Before a panel appointed under the Fast-track Approvals Act 2024 **FTAA-2504-1046**

UNDER	the Fast-track Approvals Act 2024 (**Act**)
IN THE MATTER	an application for approvals for the Waihi North Project (**WNP**) – a listed project described in Schedule 2 of the Act
BY	**OCEANA GOLD (NEW ZEALAND) LIMITED Applicant**

STATEMENT OF EVIDENCE BY ANDREW MCLEAN ON BEHALF OF OCEANA GOLD (NEW ZEALAND) LIMITED

Potential impacts of the Waihi North Project on horses and cattle

Dated 1 September 2025

Counsel acting:
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Introduction

1. My full name is Andrew Neil McLean. I reside in Tuerong, Victoria, Australia. I work in the academic fields of ethology, learning, welfare and cognition and practically in the fields of horse training and riding tuition in Australia, Europe, Canada and the USA.

2. I hold a Bachelor of Science majoring in zoology and physiology and Diploma of Education. I completed a Doctor of Philosophy in Animal Cognition and Equine Psychology at the University of Melbourne. My thesis was entitled: "*The mental processes of the horse and their consequences for training*".

3. I am co-author of the current model of Animal Welfare – the 2020 Five Domains Model of Animal Welfare[1] and many other journal papers on equine learning and cognition. I have represented Australia and have been on the World Championship shortlist for Eventing. I have successfully show-jumped to Grand Prix level and have competed in dressage to International Federation for Equestrian Sports level.

4. For more than 40 years I have owned and managed equestrian centres. In 1995 I founded the Australian Equine Behaviour Centre where we specialised in the retraining of horses with behaviour problems. I am now the Chief Executive Officer of Equitation Science International (**ESI**), which is a nationally recognised training organisation delivering a science-based framework for horse training.

Code of conduct

5. I confirm that I have read the code of conduct for expert witnesses contained in section 9 of the Environment Court Practice Note 2023 and have

[1] Mellor, D.J., Beausoleil, N.J., Littlewood, K.E., McLean, A.N., McGreevy, P.D., Jones, B. and Wilkins, C., 2020. The 2020 five domains model: Including human–animal interactions in assessments of animal welfare. *Animals*, *10*(10), p.1870.

complied with it in preparing this evidence. I confirm that the issues addressed in this evidence are within my area of expertise, and I have not omitted material facts known to me that might alter or detract from my evidence.

Scope of evidence and my conclusions

6. I have been engaged by OceanaGold (New Zealand) Limited (**OceanaGold**) to respond to the comment made by Mr John Perrins on behalf of AJ Arabians, AJ Pro and Perrins Robertson Partnership about the potential noise and vibration effects from the Waihi North Project (**WNP**) on horses and livestock.

7. Mr Perrins' considers that the Waihi North project will have a significant impact on his Arabian horse stud and equine training facility at 35 Heath Road Waihi (**Property**) through:

   a. Noise, dust and vibrations from blasting within the Gladstone Pit.

   b. Actual and perceived impacts on the characteristics and broader environment at the Property.

8. I discuss these topics in this statement. Based on the assessments completed by other experts engaged by OceanaGold in relation to the effects expected to arise from the WNP it is my understanding that noise, dust and vibration effects from the Gladstone Pit will be at or below background levels experienced by horses and cattle at the Property. Consequently, in my opinion the risk of the range of effects suggested by Mr Perrins occurring on his horses is very low to negligible.

9. Similarly, I do not consider that the Waihi North project will impact on the characteristics and amenity of the Property in ways that would restrict or impair the ability to use the Property for M Perrins' Arabian stud breeding operation or the use of the equestrian facility at the property. I also do not

consider that the presence of the Gladstone Pit would cause damaging reputational effects to any of Mr Perrins' equine interests.

10. Having visited the site, and having myself managed and owned equestrian centres for over 40 years, it is my view that Mr Perrins' activities will be able to occur in the same manner both with and without the WNP.

11. I have not identified any scientific basis for the business losses asserted by Mr Perrins that relate to effects on horses, or the ability to utilise the site for equestrian activities.

Site visit

12. I visited the Property on 26 February 2024. During that site visit, I was first shown around the Waihi mine area and the current and proposed operation was explained to me. I then met and spoke to adjacent neighbours about the horse industry and the potential effects of the mine on their equestrian businesses. Mr Perrins was one of the persons who I met during that visit.

