GRANTHAM FLOODS COMMISSION OF INQUIRY

CLOSING SUBMISSIONS ON BEHALF OF WAGNER INVESTMENTS PTY LTD AND WAGNERS AUSTRALIAN OPERATIONS PTY LTD

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1. These submissions are made on behalf of Wagner Investments Pty Ltd and Wagners Australian Operations Pty Ltd. We refer to the companies, or each of them, as "Wagners".

INTRODUCTION

2. Grantham is a small and obviously close knit community, situated in the Lockyer Valley. On 10 January 2011, the town was devastated by an enormously destructive flood. Twelve residents lost their lives and property damage occurred on a large scale. Wagners has, and has publicly expressed, deep sympathy for the citizens of Grantham.

3. Wagners owned and operated the Grantham Sandplant from November 1998[1] to in or about December 2011, when the quarry was sold to Boral as part of the sale of a larger parcel of assets. Negotiations for the sale had commenced well prior to the flood[2]. Wagners operated the quarry on the day of the flood the subject of this Commission of Inquiry, namely 10 January 2011.

4. Although Wagners lost property in the flood, these losses pale into insignificance compared with the suffering of the people of Grantham. However, during the 4½ years since the flood, Wagners and members of the Wagner family, have, through certain sections of the media, been the subject of criticism amid speculation that the collapse of an earthen bund[3] on the western embankment of the quarry[4] contributed to, or as alleged in some quarters, was the sole cause of, the loss of life and general devastation which the people of Grantham suffered on 10 January 2011. These allegations have ranged from negligence, to criminal conduct, corruption and even an allegation that after the flood Wagners performed earthworks on

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1 Ex 50a – **Denis Wagner's** statement paragraph [8].

2 Ex 50a – **Denis Wagner's** statement paragraphs [12] – [13].

3 During the course of the public hearings, the bunds became known as the "eastern bund" (the larger bund between the track and the pit hole) and the "western bund" (the smaller bund between the track and the creek). We will adopt that terminology in these submissions. When referring to them collectively, we will describe them as "the bunds".

4 In these submissions described as "the western embankment".

the western embankment with the intention of concealing or destroying evidence. Certain elements of the media have published these allegations without any scientific or other logical basis to support them.

5. The floods of 10 January 2011 devastated not only Grantham, but communities to the west of Grantham from where the water came. Severe flooding was experienced in the Lockyer Valley at Murphys Creek, Withcott and Helidon. The Grantham Sandplant is located to the east of those communities. Not only communities to the direct west of Grantham suffered as a result of the extraordinary weather conditions which prevailed in the weeks leading up to the 10 January flood. Spring Bluff and Murphys Creek, communities which lie to the north west of Grantham, suffered severe floods and loss of life. Postmans Ridge to the west of Grantham similarly suffered a severe flood and loss of life. The flood swept a family off the bridge at Helidon, peaking at such an extreme level that people at Grantham who had been told about it, disbelieved. In a separate incident which occurred on 10 January 2011, Toowoomba was hit by an extraordinary storm which caused flooding, loss of life and property damage in that city[5]. These points are not made to in any way detract from the enormity of the losses to life and property suffered in Grantham, but to illustrate the extraordinary weather phenomena influencing the region at the time.

6. The flood that devastated the communities in the Lockyer Valley on 10 January 2011 was of biblical proportions. No records produced to this Commission of Inquiry evidence any historical flooding in the Lockyer Valley which in any way even approached the flood of 10 January 2011. The enormity of the natural event unfolding on that day can be seen from

[5] Ex 110 – Inquest into the deaths caused by the South-East Queensland Floods of January 2011.

readings on the flood gauge at Helidon, conveniently depicted in figure 4.1 and table 4.1 Dr Newton's first report[6].

7. The allegation against the Wagner family, a family which has been part of the local community for generations, which participates fully in that community and has, through its commercial successes, provided hundreds of jobs and other opportunities to fellow citizens, was that the apparent collapse of a 300 metre quarry wall caused a tidal wave which made its way to the heart of Grantham some 3 kilometres downstream. Aerial photographs and news video footage taken of the flood on that day show that a wide front of flood water, completely dwarfing the 300 metre long western embankment at the quarry, swept through the Lockyer Valley. Indeed, the entire Grantham Sandplant, not just the western embankment, was completely engulfed and submerged by the water. Every single hydrologist[7] who has considered the flood has concluded that the western embankment played no part in contributing to the devastation of Grantham.

8. It is clear that some residents of Grantham have been convinced that the erosion of the bunds on the western embankment contributed to the flooding. It is not for Wagners to judge the effectiveness of the 2011 Queensland Floods Commission of Inquiry ("the 2011 Commission"). However, the fact is that some residents of Grantham held concerns that the 2011 Commission relied too heavily on computer-generated flood modelling and did not have regard to the available eye witness accounts.

9. Wagners unreservedly respects this Commission of Inquiry and recognises the clear necessity for it. Wagners' position remains that the erosion of the western embankment did not contribute to the devastation of Grantham.

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6 Ex 19 at page numbered 33.

7 Mr Macintosh (Ex 144); Dr Newton (ex 19 and 166); Mr Szylkarski (ex 163); the authors of the Cardno peer review report dated 28 May 2015 (Ex 95); the authors of the SKM flood risk report dated December 2014 (Ex 3); Dr Jordan (Ex 146).

10. Wagners fully participated in, and cooperated with, the 2011 Commission which published its findings in early 2012. Wagners has now fully participated in and completely cooperated with this Commission of Inquiry. In particular:

    (i) Wagners has made documents available to this Commission;

    (ii) the Managing Director, Denis Wagner, has made statements for, and given information to, this Commission as requested;

    (iii) Wagners has ensured the cooperation of its current employees and to the extent possible, its former employees, with this Commission;

    (iv) Mr Wagner has given full and frank evidence at the public hearings of this Commission over a period of two days; and

    (v) Wagners has retained a hydrologist, Dr David Newton, to provide an expert report for the assistance of this Commission.

11. The expert report of Dr Newton[8] was provided to this Commission before the commencement of the public hearings in Gatton. The report was tendered during the opening addresses of the public hearings on 20 July 2015. That report, to the extent possible at that time, was prepared by Dr Newton with express reference to the available eye witness accounts of what had occurred in Grantham on 10 January 2011.

12. Prior to preparing this report, Dr Newton was instructed that a legitimate concern had been expressed by some members of the Grantham community that the available eye witness accounts, which constitute crucial evidence in the inquiry into the cause and consequences of the flood, had previously been ignored. He was instructed that Wagners was concerned

[8] Ex 19.

that the evidence of these eye witnesses ought to properly be taken into account in any analysis of the flood and that he would be required at the end of the public hearings of this Commission to provide a supplementary report testing any scientific flood modelling against those eye witness accounts.

13. During the public hearings, Dr Newton was instructed to review the transcripts of the evidence given at the hearings, with particular reference to the eye witness accounts of the people of Grantham who experienced the flood that terrible day.

14. Dr Newton's supplementary report, in which he has considered the evidence of every eye witness who gave a statement to this Commission (some of whom of course gave evidence) was provided to this Commission on 20 August 2015[9].

15. After carefully considering all of the available eye witness accounts, in the light of scientific data and flood modelling, Dr Newton confirmed the conclusion reached in his first report that the western embankment had not played any role in the terrible damage and loss of life sustained in Grantham on 10 January 2011. It should be noted that Counsel Assisting the Commission did not consider it necessary for any part of either of Dr Newton's reports to be tested in cross examination. Further, not one of the parties who were given leave to appear at the public hearings required Dr Newton to be called to give evidence so that any of his opinions and conclusions could be challenged or questioned. In those circumstances, it is only fair that this Commission accept, in toto, the apparently uncontroversial opinions of Dr Newton. Of course, Dr Newton's opinions are shared by the hydrologists who were called to give evidence at the public hearings.

[9] Ex 166.

16. Wagners welcomed this Commission of Inquiry. As the public hearings have progressed, the allegations against Wagners have all fallen away. In particular:

(i) there is no evidence at all of negligence by or on behalf of Wagners;

(ii) there is no evidence at all of any criminal conduct by Wagners or any of its employees;

(iii) there is no evidence at all of any corruption by Wagners; and

(iv) there is no evidence at all of any attempt by Wagners to destroy evidence. Unchallenged evidence led from the geotechnical engineer, David Starr (an expert retained by this Commission), was that the earthworks performed by Wagners to the western embankment after the flood were necessary remedial work to repair the breach to the embankment. These works were required by the Department of Environment and Heritage Protection.

17. While a central subject matter of this Commission of Inquiry is the Grantham Sandplant, which at relevant times was operated by Wagners, the terms of reference require the Commission to inquire into various matters in which Wagners may have a community or social interest, but not a legal interest[10]. Wagners wish only to be heard, however, either in these written submissions or in later oral submissions, on the issues listed below. That said, Wagners remains eager to assist this Commission in any way possible and will of course make oral submissions or further written submissions on any additional topics if invited to do so.

[10] Such as the performance of the emergency services on the day of the flood.

18. The topics which Wagners wishes to specifically address are as follows:

(i) The terms of reference do not authorise a finding as to when the bunds on the western embankment were created or contributed to;

(ii) Alternatively to (i) above, no findings should be made that Wagners created or contributed to the bunds;

(iii) The terms of reference do not authorise a finding as to whether the operations at the Grantham Sandplant were conducted in compliance with the relevant permits;

(iv) Alternatively to (iii), the operations at the Grantham Sandplant were conducted in accordance with the relevant permits; and

(v) The bunds on the western embankment did not cause or contribute to the flooding in Grantham on 10 January 2011.

TERMS OF REFERENCE

19. The terms of reference of this Commission are:

> *". . . to make full and careful inquiry in an open and independent manner with respect to the following matters . . .*
>
> *(a) the flooding of the Lockyer Creek between Helidon and Grantham on 10 January 2011, with specific reference to any natural or manmade features of the landscape which could have altered or contributed to the flooding;*
>
> *(b) whether the existence or breach of the Grantham quarry caused or contributed to the flooding of Grantham;*
>
> *(c) whether the existence of breach of the Grantham quarry had a material impact on the damage caused by the flooding of Grantham;*

(d) whether the breach of the Grantham quarry had implication for evacuation of Grantham;

(e) how these matters were first investigated and how eye witness accounts were dealt with, particularly by State Government agencies and emergency services.

AND directs that the Commission carry out its inquiry by calling on expert hydrologists, expert engineers, law enforcement, emergency services and relevant industries; and reviewing relevant literature and data.

AND further directs that, in carrying out the Inquiry, the Commission may have regard to the experiences of individuals and other entities directly or indirectly affected by the flooding of the Lockyer Creek between Helidon and Grantham on 10 January 2011 to the extent the Commissioner considers relevant.

AND further directs that the Commission is to have regard to any reports, evidence, data, eye witness accounts and video footage in relation to the flooding of the Lockyer Creek between Helidon and Grantham on 10 January 2011 including the findings of the Queensland Floods Commission of Inquiry."

20. It can be seen then that paragraphs (a), (b), (c), (d) and (e) define the matters of inquiry. The three paragraphs which follow simply direct the Commission as to how it will inquire into the matters identified in paragraphs (a), (b), (c), (d) and (e). Nothing in the three paragraphs which follow in any way extends the matters of inquiry.

21. It is submitted that two issues that have been the subject of some evidence are not issues within the terms of reference of the Commission and therefore should not be the subject of findings. These issues are:

(i) whether the bunds on the western embankment were created in breach of any permits under which the quarry was operating; and

(ii) when the bunds were created.

22. Paragraph (a) of the terms of reference contains what could fairly be described as the primary grant of jurisdiction to the Commission. It authorises the Commission to inquire into *"the flooding of the Lockyer Creek between Helidon and Grantham on 10 January 2011"*. That, naturally encompasses inquiry into the causes of the flooding. This is confirmed by the remainder of paragraph (a), namely *"with specific reference to any natural or manmade features of the landscape which could have altered or contributed to the flooding"*.

23. Therefore, the focus of the Inquiry is *"the flooding . . . on 10 January 2011 . . ."* and its cause, with specific reference to any causal connection between any natural or manmade features and the flooding on 10 January 2011.

24. It follows then that paragraph (a) of the terms of reference authorises inquiry into such things as:

    (i) whether the bunds were natural or manmade;

    (ii) the dimensions and other physical features of the bunds; and

    (iii) the physical composition of the bunds (soil type, compaction, etc), as that may be relevant to determining whether the bunds were natural or manmade and what effect (if any) they may or may not have had on the flow of water during the flood.

25. What is not authorised by paragraph (a) of the terms of reference is inquiring into:

    (i) the history of the creation of the bunds; and/or

    (ii) whether the bunds were lawfully created.

26. The history of the creation of the bunds throws no light on *"the flooding of the Lockyer Creek between Helidon and Gatton on 10 January 2011"*. Further, the history of the creation of the bunds is not relevant to whether or not the bunds *"altered or contributed to the flooding"*.

27. There is nothing in paragraph (a) of the terms of reference which authorises an investigation into whether or not the operator of the Grantham Sandplant (from time to time) complied with any permit. What is relevant to *"the flooding"*, and whether the bunds *"altered or contributed to the flooding"*, is the physical dimensions and composition of the bunds and what effect they had in directing water. Whether the bunds were created in compliance with any permit is not probative of any issue relevant to construing the *"flooding"* or any effect of the bunds upon the flooding.

28. Paragraph (b) of the terms of reference directs the Commission to inquire specifically into any causal connection between the Grantham Sandplant and the flooding. What is relevant here are the physical features of the Grantham Sandplant (including the bunds) at the time of the flooding. Neither the history of creation or the bunds, nor whether the Grantham Sandplant was being operated in accordance with relevant permits, is relevant to that issue.

29. Paragraph (c) of the terms of reference directs the Commission to inquire specifically into any causal connection between the Grantham Sandplant and any damage caused by the flooding at Grantham. Again, what is relevant here are the physical features of the Grantham Sandplant (including the bunds) at the time of the flooding. Neither the history of the creation of the bunds, nor whether the Grantham Sandplant was being operated in accordance with relevant permits, is relevant to that issue.

30. Paragraph (d) of the terms of reference directs the Commission to inquire as to the implication (if any) for the evacuation of Grantham as a consequence of the breach of the Grantham Sandplant. What is relevant here is the impact of the Grantham Sandplant during

the flooding. Neither the history of the creation of the bunds, nor whether the Grantham Sandplant was being operated in compliance with relevant permits, is relevant to that issue.

31. Paragraph (e) of the terms of reference concerns not the flood itself, but the investigation of *"these matters"*. The term *"these matters"* must refer back to the *"matters"* of investigation specified in paragraphs (a), (b), (c), (d) and (e) of the terms of reference. It follows then that as neither the history of the creation of the bunds, nor whether the Grantham Sandplant was being operated in compliance with relevant permits, are matters of inquiry within paragraphs (a), (b), (c) or (d) of the terms of reference, the investigation of those issues cannot be within the terms of reference of paragraph (e).

THE BUNDS

32. It is submitted that issues relevant to the Commission's terms of reference are:

    (i) What was the pre-flood topography of the Grantham Sandplant, in particular the bunds; and

    (ii) What materials made up the eastern and western bunds?

33. If the Commission, contrary to our submissions made above, forms the view that the terms of reference empower it to consider the history of the bunds, then a further question to be determined is over what periods were the eastern and western bunds created?

Pre-flood topography

34. Mr Starr is a geotechnical engineer whose evidence in relation to some matters was, it is submitted, far from satisfactory. However, he analysed samples taken from test pits and did a series of examinations to identify natural ground. The earth above natural ground, he opined, was placed there by human intervention. It is accepted that the level delineated by

the black line in plate 2 of Mr Starr's first report[11] accurately identifies the level of natural ground. It is not contested that the earth above natural ground has in fact been placed on the natural earth at some time during the time that the Grantham Sandplant has been in operation.

35. Mr Starr then, with the aid of various pieces of data including LiDAR surface contour, data calculated the heights of the eastern and western bunds. It is conceded that plate 2 of Mr Starr's first report[12] fairly accurately (subject to what we say below) shows the heights of the materials on the western side of the Grantham Sandplant. However, Mr Starr's interpretation of the data is flawed.

36. Plate 2 of the first report of Mr Starr purports to be a long section of the eastern bund over a distance of about 440m. An observation is then made in that report that:

> *"The eastern bund was about 4 metres in height above natural ground level, but varied between 2 and 6 metres."*[13]

37. However, what can be seen is that there are only two points where the bund exceeds 4m. The first is at about chainage 50 and the second is at about chainage 320.

38. It can be seen that ground level is not exceeded both at about chainage 20 and about chainage 90. That area is not part of the eastern bund, but is in fact a stockpile of materials known as "the southern stockpile". This is obvious from figure 2 to the first report of Mr Starr. The southern stockpile is clearly visible in that photograph, as is the narrow, low ground between the southern stockpile and the eastern bund. That narrow low ground is the green line shown in plate 2 of the first report of Mr Starr, at about chainage 90. Mr Starr

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11 Ex 53 - Mr Starr's first report page 2.
12 Ex 53 - Mr Starr's first report at page 2.
13 Ex 53 - Mr Starr's first report at paragraph 9 page 1.

conceded in cross examination that the area shown on page 2 between chainage 0 to about chainage 90 is not part of the eastern bund[14].

39. One of the various errors made by Mr Starr in his analysis is demonstrated on the plate 2 graphic at about chainage 320. At that point, there is shown a high point of just over 4m. Figure 2 to the first report of Mr Starr shows this point as a fairly round area shaded red. In the top left hand corner of figure 2 is *"cross section A-A"* which is plate 2. It can be seen in figure 2 that the grey line which should be drawn across the top of what is the eastern bund misses the red section at about chainage 320. When giving his evidence, Mr Starr acknowledged this mistake but explained, in effect, that it was difficult to draw a line[15]. He did not explain why drawing a line was so difficult. In any event, he went on to explain that the true height of the red round section was 6m[16].

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[14] **Starr** T12/1015L19-25: "*Could we go back to figure 2, not 2A. We come back to a point you made at the beginning of your evidence, Mr Starr, which is that what you had originally thought was the southern remnant bund is actually now some sort of separate mound. Yes, so that's that area there on the southern corner of the quarry pit. The reason you believe there are access tracks is because you - I mean, we can all visually identify them - - -?---Yes.*".

