgt Booth provided a 15 page report of his inspection that is included in the coronial brief.[32] His inspection of the truck did not reveal any mechanical fault which may have caused or contributed to the collision.[33]

30. Sgt Booth's inspection did reveal that the tyres and other components of the truck were contaminated with bitumen and screenings/stone consistent with the work environment in which it was used. He was unable to offer an opinion as to whether this contamination would have affected the frictional grip of the tyre-tread but advised that as soon as the road surface becomes damp or wet, frictional grip (otherwise known as the co-efficient of friction) will be reduced, regardless of tread depth. He also advised that loss of traction in the truck would be more likely to occur when it was unladen.[34]

31. The latter proposition is also supported by the statement of Rex Moretti, a diesel mechanic and service manager for Mack and UD Trucks. He expressed the opinion that if the truck was unladen and under braking on a wet road, there is the potential for the driver to lose control of the rear of the vehicle due to there being no weight or very little weight on the drive wheels. In such circumstances, it would not matter how good the tyres were, as there would be no weight on those tyres.[35]

32. David Southwell is a Mechanical Engineer and independent tyre condition and failure analyst engaged by the coronial investigator to assist in the investigation of factors contributing to the collision. On 28 March 2014, in the company of DLSC Hardiman, he inspected the truck tyres and the condition of the road in the vicinity of the collision scene in wet conditions. Mr Southwell provided a detailed report of his inspection and conclusions which forms part of the coronial brief.[36] He was not required to give evidence at the inquest.

33. Mr Southwell conclusions included the following –

    a. There was no defect or damage evident on the tyres that might have contributed to the vehicle oversteer behaviour;

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[32] Pages 95.1-107 of the coronial brief. I note that Sgt Booth's report also includes details of his inspection of the 4WD which identified no issues that had any bearing on the collision.
[33] Page 100 of the coronial brief.
[34] Ibid.
[35] Statement of Rex Moretti at page 63 of the coronial brief – see page 64.
[36] Mr Southwell's 22 page report is at page 175 of the coronial brief and includes his formal qualifications and curriculum vitae.

b. The road surface on the stretch of road leading to the collision (that is the area where the oversteer evidently commenced) was variable and in places was at the lower end of the "grip" scale, but was generally capable of providing grip sufficient to allow the safe traverse of virtually all tyres of road vehicles, even under adverse conditions; and

c. The combination of relatively low load for the inflation pressure of the tyres would have reduced the lateral force available for cornering (relative to that available with higher vertical load, up to a point), but he would also expect the available cornering force to have been within "normal" limits given the unladen condition of the vehicle.

EXPERT EVIDENCE - SPEED

34. Detective Senior Constable Robert Hay holds an Honours degree in Civil Engineering from the University of Melbourne and is specialist in accident reconstruction with the Major Collision Investigation Unit. Prior to his analysis of the subject collision DSC Hay had undertaken a total of 230 reconstructions. He was provided with scene photographs, survey data and witness statements that he used to produce three scale plans of the collision.[37] His brief was to calculate the speed at which Mr Kortholt was driving immediately prior to the collision, when the truck rotated laterally and its rear crossed into the path of the 4WD.

35. DSC Hay used a series of formulae and calculations and applied them to the curve at which Mr Kortholt foundered to determine its critical speed or the maximum speed at which a vehicle can travel around the curve without a significant risk of yaw. Using a drag factor of 0.549g,[38] DSC Hay calculated the critical speed of the curve at 72.6 km/hr. He then reduced the drag factor to 70% to account for the difference between the performance of a motor vehicle and a truck which reduced the critical speed to 63.7 km/hr.[39] As the drag factor he used had been determined in dry conditions, a further 0.1 reduction was made to factor in the wet conditions at the time of the collision leading to a critical speed of 57.6 km/hr.[40]

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[37] Exhibits B, C and D tendered through DLSC Hardiman and referred to respectively as "collision diagram with SCRIM results", "collision diagram" and "clean scale plan" – see transcript page 20.