13. I had a detailed discussion with Mr Perrins at the Property. Mr Perrins showed me his indoor equestrian arena which I understand was built in around 2020. The arena is 60 m x 20 m and appeared to be well constructed.

14. In earlier years, Mr Perrins' property was essentially an Arabian breeding stud with a stallion and three or four mares. The Arabian stallion was of the then sought after 'Bluegrass' line. Mr Perrins explained to me that the stallion had been very popular as a breeding stallion, however he had died some years ago.

15. Arabians are known for their extraordinary endurance abilities, which exceeds that of most other breeds, including thoroughbreds. While thoroughbreds might race for a few miles, Arabians race up to one hundred miles (160 km).

16. Following the death of the stallion, Mr Perrins advised me that he had intended to continue his Arabian breeding operation, using imported semen from other, significant Arabian stallions.

17. Using his existing Arabian breeding mares, his intention was to breed three or four foals per year. However, he told me that owing to his perception of the negative effects of the adjacent mine, he has not bred with these mares for some years.

Noise, vibration and dust from the Waihi North Project

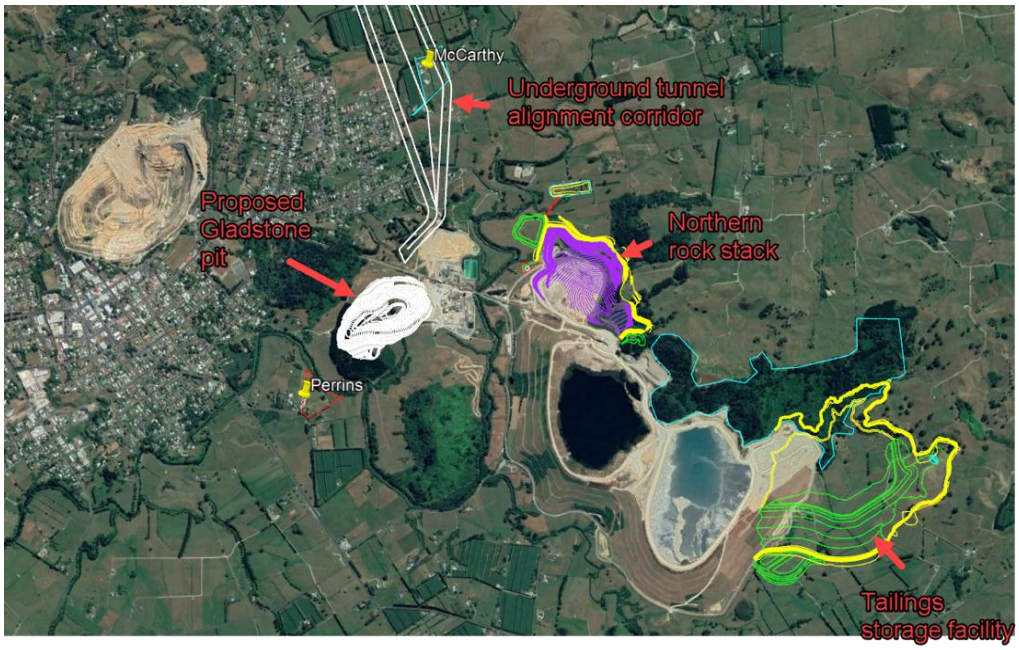
18. In the area surrounding the proposed WNP, there are two horse and numerous cattle operations, principally dairying.

19. The two equine properties are:

    a. The Perrins' property at 35 Heath Road. The Perrins property is adjacent to land owned by OceanaGold on which the proposed Gladstone Open Pit would be located.

    b. Mr Robert and Mrs Angela McCarthy's property at 83a Mataura Road. On this property, horses are brought in for training. The focus of this business in on young horses (1-2 years of age) undergoing foundation training (training to wear a saddle and to be ridden).

20. Both properties are shown in the image below:



21. The main effects of concern to the horse and cattle business operators in surrounding properties are connected with two main aspects of the project:

    a. Vibration from underground blasting emanating from a single tunnel, around 300 m underground approximately 5 km long.

    b. Ground vibrations, noise and overpressure emanating from the Gladstone Open Pit area and immediate surroundings.