[15] **Starr** T12/1014L4-26 "*Okay. Yes, so we have a colour interval for four to six metres, which is red, and we can see at the northern end of the eastern bund that there is some earthworks that are up to that height. Generally, it's two to four. Just pause on that … That's the red area that's in the four to six metre range? … but you see you've got a cross-section A to A?---Yes, A to A is along here, and I note now that I didn't quite put the cross-section right through the middle of that. It's actually quite difficult on the screen because you can't actually see what you're doing until you've done, if you see what I mean. That's what I wanted to ask about because if you look at the cross-section, it looks like, from the cross-section, at that point where there's a lot of material, the natural ground level is at about 122 and the height of the eastern bund is at about 126, which would only be four metres, but is that a consequence, is that right, does it only get up to four metres, or is that a consequence of not running through the - - -?---Yes, that's a consequence of my misaligning this part of the section. The highest point is there and I think there are contours that we can blow up to see that."*

[16] **Starr** T12/1014L31 to T12/1015L3: "*MR SOFRONOFF: Are these contours taken from LiDAR?---Yes, they are, so both pre and post-flood, these are LiDAR contours which are at half-metre intervals and probably accurate to about 250 millimetres. MR HODGE: Can we zoom in on this area here. A bit more?---Yes, so we've got 126.5, 127, 127.5, probably up to almost 128 in the middle of that dimple. Yes, and just to explain what this means, there's a contour that's marked as 126.5 and then there's a number of further contours indicating in each case a rise of half a metre within that 126.5 contour. Is that right?---Yes, that's right. So we've got 127, 127.5, and I think the dot in the middle of the dimple is 128. That's the highest point above natural ground level?---Yes. That's when the eastern bund is six metres above natural ground level?---That's correct."*

40. Later in his evidence, Mr Star was asked by the Commissioner to calculate the average height of the eastern bund. He said that average height was about 3.5m[17].

41. Having regard to the average height of the eastern bund is, with respect, more likely to confuse than assist. When one disregards the southern stockpile (as one should) it can be seen that the raised area shown in red on figure 2 on the northern end of the bund is a good deal higher than any other part of the bund. Apart from that high area on the northern end, the bund generally does not exceed 2m in height. A useful graphic is, we submit, exhibit 123[18] where lines parallel to Mr Starr's ground level line have been drawn to show the heights of the land at 2m, 4m and 6m from ground level. This graphic has not been adjusted to take into account Mr Starr's error, so that the land at about chainage 320 only shows a little over 4m. While the calculation has not been done, if one disregards the unusually high pile on the northern end of the bund, the average height is unlikely to be much over 2.5m.

42. Plate 1 of the first report of Mr Starr[19] purports to show a *"schematic cross section through western levy, Grantham Quarry"*. Mr Starr, when referring to the *"western levy"* is referring collectively to the western embankment (natural ground) in both the western and eastern bunds. Again, plate 1 is somewhat misleading. Unless careful comparison is made between plates 1 and 2, plate 1 could be interpreted as a cross section of two parallel walls, one being about 1m high and the other one being about 4m high. In evidence, Mr Starr accepted that

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17 **Starr** T12/1033L30-45 "*MR DAVIS: So, if I take you to paragraph 9 on page 1 of your statement? --- Yes. I beg your pardon, your report. You say, "The bund between the access track and the edge of the quarry lake, the eastern bund, was about four metres in height above natural ground level but varied between two and six metres"? ---Yes. I think our arithmetic average is probably 3.7. It would be less than that if you took out the southern stockpile, wouldn't it? ---Yes. It would be slightly less than that. MR SOFRONOFF: If you remove the southern stockpile the average would be about what, Mr Starr, do you think?---Well, I'm guessing here. Roughly?---Roughly 3.5.*"

18 Ex 123 - Graphic of plate 2 with further scaled levels.

19 Ex 53.

plate 1 did not represent a cross section at every point on the bunds[20] but said that it was a cross section taken of the high point on the northern part of the bund. Of course, if that is what Mr Starr intended, then plate 1 is inaccurate because it shows the eastern bund at about 4m. This is a carryover from the error made in plate 2 which, in itself, is a repeat of the error made by Mr Starr in the preparation of figure 2, when he was apparently unable to draw a line through the red high section shown in that graphic.

The nature of the material making up the bunds

43. It is not contentious that the eastern and western bunds consisted of soil which had been dumped firstly on natural ground and then later dumped on soil that had itself been dumped on natural ground.

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[20] **Starr** T12/1032L15 to 1033L45 "A long section of the eastern bund prior to the flood?---Yes. Can I now take you to figure 2, which Mr Hodge has already taken you to, but we need to go to it again in your report. We see plate 2 is replicated at the top of figure 2, isn't it?---Yes. I'm hoping this works, but I want to ask you questions both about plate 2, which is at the top there, and then by reference to the graphic that we see as figure 2. Alright?---Yes. From plate 2, what we see is that there is a height of more than four metres is achieved at about chainage 50 and about chainage 320. Would you agree with that?---Can we blow that section up, please? A bit more. So we're looking at section AA. Yes, section AA, about chainage 50?---Yes, we've got - - - You've got that red bit there?---Yes. You see that. Then again at about chainage 320-odd?---320, yes. So they're the two high points, if you like, along the long section of the eastern bund?---Above natural ground level. Above natural ground level?---Yes. And I'm sorry, I should have said that, the black line represents natural ground level and all your heights are taken from natural ground level?---Yes. I think we're agreed with this, but I want to just make sure we are, if you have alook at the long section, you'll see that there's an area from up to about chainage 90 and, at chainage 90, there's a very low point. Do you see that? ---Yes, the former haul road. If we then swing down to figure 2 itself. MR SOFRONOFF: Could we blow it up, please, so everyone can follow it. MR DAVIS: We're having a technical difficulty which doesn't appear to be associated with me. No, it might be. There we are. That there is the area chainage up to chainage 90, isn't it?---Yes, it is. If we regard that there as the eastern bund - - -?---Yes.- - - the position then is that nearly all of it is well under three metres, and there's really only the one section towards the north which tops four metres, and that's fairly close to the breach which is on the northern side of that area. Am I reading that right?---Yes. I think if you do the sums throughout these figures, you get three point something. MR SOFRONOFF: Mr Starr, on plate 2, which is the cross-section - - -? ---Yes. - - - is the left-hand side the north or the south?---The left-hand is the south. Thank you?---Yes, if you do the sums and subtract these figures and look at the - there's another version of this called figure A, figure 2A, that has the contours on it. If you do the figures. You can't see the contours on this one. MR DAVIS: So, if I take you to paragraph 9 on page 1 of your statement? ---Yes. I beg your pardon, your report. You say, "The bund between the access track and the edge of the quarry lake, the eastern bund, was about four metres in height above natural ground level but varied between two and six metres"? ---Yes. I think our arithmetic average is probably 3.7. It would be less than that if you took out the southern stockpile, wouldn't it? ---Yes. It would be slightly less than that. MR SOFRONOFF: If you remove the southern stockpile the average would be about what, Mr Starr, do you think?---Well, I'm guessing here. Roughly?---Roughly 3.5."

44. Mr Starr in his first report referred to the soil that had been placed on natural ground and said:

> *"b. … I do not know how this material was placed and compacted although air photo evidence suggest it was dumped by a front end loader. It is possible that the basal fill layers were track rolled although the bunds are generally too narrow to allow safe access for large compaction equipment."*[21]

45. That paragraph firstly suggests that the soil was compacted, secondly suggests that the material was dumped by a front end loader and thirdly opines that it is possible that the basal fill layers were track rolled. The second and third suggestions made by Mr Starr are purely speculative. The first suggestion also has no factual basis to support it. There were no compaction tests done by Mr Starr[22]. In oral evidence he conceded that there was no evidence of any compaction and that the bunds most probably consisted of soil which had simply been dumped[23].

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21 Ex 53 – First report of Mr Starr paragraph 92 at page 19.

22 **Starr** T12/999L44 to T12/1000L6 *"Are you able to tell us or make any observations about the level of compaction of that material above the natural alluvium?---Well, they appear to be two distinct layers. The material here is a lighter colour. The material at the top is a darker colour. I think the lower band of the fill is probably more compact. I can't say whether it's been compacted by a mechanical plant, but it would have self-compacted under its own weight to some extent. I think the material on top looks more like waste material, topsoil that perhaps has been added at a later stage, I can't say for certain, but - - -"* **Starr** T12/1055L5-14 *"And so there's a number of things that you considered. The first thing is, based on the material in the test pits, one of the questions you considered was whether or not the material in those bunds had been compacted or track rolled and what was your view about that?---I could find no definite evidence of track rolling. I think it would be difficult to prove. In one of the photographs in the test pit we saw it did look as if there was a looser layer that had been dumped on top. Assuming the material had been there for a few years there would have been a degree of self-compaction. So, each year after rainfall events water would seep into the material. It would naturally settle to some extent. So, I can't make a definite statement on whether it was compacted by mechanical plant."*

23 **Starr** T12/1037L36 to T12/1038L6 *"And presumably there would be a number of other important considerations when designing and building the levee?---Yes, there would. Alright. Now, when one looks at what's been called the bund, whether it's the western or eastern bund, it doesn't appear to you to be an engineered structure, does it?---No, it's just a man-made structure as far as I'm concerned. It is obviously just simply a deposit of materials, isn't it?---It's a deposit of material. There's no evidence - - - MR SOFRONOFF: But there's more to the question than that. Mr Davis means having regard to what you saw in its structure and composition it appears not to have been a planned structure in the sense of having any particular purpose. It appears to be a structure that arose*

46. The physical characteristics of the bunds have relevance to another issue upon which the Commission heard evidence, although as previously submitted this issue is beyond the terms of reference. The permits under which the Grantham Sandplant was operated prohibit the building of a *"levee"*. Mr Starr conceded that whether or not the eastern or western bunds had in fact operated as a levee or levees was a matter which he had not considered and on on which he had formed no opinions[24]. He was, he frankly conceded, "*not a dam engineer*"[25]. However, he gave some evidence of the engineering considerations usually relevant for the construction of a levee. These considerations include the nature of the soil, (in particular its moisture content and cohesiveness), the degree of compaction, the batter angles and the height[26]. Mr Starr conceded that neither the western nor eastern bund appeared to be an engineered structure and rather was simply just a deposit of materials[27].

The period over which the bunds were created

The photographs

47. The Commission has received a number of photographs of the area of the western embankment of the quarry over a number of years, dating from 1982 to 2009.

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because people dumped earth there from time to time?---Yes. I don't think it's an engineered structure."

24 **Starr** T12/1035L40-43 "*So, can I take it from that, that you didn't consider that it was your role to determine whether or not the embankments did or did not act as a levee? That's right, isn't it?---Yes. It wasn't my role.*"

25 **Starr** T12/1038L11.

26 **Starr** T12/1037L4-14.

27 Transcript page 1037 to 1044. See in particular **Starr** T12/1037L36 to T12/1038L6 "*And presumably there would be a number of other important considerations when designing and building the levee?---Yes, there would. Alright. Now, when one looks at what's been called the bund, whether it's the western or eastern bund, it doesn't appear to you to be an engineered structure, does it?---No, it's just a man-made structure as far as I'm concerned. It is obviously just simply a deposit of materials, isn't it?---It's a deposit of material. There's no evidence - - - MR SOFRONOFF: But there's more to the question than that. Mr Davis means having regard to what you saw in its structure and composition it appears not to have been a planned structure in the sense of having any particular purpose. It appears to be a structure that arose because people dumped earth there from time to time?---Yes. I don't think it's an engineered structure.*

48. Those photographs "prepared by" Amanda Gearing which are asserted to have been taken in approximately 1985[28], that given to Jonathan Sippel by the previous owner of his property which are said to have been taken in July 1997[29] and those taken by Mrs Mallon in 2000[30] are not in stereo; nor are the photographs taken by Mr Gallagher, probably in 1988, but mis-described as having been taken in 1996[31].

49. Those photographs, together with eye witness observations over the years, provide a body of evidence from which the Commission may draw some conclusions as to the height and development of the bunds in the three decades before the flood. This issue (if within the terms of reference) is of significance to Wagners given that it purchased the Grantham Sandplant in November 1998.

50. Photographs are *"stereo pairs"* if they are taken on the same occasion, but at slightly different times along the aircraft's flight path. Where stereo pairs are obtained, they can be viewed together through a mirror stereoscope. A pair of photographs when so viewed creates a three dimensional image[32]. That is here important, as the Commission is interested in whether the bunds, which are elevated areas, can be seen in the photographs.

51. The Commission has been provided with a mirror stereoscope. Therefore the Commissioner can view the stereo pair photographs and draw conclusions as to what is shown in them.

52. Mr Starr, in his evidence, purported to interpret the photographs and give an opinion as to what the photographs show. Issues arise, we submit, as to whether:

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28 Ex 53 - Plate 25 of the first expert report of Mr Starr.
29 Ex 53 - Plate 26 in the first report of Mr Starr.
30 Ex 53 - Plates 27(a) and 27(b) in the first report of Mr Starr.
31 Ex 53 - Plates 30(a) and 30(b) in the first report of Mr Starr.
32 **Starr** T12/1016L25-45.

(i) any regard should be had to Mr Starr's opinion as to what the photographs show; and

(ii) if so, whether his opinion should be accepted.

53. There is no doubt that there is *"science"* behind the operation of the mirror stereoscope. It should be accepted, for instance, that when stereo pairs of photographs are viewed through a mirror stereoscope, an accurate 3D image appears. Mr Starr's evidence that no accurate calculation of the height of objects can be made without surveyed reference points being struck should also be accepted[33]. His evidence that the striking of survey points is a more sophisticated method of calculating the height of objects in aerial photographs should also be accepted[34]. However, there seems to be no science behind Mr Starr's expression of an opinion of what is shown in the photographs; in other words, the Commissioner is in as good a position as Mr Starr to view and interpret the 3D photographs shown in the mirror stereoscope and the other photographs.

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[33] **Starr** T12/1019L1-20: "*Alright. You take over from there?---You then compare that with what you do know is a lump of dirt and make a judgment on how high the vegetation is compared with the lump of dirt. Alright. Can I stop you there. There is a system, isn't there, which is more sophisticated than your exercise where you actually strike particular survey points and then you can actually work out heights?---Yes, that's right. So - - - And you haven't done that, have you?---I haven't done that, no. If you had done that there would be pure science, wouldn't there, because you're actually then calibrating off particular points and you're applying a scientific formula presumably. Is that right?---There would certainly be more science, yes. So, that's not what you're doing. What you're doing - or I beg your pardon, what you've done is you've identified the 3D image and then, really quite subjectively, you're giving an opinion as to what it means?---Yes. I'm giving an opinion*."

[34] **Starr** T12/1019L1-20: "*Alright. You take over from there?---You then compare that with what you do know is a lump of dirt and make a judgment on how high the vegetation is compared with the lump of dirt. Alright. Can I stop you there. There is a system, isn't there, which is more sophisticated than your exercise where you actually strike particular survey points and then you can actually work out heights?---Yes, that's right. So - - - And you haven't done that, have you?---I haven't done that, no. If you had done that there would be pure science, wouldn't there, because you're actually then calibrating off particular points and you're applying a scientific formula presumably. Is that right?---There would certainly be more science, yes. So, that's not what you're doing. What you're doing - or I beg your pardon, what you've done is you've identified the 3D image and then, really quite subjectively, you're giving an opinion as to what it means?---Yes. I'm giving an opinion".*

54. Mr Starr, quite worryingly, referred to the discipline of geotechnical engineering as *"a mixture of an art and a science"*[35]. It is, it is respectfully submitted, unusual in the extreme for a scientist called to give expert opinion evidence to base his opinions on *"part art"*.

55. When cross examined, Mr Starr insisted that he was in a better position to interpret the photographs than a lay person because of his *"experience"*[36].

56. However, when pressed, he could not explain how his experience placed him at any advantage when interpreting the photographs[37].

57. Mr Starr showed himself to be a self-opinionated witness, who clearly resented being challenged. His evidence should be approached with extreme caution. For instance:

> *"I'll come back to what I put to you earlier. I am in as good a position, as is the Commissioner, as you are, to look into the stereoscope and determine whether there's an elevation shown, or, for that matter, depression. You would agree with that? – Yes, but you need to put that in the context of more than a week's experience looking at it."*[38]

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35 **Starr** T12/987L15-24; Starr T12/1016L22-26.

36 Transcript pages 1016 to 1020 – for example see **Starr** T12/1018L21-43 "*No, I suggest to you that if what we're doing here is looking into the stereoscope and trying to work out whether there's a lump of dirt there or not - - -?---It's an opinion. It's an opinion, so it's subjective to a point?---Yes. Do you agree with that?---Yes. So we're in the art section here, are we, not the science section?---It's an informed art. I think you're agreeing with me it's subjective, we're in the art section rather than the pure science section?---Yes. I think you're agreeing with me that I am in as good a position as you once the machine is all set up to look and see whether a lump of dirt is there or not. You would agree with that?---No, else I wouldn't be sitting here. Why are you in a better position than me to determine whether on the 3D photograph there's a lump of dirt there or not?---I think there is in this art some experience. Can I outline the experience I've had in this art?*"; **Starr** T12/1019L20-25 *"So, why is your opinion better than mine?---Because I've been doing it slightly longer than you. Alright, but we're only looking at lumps of dirt?---We're looking at lumps of dirt."* **Starr** T12/1020L6-14 "*MR DAVIS: And what has any of that got to do with whether you are better qualified than me to see a lump of dirt through that, because that's all we're talking about; a rise? That's all we're talking about is an elevation, aren't we ---Yes. We're talking about - - - We're not talking about active faults. We're not talking about - - -"*

37 **Starr** T12/1019 to 1020.

38 **Starr** T12/1018L15-20.

And then:

> *"I think you're agreeing with me it's subjective, we're in the art section rather than the pure science section? – Yes."*[39]

And then:

> *"So, why is your opinion better than mine? – Because I've been doing it slightly longer than you."*[40]

58. Circumstances can obviously be imagined where the aim of the examination of the photograph is to identify some special geological feature on the landscape. For instance, when questioned by the Commissioner about his experience, Mr Starr said that he had studied photographs to identify geological faults[41]. Naturally, there is a science behind understanding and identifying a geological feature such as a fault. Mr Starr is no doubt in a better position than a lay person to identify such a feature from a photograph. In other words, Mr Starr knows what to look for. However, the evidence is that the bunds are no more than piles of earth. The question then is whether the photographs show piles of earth[42].