[38] This drag factor was arrived at after three skid tests conducted by Detective Acting Sergeant Jenelle Mehegan at the collision scene on a drug surface on 19 February 2014 and witnessed by DSC Hay. See Exhibit G, statement of DSC Hay at page 88 of the coronial brief – at page 91 "The lowest value of the drag factor was 0.54g, this value is a little low but not an unsatisfactory level given the grade of the road." See also transcript at page 34 where DSC Hay explains what a drag factor is – "a measure of friction, so it's the measure of the resistance to motion between the two surfaces. It's surface-specific. It's measured in units of gravity, hence the g. The reason it's a drag factor rather than frictional resistance is that it's done in a car on the slope of the road, so it actually takes into account, by the very doing of the skid test, the slope of the road. Otherwise, we have to correct for …the grade of the road, not the slope of the road. So it's a drag factor rather than purely friction. It actually accounts for the grade." And transcript page 48 where he further explains the workings of the VERICOM testing method used by the police.

[39] Exhibit G at page 91 of the coronial brief and transcript pages 35-36.

[40] Ibid.

36. Data provided by VicRoads to DSC Hay on 2 April 2014 showed a variation in the skid resistance across the roadway in the vicinity of the loss of control immediately prior to the collision, with the wheel path on the driver's side of the truck having a drag factor 0.1g lower than the passenger side wheel track, being 0.3g and 0.4 g respectively. Adjusting for this difference and for the natural differences in effective lateral friction when negotiating a left turn (66% on the outer tyre and 33% on the inner tyre), DSC Hay determined a critical speed of 49.4 km/hr for the truck negotiating the subject curve in the wet.[41]

37. Applying all the known factors and the appropriate formula to the skid marks that were left by the truck at the collision scene, DSC Hay calculated that the truck was travelling at a minimum speed of 53.33 km/hr at the commencement of the visible skid marks.[42] This calculation could be further adjusted on the basis of Victoria Police's 1997 Project YAM findings that showed that when a vehicle leaves skid marks the actual speed of the vehicle is 10% higher due to the time that the vehicle is decelerating but not leaving skid marks.[43] This yields an upper estimate for the minimum speed of the truck immediately before it commenced to skid at 58.6 km/hr.[44] DSC Hay stressed that while the short double skid marks observed at the Gordons Bridge Road intersection were consistent with this scenario, he had not used them in calculating the speed of the truck prior to the loss of control/skid.[45]

38. DSC Hay concluded that causes of the truck rotating in an antic-clockwise direction into the path of the 4WD were multi-factorial and that the collision occurred in a perfect storm of adverse factors.[46] In his opinion, Mr Kortholt lost control due to driving at 8 km/hr above the advisory speed limit, in excess of the critical curve speed, and under braking, which put him at significant risk of yaw, and which combined with the differential road friction, caused the rear driver's side of the truck to "step out".[47] DSC Hay added that, in his opinion, if Mr Kortholt had been travelling at (or below) the advisory speed of 45 km/hr as he rounded the curve, the collision would most likely not have occurred.[48]

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[41] Exhibit G at page 92 of the coronial brief and transcript pages 37-40.
[42] I note that this calculation uses the higher drag factor of 0.4g which is applicable only to the left wheel track of the truck and is therefore "generous" to Mr Kortholt – see Exhibit G at page 92 of the coronial brief
[43] Exhibit G at page 92 of the coronial brief.
[44] Ibid. DSC noted that this higher speed is consistent with the evidence of Mr David Whiteside who estimated the truck's speed at between 60-70 km/hr – see page 93 of the coronial brief.
[45] Exhibit G at page 93 of the coronial brief and transcript pages 41-42.
[46] Transcript pages 38 and following.
[47] Exhibit G at page 93 of the coronial brief and pages 38 and following.
[48] Ibid. I note that D/Sgt Mehegan deferred to DSC Hay on the issue of speed calculations as he was the primary MCIU accident reconstructionist and this was his role. She did stress at inquest that it would be a complex exercise to calculate the speed at which Mr Kortholt was travelling because of a number of unknown (and unknowable) variables such as the precise taken by Mr Kortholt through the curve which would affect the radius of the curve he drove as opposed to the straight line around the curve that would be used in reconstruction calculations. Transcript pages 111 and following.

EXPERT EVIDENCE – ROAD SURFACE

39. As one of the factors identified in the investigation of this collision was the quality of the road surface, and in particular the variances in skid resistance across the eastbound carriageway that may have contributed to the collision, there was a need for relevant expert evidence about these matters. Two expert witnesses were identified as appropriately qualified and experienced to provide reports and testify at the inquest.