22. Blasting operations can result in a number of adverse environmental consequences including ground vibrations, overpressure, fly rock emissions, generation of fine particles, fumes and dust.

23. While the majority of the WNP takes place underground, there will also be construction of access roads, clearance of vegetation and construction of buildings and amenities. And of course the proposed Gladstone Open Pit will involve surface mining.

24. The WNP will cause noise and ground vibrations of varying intensity that may be experienced by horses and cattle. According to the acoustic

assessment, the Property is likely to experience sound levels between 32 and 49 dB L_{Aeq} between years 8 to 18 of the project.[2]

25. Noise levels below 50dBL_{Aeq} are well below the typical aversive level (85 dB) for cattle and horses. To put the noise levels in context, it is my understanding that 50dBL is similar to the noise experienced inside a suburban home during the day.

26. I understand that vibrations from blasting at the Gladstone Pit are predicted to be felt by around 50 properties at levels at low and marginally perceptible levels.[3] I understand that the expected vibration at the Property would be between 1 and 3 mm/s, which is barely perceptible by humans.[4]

27. I have been provided with a copy of the Air Quality report prepared by Beca. The authors of that report observe that the risk of dust from the Gladstone Pit generating offensive or objectional effects on the Property to be low.[5] The dwelling and covered arena at the Property is 440 m from the Gladstone Pit and is not downwind from the Gladstone pit in prevailing wind conditions.

Sensitivity of horse and cattle to noise and vibrations

28. Mr Perrins discusses the sensitivity of horse and cattle to noise and vibrations.

29. Both horses and cattle are herbivorous prey species and therefore have evolved to maximise the intake of an herbivorous diet and the avoidance of predators within the constraints of their respective environments.

2 B.56 Assessment of noise effects, Table 17, page 52.
3 B.53 Blasting and vibration assessment, page 29.
4 B.53 Blasting and vibration assessment, page 8, Appendix A, Plate No. 1.
5 B.21 Beca Air Discharges, page 55.

30. In general, cattle are more calm than horses and dairy cattle in particular tend to be very calm because of the necessity of direct human contact via milking.

31. Within breeds of horses, there are marked differences in reactivity, with breeds such as thoroughbreds and Arabians having typically greater levels of reactivity than draft or pony breeds. Importantly, it should be noted that there is considerable variation within breeds of horses as well as cattle.

32. The hearing of the horse extends from 50Hz to 33.5kHz, beyond the range of human hearing (20Hz to 20kHz). Therefore, high frequency noises up to 33.5kHz are characteristically audible to horses.

33. Animals, in general, find noises over 100 dB to be aversive although the precise figure has not been ascertained in horses. In my opinion, one would expect to find individual and experiential variation between different animals. Nevertheless, the study of horses kept adjacent to a landing strip in USA showed that horses are able to habituate to noise levels of >90dB (Bowles, 1995).[6]

34. As far as we know in science, and in contrast to some beliefs in 'pop' science, horses have not evolved to detect seismic activity, volcanic activity or tsunamis, beyond the sensory abilities listed above. This is most likely because of the scarcities of such events in the environments to which the early horse was adapted and the unpredictability of appropriate and effective escape behaviours that would determine the effects of natural selection.

35. In my opinion, ground vibrations are unlikely to elicit fear responses in horses. In general, horses rapidly adapt to transport in moving trucks and trailers. A thorough review of the sensory abilities of horses can be found in Rørvang *et al*., 2020.[7]

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6 Bowles, A.E., 1995. Responses of wildlife to noise. *Wildlife and recreationists: Coexistence through management and research*, pp.109-156.

7 Rørvang, M.V., Nielsen, B.L. and McLean, A.N., 2020. Sensory abilities of horses and their importance for equitation science. *Frontiers In Veterinary Science*, 7, p.633.

36. In tandem with highly developed senses, horses have also evolved highly developed survival mechanisms of escape reflexes known collectively as the ‘flight response’.

37. The flight response is not a categorical, one size fits all type of response. In contrast it is a dimensional array of reactions. At the greatest intensity, the flight response can initiate strong reactions in animals.

38. The flight response can be expressed as rapid panic behaviour that triggers horses into survival behaviours that are characterised by hyper-reactive states that may escalate to the behaviours including bolting, bucking, pronking, shying, and rearing.