59. The rules of evidence do not apply to a Commission of Inquiry. However, the common law rules of evidence constitute a body of jurisprudence developed to, in effect, regulate evidence to be considered by a court or tribunal. That regulation seeks to ensure, as much as practicable, that a court or tribunal acts only on reliable evidence. Tribunals which are not bound by the rules of evidence should nevertheless not disregard the rules when determining what evidence they should or should not consider and act upon[43].

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39 **Starr** T12/1018L33-34.

40 **Starr** T12/1019L21-23.

41 **Starr** T12/1019 to 1020.

42 **Starr** T12/1017 to 1018.

43 *Lillywhite v Chief Executive, Liquor Licensing* [2008] 100 ALD 568; 2008] QCA 88 at paragraph [34] per Muir JA (with whom McMurdo P and Chesterman J agreed) said "*I readily accept that the Rules of*

60. In *Smith v The Queen*[44], the High Court heard an appeal from the appellant's conviction for armed robbery. A security camera in the bank which was robbed recorded various photographs of the bandits. It was contended by the Crown that the appellant was one of the robbers. The Crown called evidence from police officers who claimed to have had previous knowledge of the appellant and who asserted that the appellant was one of the people shown in the photographs.

61. The High Court considered section 55 of the *Evidence Act 1995 (NSW)* although, for the present considerations of the Commission, the difference between the common law concept of relevance and those concepts of relevance embodied in the New South Wales statute are irrelevant. In allowing the appeal, the High Court said:

> *"[10] The question of the relevance of the evidence of the police officers may be approached in this way. The fact in issue was, as we have earlier said 'Is the person standing trial the person who is depicted at the right-hand side of some of the photographs tendered in evidence?' Is an assertion, in evidence, by a witness that he now recognises, or has previously recognised, the person who is depicted in those*

Evidence, based as they are on the cumulative wisdom and experience enshrined in judicial decisions, are relevant. However, whatever approach may have been appropriate in relation to a hearing under the Children's Services Act 1986 (ACT), it is not the case that the Tribunal acting under s 47(4) of the Commercial and Consumer Tribunal Act 2003 (Qld) should act on the premise that the Rules of Evidence apply unless, for sound reason, their application is dispensed with. Such an approach imposes a procedural limitation on the Tribunal which is not to be found in the language of the evidentiary provision and, indeed, is inconsistent with it. Section 47(3) also makes plain the legislative intention that the Tribunal not adopt procedures appropriate for a court. It provides: "The proceeding is to be conducted with as little formality and technicality and with as much speed as the requirements of this Act and a proper consideration of the matters before the Tribunal permit." Dixon J in *Briginshaw v Briginshaw* (1938) 60 CLR 336 at 361 said that "*The truth is that, when the law requires the proof of any fact, the tribunal must feel an actual persuasion of its occurrence or its existence before it can be found. It cannot be found as a result of a mere mechanical comparison of probabilities independently of any belief in its reality. No doubt an opinion that a state of facts exists may be held according to indefinite gradations of certainty; and this has led to attempts to define exactly the certainty required by the law for various purposes …. Except upon criminal issues to be proved by the prosecution, it is enough that the affirmative of an allegation is made out to the reasonable satisfaction of the tribunal. But reasonable satisfaction is not a state of mind that is attained or established independently of the nature and consequence of the fact or facts to be proved. 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 issue has 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.*"

[44] (2001) 75 ALJR 1398.

> *photographs as the accused, relevant evidence? That is, in the language of s 55 of the Evidence Act, could that evidence, if accepted, rationally affect the assessment by the jury of the probability that it is the person standing trial who is depicted in the photographs?*
>
> *[11] Because the witness's assertion of identity was founded on material no different from the material available to the jury from its own observation, the witness's assertion that he recognised the appellant is not evidence that could rationally affect the assessment by the jury of the question we have identified. The fact that someone else has reached a conclusion about the identity of the accused and the person in the picture does not provide any logical basis for affecting the jury's assessment of the probability of the existence of that fact when the conclusion is based only on material that is not different in any substantial way from what is available to the jury. The process of reasoning from one fact (the depiction of a man in the security photographs) taken with another fact (the observed appearance of the accused) to the conclusion (that one is the depiction of the other) is neither assisted, nor hindered, by knowing that some other person has, or has not, arrived at that conclusion. Indeed, if the assessment of probability is affected by that knowledge, it is not by any process of reasoning, but by the decision maker permitting substitution of the view of another, for the decision-maker's own conclusion."*[45]

62. Here, the same considerations apply. The Commissioner should himself, with the aid of the mirror stereoscope where there are stereo pairs, study the photographs and determine whether mounds of earth in the position of the bunds can be seen. Without some proper explanation from Mr Starr as to why his scientific (or for that matter *"artistic"*) abilities place him in a better position than the Commissioner to interpret the photographs, the temptation to rely on what Mr Starr says that he sees should be resisted.

63. A good example of the difficulties in relying upon Mr Starr's opinion of what is shown in the photographs is this exchange:

> *"Mr Sofronoff: Mr Davis, just let me put this to Mr Starr, hopefully without interfering with what you're doing.*
>
> *It appears to me that whatever might be the height of the area that's under discussion now, the area right in the middle which appears to be a track that's used, although it's got some vegetation on it, is lower than the areas on either side of it.*

[45] At paragraphs [10] and [11].

What do you say about that? – Can I confirm what we're talking about? This area here?

Let me get my little machine. If you look at the projection, there appears to be a track that leads down there? – Yes.

And that track appears to me, subject to what you say, that track appears to me to be lower than the land on either side of it? – Yes. I have said . . .

Is that how you see it? – Yes, it is how I see it, and I suggested that if it is only a matter of half a metre it could be that that track has just eroded below the pre-existing land surface."[46]

64. The Commissioner can obviously see (as anyone could) a raised area. Mr Starr asserts that it is about half a metre which is, frankly, inconsistent with his earlier evidence that without survey points, height cannot be accurately estimated. It is also inconsistent with his first report, where he says that he cannot see any bunds in the 1997 photograph and makes no mention of any raised areas either side of the track[47].

65. Further, Mr Starr's opinion of what the photographs show is inconsistent, unreliable, and in some circumstances just wrong.

66. Mr Starr seemed quite incapable of orientating any photographs other than those taken from almost directly above the site. There are three examples of this inability.

67. The first example concerns the photographs which Mr Gallagher believes were taken in 1996, but were probably taken in 1988. These are the photographs shown in plates 30(a) and 30(b) in Mr Starr's first report. Mr Starr thought that the photograph[48] showed the *"western side of the quarry . . . in the middle distance"*[49]. In cross examination, he admitted

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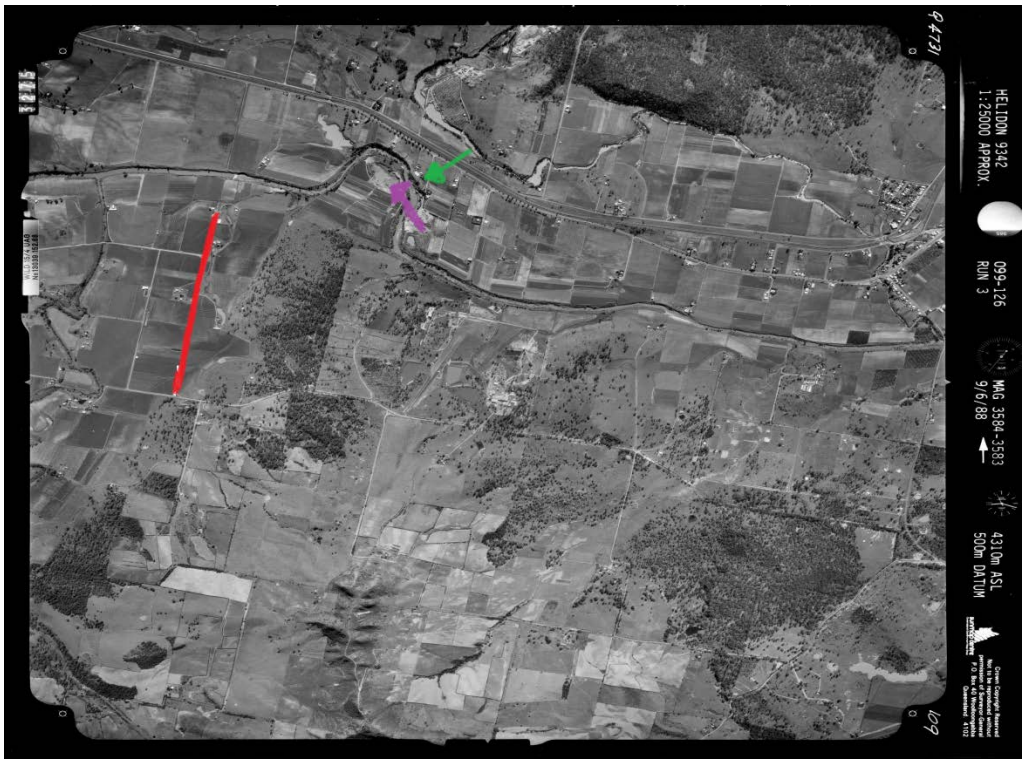
46 T12/1029.
47 Pages 42 and 43 of Mr Starr's first report.
48 Ex 53 - Plate 30(a).
49 Ex 53 - Paragraph 12.4 of the first report of Mr Starr.

that what he had believed to be the western side of the quarry, simply was not[50]. We have circled in red this area on a copy of plate 30(a) which follows.

68. The buildings in the background (circled in yellow), Mr Starr thought to be buildings on Klucks Road. The photograph is obviously taken from the eastern bank of the Lockyer Creek at the place of the stockpiles in the concrete batching area. The building in the background is Mr Reiman's house, with the hill at the south west of the house. What is seen in the middle distance is not the western embankment, but a stockpile. The western embankment is behind the tree shown in the left of the photograph. We have marked on a copy of exhibit 54 that follows, the actual line of the photograph in purple and also a line of the photograph as Mr Starr incorrectly interpreted it in green. Klucks road is marked in red. Mr Starr thought that the photographer was looking directly towards the south west, whereas in fact, the photographer was looking north west.

[50] T12/1034 to 1035.



69. The following passage of cross examination also demonstrates Mr Starr's general arrogance and resentment at being challenged. In order to excuse his obvious error, he gave these answers:

> *"Alright. And after having looked at it more carefully you realised you were just simply looking in the wrong direction? – Well, I wasn't looking at the wrong direction. The photograph was looking at a different direction.*
>
> *I see. It's the photographer's fault, is it? It's just the case that you couldn't work out, I suggest, what you were looking at? – I misidentified the properties.*
>
> *And prepared to say in a report, after you've misidentified the properties, that this shows the western bund not being there in 1996. That's a pretty big mistake, isn't it? – It's an error of judgment, yes.*
>
> *It's a pretty big mistake, isn't it? – No, I don't think it's a big mistake.*

Looking in the wrong direction and then opining as to the existence of the bund is not a big mistake? – No, I don't think so."[51]

70. Mr Starr also mistakenly orientated the photographs taken by Mrs Mallon in the year 2000, which are plates 27(a) and 27(b) in his first report. In cross examination, his attention was drawn to a triangular shaped area which clearly shows a substantially raised bank[52]. A copy of plate 27b is reproduced below and the triangular area is circled in red.

71. It was put to him that this was the northern end of the bund. He responded by saying that the bund was to the left of the triangular shaped embankment. It is submitted that he is wrong about that and that this is obviously the case having regard to what can be seen in plate 27a (reproduced below; the triangular section is circled in red; the batching plant area, which is to the south-east of the pit area is outlined with a green box).

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51 T12/1034L39 to 1035L9.

52 Transcript page 1031; plates 27a and 27b on page 37 of the first report of Mr Starr are different copies of Mrs Mallon's year 2000 photograph.

72. The western embankment effectively commences at the triangular shaped bank and continues to the right of the triangular shaped bank. Mr Starr's report states that the embankment is in that position[53]. When he refers in his evidence to the *"cutting"*, he obviously thought that he was referring to the haul road to the south of the bund. In fact, the photograph is looking at the cutting at the north end of the western embankment. Reproduced below is a cropped copy of the 2001 DNRM photograph[54] showing the position of the triangular shaped cutting in Mrs Mallon's photograph (circled in red), that part of the haulway where the cutting is (within the red circle), and that place where Mr Starr wrongly believes the cutting is (circled in blue).

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53 Ex 53 - See paragraph 146 on page 36 of the first report of Mr Starr "*…Based on Plate 27b which is an enlargement of a cropped section of Plate 27a, there may be a cutting alongside the haul road. Because the field of view is cut-off at the right side (western end), I cannot see the access track along the western levee, and am not able to comment on the presence of any bunds either side of the track.*"

54 Ex 46.

73. Mr Starr also misunderstood the photograph taken by Mr Jonathan Sippel, which appears as plate 26 in his report[55]. At paragraph 145 of his first report, Mr Starr refers to the *"north eastern levy"*. We ask the Commission to take this photograph, enlarge it, and view the area which we have circled in red on the copy reproduced below. That area is the western embankment, and the bund on the western embankment can be very clearly seen.

55 Page 36 and paragraph 145 of the first report of Mr Starr.

74. There are two sets of stereo pair photographs taken in 1997. The first set of photographs was taken by DNRM ("the first 1997 photographs") and these appear as plate 31a in the first report of Mr Starr. An enlargement appears as plate 31b. Mr Starr says of the enlargement that he *". . . notes no bunds either side of the access track"*[56]. He then considers a stereo pair of photographs taken in 2001 when mounds of earth can clearly be seen[57]. This is plate 32(b). He concludes that the bunds have therefore initially been created between 1997 and 2001. He then goes on to note changes in the bunds, finally concluding that they have reached their pre-flood configuration by 2005[58].

75. After preparation of Mr Starr's first report, Wagners produced stereo pair photographs taken in 1995[59] and 1997[60] ("the second 1997 photographs"). The second 1997 photographs were taken from a lower altitude than the first 1997 photographs. Any rational comparison of the first 1997 photographs and the second 1997 photographs clearly shows that the second 1997 photographs contain much more information than the first 1997 photographs. Bewilderingly, Mr Starr seemed not to wish to concede this, saying at one point that the altitude at which the photograph is taken is not a consideration[61]. The Commission should, we respectfully submit, carefully consider that assertion which severely undermines Mr Starr's general reliability in the interpretation of the photographs.

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56 Ex 53 - Page 41 and paragraph 156 of the first report of Mr Starr.

57 Ex 53 - Page 44 and paragraphs 158 to 160 of the first report of Mr Starr.

58 Ex 53 - Page 44 and paragraph 163 of Mr Starr's first report.

59 Ex 102.

60 Ex104.

61 **Starr** T12/1025L30-45 " *- - - that's the 1997 photograph that you relied upon?---That's correct, yes. Do you agree with this proposition. This photograph is of a far inferior quality to the one we just looked at for 1997? MR SOFRONOFF: Sorry, far inferior? MR DAVIS: Inferior. To be fair, by "inferior", I mean less information is available from that photograph than the other one?---If you examine this in stereo, it's actually better in terms of height because it is taken vertically above this surface. MR SOFRONOFF: Why does that make it better?---Well, the previous photos commissioned by Wagner are oblique photos, they are not ideal for gauging features from - certainly in terms of height.*"

76. Although Mr Starr asserted in his first report that no bunds could be seen in the first 1997 photographs, he conceded that there were elevated areas in the area of the western embankment shown in the second 1997 photographs which were in fact taken before the first 1997 photographs[62]. He opined that these were though no more than half a metre high[63]. However, his opinion as we have already observed was that without surveying reference points (there are none here), the heights of elevated areas seen in mirror stereoscope view of stereo photographs cannot be determined[64]. As already observed, when pressed on this, Mr Starr would only say that the estimation of height of a half a metre was made by him in reliance upon his *"experience"*, the significance of which in this context he was unable to explain[65].

77. Mr Starr then opined that he could see raised areas in the first 1997 photographs[66]. This is inconsistent with what he stated in his first report, at least to the extent that in his first report he never mentioned any raised areas that might have been shown in the first 1997

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62 **Starr** T12/1026L35 to 1027L24: "*MR DAVIS: Through this area here and here. It's a simple question: is there any elevation in that area?---Yes, I can see that the track is slightly lower than the land at the top of the terrace either side. That's the only elevation that you can see. Is that right?---Well, I can see the trees for reference, I can see there's some tracks through. Elevation of the earth from the ground. We're looking for lumps of dirt, remember, Mr Starr. MR SOFRONOFF: We're looking for the beginnings of a bund. Is that right? MR DAVIS: Yes, so you can't see anything through there or there?---Well, I can see features, linear features, which I've interpreted as vegetation. But they might not be?---They might be material that's perhaps half a metre higher than the track. In the other 1997 photograph that you said wasn't as good for your purposes as this one, you clearly enough said that there may be up to half a metre of material?---Yes. With this one it seems you can't see that half a metre of material, which means it's either been removed or this just isn't as good a photograph as the other one for the purposes of interpreting elevation?---Well, I can see the same linear features along either side of the track. They are not so well defined, but they do show up more clearly under the stereo viewer. In any event, this along here, I think you've told us, could be vegetation or could be material?---It's more likely vegetation, I think. The vegetation is higher than any material. Of course, it could be vegetation on the material?---It could.*"

63 **Starr** T12/1027L5-6.

64 **Starr** T12/1019.

65 **Starr** T12/1019 to 1020.

66 **Starr** T121026 to 1027.

photographs[67]. This also shows as illogical his assertion that the first 1997 photographs were of more assistance than the second 1997 photographs[68].

78. Worryingly, it seems that Mr Starr's interpretation of the first 1997 photographs is affected by his opinion of what he says that he saw in the 2001 photographs[69]. It seems he relied upon the fact that mounds are shown in the 2001 photographs to conclude that the mounds were not present in the 1997 photographs[70]. In other words, because he could see mounds in both of the 2001 photographs, and couldn't see them in the first 1997 photographs, it follows that they were not present in 1997.

79. This all demonstrates the dangers in relying on so called *"expert"* opinion on an issue where there is no real science. Mr Starr acknowledged in evidence that a critical consideration in the assessment of aerial photographs is vegetation[71]. That is, with respect, obvious. He also conceded that the 2001 photographs showed the mounds clearly because of a lack of vegetation[72]. However, the second 1997 photographs, which obviously contain more

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67 Ex 53 - Page 41 and paragraph 156 of the first report of Mr Starr.