40. Cassandra Simpson is a Specialist Pavement Testing and Technology Engineer at VicRoads. A number of documents were authored by her and/or tendered through her at the inquest.[49]

41. As a consequence of this fatal collision, VicRoads' Technical Services was requested by VicRoads North Eastern Region to undertake SCRIM testing. Ms Simpson inspected the site on 21 February 2014 and confirmed the need for SCRIM testing which was undertaken on 2 March 2014. The SCRIM results for the immediate vicinity of the collision are depicted on Exhibit B.[50] This area extends from about 45 metres west of the middle of Gordons Bridge Road, through the point where the truck stepped out, through the impact point and the length of the truck skid marks to the resting point of the vehicles, some 80 metres to the east of the middle of Gordon's Bridge Road.[51]

42. At inquest, Ms Simpson explained the Sideways Co-efficient Routine Investigation Machine [SCRIM] used by VicRoads to measure skid resistance of the road surface in the wet.[52] She testified that SCRIM is the industry standardised test used around the world. The equipment is mounted on a truck and tests both the left and right wheel paths. It is a continuous test with data taken as the truck drives at a constant 50 km/hr[53] with a 400 litre water tank and spray wetting the area immediately in front of the test tyres.

43. Data is presented graphically and compared with "investigatory levels" that are determined by reference to the characteristics of the site and trigger a response by VicRoads where they are

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[49] Exhibit H is the Surface Condition Report authored by Ms Simpson at page 119 of the coronial brief and a memo dated 21 September 2016 from Ms Simpson which is an addendum to the report – see transcript pages 55-56; Exhibit I is Technical Advice (Surfacing Advice) written by Ms Simpson on 9 April 2014 appearing at page 422 of the coronial brief; Exhibit J is Technical Advice (Surface Inspection) written by Ms Simpson on 24 February 2014 – see transcript page58.

[50] Transcript page 82. The SCRIM data in their entirety form part of the coronial brief – see pages 280 and following for the SCRIM data for Healesville-Kinglake Road from 21 May 2012, the last set of available data prior to the collision and pages 352 and following for the SCRIM data obtained on 2 March 2014 which was analysed by Ms Simpson in Exhibit H.

[51] Exhibit B depicts the SCRIM results overlaying the scale diagram of the collision produced by DSC Hay with the skid marks associated with the truck commencing at chainage "J", the impact point at about chainage "K" and the final resting place of the 4WD and the truck respectively at about "O" and "Q". Transcript page 68.

[52] Exhibit K is VicRoads Technical Note is TN 110 as at November 2015 entitled Measurement and Interpretation of Skid Resistance using SCRIM. For all material purposes, it is to the same effect as the technical note applicable at the time of the collision – see transcript page 61.

[53] Reduced to 20 km/hr for tight curves with less than a hundred metre radius – see transcript pages 65-66, 89.

not met, that is where the SCRIM results indicates less skid resistance than is appropriate for the site. Ms Simpson's evidence was that given the characteristics of the collision site, in particular the curves and gradient, an investigatory level of 0.45 Sideways Force Co-efficient [sfc] was appropriate.[54]

44. As SCRIM tests the skid resistance provided by the road surface along the left and right wheel paths, it is particularly useful in identifying differential skid resistance across a carriageway, otherwise referred to as split or variable skid resistance or friction.[55] According to Ms Simpons's evidence and the relevant technical note, the optimal difference in sfc values between wheel paths should be less than 0.10sfc where the speed limit is greater than 60 km/hr (or less than 0.20sfc where the speed limit is 60km/hr or less).[56]

45. Ms Simpson's analysis of the post-collision SCRIM data indicated that –

    a. Approaching the collision site from the west the road surface provided variable skid resistance.

    b. The section of the eastbound carriageway on which the truck was travelling before Gordon's Bridge Road (SCRIM chainage 0.74-0.70 km) reported skid resistance below the investigatory level by 0.05sfc with reduced macro texture and bitumen at the surface of the sprayed seal.

    c. The section of the eastbound carriageway on which the truck was travelling shortly before Gordon's Bridge Road and up to the resting place of the two vehicles (from SCRIM chainage 0.65 to 0.53 km) provided skid resistance below the appropriate investigatory level of 0.45sfc by 0.10sfc in the right wheel path only, the left wheel path providing skid resistance above the investigatory level.