39. At lower intensities of flight response, it may manifest as elevated arousal levels and anxiety. The signs of these may be subtle such as altered facial characteristics (ears widened, sclera (white tissue) of the eyes showing, and nostrils enlarged), faster shorter strides, higher head carriage, and neophobic behaviour (increased suspicion of novel stimuli).

40. Another element that is frequently overlooked, even by many behavioural experts, is the effect of confusing, punitive training and poor management of horse behaviour (Mellor *et al*., 2020).[8]

41. Confusing and punitive training as well as poor management of horses’ essential needs are known to lower the threshold of flight response and to increase the tendency of horses to be not only neophobic but also fearful of known, generally innocuous stimuli to which other, more mentally secure horses would be unafraid.

[8] Mellor, D.J., Beausoleil, N.J., Littlewood, K.E., McLean, A.N., McGreevy, P.D., Jones, B. and Wilkins, C., 2020. The 2020 five domains model: Including human–animal interactions in assessments of animal welfare. *Animals*, *10*(10), p.1870.

42. In other words, the quality of training and management greatly affects the outcome of horse behaviour in challenging circumstances (McLean and Christensen 2017).[9]

Equine cognition and learning pertinent to noise and vibration effects

43. The mental abilities of horses are perhaps the most misunderstood, even by experienced horse owners, trainers and coaches. Humans tend to ascribe human traits to animals and in particular apply descriptors of human mental abilities such as reasoning. This is known as anthropomorphism.

44. The ability of horses and humans to communicate enables horses to be trained for human purposes. Like all mammals, horses learn via the processes of *non-associative learning* and *associative learning*

45. Non-associative learning has two major subsets: (i) *habituation*; and (ii) sensitisation.

46. Habituation involves learning to ignore stimuli that are unimportant to survival.

47. Habituation is a universal learning phenomenon in the animal kingdom ranging from annelids (worms) through to mammals. It evolved as an adaptation for energetic efficiency, in other words to save energy wastage by learning *not to react* to stimuli that turn out to be innocuous.

48. Therefore, when stimuli become regular and innocuous, animals soon learn to pay no attention to these.

49. Examples of habituation can be seen where horses that are housed beside railway lines soon learn to ignore the sound of trains passing by. Show jumping horses learn to ignore the vast number of extraneous sights and sounds at the show, and to habituate to all the different shapes and colours

[9] McLean, A.N. and Christensen, J.W., 2017. The application of learning theory in horse training. Applied Animal Behaviour Science, 190, pp.18-27.

of the show-jumping courses. Horses can also habituate to painful stimuli such as spurs where they learn to tolerate the pain and so become increasingly unreactive to it, which impacts the horse's mental welfare.

50. Initial presentations of aversive stimuli may induce stronger flight response behaviours, however in the absence of pain or high levels of fear they typically attenuate as a result of habituation. This attenuation is significant with regard to this report and the potential effects of noise and ground vibrations.

51. Not all novel visual or auditory stimuli have the same effect on horses. Some effects may be purely physiological with increased heart rate whilst others may cause escape or other locomotory effects.

52. In their experiments, Christensen *et al*., (2005)[10] showed that presentation of novel visual and auditory stimuli to horses did not necessarily produce locomotory responses, however they tended to significantly increased heart rate responses.

53. Of course, at certain high threshold decibels, noise can be noxious and damaging to animals including horses and cattle and also at extremely low frequencies such as the infrasound range. Whilst effects of low frequency sounds have not been studied in detail in cattle and horses, prolonged exposure to low frequency sounds in humans may cause fatigue, headache, impaired concentration, sleep disturbance and physiological stress, as measured by raised cortisol (Pedersen and Persson Waye, 2004).[11]

54. Ground vibrations can also be aversive to horses however horses are known to habituate easily to vibrations. As mentioned above, horses and cattle both learn to travel comfortably in trucks and trailers which supply significant vibration as well as some unique noises.

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10 Christensen, J. W., Keeling, L. J., Nielsen, B. L. (2005). Responses of horses to novel visual, olfactory and auditory stimuli. *Applied Animal Behaviour Science*, *93*(1), 53-65.