68 **Starr** T12/1028L1-29 "*MR DAVIS: I understood your evidence was that it wasn't uniformly flat shown in the other 1997 photograph?---Well, maybe my judgement was it might show half a metre of difference, but looking at these photos taken vertically it seems uniformly flat to me. Or it could simply be that the information which is in the other 1997 photograph that I showed you is not in this photograph simply because this one is a higher magnification. It's taken from further away. That's possible, isn't it?---Yes, that's possible. Your evidence can't possibly be that the further away or the higher up the photograph from the earth the more information one gets in the photograph. That can't be right, can it?---What I'm saying is that - - - Well, can that proposition be right? MR SOFRONOFF: Well, it can be, depending upon the resolution of the camera, but you - - - MR DAVIS: Well, I'm asking him. I'm asking him about that proposition. He's answering something else. MR SOFRONOFF: Yes. WITNESS: My point is that the photos taken vertically are more reliable in terms of interpretation than the oblique ones*."

69 **Starr** T12/1029 to 1030, see for example T12/1-20L14-18 "*Or I suggest to you it could be higher lumps of earth with vegetation on them? ---Well, I'm using as the yardstick the 2001 photo with the proto-bunds and assuming that they are about two metres high there's nothing on either of these sets of photographs, in this area, which I would say are two metres high."*

70 **Starr** T12/1029 to 1030 and see also T12/1019L1-5.

71 **Starr** T12/1017L34-39 "*MR DAVIS: And I can see you're enjoying it. You look through the stereoscope and you knew that sometimes what you're looking at, as by way of a raised area, the height may be in some way contributed by vegetation?---Yes. You know that from experience?---Yes.*"

72 **Starr** T12/1030L1-6 "*But, of course, the major distinction between this photograph and the 2001 photograph, which we'll come to in a moment, is that the 2001 photograph is virtually completed*

information that the first 1997 photographs, show thick vegetation over the area of the western embankment. When pressed, Mr Starr conceded that elevated areas were shown on the western embankment in the second 1997 photographs[73]. Mr Starr's reliance then on the first 1997 photographs is misplaced. They are photographs taken from high altitude and have been enlarged 400 or 500 times[74]. The absence on the image of clear evidence of mounds of earth is unsurprising given the thick vegetation shown in the second 1997 photographs.

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denuded of vegetation. Do you agree with that?---May I have a look at the 2001 photograph? Yes. It can be found as plate 32B which is at page 43 of your report?---Yes. Yes, so certainly the drought has affected the vegetation."

[73] **Starr** T12/1023L11-26 "*All through here, to use your term, there's a lot of vegetation, and I suggest to you that, under the stereoscope, you can see that there is height through this area, and the question is whether or not it is vegetation or the build up of other materials?---Yes. Do you agree with that?---Yes, I previously answered that question to Mr Hodge that I thought it might be, say, half a metre of material either side of the track. When you say there may be half a metre either side of the track, do we take that as confirmation that there is material there?---No. So there just might be material there?---Yes, because it's so low in height. So there may be material there and there's vegetation on top of it. Is that right?---Vegetation perhaps either side of it or on top of it*." **Starr** T12/1026L29 to 1027L24 "*What we would really like, rather than a judgement at the moment, is perhaps just answer to the question?---Yes. Is there elevation that you can see through there? MR SOFRONOFF: Through where, Mr Davis? MR DAVIS: Through this area here and here. It's a simple question: is there any elevation in that area?---Yes, I can see that the track is slightly lower than the land at the top of the terrace either side. That's the only elevation that you can see. Is that right?---Well, I can see the trees for reference, I can see there's some tracks through. Elevation of the earth from the ground. We're looking for lumps of dirt, remember, Mr Starr. MR SOFRONOFF: We're looking for the beginnings of a bund. Is that right? MR DAVIS: Yes, so you can't see anything through there or there?---Well, I can see features, linear features, which I've interpreted as vegetation. But they might not be?---They might be material that's perhaps half a metre higher than the track. In the other 1997 photograph that you said wasn't as good for your purposes as this one, you clearly enough said that there may be up to half a metre of material?---Yes. With this one it seems you can't see that half a metre of material, which means it's either been removed or this just isn't as good a photograph as the other one for the purposes of interpreting elevation?---Well, I can see the same linear features along either side of the track. They are not so well defined, but they do show up more clearly under the stereo viewer. In any event, this along here, I think you've told us, could be vegetation or could be material?---It's more likely vegetation, I think. The vegetation is higher than any material. Of course, it could be vegetation on the material?---It could*."

[74] **Starr** T12/1009L11-17 "*Have you prepared some video files to attempt to show the change over time in the close-up area of the western embankment?---Yes, I have. There were two video files, there is one called 1997, which is not based on this photo, it was the blown up image from DNRM, and I would point out that image has been blown up probably 400 or 500 times, so the difference in definition will be self explanatory*." **Starr** T12/1026L11-14 "*The parallax effect?---Yes, that's correct. I'm actually happier interpreting this. I agree that the definition is not so good because this has been enlarged 400 or 500 times, but when looked at in stereo it allows quite a good interpretation.*"

80. Given that the second 1997 photographs show mounds of earth in the relevant area and heavy vegetation, the proper interpretation of the first 1997 photographs and the 2001 photographs is not that the 1997 photographs show no elevations because the mounds are not present. The correct interpretation must surely be that the first 1997 photographs do not show the elevated areas shown in the second 1997 photographs because vegetation has obscured the view of the elevated areas in the first 1997 photographs.

81. Mr Wagner, when he gave evidence, was asked to say what he saw in various photographs[75]. He opined that a bund could be seen in the first 1997 photographs[76]. Mr Wagner was right to refuse to concede that the first 1997 photographs did not show a bund[77]. Mr Starr, as already observed, agreed not only that the second 1997

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[75] See for example **Wagner** T7/549-550; T7/568-572; T7/588-589; T7/600-601; T7/603; **Wagner** T8/635-638; T8/646-652; T8/652.

[76] **Wagner** T568L40 to 569L 29 "*MR HODGE: Page 42, Mr Commissioner. Mr Wagner, these are two photographs in the geotechnical report. The top photograph is an aerial photograph of the quarry as at 1997, and I think you've looked at that before for the purposes of preparing the statutory declaration you gave yesterday? ---Yes. I think one of the difficulties you had was in the version of the image that you were using when you zoomed in on it, it became very pixelated and you couldn't see close-up?---The 97 one was much clearer than the others, but we could get a very similar image to the bottom picture. Did you say you couldn't?---We did. If we just pop out the bottom picture, plate 31B, and you can see, Mr Wagner, as at 1997 there's a very clearly defined access track. This is running along the western side of the quarry pit. Do you agree with that?---Yes. It appears that there's no bund on either side of that access track at that time. Do you agree with that?---I don't entirely agree with it. If you look at - it is a very difficult photograph, I will acknowledge that, but I can't see that one. Can I put it up on this? MR SOFRONOFF: Yes, use whichever one is best, Mr Wagner, or most convenient?---If you look sort of closely through that area there, the ground colour and terrain looks different to the area through here, so it would indicate that there probably has been material deposited there. Just so others can see, Mr Wagner, you're indicating, if you look on that other screen, you're indicating that area - - -?---Yes. - - - as having indications of - - -?---A bund. - - - a piling up of a bund?---Material. But there is vegetation on it, though.*"

[77] **Wagner** T7/569L9-16 "*If we just pop out the bottom picture, plate 31B, and you can see, Mr Wagner, as at 1997 there's a very clearly defined access track. This is running along the western side of the quarry pit. Do you agree with that?---Yes. It appears that there's no bund on either side of that access track at that time. Do you agree with that?---I don't entirely agree with it. If you look at - it is a very difficult photograph, I will acknowledge that, but I can't see that one. Can I put it up on this?*" **Wagner** T7/570L1-33 "*If it's the case that the access track is in its current position over that area, then it's even plainer that to the west of the access track's current position, there is no placement of a bund in that photograph?---No, I don't agree. What I am suggesting may have happened is that, in time, the access track was put on the other side of the bund or over underneath the power lines. MR HODGE: Let me just make sure that I'm understanding what you're saying, Mr Wagner. So this is the access track as at 1997, you're saying that at some time after 1997, the access track might have been moved further to the west closer to the creek. Is that right?---The access track in the 2010 photograph*

photographs showed elevated areas consistent with dumping of materials, but also that the first 1997 photographs showed elevated areas.

82. In his evidence, Mr Wagner explained, by reference to the first 1997 photographs, the 2001 photographs and the 2009 photographs, that the track seemed to have moved west[78]. His conclusion was that the western bund had become the eastern bund. This is evidenced by the graphics on the photograph, exhibit 56 and the evidence of Athol Fowler[79], who gave evidence that he graded a track, probably sometime in 2007. This would have been a track into the western bund that had become the eastern bund after the quarry effectively consumed the eastern bund. Mr Starr gave evidence that the track had moved so that it

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seems to be in a different position. You think further to the west, though, closer to the creek. Is that right?---Yes. As at 1997, then, that is where the access track is, so it's not built up there? --No. What do you think has happened to that area by 2010?---That's been mined. You think that's been mined out?---Yes. MR SOFRONOFF: Do you know that or are you inferring that from the photos?---I deduce that from the aerial photographs. MR HODGE: When you look at this photograph, you detect a slight or some sort of bund at this stage on the western side of that track. Is that right?---Yes. Do you think that, at some later time, the track was moved onto the western side of that bund?---Yes."

78 **Wagner** T7/569 to 574; T7/603L30-39; **Wagner** T8/635 to 639; T8/652L30 to 653L4.

79 **Fowler** T8/663L9-24 **"***MR SOFRONOFF: You think what we're calling the bund on the western side was created as a rill when the road was cut and filled?---Yes, I would think that would be the case. I remember actually grading through there for access for the power line company. For the power line company?---Yes. Tell me about that. When was that?---I can't remember exact dates, but they were coming in there at one time to do some work on the power lines, so we just opened it up for them. I created it flat so they could get their vehicles through there. Was that when you were a batcher or when you were a manager?---I think it was the latter. You operated the machine?---Yes, I did at some stages, yes.* " **Fowler** T8/672L35 to 673L21 "*If we just pop out the bottom picture, plate 31B, and you can see, Mr Wagner, as at 1997 there's a very clearly defined access track. This is running along the western side of the quarry pit. Do you agree with that?---Yes. It appears that there's no bund on either side of that access track at that time. Do you agree with that?---I don't entirely agree with it. If you look at - it is a very difficult photograph, I will acknowledge that, but I can't see that one. Can I put it up on this? asset management of Energex, Mr Ronald Barbagallo, dates of inspections? --Yes. The last inspection undertaken of that pole was on 17 August 2007?---I may have done it when I was there at 2007, then. Do you say that you did work on the track for that pole inspection to be undertaken?---We would have done that, yes. Pole inspectors you see going across paddocks with no tracks, why would they want you to put a track on that occasion?---I don't know. We may have had a notice to say that they were coming and we may have just pushed a track in there for them so that they had easier access to it. You're familiar with pole inspection programs where people walk across paddocks and look at poles?---Yes, they also do it in vehicles. You put that track in at that time because you didn't think that it would be trafficable without you doing the work?---I presume so, yes. It was only done for the power company?---No, there was always a track there, but we upgraded it*."

passed to the west of some trees that had previously passed to the east[80]. He did not, in the evidence he gave when being examined by Counsel Assisting the Commission, suggest that the entire track had moved west. However, this is obviously so when one studies the photographs. In the end, Mr Starr accepted the graphics which had been prepared by Mr Wagner, which became exhibit 56[81].

The eye witness evidence

83. A number of witnesses gave evidence about the bunds.

84. A significant number of witnesses gave evidence as to the height of the bunds over the years. The witnesses can conveniently be regarded as falling within one of two categories, namely residents and Wagners' employees who worked at the quarry.

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80 **Starr** T12/993L39 to 994L25 "*The Lockyer Creek would be to the right-hand side of this image?---To the right going down here. So the fence line is probably just off this photo and this I refer to as the remains of the eastern bund. Again, these are what I call remnants because the material in front of us was washed away by the flood. And also what is interesting is that there are some trees here which appear in most of the air photographs that were examined; they've grown bigger over time, but - - - MR SOFRONOFF: That's that pair of trees we see from time to time in the - I think it's the southwestern part of the area. Is that right?---That's correct, Mr Commissioner. MR HODGE: Can we go to page 31 of the report. Can we pop out plate 22? So the photograph we were looking at before would have been taken somewhere up here. Is that right?---Yes, up there. And we can see, if you just have a look up at the screen, this part here that you've identified and this part here are the remnants of what remained and what you've called the eastern bund after the flood?---Yes, although I now understand that this may have been the remains of a stockpile rather than what we have called the bund. There was an access track, a haul road I would call it, going through here, and I think the eastern bund proper would have started from here somewhere. Can we go back to page 15 and can we pop out photograph B13?---So here we are at the southern end of the access track on the western levee. We can see some of the trees that appear in many of the air photos, again, grown a bit since 1990s. We can see what I now understand now to have been a stockpile of some sort. There was a haul road going down here before the flood and on the other side of this mound. Where I am standing, there is a power pole to my left and the track, the access track as it is at the moment then turns towards the east*." **Starr** T12/1011L20-35 *"MR HODGE: So, just pause it. Now, this area which I'm marking out which is what you've called the proto-bund or the western bund - - -?---Yes. - - - the bund between the access track and the Lockyer Creek, that area between 2001 and 2009, as you've observed it and as we can all observe it, remains the western bund?---Yes. But in this northern area above that tree that I'm pointing out there - if you just have a look up, Mr Starr - above that tree here - - -?---Yes. - - - or about there, the access track gets cut through the western bund - - -? --Yes. - - - or what was the western bund and so part of what was the western bund becomes part of the eastern bund?---The eastern bund. Yes, that's correct.*"

81 **Starr** T1039 to 1040; Mr Wagner's evidence on this point is at Wager T8/635L11 to 639L5.

85. The residents who offered evidence relevant to this topic were:

(ii) Kenley Arndt;

(iii) Helen Besley;

(iv) Thomas Friend;

(v) Patrick (John) Gallagher;

(vi) John (Sean) Gillespie;

(vii) Allan Marshall;

(viii) Anthony McIntosh;

(ix) Ian Pinkerton;

(x) Jonathan Sippel;

(xi) Henry (Bob) Stephenson; and

(xii) Martin Warburton.

86. Helen Besley, as the Commission heard, lived close to the quarry, but did not notice any changes to the embankments[82]. Mr Marshall lived in Grantham from about 2007 and he did not notice any changes to the quarry over that period[83]. Mr Warburton could not recall any build-up of the quarry at the west[84].

87. Some of these witnesses are contradicted by the aerial photographs and/or the LiDAR and/or the information from Mr Starr's test pits. For example, Kenley Arndt thought that 30

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82 Ex 29b - **Besley** paragraphs [2] to [6].

83 Ex 30 – **Marshall** paragraph [24].

84 **Warburton** T5/417L16-20 *"In particular, can I ask you to look at that area there, which is on the eastern side of the west side of the quarry, did you recall any build up of bank there as at 1993?---No, it just looked like a normal creek bank, you disappeared the tree line and then you could see the creek bank on the other side."*

years ago the embankment itself used to be flat[85]. This cannot, with respect, be correct because the test pits show the natural level of the earth as identified in plate 2 of the first report of Mr Starr. Mr Arndt also thought that from 2005, the wall started to get higher[86]. This is unlikely given that the photographs show little change from 2005. That is certainly Mr Starr's opinion[87].

88. Mr Friend also seems to have the western embankment lower in the 1970s and 1980s than is shown by Mr Starr's test pit results[88]. He said in his statement that from 2004, the height

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85 **Arndt K** T4/319L17-32 "*Where the quarry pit is now, what was it like back then when you would go fishing?---Well, it was a place where a farmer used to grow Lucerne, a flat, that's what I saw when we used to go there first, and then later on in life they destroyed it apparently. In your statement to the Commission, you talk about when the quarrying was underway, overburden being dumped up on a flat around the quarry?---Well, they used to put the overburden where it was the easiest place to put it. Could we switch to the big map, and could we pop out the quarry. Are there particular areas where you remember seeing overburden placed? MR SOFRONOFF: Before you start on it. You said you remember overburden being placed there. When are we speaking about, how long ago, the 80s, 90s?---No, after the 90s*." **Arndt K** T4/333L25-30. "*- - do you remember a flat paddock that had lucerne in it from time to time? ---That was back in - - - Before the quarry?---Yes.* "

86 **Arndt K** T4/336L7-35. "*MR TOBIN: When was it that you first saw the appearance of that bank to the west? Don't tell me about the height, but when there appeared to be material banked on it?---Yes, let me think. If you can't say, say you can't say?---Around about 2005, I would say, we could see it from where we were fishing. Do you have any memory of the bank being there before 2005, the bank on the western side as distinct from the bank on the northeastern side?---Well, it could have been a low and little bank, but I didn't see it that much. When you first became aware of that bank, did the bank height change or did it stay as a fixed bank from when you first - - -?---No, it kept getting higher and higher. MR SOFRONOFF: From about 05?---What's that? From about 2005?---Yes. How do you pin that date?---Well, when we were fishing you could see it going up higher, you know, higher over the years. I mean, why are you certain that it was from about 2005 that it began to get higher?---Well, I'm thinking that's about - if I can remember rightly - it's about that time. 10 years ago?---Yes.*"

87 Ex 53 - First report of Mr Starr page 2, paragraph 12 " *From my examination of oblique air photos, personal photos contained in various witness statements, Wagner's survey plan of 2008, and stereo air photo examinations covering the years 1997, 2001 and 2009, it is my opinion that the construction of bunds either side of the access track along the western levee of the quarry site commenced after August 1997 and before June 2001, and the bund construction continued from 2001 until about 2005.*" See also page 4, paragraph 19 "*The 2005, 2008 and 2009 photos indicate similar conditions of the bunds, and when compared with the pre-flood LiDAR data, in my opinion this indicates that the bunds had possibly reached their pre-flood condition by 2005. The topography of the bunds is confirmed by the 2008 survey plan.*"

88 **Friend** T6/499L1-14 "*Yes, you could just on top. If you were walking around in there, you wouldn't be able to see Johnno's house, which in them days was Teddy Evan's. You would look across, and, you know, you could just see the tip of the roof of it sort of thing, but now when you come back you could sort of stand up when you got up on that bit of a bund you could see right across the flats, but I just noticed the difference in buildup in the ground level, yes. And you were talking about standing on, effectively, the height of the access track?---Yes, just where the track goes in, the access, yes. You're*

of the western wall grew by about half a metre[89], but then said in evidence that it did not alter much at all[90] but thought that it was always *"6 or 7 metres"*[91] which is not supported by the evidence. He then, though, said that he thought that the height of the western wall was 2m to 3m higher, than the ground level[92] which is relatively consistent with the evidence. That evidence does not throw much light on what occurred before 1998.