    d. The same section of road provided differential skid resistance ranging (from between 0.10 and 0.25sfc[57]) which is considered in some literature to contribute to vehicles rotating, in this case in an anti-clockwise direction, during loss of control crashes.

    e. (Presumably) On visual inspection, this same section of road displayed reduced texture and bitumen at the surface of the sprayed seal especially in the right wheel path.[58]

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[54] Exhibit H at page 130.1 of the coronial brief and transcript page 63.
[55] Transcript pages 60 and following.
[56] Exhibit K and transcript pages 60 and following.
[57] There appears to be an arithmetic error as the differential skid resistance between SCRIM chainages 615 ("A") and 535 ("Q") vary from a minimum of 0.00 to 0.28. Relevantly, the differential skid resistance closer to the place where the loss of control was seen is at the higher end – from 0.29 at "F" to 0.24 at "J".
[58] Exhibit H and transcript pages 69 and following.

46. The second expert who provided a report and testified at inquest was Detective Sergeant Jenelle Mehegan from the Major Collision Investigation Unit. D/Sgt Mehegan is a Mechanical Engineer with a Ph.D in the area of the co-efficient of friction and with accident investigation and accident reconstruction experience as a police member. D/Sgt Mehegan was specifically asked to review the material provided by VicRoads/Ms Simpson and provide an assessment of the road surface at the location and its likely contribution to the collision.[59]

47. D/Sgt Mehegan noted that the SCRIM data indicated that in the 250 metres leading to the collision site, skid resistance levels varied between 0.22sfc and 0.75sfc with significant difference between the left and right wheel paths. The loss of control of the truck occurred prior to the impact between the two vehicles and therefore the relevant skid resistance levels were those leading up to the point of impact.[60] D/Sgt Mehegan's evidence at inquest was that this was between Gordons Bridge Road (SCRIM chainage 615 or "A" on Exhibit B)) and the commencement of the skid mark (SCRIM chainage 570 or "J" on Exhibit B).[61]

48. She clarified that while differential skid resistance across the carriageway is problematic, the SCRIM data also indicated significant variations even along and within each of the left and right wheel paths, and between the front and rear of the truck, all compounding problems with the stability of vehicles when negotiating the curve.[62]

49. D/Sgt Mehegan's evidence is that differential friction results in increased vehicle sensitivity to steering, braking and cornering and in particular increases the risk of rear slide out in heavy vehicles. The greater the differential, the greater the risk of a slide out. If differential friction is the cause of a rear slide out, would be expected that a vehicle would slide out to the right on a left curve, as the truck did immediately prior to impact with the 4WD.[63]

50. The possibility of a yaw attributable to simply taking a curve at a speed (significantly) in excess of the critical curve speed, was not entirely excluded by D/Sgt Mehegan, but she did not accept that a yaw due to oversteering was involved, as this would not result in the rear of the truck sliding out and over onto the westbound carriageway.[64]

51. While D/Sgt Mehegan accepted that the cause of the loss of control and collision was multifactorial and involved the speed at which the truck was being driven, the condition of the road, the wet conditions, the way in which the truck was being driven and the fact that the

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[59] Exhibit L is D/Sgt Mehegan's twelve page report and includes details of her formal qualifications and experience.
[60] Exhibit L page 6. I note that D/Sgt Mehegan indicated a preference for the SCRIM data rather than Vericom data as being more accurate as regards skid resistance – see transcript page 111 and following.
[61] Transcript page 99.
[62] Transcript pages 101-103.
[63] Exhibit L at page 6.
[64] Transcript page 104-105, 117.

truck was unladen, she maintained that the two principle causal factors were the speed at which the truck was being driven, being close to the critical curve speed, and the differential skid resistance between the left and right wheel paths.

52. D/Sgt Mehegan could not preference one of these factors above the other as the principle cause of the collision – *"I believe if the truck was travelling under the advisory, it wouldn't have mattered that the split friction was so significant in some places. If the split friction was under 0.10 [sfc] the entire way, then at the speed that he was travelling at, given that it wasn't ...over then I don't think the crash would likely have happened either".*[65]

VICROADS EVIDENCE – ROAD MAINTENANCE PROGRAM

53. Mr Bryan Sherritt, Regional Director of the North Eastern Region of VicRoads, provided a detailed nine page statement and several attachments including the VicRoads Road Management Plan dated 30 October 2004 [RMP] and testified at inquest.[66] VicRoads is a creature of statute and is responsible for some 22,500 kilometres of freeway and arterial roads valued at around $27 billion all of which are listed under the VicRoads' "Register of Public Roads".