11 Pedersen, E., Waye, K.P. and Dose-response, I.I., 2004. Wind turbines' impact on people living in the vicinity of the turbines. Acceptability in implementation of wind turbines in social landscapes, p.81.

55. It is also important to consider that horses and cattle in this region of New Zealand especially are likely to have experienced significant earth tremors due to the frequency of earthquakes in this area each year.

56. These tectonic activities as well as exposure to thunderstorms would likely contribute to the habituation of horses and cattle to noise and vibrations emanating from underground blasting and to some extent to blasting noise.

57. In terms of the aversive features of stimuli that are aversive to animals such as horses and cattle (such as magnitude, novelty, multiplicity, proximity, random appearance and advancing or erratic movement), blasting and noise emanating from the Gladstone Pit would only be significant in terms of magnitude and randomness. However, as I mentioned earlier, these are likely to be efficiently habituated to, to the extent that they are perceptible above background noise and vibrations.

58. Habituation is also conferred to young animals rapidly and efficiently by the modelling of the mother (mare or cow) or other conspecifics.

59. Therefore, mothers that are habituated to noise and blasting would likely rapidly transfer this to their offspring.

60. *Sensitisation* is the opposite to habituation. Exposure to aversive stimuli can make an animal more sensitive to other stimuli if the eliciting stimulus is excessively painful or fear inducing. For example, a horse that has been electro-shocked will likely become more sensitive to other stimuli. Sudden, excessively loud noises can sensitise horses to other more generally benign noises. In the WNP context I do not consider sensitisation of horses is likely.

The behavioural biology of cattle

61. Domestic cattle evolved in a variable grass/shrubland/marshland environment ranging from the Near East to Western Europe. Cattle are

ruminants having evolved to consume a mixed grass and herbivorous diet in variable climates depending on the subspecies.

62. Cattle have been domesticated for almost twice as long as horses, around 11,000 years, owing to their utility in terms of meat, milk, skin and other products harvested by humans over the millennia.

63. Like horses, cattle have been bred for their tendencies to habituate so that they were safer and tame to handle. However, there are still variations in temperament within the various breeds.

64. Again, like horses, cattle have also been used as draught animals.

    a. Compared with horses, cattle can hear a broader range of sound frequencies (23 Hz to 35 kHz). Like horses, cattle can detect higher frequency sounds than humans (Heffner and Heffner 1983;[12] Watts and Stookey, 2000[13]).

    b. Amplitudes at or above 85 dB seem to be perceived as aversive for cattle (Johns *et al*, 2017)[14] although their ability to habituate (become tolerant) to these amplitudes has not been studied.

    c. With regard to the effects of noise, it is generally understood that startle responses may occur above 130 dB and cattle may consequently show fearful or defensive behaviours (Manci, 1988).[15]

    d. Sudden noise above 110 dB has been known to unsettle dairy cattle.

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12 Heffner, R.S. and Heffner, H.E., 1983. Hearing in large mammals: Horses (Equus caballus) and cattle (Bos taurus). Behavioral Neuroscience, 97(2), p.299.

13 Watts, J.M. and Stookey, J.M., 2000. Vocal behaviour in cattle: the animal's commentary on its biological processes and welfare. Applied Animal Behaviour Science, 67(1-2), pp.15-33.

14 Johns, J., Masneuf, S., Patt, A. and Hillmann, E., 2017. regular exposure to cowbells affects the Behavioral reactivity to a noise stimulus in Dairy cows. Frontiers in Veterinary Science, 4, p.153.

15 Manci, K.M., 1988. *Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis* (Vol. 88, No. 14). US Fish and Wildlife Service, National Ecology Research Center.

e. Consistent noises that alert cattle into higher levels of arousal can also reduce foraging.

f. However, cattle exposed to occasional sonic booms have shown no reductions in milk yield (Manci, 1988).[15] This is most likely due to habituation.

65. The neurobiology of flight response in cattle is analogous to that of horses whereby it ranges from mild level mild level anxiety and the production of adrenaline to cortisol mediated long-term flight response (Boissy *et al*., 2005).[16]

66. Similar to horses there is a variation in flight response and temperament within and amongst different breeds of cattle.

67. Because of the reduced flight response as compared to horses, cattle tend to be a little more 'sensible' and are less prone to panic than horses. For example, a cow with its leg caught in a wire fence is unlikely to kick, thrash, injure and endanger itself as a horse might do.