89. Mr Gallagher thought that the changes to the western wall occurred from 2000[93], although this is unlikely given that there is clear evidence of the depositing of materials earlier on the southern area of the quarry and captured by the 1995 aerial photographs[94] and Mr Starr eventually conceded that there was evidence of at least half a metre elevation through the mid and northern area of the bund in the 1997 photographs[95].

90. Mr Sean Gillespie thought that from 2007 onwards there was an 8m wall around the quarry[96] which is inconsistent with a survey undertaken on behalf of Wagners in 2008.[97]

91. Mr McIntosh thought that in the 1970s, the pit was a low pocket of soil[98] but this is inconsistent with Mr Starr's test pit results. He thought more material was piled along the

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not talking about standing on top of the bund between the access track and the quarry?---No, if you stand on the bund you would have no trouble looking out. "

89 Ex 47 – **Friend** at paragraph [8].

90 **Friend** T 6/495L11-20 "*Do you remember in 2005 how high that was?---Yes, it stayed around that because it had a lot of grass on it, and it was always, you know, a good three - I didn't see them alter that at all, to be honest. It was mainly the northern one along the creek used to always get pushed up because I had a - I used to run cattle in there, I had a good relationship with a bloke who used to manage the place, and I fed my cattle down along the creek and I had an electric fence used to come down to my place to the creek and then I had just an electric fence run right along the top of that northern. There was another bank, a bund, what you call, right along the northern wall*."

91 **Friend** T6/503L35-38.

92 **Friend** T6/496L2-8.

93 **Gallagher** T6/461 L10-15 "*After 96, after that flooding, what changes did you notice around the quarry pit?---I never noticed the changes in the wall until probably getting up to 2000. You've got to remember, and it's a bit hard to see on this map here, but up in this area here was a fairly high area and it went down this way here. There was a fair slope along this part of the farm here, it's like this part over here. There's a fair bank here. This section here is up compared to this section down here.*"

94 Ex 54 and Ex 102.

95 Ex 104.

96 Ex 49 – **Gillespie** paragraphs [11] and [12].

97 Ex 107.

western side of the quarry from about 2000[99], but then was not sure as to the years[100]. He denied that the bund was created between 1996 and 1998[101].

92. Mr Pinkerton was adamant that there was no wall around the quarry when he worked as a truck driver visiting the quarry in 2006[102] and that the wall suddenly appeared in 2010[103]. Mr Pinkerton's evidence is contradicted by virtually all the objective evidence. It is not contentious that the photographs from 2001 show dumping of soil on the western embankment. The second 1997 photographs also, it is submitted, show this and Mr Starr ultimately thought that the first 1997 photographs may also have showed elevated areas. A structure which could be identified as the bund was certainly in existence and was probably in its present form by 2005.

93. Mr Sippel between 2006 and 2011 noticed what he described as a wall on the western side of the quarry[104], but his evidence adds little as to when it was actually created.

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98 **McIntosh** T6/512L10-25 "*And on your right-hand side what was the land like?---On the right-hand side of the track, from this point of the bank was quite high and it slowly, as you moved north, the ground tapered away as you got closer to the bend in the creek and along the track at about this point the bank immediately to your right was quite high and as you got further down at probably this point the ground tapered off to be fairly flat. It was a little bit lower than the paddock which is now where the quarry is. It showed that it was the same height, sorry, at this point as the paddock where it once crossed where the pointer is now. That's the north-western corner of what's now the quarry pit is where you're pointing?---Yes. On that it was level but, like I said, as you came from this way heading north the bank to the right was quite high and it just tapered down the further you go to the bend in the creek. At this level it was fairly flat ground. It was all the same at about this point*."

99 Ex 48 - **McIntosh** paragraph [13].

100 **McIntosh**T6/ 513L29-30 "*Yes?---I don't know when it was originally laid down, but there was some years, like it would have been in 2005, something around that time*".

101 **McIntosh**T6/520L40 to 521L2 "*That's just to make sure that we're - so that bit. I want to suggest to you that started to be laid from about 1996?---Not that part of the embankment, not that bunding there, but below that, what that triangle area you've got was put on, was laid down and that hasn't - was not there for that long of time. You won't agree with me when I suggest to you that it was completed by about 1998 in terms of laying the bund that ran along the western side of the pit?---I don't believe so, about that part of it.*"

102 **Pinkerton** T4/277L41-42.

103 **Pinkerton** T4/281L40 to 282L29.

104 Ex 25 - **Sippel** paragraph [8].

94. Bob Stephenson worked for CSR between 1990 and 1998 and thought that CSR never placed any material around the outside of the pit[105]. This, frankly, cannot be correct because the 1995 aerial photograph[106] clearly shows stockpiles on the south western side of the pit[107] and the 1997 photographs show elevations on the mid and northern end of the western embankment.

95. The witnesses who were called by the Commission, and who had worked for Wagners (or in the case of Mr Johnson, a previous owner) at the Grantham Sandplant, were:

(i) Cameron Coleman;

(ii) Nicholas Duff;

(iii) Athol Fowler;

(iv) Philip Gregory;

(v) Dean Heit;

(vi) John Johnson;

(vii) Trevor Leishman;

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105 Ex 67 **Stephenson** paragraphs [11] to [15]; **Stepheson** T9/706L10-25 "*Now, I'm sorry I should just ask one other thing. As far as you can remember, when you left the quarry in 1998, was there any over burden, any bund or anything that had been placed - - -?---No. - - - on that western side?---Definitely not. Definitely not. And when you say definitely not, why are you so confident of that?---Well, because I was the man that was working in the hole and apart from - we had a drag line that used to sit there, Alright, which actually dug the material out of the ground under the water and he put it onto that bench and let it dry out and then the other loader, which was me, would be on this one here pushing this dirt down onto there and then carting it over to the plant so there was basically no-one else in there apart from myself and occasionally we would have another chap that was working with us and he would occasionally drive the dump truck*."

106 Ex 54 and Ex 102.

107 About which Mr Stephenson could make no comment; **Stephenson** T9/712L15-25 "*MR SOFRONOFF: Have you got the laser pointer, Mr Andreatidis, or is that the part that you want that's in blue now? MR ANDREATIDIS: This bit down here. That part there, can you zoom that up a bit, please. Mr Stephenson, will you agree with me that appears to be mounds of deposited material?---Yes. Can you help us to explain how it got there?---No. MR SOFRONOFF: We're told that photograph was taken in 1995, Mr Stephenson.*"

(viii) John Stark; and

(ix) Denis Wagner.

96. Mr Coleman worked at the Grantham Sandplant between 2010 and 2011 and thought that the bund was in situ when he arrived. He says in his statement that he cannot recall its height, but it was at least 1m[108].

97. Nicholas Duff worked at the Grantham Sandplant between 2007 and 2011. He said that there were two bunds. One was along the edge of the pit at about 3m high and the other along the creek about 1.5m-2m high. No work was done on the western embankment and both bunds were in situ when he arrived[109].

98. Athol Fowler worked at the Grantham Sandplant between 2007 and 2008 and then again in 2010 and 2011. He said that no material was placed on the western side and that when he arrived, the bund was already there[110]. He could not recall how high it was, but it was probably between 1m and 3m, but he hardly ever went to the western side[111]. He recalls grading along the western side of the pit to create a track; that could have been in 2007[112].

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108 Ex 97 – **Coleman** paragraphs [12] to [17].

109 Ex 98 – **Duff** paragraphs [8] to [14].

110 **Fowler** T9/666L15-39 "*MR HODGE: So, if you just focus for a moment, Mr Fowler, on this area between the access track and just this tree line here, do you recall, when you were manager, there being a bund in that area?---Well, we didn't class it as a bund. It was just that there was dirt there, so - - - And how high was the dirt there above the access track?---I've got no idea, to be honest. It wasn't very high but I wouldn't have a clue. Less higher than the dirt on the other side between the access track and the quarry pit?---Yes. Alright. We can take that image down. You say in your statutory declaration that what we've called the eastern bund was, you believe, between one and three metres high?---Yes. And does that mean it varied along its length, as you recall it?---Yes, I believe so. Did you go out there along that track when you were the manager?---I was only - it would be very rarely, every now and again, but not too often. You say, "We did not put any material on top of it"?---Yes. We never placed any material at all on that western bank. We only stockpiled on the southern space or we did a little bit around on the northern, northern end.*"

111 **Fowler** T9/666L15-39 quoted in footnote above.

112 **Fowler**T8/663L9-24 **"***MR SOFRONOFF: You think what we're calling the bund on the western side was created as a rill when the road was cut and filled?---Yes, I would think that would be the case. I remember actually grading through there for access for the power line company. For the power line company?---Yes. Tell me about that. When was that?---I can't remember exact dates, but they were coming in there at one time to do some work on the power lines, so we just opened it up for them. I created it flat so they could get their vehicles through there. Was that when you were a batcher or*

This evidence is potentially important because it may explain the apparent alteration in the bunds shown by the graphic tendered through Mr Wagner's evidence[113]. It may well have been that what was the eastern bund had disappeared into the pit and that Mr Fowler carved a track into what was the western bund, creating an eastern and western bund.

99. Philip Gregory worked at the Grantham Sandplant between 2010 and 2011 and believes that no material was placed on the stockpiles[114].

100. Dean Heit worked at the Grantham Sandplant between 1998[115] to 2002 and the bund was already in situ. He thought the bund was 2m to 3m high[116].

101. John Johnson worked for Sellers in the period 1987 and 1988. He thought there was a storage stockpile on the western side of the quarry that was 2m to 3m high[117]. He thought

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when you were a manager?---I think it was the latter. You operated the machine?---Yes, I did at some stages, yes. " **Fowler** T8/672L35 to 673L21 "*If we just pop out the bottom picture, plate 31B, and you can see, Mr Wagner, as at 1997 there's a very clearly defined access track. This is running along the western side of the quarry pit. Do you agree with that?---Yes. It appears that there's no bund on either side of that access track at that time. Do you agree with that?---I don't entirely agree with it. If you look at - it is a very difficult photograph, I will acknowledge that, but I can't see that one. Can I put it up on this? asset management of Energex, Mr Ronald Barbagallo, dates of inspections? --Yes. The last inspection undertaken of that pole was on 17 August 2007?---I may have done it when I was there at 2007, then. Do you say that you did work on the track for that pole inspection to be undertaken?---We would have done that, yes. Pole inspectors you see going across paddocks with no tracks, why would they want you to put a track on that occasion?---I don't know. We may have had a notice to say that they were coming and we may have just pushed a track in there for them so that they had easier access to it. You're familiar with pole inspection programs where people walk across paddocks and look at poles?---Yes, they also do it in vehicles. You put that track in at that time because you didn't think that it would be trafficable without you doing the work?---I presume so, yes. It was only done for the power company?---No, there was always a track there, but we upgraded it*.

113 Ex 56.

114 Ex 99 - **Gregory** paragraphs [10] to [13].

115 When Wagners acquired the site.

116 Ex 64 – **Heit** paragraphs [9] to [11] and see **Heit** T8/687L10-25 "*MR SOFRONOFF: Where was the over burden taken to? Can you recall? ---The over burden, when I got there, was already gone. Like I said, that lower bench was probably - look, at a rough guess it was probably 20 metres wide. That had been stripped back already and then, you know, by the time I had left it was probably six metres wide, you know. Yes?---So, the excavator or the drag line used to sit on that lower bench. He just would sit there digging it out. He may not move for two days and if he did it was probably a couple of hundred mil, you know. And he then drops the product onto the back of a truck?---No. He used to just swing around and put it on that lower bench. We'd let all the water drain out and then we'd load it up and take it across to the other side, so it might sit there. It depended on trucks and availability. He might sit there a week. He might sit there a month. He might sit there six months.*"

117 Ex 62 – **Johnson** paragraphs [9] to [11]; **Johnson** T8/677L5-6 "*And then in your statement you say you recall a storage stockpile of over burden on the western side?---That's correct."* **Johnson** T8/677L25 to

there was vegetation growing on the embankment and he was unsure as to its height[118]. This evidence is consistent with what is shown in the second 1997 photographs, being an elevated area covered in vegetation.

102. Trevor Leishman worked at the Grantham Sandplant in 2000 and 2001 and recalls a bund a couple of metres high on the western side[119]. When he left he could recall a bund of about 2m in height[120]. While he was at the Grantham Sandplant , he did not place material along the western embankment and he did not see any other Wagners' employee doing so[121].

103. John Stark worked for Wagners between 2002 and 2004. He recalls that there was a bund which he thought was at least 1m[122] and it was in situ when he arrived. He recalls it as a

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678L1 *"MR SOFRONOFF: Thanks?---When we did due diligence on the property, I spent a little bit of time going over it to see how the quarry development had be done. It was done in a pretty haphazard manner. I recalled the overburden storage area there, it would appear that it might have been trucked up there and either tipped in one truck load or two truck loads wide, and in my statement there, the comment on that is the width and the height, and when you usually tip, say, one truck load, it's usually, say, one and a half metres high and the angle is reposed while the truck body is turned, the angle reposes, say, 45 degrees, so ultimately it comes out nearly four metres wide at the bottom. So for two loads wide, it will be, say, around about eight metres. I recalled after looking at the photographs and thinking a lot about it how untidy it was at the time because it wasn't tipped neat and tidy and, back in those days, most small operations didn't operate that tidy anyway. But it distinctly came to mind and it made me think, well, we're going to have to sort out a much better development plan for the site. Did you sort it out?---Pardon? Did you do something about it?---We worked towards it, but bear in mind I was only there a year and a half, and it's not something that can happen instantly. To the best of my recollection, we never did anything with the material that was there*."

118 **Johnson** T8/678L24-31 "*It appeared to you, as you recall it, to be about two dumps wide, about eight metres wide?---Well, with the effluxion of time, I can't be a hundred per cent sure of that. I know it was erratic. In addition to that, it was difficult to ascertain the reasonable accurate dimension on it, because there was weeds growing in it. When you dig overburden and stuff up and you shift it, quite often it promotes the growth of weeds, so there was - I remember, like, being a lot of weeds and stuff growing, so it was fairly difficult to determine concisely what might be the dimensions of it.*"

119 Ex 72 – **Leishman** paragraphs [5] and [10].

120 Ex 72 – **Leishman** paragraph [10]. **Leishman** T10/747L12-15 "*Again, as I understand it, at the point at which you left, you recall there being a bund of approximately two metres in height, but you're not sure ---? –Yes*."

121 **Leishman T10/**746L1-2 "*Did you ever place material there? – No, no, we never went out, no. Did you ever see anybody else place material there? – No.*"

122 Ex 65 – **Stark** paragraphs [10] to [14].

"safety bund"[123] and he thought it was about a metre high[124]. In the course of his evidence, the Commissioner asked Mr Stark questions. This exchange occurred:

> *"Commissioner: Just before you begin, Mr Davis, Mr Stark, you were there between '02 and '04?. . . Yes.*
>
> *If you assume that this room is 4½ metres, the ceiling is 4½ metres from the floor, if there had been an embankment made of overburden? -- Yes.*
>
> *--- on the western side of the pit, anywhere between the edge of the pit and the creek which was three to four metres high, you would have noticed it, I take it? -- Yes certainly.*
>
> *You didn't see anything like that? . . . No"*[125]

104. This exchange between Mr Stark and the Commissioner occurred before Mr Starr was called. Based on Mr Starr's report it was, with respect, appropriate for the Commissioner to ask Mr Stark about a bund *"3 to 4 metres high"*. However, as we have earlier submitted, that is not in fact a proper description of the eastern bund. Most of the bund was about 2m high going to about 3m. To the south of the bund was the southern stockpile which is much higher and to the north of the bund, there were the northern stockpiles, and a single mounded area of 6m on the variation part of the bund[126]. Mr Stark gave no evidence of ever going onto the bund.

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123 **Stark** T8/693L34-39 "*Maybe you can just help us. In terms of the extraction, the extraction was happening here, down on the lower bench?---Yes, well, it happens in two places because you remove the topsoil and loam, and bedding sand to get down to the sand layer, so this would push back first and this would follow up afterwards. So my recollection is wherever the edge of what you refer to as "the upper bench" was, that the safety bund was on the pit side of that*."

124 **Stark** T8/693L40-45 "*How high do you remember that being?---I would say it's at least a metre high. I don't recall the actual height, but I would say that because typically with those you built them to a height relative to the wheel size of machines operating on the site, so the rule of thumb was it was half the height of a wheel loader or a dump truck, whatever was running along there. You know?*"

125 **Stark** T8/694L40 to 695L8.

126 Ex 53 – Mr Starr's first report – Figure 1 "P*re Flood Contoures and Interpreted Height of Fill Plan North*."

105. What is evident is there is a significant variation in the estimates of the height of the eastern bund. This could of course be because the bund was varying in height, although there is a fairly solid body of evidence that material was not being habitually stockpiled there at least after 2005. In order to estimate the height of the bund from within the pit or from the eastern side of the Grantham Sandplant, one would have to had looked onto the excavation face of the pit. All that would have been seen would have been the exposed subsoils, on top of that natural ground, and on top of that the eastern bund covered in vegetation. It is all well and good now for a geologist to identify where the natural ground starts and stops and where the bund starts and stops. That would have been very difficult with the naked eye simply looking west towards the western embankment. That likely explains why there are fairly widely differing estimations of the height of the eastern bund.

106. Even if it is assumed that the bunds were created sometime between 1997 and 2001, there is no evidence to exclude creation of the bunds prior to November 1998 when Wagners purchased the Grantham Sandplant.

THE TERMS OF THE PERMITS

107. We submitted earlier that the question of whether the relevant permits were complied with is beyond the Commission's terms of reference. If those submissions are rejected, then it is submitted that the appropriate finding ought to be that Wagners did not breach any terms of the relevant permits.

108. To be clear, Wagners does not make any submission on the question of whether or not any conditions that were imposed on previous owners applied as at November 1998, when Wagners acquired the site. However, solely for the purposes of these submissions, it will be assumed (without admission) that any such conditions did apply.