54. VicRoads has the statutory duty to inspect, maintain and repair public roads to the standard specified in the RMP for that road or a specified class of roads which include that road.[67] The relevant section of Heidelberg-Kinglake Road is classified as an arterial road and falls within VicRoads' statutory remit to inspect, maintain and repair. VicRoads' road maintenance program encompasses routine, periodic and rehabilitation maintenance.

55. Routine maintenance addresses minor defects before significant deterioration occurs, such as the identification and repair of defects such as potholes before they develop into larger patches. The maintenance standards under the RMP contain a list of hazards to be addressed during routine maintenance inspections including "Installation of warning signs or treatment at sites where measurement and/or assessment in accordance with the skid resistance policy indicates a slippery surface".[68] Under the RMP 2004, the subject road was a Category 4 road that was routinely inspected every second week during the day and once annually at night.

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[65] Transcript page 107. I note that the transcript has a notation of "indistinct" here but consistent with her earlier evidence, I think it is tolerably clear that the missing words are to the effect of "too far" over the critical curve speed. See transcript pages 105-106 and 115-117.

[66] Transcript pages 121-174. Mr Sherritt expanded on his statement but did not materially alter his evidence during cross-examination at inquest.

[67] Exhibit M is Mr Sherritt's statement dated 27 May 2016 at page 543 of the coronial brief.

[68] Exhibit M at page 544 of the coronial brief. This refers to the RMP 2004. Since 1 April 2014, the RMP includes the hazard "Where assessment in accordance with the skid resistance policy indicates remediation is required."

56. Periodic maintenance, sometimes referred to as "asset preservation" refers to road maintenance and repair activities which take place on a periodic basis, such as the resealing or resurfacing of sections of the arterial road network. While VicRoads has been performing resurfacing works for many years, since about December 2011, the manner in which they identified and managed roads in poor condition is set out in their Skid Resistance Police and Signage Guidelines.

57. Road condition is monitored by way of inspections, including routine, targeted and site specific inspections – Surface Inspection Ratings [SIR] a standardised system for assessment of the surface condition based on visual inspection by trained contractors; Pavement Condition Surveys [PCS] whereby one half of the road network is surveyed annually by means of a specially equipped vehicle that automatically collates road pavement information as it travels over the road; and Sideways Force Co-efficient Routine Investigation Machine or SCRIM testing referred to earlier whereby one third of the sites categorised as high risk are tested annually and other sites where a specific concern about skid resistance has been raised, for example, following an accident or an enquiry from a member of the public.[69]

58. In the period preceding the collision, Healesville-Kinglake Road was inspected by way of a SCRIM test performed on 21 May 2012, an SIR performed on 24 January 2013, a PCS performed on 14 January 2014 (however the results were not available immediately due to the need for the data to be analysed) and a routine day-time inspection on 5 February 2014.[70]

59. Significantly, on or about 10 April 2012 VicRoads carried out an additional visual inspection of a curve on Healesville-Kinglake Road, some 1.1 kilometres from the subject collision scene and a further SCRIM test was recommended due to concerns about the level of skid resistance provided by the road. SCRIM testing was performed on 21 May 2012 on the section of road between Gordon's Bridge Road and Mountain Home Road and the results indicated that the road fell below the investigatory level. Another physical inspections followed and the section of road was confirmed as being in "poor condition" and added to the "Roads in Poor Condition Register".

60. In general, such roads are considered for annual funding under the annual pavement maintenance program. Pending remediation, VicRoads installed a number of "Slippery When Wet" signs.

61. Mr Sherritt gave evidence about the effect on funding cuts on proposals for remediation of the road surface of Healesville-Kinglake Road and the response of VicRoads to the fatal collision the subject of this coronial investigation – the installation of 16 additional warning signs and a review of the 80 km/hr speed limit (and 45 km/hr advisory limit on the approach).[71]

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[69] Exhibit M at page 545 of the coronial brief.
[70] Exhibit M at page 546 of the coronial brief.
[71] Exhibit M at pages 547-548 of the coronial brief and transcript page 122.