The approvals

109. For these purposes, based on what has been notified to Wagners during the course of the public hearings, it is anticipated that the only conditions which are relevant are:

(i) Conditions 9 and 10 in the approval of 20 October 1981 issued by the Gatton Shire Council to Sullweis Pty Ltd, at the time the owner of the site[127]:

> " *9. BUFFER ZONES*
>
> *The buffer zone between the Lockyer Creek and any excavated area to be 40 metres, except where pegged to retain the natural water exit on the south east corner in case flooding of the lower terrace …*
>
> *10. WORKING MADE SAFE*
>
> *Overburden is not permitted to be placed so as to form a levee bank, unless approval is obtained from the Water Resources Commission…*"

(ii) Conditions 1 and 2 of the approval dated 20 February 1990 from the Gatton Shire Council to Sellars Holdings[128]:

> *1. Compliance with Conditions 1 to 16 of Council's Town Planning consent approval granted in 1981.*
>
> *2. Compliance with the requirement of the Water Resources Commission as set out in its letter of 3rd July, 1989."*

(iii) The Water Resources Commission letter of 3 July 1989 provided in condition 4 that "*overburden is not permitted to be stockpiled so as to form a levee bank*."

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127 Ex 51 – Conditions of Approval for a sandmining operation.

128 Ex 52 – Town Planning Consent from the Gatton Shire Council to Sellars.

The 40 metre buffer zone

110. It is submitted that the appropriate finding is that Wagners did not breach this condition.

111. The condition, by its language, requires there to be a buffer zone of 40m between *"the excavated area"* and the creek. The *"excavated area"* is of course the pit (not the bunds) and it is, at all points, more than 40m from the creek. This can be ascertained by using the figures in Mr Starr's first report to measure the distance between the pit and the creek.

112. Evidence given by Mr Starr on this topic is of no assistance to the Commission because it focuses, wrongly, on the distance between the foot of the bunds and the top of the creek[129]. Mr Starr said:

> *"Alright. If I can take you to the plate that is figure 2, which is in the annexures to your document?---Yes. The section?*
>
> *It's a photo with height markings on it and the lines indicate it. That's the one, yes?---Yes.*
>
> *Alright. Now, if I can take you to this point which is the south-west corner - - -?---Yes.*
>
> *- - - of what we've been calling the line of the eastern and western bunds?*
>
> *---Yes.*
>
> *Now, at this point, from these earthworks here, or what are said to be earthworks here, to the creek itself, is significantly less than 40 metres. Is that correct?---I believe so, yes.*
>
> *And that's illustrated to some extent. It's difficult to see on the screen here but we've got a scale here - - -?---Yes, that's right.*
>
> *- - - and 40 is marked on it. If you translate the scale across there's various points but certainly part of those are closer than 40 metres to where the creek begins?---I agree."*

113. Mr Flint was questioned about this condition and he was unable to provide any assistance[130].

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129 **Starr** T12/1045L34 to 1046L10.

Not a levee bank

114. It is submitted that the appropriate finding is that Wagners did not breach this condition.

115. Wagners did not "*place*"[131] or "*stockpile*"[132] the relevant material. The bunds were created by previous owners and were already in place as at 1998 when Wagners purchased the site. Please refer to paragraphs 43 to 102 of these submissions.

116. Further, there is no evidence that the material comprising the bunds was placed or stockpiled "*so as to form a levee bank*".

117. According to the evidence of the Department of Infrastructure Local Government and Planning, *"Under the water legislation a bund or overburden did not meet the definition of a levee bank unless it was constructed to prevent flooding. The State would have expected the company to apply for a licence to build a levee if it was for flood protection"*[133].

118. Mr Starr agreed that a "*fair*" definition of a "*man made levee bank*" is an embankment built to prevent flooding of low lying land. It may or may not have an impervious core[134].

119. Mr Starr also agreed that in designing and constructing a levee bank, consideration would need to be given to:

    (i) the appropriate height of the walls[135]. There was no engineering evidence led about this. In fact, what the evidence shows is that the uneven height of the bunds and

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130 **Flint** T11/902L10-15 "*Just in relation to that, because it's referred to in a number of documents which are conditions but also documents that aren't conditions. When it says "a buffer zone of 40 metres from the creek", is that the high water mark of the creek or was it the centre of the creek, or what?---I don't know. Is it defined anywhere, to your understanding?---Sorry, I can't answer that one.*"

131 To use the term used in condition 10 of the 1981 approval.

132 To use the term used in the Water Resource Commission letter dated 3 July 1989 which is picked up by condition 2 of the 1990 approval.

133 Ex 214 – Mr Johnston's affidavit sworn 17.07.15, at paragraph 163; see also paragraph 162 *"This means that from 1989 the company would have required State approval to build a levee bank, if the purpose of the levee bank was to prevent flooding."*

134 **Starr** T12/1036L10-14.

topography was such that water would have inundated the pit area in the southwest corner, the north-west corner and also from the south-east corner;

(ii) the nature of appropriate soil, in particular, moisture content and its cohesiveness. As Mr Starr said, consideration must be given to the foundation conditions[136];

(iii) compaction[137]. No compaction tests were done by Mr Starr[138]. In oral evidence, he conceded that there was no evidence of any compaction and the bunds most probably consisted of soil which had simply been dumped[139]; and

(iv) batter angles[140]. There was no evidence about batter angles.

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135 **Starr** T12/1037L4-5.

136 **Starr** T12/1037L7-9.

137 **Starr** T12/1037L10.

138 **Starr** T12/999L44 to T12/1000L6 "*Are you able to tell us or make any observations about the level of compaction of that material above the natural alluvium?---Well, they appear to be two distinct layers. The material here is a lighter colour. The material at the top is a darker colour. I think the lower band of the fill is probably more compact. I can't say whether it's been compacted by a mechanical plant, but it would have self-compacted under its own weight to some extent. I think the material on top looks more like waste material, topsoil that perhaps has been added at a later stage, I can't say for certain, but - - -*" **Starr** T12/1055L5-14 *"And so there's a number of things that you considered. The first thing is, based on the material in the test pits, one of the questions you considered was whether or not the material in those bunds had been compacted or track rolled and what was your view about that?---I could find no definite evidence of track rolling. I think it would be difficult to prove. In one of the photographs in the test pit we saw it did look as if there was a looser layer that had been dumped on top. Assuming the material had been there for a few years there would have been a degree of self-compaction. So, each year after rainfall events water would seep into the material. It would naturally settle to some extent. So, I can't make a definite statement on whether it was compacted by mechanical plant."*

139 **Starr** T12/1037L36 to T12/1038L6 "*And presumably there would be a number of other important considerations when designing and building the levee?---Yes, there would. Alright. Now, when one looks at what's been called the bund, whether it's the western or eastern bund, it doesn't appear to you to be an engineered structure, does it?---No, it's just a man-made structure as far as I'm concerned. It is obviously just simply a deposit of materials, isn't it?---It's a deposit of material. There's no evidence - - - MR SOFRONOFF: But there's more to the question than that. Mr Davis means having regard to what you saw in its structure and composition it appears not to have been a planned structure in the sense of having any particular purpose. It appears to be a structure that arose because people dumped earth there from time to time?---Yes. I don't think it's an engineered structure."*

140 **Starr** T12/1037L14.

120. Further, Mr Wagner explained why the bunds would not work as a levee:

> *"MR HODGE: And in terms of what a levy bank is, could you just explain what your understanding is of a levy bank?---The best example I can give of a levy bank is there is a number of towns in regional Queensland that have levy banks around them: Charleville, Roma, Goondiwindi and those sorts of towns. A levy bank is a structure that is built up to keep water out or stop the flow of water.*
>
> *MR SOFRONOFF: And what did you understand the words "levy bank" to mean in this condition?---I don't know that I put any sort of real emphasis on the words "levy bank". You know, I would have considered back then I think that we couldn't build, you know, a structure around the rim of the quarry that would stop water going in I assume but I probably never really put a lot of thought into it on the day."*[141]

And also as follows:

> *"By reference to the graphic, which is plate 2, could you point out any features which would indicate that the bund may not be an appropriate structure to act as a levee?---If you look at chainage about 340 through to 400, the level indicated there is very close to what the author of this report determined to be natural ground level. In my opinion, I think that was natural ground level, the level that we were working on. Had this been constructed or intended to be a levee, it simply doesn't work because the water would run around the end of it.*
>
> *You gave some evidence yesterday about where the breach occurred?---Yes.*
>
> *That's the breach which allowed water to then come into the pit - - -?---Yes.*
>
> *- - - during the flooding event. Can you point out on the cross-section there the area of the breach?---Well, my understanding is the breach is in that chainage 350 to 400, maybe 390 to 400, so 50 or 60 metres wide. So, in essence, what I believe happened in this event was the Lockyer Creek overtopped at that point and flowed into the pit. So it overtopped on the natural ground and the embankment, that's the level of the embankment right along that western embankment, where it overtopped at that point, because that was naturally the lowest point on the embankment and it flowed*

141 **Wagner** T7/550L15-29.

into the pit and eroded, and that is what is known as the breach in a lot of the reports. The breach was about 50 metres wide and several metres deep." [142]

121. It is submitted that any physical thing (such as stockpiles of earth) that is in the way of flood water has the potential to stop or cause the flood water to be diverted. It must be a question of fact and degree. Here, taking the evidence at its highest, the bunds may have influenced the flow of flood water in some way. However, the creation of the bunds can fairly be described as haphazard, and apparently undertaken without consideration to the matters referred to in paragraph 119 above. The bunds were of varying heights, comprised uncompacted soil and were not positioned or designed so as to prevent or mitigate the flow of flood water into the pit. In those circumstances, it cannot be held that the bunds formed a levee bank or banks.

THE GRANTHAM SANDPLANT DID NOT CAUSE OR CONTRIBUTE TO THE DAMAGE CAUSED BY THE FLOOD

Physical evidence of flooding in the Lockyer Valley

122. The flood was an extreme event, the highest flood on record and not previously experienced in anybody's living memory. All the studies which have been undertaken in respect of the flood event reflect this.

123. The Bureau of Meteorology in its report entitled "*Southeast Queensland Floods January 2011*"[143] describes the flood event as an "*exceptional and tragic rain event*"[144]. The report describes "*heavy to intense*" rainfall in December; that rain fell on "*an already saturated*

142 **Wagner** T8/634L24 to 635L6.

143 Ex 1.

144 Ex 1 at page 1 "*An exceptional and tragic rain event occurred over southeast Queensland during the second week of January 2011 causing extreme flash flooding in the Lockyer Valley and major river flooding in the Brisbane and Bremer Rivers.*

catchment from very much above average to highest on record rainfall in December"; and this led to "*extreme river level rises and flash flooding*"[145].

124. In the last four months of 2010, ocean temperatures around Australia broke previous records, resulting in Queensland experiencing its wettest July to December[146].

125. The Bureau of Meteorology reported that its radar imagery for 10 January 2011[147] showed the rain band with embedded storm cells moving through the region and that this contributed to flash flooding in Toowoomba and the Lockyer Valley region[148]. Counsel Assisting the Commission, in the opening, described, with respect correctly, the storm cells as having merged into "*super storm cell*" which arrived over the Lockyer Valley by 1pm[149].

126. The Bureau of Meteorology reported that the "*heavy rainfall*" from 9 to 12 January 2011 led to "*the development of extreme creek rises and extreme flash flooding*" in the Lockyer Valley[150]. In a figure comparing and summarising the peak creek heights with historical data, the Bureau of Meteorology stated that in respect of the Lockyer Creek, on 10 January 2011,

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145 Ex1 - at page 1 "*A moist tropical airstream and potently unstable atmospheric conditions led to the development of heavy to intense rainfall over southeast Queensland between the 9th and 12th of January 2011. This rain fell over an already saturated catchment from very much above average to highest on record rainfall in December. This led to extreme river level rises and flash flooding in the Lockyer Valley and major river flooding along the Brisbane and Bremer river including Brisbane City and Ipswich."*

146 Ex 110 – Inquest into the deaths caused by the South-East Queensland Floods of January 2010 at page 6.

147 Ex 2.

148 Ex1 - at page 4 "*Analysis of imagery during the 9th to 12th of January indicates several periods of very intense rainfall during the 10th and 11th of January. The sequence of radar imagery in Figure 2.2.1 shows the rain band with embedded storm cells that moved through the region between 10am and 1pm on the 10th of January and attributed to flash flooding in Toowoomba and the Lockyer Valley region. A broad rain band with embedded thunderstorm cells are clearly evident."*

149 T1/3L13-21.

150 Ex1 - at page 6 *"Heavy rainfall was recorded across southeast Queensland from the 9th to the 12th of January 2011.This led to the develop of extreme creek level rises and extreme flash flooding in the Lockyer Valley and major river flooding in the Brisbane, Stanley and Bremer rivers including Brisbane city and Ipswich. Record flood heights were recorded at various locations along Lockyer and Warrill Creeks and the Bremer and Brisbane River. Peak river levels on the Bremer River at Ipswich and along the Brisbane River from Mt Crosby to Brisbane city remained below the 1974 flood level".*

the peak at Helidon was the "*Highest on record*" and the effect was "*Extreme Flash Flooding Mon 10/01"*[151].

127. The extreme and unique nature of the flood event is confirmed in the flood study commissioned by the Lockyer Valley Regional Council[152]. Dr Macintosh in his first report said that:

> "*The 10th January 2011 flood event had never before been experienced in the Lockyer Valley's recorded history, and particularly in the area of Grantham. It was a flash flood in the Lockyer Valley driven by extreme rainfall event and only rarely expected to occur."*[153]

And:

> "The magnitude and rapid rise of the flood produced inundation characteristics *never before been experienced or imaged by the residents of Grantham*[154]*.*

128. Dr Newton also described the flood as extreme and unprecedented[155]. This flood peaked 5m higher than any other flood and rose 4 times faster than any other historical flood since

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151 Ex1 - Bureau of Meteorology report entitled "*Southeast Queensland Floods January 2011*" at page 8.

152 Ex 3 - Lockyer Creek Flood Risk Management Study at page 21-"*The flood event that occurred on the afternoon of Monday 10th January, 2011 devastated communities, destroyed lives and washed away houses. A total of 17 lives were lost with two other persons never found, presumed dead. This event consisted of an intense two hour storm burst which travelled in a south west direction from the coast towards Wivenhoe Dam and across the upper catchments of the Lockyer Valley. The storm burst intensified as it travelled further inland, reaching its most intense form across the Murphys Creek, Fifteen Mile Creek and Alice Creek catchments. This storm created very high rates of runoff from an already saturated catchment"*; Ex 3 Lockyer Creek Flood Risk Management Study at page 22 - " *The most intense rainfall fell on the Fifteen Mile Creek and Alice Creek catchments to the immediate north of Helidon. As the rain cell moved south-westerly towards Toowoomba, there were heavy falls on the upper Lockyer Creek catchment. Specifically, Murphys Creek catchment and the Lockyer Creek (upstream of Withcott and Postmans Ridge) received very intense rainfall. The shape of the weather system uniquely matched the "bowl" shape at the top of the Lockyer catchment. This resulted in the high intensity rainfall to fall wholly within the upper catchment and not be distributed to adjacent creek systems. This was not the only unique trait, as it is also very rare for storms to intensify as they travel west across the landform. The intensities recorded from gauges were approximately 90mm in a two hour period. These intensities on coastal catchments where the storm originated only result in an AEP of 1:100*." Ex 3 at page 26 "*The flood events on the 10th and 1th of January 2011 were extreme and led to widespread destruction of the community*."

153 Ex 144 at paragraph [9].

154 Ex 144 at paragraph [10].

1974[156]. Dr Newton helpfully prepared the following, which graphically demonstrates the extent of the magnitude of the flood[157]:

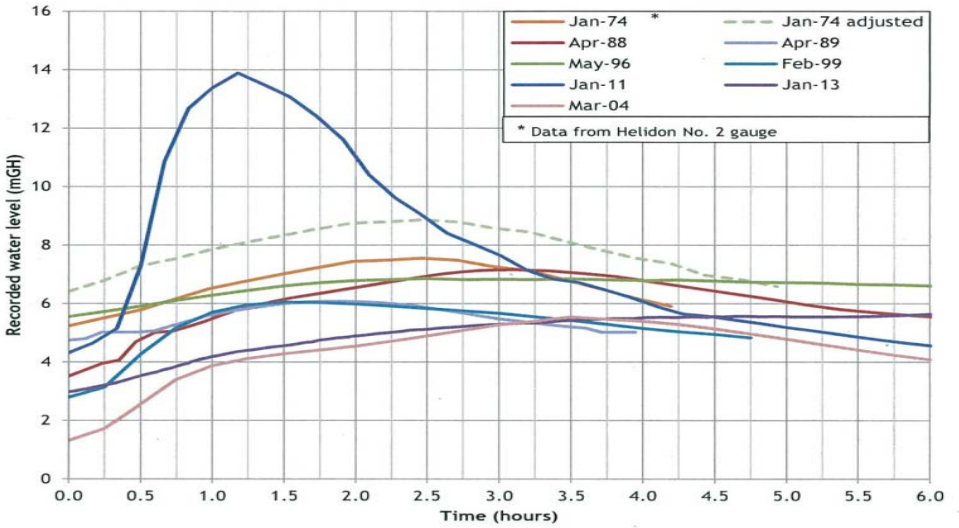

Figure 4.1 - Comparison of recorded flood level hydrographs at Helidon

Table 4.1 - Recorded peak water level and maximum rate of water level rise in Lockyer Creek at Helidon

Event	Recorded peak water level (meters GH)	Maximum rate of water level rise	
		meters per hour	meters per minute
Jan-74*	7.55	1.6	0.03
Jan-74 adjusted*	8.86	2.0	0.03
Apr-88	7.16	5.4	0.09
Apr-89	6.08	1.9	0.03
May-96	6.86	0.8	0.01
Feb-99	6.05	4.5	0.07
Mar-04	5.54	3.4	0.06
Jan-11	13.88	21.5	0.36
Jan-13	5.72	2.5	0.04

* Information shown in this table is based on recorded data at Helidon No. 3 gauge except for the Jan-74 event. The Jan-74 event data was recorded at Helidon No. 2 gauge, which is located about 2.7 km downstream of Helidon No. 3 gauge at the confluence of Monkey Water Holes.

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155 Ex 19 at paragraph [1] *The 10 January 2011 Grantham flood was an extreme event with a magnitude and character vastly different from anything that local residents had experienced before. Floodwaters in Lockyer Creek at Helidon and Grantham rose much higher and much faster than at any time in living memory."*

156 *Ex 19 at "[172] The 10 January 2011 Lockyer Creek event was an exceptionally large and fast-rising flood. It caused substantial damage to natural and man-made features along Lockyer Creek, both upstream and downstream of the Grantham Sand Quarry. [173] A comparison to historical data indicates that the January 2011 peak flood level at Helidon, upstream of the Grantham Sand Quarry, was about 5 metres higher than any other historical flood since 1974 and the rate of rise was at least 4 times faster. [174] The magnitude and speed of rise of the January 2011 flood in Grantham was well beyond the personal experience of any Grantham resident."*

157 Ex 19 – WRM report at page 33.

The experts

129. The following hydrological reports have been prepared relevant to the flood event of 10 January 2011 and in particular, whether or not the Grantham Sandplant contributed to the devastation caused by it:

(i) Dr Jordan's report to the 2011 Commission, entitled "*Provision of Hydrological Advice to Queensland Floods Commission of Inquiry*" dated 16 September 2011[158];

(ii) The flood study entitled "*Lockyer Creek Flood Risk Management Study*" prepared for the Lockyer Valley Regional Council dated 19 December 2014[159];

(iii) Mr Szylkarski's report entitled "*Grantham and Wagner Quarry Review of Flood Impact 10th January 2011 Flood Event*" commissioned by the Australian dated February 2015[160];

(iv) The Cardno Peer Review report entitled "*Flood Modelling Peer Review*" dated 28 May 2015[161];

(v) Dr Newton's Report entitled "*Impact of the Grantham Sand Quarry on the January 2011 Flood in Grantham*" dated 3 July 2015[162];

(vi) Dr Macintosh's report entitled *"Expert Hydrology Report 10 January 2011 Circumstances and Contributing Factors*" dated 11 August 2015[163];

(vii) Mr Szylkarski's report entitled "*Review of Expert Hydrology Report 10th January 2011 Grantham Flood*" dated 13 August 2015[164];

158 Ex 146.
159 Ex 3.
160 Ex 145.
161 Ex 95.
162 Ex 19.
163 Ex 144.

(viii) Dr Macintosh's supplementary report entitled "*"Expert Hydrology Report 10 January 2011 Circumstances and Contributing Factors Supplementary Material*" dated 17 August 2015[165]; and

(ix) Dr Newton's supplementary report entitled "*January 2011 flood in Grantham Supplementary Report 1*" dated 17 August 2015[166].

130. There are nine reports prepared by six hydrologists. No one during the course of the Commission's public hearings suggested that any of the hydrologists who have prepared a report are not properly qualified to provide an opinion on the cause of the flood of 10 January 2011 and what, if any, impact the Grantham Sandplant had. None of the experts in any of the reports opined that the Grantham Sandplant or any of its features had caused or contributed to the loss of life and property damage suffered in Grantham.

131. There has been some criticism in the media concerning the conduct of the 2011 Commission and the findings made in relation to Grantham. Some residents of Grantham have expressed concerns that the 2011 Commission did not have regard to their local knowledge and eye witness accounts of the flooding. There can be no fair or rational criticism of that kind in respect of this Inquiry. Eye witnesses have been called, and the experts have had regard to that evidence.

132. The experts have confirmed that the flood modelling has been validated by reference to the available eye witness evidence and the electronic evidence (videos or photographs) collected by the residents of Grantham on 10 January 2011, as well as the post-flood survey data and the content of radio calls and 000 telephone calls made during the flood.

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164 Ex 163.
165 Ex 144.
166 Ex 166.

133. After two Inquiries, after detailed and careful evidence from the residents of Grantham being heard in this Inquiry, and five days of expert hydrological evidence, there is no evidence upon which it might be concluded that the Grantham Sandplant or any of its features caused or contributed to the devastation to life and property in Grantham on 10 January 2011.

Dr Macintosh's opinion

134. Dr Macintosh prepared two reports[167] and was cross examined over many days[168]. Ultimately, the opinions he expressed were vigorously tested and, it is submitted, no defect or error was demonstrated about his analysis, modelling or conclusions. His expertise was not challenged.

135. Dr Macintosh modelled three scenarios; "the most likely", "the no quarry" and "the worst case". The worst case scenario was in fact an extreme and unrealistic scenario designed to test the theory that circumstances may have existed where the quarry and/or the bunds may have contributed to the flood or the loss of life and damage caused by it[169].

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167 Ex 144.

168 Day 14 to Day 17.

169 Ex 144 at paragraph 46 "*However, it is also my opinion that, the Worst Case scenarios are unrealistic because of the undertlying assumptions that I have applied …*" **Macintosh** T14/1164L40 to 1165L20 *"Then what you did was you undertook an exercise which you called the Worst Case Scenario, but that perhaps, I'll suggest, is almost something of a misnomer because what you were doing was attempting to test the physical limits of what you could actually achieve within this system between Grantham and the quarry?---Yes, I was sort of working backwards. Many eye witnesses had referred to surges of water and even walls of water and these things, and I wanted to understand what mechanism could possible be attributed to this. To start off with, rather than work from the bottom up, I worked from the top down, "Let's just make it really big and see what the model generates with regards to surges or any interesting or unusual characteristics." In setting up the model, I was more focused on trying to get the model as a tool to generate a characteristic which may have been of relevance. I was more interested in that than looking at how I achieved it as to whether that was realistic or not, so that's - - - What you were looking to do was within the confines of topography and the flood water coming through that topography, you were looking to achieve the biggest possible effect you could from the quarry and the bund?---Yes, the biggest possible that could come out of it within the physical limits. What you did was you made three changes to what you had been modelling. The first change, which we know from your sensitivity analysis is ultimately not all that*

136. In undertaking his modelling, Dr Macintosh assumed that the water level in the pit of the Grantham Sandplant was 120AHD[170].

137. Dr Macintosh concluded that the primary effect of the Grantham Sandplant was to delay the time of inundation of Grantham by between 1 to 3 minutes. The primary reason for this is the time which it took for the flood water to fill the quarry pit[171].

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significant, is that you dropped it down from a 10 minute breach to a five second breach, so it would be near instantaneous?---As close as I could, and that's the modelling limitation as well."

170 **Macintosh** T14/1130-1131 "*And the consequence of undertaking that exercise was that if you averaged the flow over the preceding 31 days to 10 January 2011 you would have expected the water level in the creek to be at about 116 AHD?---Yes. And if you averaged it over the preceding seven days, when there had been a lot more flow and as we have heard evidence that there had been flooding that occurred, the water level would be at about 117 AHD?---On average, yes. And so you then, in terms of the process you went through, you took the higher 15 of those two?---Mm'hm. 117 AHD?---Yes. And then you added to that the maximum amount of rainfall that could have 20 fallen into the quarry pit. Is that right?---Yes. The creek level, there's a delay in time between what is in the creek and what is in the pit. I took the 117 in the creek and then applied that directly across to the pit as a reasonable estimate as to how high it could have been and then further added on the rainfall that you just mentioned. And in terms of how you went about coming up with the rainfall, I described it as the maximum amount of rainfall that could have possibly fallen into the quarry pit and is that accurate?---Yes, and I determined that by looking at and referring to local rainfall records of the time and a very rough calculation 30 applying that to the catchment area to come up with the level rise. So you took the catchment area as being the area around the quarry pit between the creek?---That's correct. That's about 16 hectares?---16 hectares flowing into a pit, a surface area of about 10 hectares. That slightly amplifies the depth of rainfall as it reports to the pit. You assume that there would be a hundred per cent runoff, so all of the water 40 would flow into the pit?---Yes. You assume that none of that water would then permeate back out into the Lockyer Creek or would have had time to permeate back out into the Lockyer Creek?---That's correct, a conservative analysis from that point of view. So then you got to a height of 117.8 AHD and that was the highest reasonable estimate you had of the likely amount of water in the quarry pit?---That's correct. But then, in fact, for the purposes of your most likely scenario, you've added another 2.2 metres of water onto that?---Yes. To bring it up to 120 AHD?---To really lift it up, to almost beyond the credible 10 limit, but took it up as high as I could there. Which would remove quite a lot more storage capacity from the quarry pit? ---A substantial amount of storage capacity, it would - - - MR SOFRONOFF: That would reduce its effect as a buffer?---That's correct. The higher the volume you assumed in this way the less effective the quarry pit would be as a buffer to take in water?---That's correct, Mr Commissioner. Because there was uncertainty with this, I wanted to, within reason, be able to 20 remove it from the equation as being a significant factor. Being mindful that I needed to have a balanced approach at this, so in other words not to compromise the outcomes of my work in - - - Not be unreal?---Yes. MR HODGE: So if you assume the bottom of the pit is about 112 AHD or something in that order, at 117.8 AHD you've got 5.8 metres of water, you've effectively added on almost another 40 per cent again - - -?---On top of - - - - - - of the volume of water on top of that?---Yes. That's then the figure that you've used in your most likely scenario, but you did do some sensitivity testing around that?---That's in the appendix of the report, correct. What you tested was whether there was a significant difference between assuming a quarry pit level of 116 AHD as compared to 120 AHD?---That's correct, yes."*

171 Ex 144 at paragraph [44].

138. In his supplementary report, Dr Macintosh undertook some further modelling at the request of some of the parties[172] (not Wagners) and recorded the results of a number of scenarios[173] at 11 locations throughout Grantham[174]. None of the results indicate that the Grantham Sandplant caused or contributed to the devastation in Grantham.

139. It is submitted that the evidence given by Dr Macintosh, at the end of the first day of his evidence in response to questions put to him by the Commissioner, neatly and accurately sets out the effect of the hundreds of pages of reports and the hundreds of pages of transcripts of his evidence. The exchange was as follows:

> *"MR SOFRONOFF: Dr McIntosh, we've been looking backwards, as we're obliged to do, but do I understand the effect of your evidence to be this as well, that whatever is done with the quarry land and if Queensland Rail were to remove that railway line, if there was another conjugation of rainfall events which had the result of dumping a similar volume of water in the catchment area which had already been saturated and wouldn't soak up any more, that this would happen again?---Yes. It's the same consequences. Well, the planning has now moved in to reduce the people exposed to the risk but yes, the same thing would happen. The same flooding characteristics.*
>
> *All things being equal, the quarry or no quarry, whether there's a railway embankment or no railway embankment, if there was a sudden dump of water on the Range and in the catchment area of this order, well, you'd expect it to happen again?---Yes. You'd expect the same thing. It's as simple as that."* [175]

140. There appeared to be a suggestion in cross examination that the area where the batching plant was located contributed to the flooding. Any submission to that effect should be rejected because it:

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172 **Macintosh** T14/1170L1-4.
173 Ex 144 - paragraph 2 – describes the scenarios.
174 Ex 144 – identified in figure 1.2
175 **Macintosh** T14/1174L41 to 1175L10.

(i) found no support from the expert[176]; and

(ii) ignores the fact that LiDAR shows that the only elevated areas are the stockpiles – the rest of the batching plant area is at or about 124AHD[177].

141. At one stage it seemed to be suggested that Wagners may have been at fault for failing to build a bund to the eastern side of the quarry[178]. That suggestion was not supported by any of the evidence and should be rejected.

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176 **Macintosh** T17/1332L3-32 "*So whatever changes you make to the batching plant area will have no effect on that natural channel?---It won't; it will still convey the same amount of flow*." **Macintosh** T17/1337L30 to 1338L26 "*But just focusing then finally on the batching plant, what we could see from your cross-sections is that the batching plant is obviously higher ground, but intermittently higher because of the presence, presumably, of stockpiles and the like?---Yes, agreed. … Yes. Would it, though, affect the path - - -?---No, not at all.- - - that the western overbank flow takes toward the railway line and then down into the town of Grantham?---No. The path, that path is unaffected, it's a low spot. The flows that are going down there, it's flowing down there basically because it's downhill and the water levels in this region are higher, so it would have traversed there in exactly the same, to exactly the same extent for these purposes*. **Macintosh** T17/1345L25-39 *"So it depends in the sense here as to whether or not this batching plant has changed the topography, the batching plant has lifted the topography so as to constrict it flowing on in that direction, it would influence the whole flood with respect - - -?---Okay. So with the batching plant, yes, every change makes an influence for sure, and the significance to the flow over this path here really comes back down to how might a change in the batching plant levels affect the water levels in this area here and the greater the flow which travels across here, the lower the water depth there, because you're opening up the area. As I've said already, even if you drop this down by half a metre or so, I don't think that would result in any significant change in depth in this region in the context of causing overflows and the nature of the western overbank discharges that have occurred."*

177 Ex131 – Mr Starr's report - see figure 3A.

178 **Macintosh** T16/1249L25 to 1253L15, see in particular T16/1252L9 to 1253L2 "*Okay, thank you. Sorry, that was inappropriate. So am I right, then, just when we think about the capacity of a very localised change in topography to have an impact on flood behaviour, the buildup, for example, and I'm not suggesting this happened, I'm just trying to establish as much as anything else what we might do in the future, the buildup, for example, of that bank by a pretty small amount could easily, and I know you haven't tested this, but could have an impact or would have an impact, at least at some level, on the likelihood of that breakout occurring?---Okay. So just make sure I understand you correctly. I'll just get this pointer working now, so the red button. I'm going to need assistance here, please. This one looks like it's dying as well, unless I'm doing it incorrectly. Thank you. I've worked it out. There's a safety catch on the side. In case you're going to shoot somebody?---Okay. Back online. Okay. So what you're saying is that if there were a buildup, a manmade buildup in this region here - - - Yes?--- - - - whether that would have meant that it would have broken out through here either sooner or at a higher intensity, or - - - Or not at all?--- - - - something like that? Or not at all?--- Or not at all? Okay. Let me try to make it clear: you indicated before that it was the drop, essentially, the fact that the land was lower in the area of the Besleys' house, which was one of the three physical phenomena that, in your view - - -? --Okay. - - - explained the breakout. The point I'm really making is: it wouldn't take much to modify the landscape of that point to fundamentally alter flood behaviour?---So if this would drop down lower, whether, for example, whether it would have come*

Mr Szylkarski's opinion

142. In his first report[179] (commissioned by the Australian), Mr Szylkarski identified a number of matters of concern with Dr Jordan's report to the 2011 Commission[180]. In his oral evidence to this Commission, Mr Szylkarski confirmed that the matters had been addressed by Dr Macintosh to his satisfaction[181].

143. There were two tasks to be performed by Mr Szylkarski for this Commission. The first was to review the report of Dr Macintosh and to express his own view based on the material and data set out in the report[182].

144. Mr Szylkarski confirmed that, in his opinion, Dr Macintosh had captured the full range of possible scenarios[183].

145. In paragraph 54 of his report to this Commision[184], Mr Szylkarski set out his conclusions. In giving evidence during the public hearings, he explained his conclusions[185] and summarised them this way[186]:

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down through here first, is that what you're indicating, or - - - No, or higher, so that it would actually be constrained in the banks of the Lockyer and not break out on the western overbank at all?---Well, if, of course, you had a levee bank through there, well, depending on the height of it, of course, you would keep it within banks."

179 Ex 145.

180 **Szylkarski** T17/1352L1-15.

181 **Szylkarski** T17/1352L20-41 - the first issue model selection; **Szylkarski** T17/1352L42 to 1354L26 – the second issue capturing eye witness accounts of waves; **Szylkarski** T17/1354L9-26 - the way in which Dr Jordan modelled the failure of the bunds; **Szylkarski** T17/1354L27 to 1356L2 – the boundary conditions used by Dr Jordan in his modelling. **Szylkarski** T17/1356L4 to 1357L11 - calibration or corroboration against eye witness accounts and timing.

182 **Szylkarski** T17/1351L40-45.

183 **Szylkarski** T17/1357L39 to 1358L7 "*Dr Macintosh has carried out such a wide range of possible failures, and also, as we'll come to in a moment, attempted to test the physical limits of what's actually possible?---Yes, that's right. I* think *he's tested, you know, what is a highly unlikely scenario of the whole thing collapsing immediately in a matter of seconds versus a much slower failure of up to one hour. You know, in all likelihood the actual failure is probably a combination of different timings for different parts of the breach. There may be some areas that failed quickly and there may be some areas that failed slowly, and we'll never know, but I think if you take the fastest and the very slowest then you know you've captured that full range of possible behaviour. By "fastest", you mean the five seconds?---The five seconds, yes. By "slowest", the one hour scenario?---The one hour, yes.*"

184 Ex 163.

"*So in terms of your view about the possible contribution of the quarry and the western levees and the failure of the failure of the western levee to this flooding, are you able to just summarise that for the Commissioner?---Yes, I think my opinion is, is this three minute delay, and then a very slight increase to reach the peak discharge. This is the contribution from the southwest and western overbanks. There is no increase in the peak flow, but there's a slight change to the timing. So it's three minutes later, but it achieves the peak discharge at about the same time. So it's important to keep in mind that is the contribution of flow at the boundary of the creek to the whole floodplain its entirety that surrounds Grantham. So it's not necessarily the contribution directly to Grantham itself, but it's the flow that breaks out from that southwest and that western breakout.*

…

… compared to the no quarry scenario. So the model is showing a tendency, whichever scenario that you want to run, that you're going to be equal to or less than the no quarry scenario. Then on the southwest, you get the delay, and generally speaking it comes to the same discharge. So it doesn't show a tendency for a reduction, but it does show equalling and delayed. Now, that's consistent across all the scenarios. So, to me, that points to the general response of the system to a failure of any sort that you can develop with the given heights of those walls. The worst case scenarios with the unrealistic wall show a bigger response, but that is, of course, unrealistic. The walls would have had to have been higher for that to have occurred.

… If you look at the impact of the different scenarios on those hazard ratings that Dr Macintosh has produced, whilst they might move around a little bit, they never really drop below that two square metre per second extreme value. So, you know, okay, there might be some small changes, but it's still an extreme condition.

Hence, I think, what you say at paragraph 55 is the flood intensity exceeded an extreme condition at all locations that were assessed for all scenarios presented?---Yes, so, I mean, I would point out that when I looked at contribution compared to

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185 **Szylkarski** T17/1360L39 to 1362L24

186 **Szylkarski** T17/1362L25 to 1363L35.

hazard and damage, I look at contribution as a volume issue, you know, did the quarry have an impact on changing volumes moving around the floodplain, and that's what we discussed just previously. The question then is: what does that change in volume do at any individual specific location, and that's a point feature as opposed to a regional feature, which is a discharge or a contribution line. So in the end, you can have a contribution, but it hasn't materially changed at the specific point locations that have been highlighted, it hasn't materially changed out of the extreme range."

146. Mr Szylkarski was cross examined and the opinions he expressed were vigorously tested and, it is submitted, no defect or error was demonstrated about his analysis or conclusions. His analysis and conclusions conformed with the opinions of the other experts. Mr Szylkarski's expertise was not questioned.