62. Ultimately, the decision was made to maintain the 80 km/hr speed limit as being appropriate for an 'undivided road on the urban/rural fringe, or in a rural area where there is an elevated risk of crashes' and on the basis that the relevant guidelines indicate that lowering speed limits should not be used to compensate for sub-standard road infrastructure, rather infrastructure measures should be implemented to address specific infrastructure safety problems where they exist.[72]

63. During 2014 and following the collision the subject of this investigation, a further review of the speed limit was undertaken by VicRoads that identified that the issue with the relevant section of Healesville-Kinglake Road was the loss of skid resistance (and not the speed limit). As expressed by Mr Sherritt in his statement, the ideal solution was to resurface the road, not to reduce the speed limit and the site received funding for resurfacing works under the periodic pavement maintenance program in the 2014-2015 financial year. [73]

CONCLUSIONS

64. The standard of proof for coronial findings of fact is the civil standard of proof, on the balance of probabilities, with the *Briginshaw* gloss or explication.[74] Adverse comments or findings are not to be made with the benefit of hindsight but only on the basis of what was known or should reasonably have been known or done at the time.

65. Having applied the applicable standard of proof to the available evidence, I find that:

    a. The manner in which Mr Theobold drove the 4WD did not cause or contribute to the collision in which Chloe and he both lost their lives.

    b. The road surface of Healesville-Kinglake Road in the vicinity of Gordons Bridge Road was wet and slippery but it was not actually raining at the time of the collision.

    c. The road surface in this vicinity had significant differential skid resistance, apparently having deteriorated since the last routine SCRIM test undertaken by VicRoads in May 2012.

    d. Following this SCRIM test and a further physical inspection, the road was included in VicRoads' Roads in Poor Condition Register and, pending a successful funding bid, signage was installed to warn of the "Slippery When Wet" conditions.

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[72] Exhibit M at page 549 of the coronial brief. This is an oversimplification of the material provided by VicRoads but suffices for present purposes.

[73] Ibid.

[74] *Briginshaw v Briginshaw (1938) 60 C.L.R. 336 esp at 362-363.* "The seriousness of an allegation made, the inherent unlikelihood of an occurrence of a given description, or the gravity of the consequences flowing from a particular finding, are considerations which must affect the answer to the question whether the issues had been proved to the reasonable satisfaction of the tribunal. In such matters "reasonable satisfaction" should not be produced by inexact proofs, indefinite testimony, or indirect inferences..."

e. This response by VicRoads was reasonable and appropriate pending rectification, particularly in the setting of funding cuts and competing road infrastructure needs across the state wide public road network.

f. The collision occurred in an 80 km/hr speed zone with applicable 45km/hr advisory and "Slippery When Wet" signs.

g. Mr Kortholt was familiar with the truck he was driving, familiar with the road on which he was travelling and knew the road to be slippery in sections when wet.

h. Mr Kortholt negotiated the left curve in the vicinity of Gordons Bridge Road without apparent incident, while driving at a minimum speed, at or near the critical curve speed of 53.33 km/hr.

i. Shortly after negotiating the left curve, the truck rotated in an anti-clockwise direction, causing its driver's side rear to slide or step out and over the double white centre lines into the path of the oncoming 4WD.

j. The main causal factors of the collision were

    i. the speed at which Mr Kortholt negotiated the left curve and was driving when the truck slid or stepped out, and

    ii. the significant differential skid resistance between the left and right wheel paths travelled by the truck.

k. The evidence does not allow me to determine which of these factors was the primary cause of the collision but does support a finding that absent either factor the collision would probably not have occurred.

l. Other contributory factors (although both are to some extent encompassed within the notion of skid resistance) are the wet condition of the road and the unladen state of the truck.

I direct that a copy of this finding be provided to:

The Senior Next of Kin and family of Mr Theobold

VicRoads

Transport Accident Collision

Child Safety Commission

Detective Sgt Jenelle Mehegan c/o O.I.C. Major Collision Investigation Unit

Detective LSC Michael Hardiman c/o O.I.C. Major Collision Investigation Unit

Signature:

PARESA ANTONIADIS SPANOS

Coroner

Date: 11 July 2017