Dr Newton's opinion

147. Dr Newton (retained by Wagners) prepared two reports[187]. In his first report he concluded that neither the bunds nor the quarry had contributed to the flooding on 10 January 2011. The purpose of the second report was, in effect, to check the results and conclusions expressed in the first report by reference to the further evidence which had become available during the Commission's public hearings. The supplementary report confirmed that this additional evidence corroborated (not contradicted) the conclusions reached in the first report[188].

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187 Ex 19 and Ex 166.

188 Ex 166 - **at paragraph [52]** "*The flood modelling undertaken for my previous report (WRM 2015) was revised to take into account the additional information on flood behaviour obtained from the further evidence presented at the GFCI hearings. The adopted changes to the model assumptions and parameters are relatively minor, but provide an improved match between the model results and the more recently obtained witness observations."* **At paragraph [59]** "*Similar to my previous report (WRM 2015), the Late/Fast Breach scenario was adopted for comparing model results to witness observations and other calibration data (the different breach scenarios make little difference to the model results). The Late/Fast Breach scenario is based on erosion of the bund/embankment commencing at 3:50pm and eroding to the post-flood profile within 1 minute*." **At paragraph [60]** "*The results of the revised model calibration are very similar to the results presented in my previous*

148. Dr Newton concluded that the existence of the Grantham Sandplant did not cause or materially contribute to the flooding of Grantham, which was inevitable based on the magnitude of the flood event in Lockyer Creek and that its existence did not have a material impact on the damage caused by the flooding at Grantham. For all of the scenarios investigated, the peak flood levels and velocities in Grantham were not significantly different. Furthermore, the Grantham Sandplant slightly reduced flood levels in Grantham compared to what would have occurred if the pit had not existed[189].

149. As to the breach and erosion of the western embankment and the bunds, Dr Newton concluded that it did not[190]:

(i) cause or materially contribute to the flooding of Grantham, which was inevitable based on the magnitude of the flood event in Lockyer Creek; and

(ii) significantly change peak flood levels or velocities in Grantham because the flow through the breach was attenuated in the pit and subsequently spread out over the large floodplain area downstream of the Grantham Sandplant. Consequently, the breach and erosion did not have a material impact on the damage caused by the flooding in Grantham.

150. No party required Dr Newton for cross examination. With respect, it was pointless to do so. Dr Newton's opinions are strongly corroborated by the opinions of Dr Macintosh and Mr Szylkarski.

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report, with the main difference being that the breakout of flood waters from the Lockyer Creek main channel occurs about 5 to 10 minutes earlier. This provides a better match to witness observations which were not available to me at the time of preparing my previous report." **At paragraph [61]** "*The revised calibration results show that modelled peak flood levels are generally within about 0.2 metres of the surveyed peak levels. These differences are within the expected level of accuracy of peak flood levels derived from surveyed debris marks".*

189 Ex 19 at paragraph [182] and [183].

190 Ex 19 at paragraphs [184]-[186].

The residents of Grantham

151. Dr Macintosh and Dr Newton prepared detailed computer generated flood modelling. The Commission should take comfort from the fact that two acknowledged experts, working completely separately, and without access to each other's work,[191] produced virtually identical flood modelling. This confidence should be strengthened by the role Mr Szylkarski, who essentially undertook a peer review of Dr Macintosh's work.

152. In order to produce the computer generated flood modelling, it is of course necessary to collect and input data. Much of this data is technical and scientific data, but as acknowledged by Dr Macintosh in his evidence, the eye witness accounts are vital evidence against which the flood modelling must be tested[192]. Further, even in the face of a life threatening flood, the people of Grantham managed to electronically record much of the flood with videos and photographs. This evidence is invaluable[193]. In other words, the

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191 **Macintosh** T14/1111L30 to 1112L16. Dr Newton's first report (Ex 19) was provided to the Commission on 3 July 2015 which was inexcess of a calendar month before Dr Macintosh provided his report.

192 **Macintosh** T14/1142L24-29 "*So the process that I've applied in going along this journey is to start off at a starting point, put through the known information and critically review what the model simulates. My critical review is, amongst other things, but very importantly, then comparing what the model simulates with what the eye witness accounts are - - -*".

193 **Macintosh** T17/1323L20 to 1324L17 "*In your studies of this particular flood event, you have, of course, had reference and access to quite a large body of independent evidence which indicates or proves when the flood waters arrived at particular places. Do you agree with that?---Yes, I have. So you've had the benefit, for instance, of Mr Lack's photographs - - -?---Yes. - - - Mr Warburton's photographs and videos, and all these are time and dated?---They are, yes. Mr Sippel's photographs, Ms Stevens' photographs and videos, Mr Robertson's (sic) videos, you've had access to all these things?---Mr Robertson? Richardson, I'm sorry?---Richardson, yes. Mr King's videos, Mr Pinkerton's?---No, I don't think so. Mr King is the gentleman who was hanging onto the - - - MR SOFRONOFF: He and his son were hanging onto a car at one stage. MR DAVIS: Hanging onto the car. You were asked questions by the Commissioner a moment ago about that?---I haven't seen those videos. He described the location. Of course, during the - when Mr Smith was giving evidence, that situation was described then. In any event, all these events described by those people, we know the time that all those things occurred, don't we?---Yes. You've obviously taken that into account when you're corroborating the modelling?---I have. Any doubts or any inherent weakness that the modelling might have in relation to taking into account debris and roughness, you've taken into account the timing of the arrival of the flood anyway, haven't you?---More to the point, in my testing of the model to determine that it's functioning properly and so forth for my purposes, one key part of it is if the model produces a simulation outcome which differs from expectations or observations that means there is something in the model which isn't right and isn't simulating properly. This being the case, the model performed*

people of Grantham were entitled to expect these scientists prove that the science 'stacks up' against what they actually experienced. In our submission, that legitimate expectation has now been met.

153. Dr Newton prepared his report before the commencement of the public hearings. His first report was calibrated by reference to the eye witness accounts which were available at that time, as well as the available photographs, videos and post-flood survey data[194].

154. Dr Newton was then instructed to review the evidence given by residents during the public hearings and compare that evidence to the results of his flood modelling[195]. The result of that analysis was Dr Newton's supplementary report[196].

155. Some of the evidence was general in nature[197]. Those witnesses could not provide specifics, for instance, in relation to time. Of course, that is understandable. The evidence was nevertheless taken into account to the extent possible by Dr Newton[198]. An analysis of that

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and matched up with observations and my expectations as well which therefore indicated that the effects of debris or other factors were not significant for my purposes."

194 Ex 19 at paragraph [118] "The results of the GPU and CPU hydraulic models were validated by comparison *to available flood data for the 10 January 2011 flood.}* **At paragraph [120]** *"The CPU model was calibrated to match peak flood levels in Grantham, as well as the timing of initial inundation and the rate of rise able to be inferred from various photographs and eye witness accounts."* **At paragraph [175]** *"The flood model developed for this investigation has been validated against surveyed flood levels and a range of anecdotal information for the January 2011 flood. The model results are generally consistent with the surveyed flood levels and the available witness observations, including photographs and video."*

195 Ex 166 at paragraph [14] "*Since the completion of my previous report on 3 July 2015, the GFCI hearings have been underway, collecting additional statements, photographs and video footage, as well as oral evidence which is recorded in the transcripts of the hearings. I have reviewed this additional information and assessed its consistency with the results of the flood modelling described in my previous report (WRM 2015)."*

196 Ex 166.

197 Ex 166 at paragraph 15 "*The available witness information varies widely in its level of precision, depending on the circumstances of each observer at the time and the accuracy with which they were able to recall events up to 4 years after they occurred. Many of the observations are of a qualitative nature and do not have accurately recorded times or water levels. However, some of the information has been quantified through the timing of telephone calls and time-stamped photographs and video."*

198 Ex 166 at paragraph 16 "*In comparing the results of the flood modelling to witness observations, I have focussed particularly on time-stamped photographic and video evidence which can be used to validate the results of the flood model. However, I have also given consideration to more general*

body of evidence shows that there is nothing inconsistent with the flood modelling. Then, there were witnesses who gave very specific evidence. These witnesses had caught the events on photographs and videos. The evidence of some of the witnesses who did not, themselves, precisely identify the times of the events could be verified by objective evidence such as recorded 000 and radio calls[199]. Those witnesses, whose experiences could be linked to particular times, positively support the flood modelling[200].

156. It is not proposed to analyse the evidence of each and every resident who provided a statement or gave evidence during the public hearings. There was ample opportunity during the hearings for either Counsel Assisting the Commission, or any of the barristers representing the parties, to expose any inconsistencies. We mention below some of the witnesses. These witnesses strongly and positively corroborate the flood modelling. That they do so is, we submit, clearly demonstrated by the animation of the model prepared by Dr Newton that superimposes the following photographs, videos and records of 000 telephone calls[201] ("the validation video"):

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descriptions of flood behaviour, such as the directions of water flow and the relatively sudden change in the character of flooding in areas of Grantham affected by floodwaters from Sandy Creek."

199 An important example of that being the records of the 000 calls made by Mr McGuire commencing at 3:59pm and finishing at 4:21pm. (Ex 42 and 44). The audio recordings and transcript show that the McGuire family were, for 21 minutes, caught in the flood with the water constantly rising around them. The 3:59pm call appears to capture when they first saw the flood waters approaching "*(saying in the background) Llync! Have a look up here.*" At 4:14pm, Mr McGuire tells the operator that they are in the rural truck and the cater it coming up to the windscreen. At 4:15pm Mr McGuire tells the operator that the water "*just keeps rising"* and that it is "*coming up like anything and starting to throw the truck around*." At 4:20pm Mr McGuire asked the operator that they hurry because water was beginning to enter the truck and in the background saying " *I'll try turning around and let it float.*" Finally, at 4:21pm, Mr McGuire tells the operator that he's "*taking water in this truck like anything*" and that they are going to have to abandon the fire truck.

200 Ex 166 at paragraphs [13] to [51] identifies and comments on the key additional information. With the exception of Mr Warburton's evidence, the additional information is consistent with Dr Newton's model. Dr Newton discusses Mr Warburton's evidence at paragraphs [42] to [51].

201 Ex 167 (the validation video).

(i) Mr McIntosh residence[202]. Time stamped photographs were taken from his home. The location and extent of flood water predicted by the model matches the photographs taken at 3:08pm and 3:20pm.

(ii) At 3:45pm, Mrs Sippel took a photograph showing where the flood waters had broken the banks of the Lockyer Creek at their home[203] and the extent to which the flood water had inundated their backyard. The photograph and the model coincide[204].

(iii) It is known, from 000 telephone records, that at 3:47pm, Mrs Besley called 000 for assistance[205]. The transcript records Mrs Besley telling the operator that the "*creek has overtaken us*" and that they were in their car and that the flood water was "*coming up to the doors*". The transcript records Mrs Besley communicating that the water was constantly rising and that they were in their driveway. No specific detail is given about the extent of inundation, the height of the water etc, and of course, that is entirely understandable. It can be seen however that the qualitative evidence that is objectively ascertained from the 000 record matches what is shown in the model.

(iv) There was a suggestion that the modelling did not match evidence given by Mr Sippel about flood water to the north of Dinner Corner[206]. It can be seen from the

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202 42 Klucks Road – see Ex 48 – statement of Mr McIntosh.

203 1649 Gatton-Helidon Road – see Ex 25 – statement of Mr Sippel.

204 Ex 166 at paragraphs [21] and [22] – Dr Newton comments on the Sippel photographs and concludes that they are consistent with the flood model.

205 Ex 153 and Ex 154.

206 **Macintosh** T15/1299 – "*Thank you. Now, just two final topics, and it might be something that you need to have a think about, but I'd like to just raise it with you. When Mr John Sippel gave evidence - and it might be important just for the witness to be able to take this issue away, page 138 of the transcript, at lines 5 and following. Mr Sippel described going to Dinner Corner and the water was running back, he says, through here heading down the northern side of the train tracks and cutting across into Sandy Creek was the description that he gave. So he's standing at Dinner Corner and he*

validation video that the matters described by Mr Sippel are reflected in the model. It is perhaps a little difficult to see the detail in the validation video. The "Dinner Corner (late fast)" video[207] magnifies the validation video so that what is occurring at Dinner's corner is easier to see.

(v) The model predicts what Mr Steffens saw from his car as he drove west along Gatton-Helidon Road at 3:58pm. When the photograph[208] taken by Mr Steffens at that time is compared to the model, it can be seen that they are consistent[209].

(vi) Mr Stibbard took photographs from the Stanbroke beef works which is located to the south of the Lockyer Creek. The validation video scrutinises photographs taken from that location to demonstrate the consistency between the model and the photographs[210].

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sees the water heading down the northern side of the train tracks. There's a road there, essentially. It's heading down the northern side there. As I see your models - and I was only able to do this at lunch time, so I just wanted to raise it because it might be something that the Commissioner may need some assistance on - as I look at your models, it appears that your most likely scenario doesn't show that phenomenon and it's in fact only the worst case scenario that shows that particular phenomenon. MR SOFRONOFF: Which phenomenon, Mr Holt? MR HOLT: The running of water down the northern side of the railway line from Dinner Corner towards Sandy Creek at that point. Again, it might be a matter you need to take on notice, and I'm sorry I couldn't give you more. It might be something you just need to look at?---Yes, I will. Thank you. I wonder if it's best left on that basis, Mr Commissioner, rather than asking." It is anticipated that the evidence of Mr Sippel that is being referred to in the cross examination of Dr Macintosh is **Sippel** T2/137L5: *"And the water that was between you and the train tracks, where was that coming from?---That was from the gully. That had been pushed up in there from the water going through underneath the gully, so heading towards the north; through underneath the train tracks heading to the north. The first time I got to Dinner Corner the water was running back through here and heading down the northern side of the train tracks and cutting across into Sandy Creek. About here there was a great big wash out where the water was going under, down and across. All right, and I think the point where you are describing is on the map it's marked as Gully. It was running through that gully underneath the train tracks and then down on the northern side of the train tracks?---Yes. Heading east on the northern side of the train tracks back into Sandy Creek. And from where you were could you see Mitchell Ryman's house? …"*

207 Ex 167.

208 Ex 17 (photographs and videos taken by Mr Steffen) and Ex 18 (Statement of Mr Steffen).

209 Ex 166 at paragraphs [23] to[24] – Dr Newton comments on the Steffen photographs and concludes that they are consistent with the flood model.

210 Ex 166 at paragraphs [26] to[28] – Dr Newton comments on the Stibbard photographs and concludes that they are consistent with the flood model.

(vii) Photographs were also taken by Mr Owen north of the railway line. The photographs taken at 4:13pm show that the south side of the railway track is inundated and that the floodwaters have ponded against the railway embankment. It is also apparent that water is overflowing to the east of Mr Owen's position. The model also shows this.

(viii) A number of very useful videos were taken from the Pinkerton residence[211]. The model shows the nature of the initial inundation coming from the south. The video which captures that initial inundation into the Pinkertons' backyard matches what can be seen in the model. The next video superimposed on the model shows how the flood waters are beginning to surround the home which is not yet completely surrounded and also showing that the Gatton-Helidon Road has not been inundated at this location. This is also consistent with the model. The third superimposed video is taken from the front of the Pinkerton home. It shows that the house is almost surrounded, but the Gatton-Helidon Road has not yet been inundated. Again, this is reflected in the model.

(ix) Parts of the Godley video[212] are also superimposed onto the validation video. What can be observed in the Godley video is consistent with the model[213].

(x) The video also emphasises the inundation of Gatton-Helidon Road at Mr McGuire's location in the period 4:15pm to 4:21pm. This is confirmed by Mr McGuire's 000 calls for assistance[214].

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211 1347 Gatton-Helidon Road – see Ex 24 – statement of Mr Pinkerton and videos.

212 Taken from 1338 Gatton-Helidon Road.

213 Ex 166 at paragraph [41] – Dr Newton comments on the Godley video and concludes that it is consistent with the flood model.

214 Ex 42 - the 000 calls made by Mr McGuire included those made between 4:15pm and 4:21pm. At 4:15pm Mr McGuire tells the operator that the water "*just keeps rising*" and that it is "*coming up like*

(xi) Finally, it is noted that whilst the videos and photographs taken by Mr Richardson and Mr Lack have not been superimposed, the animation of the model reflects what can be seen in those images and videos.

157. The validation video was played at the end of the Commission's public hearings. It is proof positive that the experts have modelled the flood based on the irrefutable evidence collated by the people of Grantham. We ask the Commission to consider the validation video.

CONCLUSION

158. In respect of the matters set out in the terms of reference, for the reasons set out above, it is submitted that the appropriate findings by the Commissioner (as the issues affect Wagners) are:

(i) in respect of term of reference (a): the flooding of Grantham on 10 January 2011 was caused by a severe natural event; the natural and man-made features of the Grantham Sandplant did not alter or contribute to the flooding between Helidon and Grantham on 10 January 2011;

(ii) in respect of term of reference (b):

a. the existence of the Grantham Sandplant did not cause or contribute to the flooding of Grantham;

b. if the Grantham Sandplant had not existed, the devastating natural disaster which occurred on 10 January 2011 would have been slightly worse for Grantham; and

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anything and starting to throw the truck around." At 4:20pm Mr McGuire asked the operator that they hurry because water was beginning to enter the truck and in the background saying " *I'll try turning around and let it float."* Finally, at 4:21pm, Mr McGuire tells the operator that he's "*taking water in this truck like anything*" and that they are going to have to abandon the fire truck.

c. the breach and erosion of the western embankment/bunds did not cause or contribute to the flooding of Grantham;

(iii) in respect of term of reference (c):

a. the existence of the Grantham Sandplant did not have a material impact on the damage caused by the flooding in Grantham;

b. if the Grantham Sandplant had not existed, the damage caused by the flooding in Grantham would have been slightly worse; and

c. the breach and erosion of the western embankment/bunds did not have any material impact on the damage caused by the flooding in Grantham;

(iv) in respect of term of reference (d): the breach and erosion of the western embankment/bunds had no adverse implications for the evacuation of Grantham.

159. We make no submissions in relation to term of reference (e). While Wagners has a community interest in these matters, it has no legal interest and it would be inappropriate for Wagners to make submissions on that topic.

Peter J Davis QC and Nicholas Andreatidis

Counsel for Wagner Investments Pty Ltd and Wagners Australian Operations Pty Ltd

28 August 2015