68. Also similar to horses, cattle exhibit identical learning processes in terms of both non-associative and associative learning.

69. Compared with horses however, cattle remain largely untrained except for the general training of management of dairy cows to enter milking stalls and to habituate to being milked. In many respects, this lack of training in dairy cattle implies that as a domestic species there would be less confusion and conflict behaviour than in horses.

[16] Boissy, A., Fisher, A. D., Bouix, J., Hinch, G. N., and Le Neindre, P. (2005). Genetics of fear in ruminant livestock. *Livest. Prod. Sci*. 93, 23–32. doi: 10.1016/j.livprodsci.2004.11.003

Existing noise and vibration effects at the Property

70. The Property is subject to various existing environmental features that produce noise and vibration effects that are likely to be far more significant than those expected to be produced by the Waihi North Project. Mr Perrins' horses will have learnt to habituate to these existing features, as they are typically adept to do.

71. For example, the nearby highway emanates various random noises of trucks and other vehicles, and in terms of vibrations, the entire Waihi region is subject to reasonably regular tectonic vibrations and tremors. The foals and horses would soon learn to habituate to these sounds and vibrations. Regardless of whether the Waihi North Project existed or not, these noises are present for guest horses arriving for lessons, training or competitions in the indoor arena.

72. While we were talking in Mr Perrins' indoor arena during my site visit, rain began to fall on the corrugated iron roof of the arena which was certainly loud despite the fact that the rain was not especially heavy (I am advised that the Waihi area can experience very heavy rain). Having owned an indoor arena at the Australian Equine Behaviour Centre in Victoria, I am well aware that rain and hail falling heavily onto a corrugated iron roof can be deafening and certainly scary for even the most docile horses.

73. In my opinion, horses in such high rainfall regions would habituate to rain and hail noises and so it follows that they would indeed habituate to mining noises of around 40 dB and low levels of vibrations emanating from the WNP.

Conclusions on potential effects from noise and vibration

74. In my view, the potential for noise and vibration effects from the WNP to cause startle effects or otherwise interfere with breeding activities at the

Property is negligible. The predicted levels of noise and vibrations are at or below background levels currently experienced at the Property.

Reputational issues and loss of business

75. Mr Perrins states that Waihi Project will result in a net loss to his businesses of $5M - $8M. Those predicted losses are not explained in any detail.

76. As mentioned above, Mr Perrins' Arabian breeding stud focused on the 'bluegrass' breeding line, which was a prominent line two decades ago. It is now considered in the industry to be old-fashioned.

77. This moving fashion is very common in the horse breeding industry. It is rare that a single bloodline would be highly valuable after a decade or so.

78. Unfortunately there is no online version of the New Zealand studbook so any precise estimation of the number of Mr Perrins' stud offspring are difficult to thoroughly investigate.

79. Regardless, in my opinion Mr Perrins would not be considered to be a large or prolific breeder. In 2012, Mr Perrins bred two foals and in 2013 just one foal by the Bluegrass stallion that belonged to Mr Perrins. I have been unable to find any other breeding records.

80. Prices in the endurance racing market, which Arabian horses are bred for, have fallen considerably in the last few years.

81. Nowadays, a breeder of Arabians is lucky to get NZ$20-$25,000 for a very well performed endurance horse that has been to all the competitions, has a logbook and is extremely well performed. Mr Perrins' enterprise does not include endurance racing but by contrast is limited to show classes, to the best of my knowledge.

82. Further, the United Arab Emirates are buying very few horses from Australia or New Zealand these days as a result of importation costs. Therefore the international market for Arabians in endurance racing appears to have closed down considerably.

83. Today, a young unbroken Arabian horse would fetch between NZ$2000 to $5000 as a one to three-year-old.

84. Based on the information available to me, the business losses suggested by Mr Perrins are unfounded in my view. Perhaps more importantly, there is no scientific reason why the breeding operation could not continue during the ten year period when works will take place at the Gladstone Pit the in the same manner as it has previously. The effects from the Gladstone Pit are predicted to be very small and well below levels that could impact horse breeding.

85. There are good prospects for generating a profitable business from the indoor arena as it is one of the very few in the vicinity of Waihi, and in my view is a very nice facility. These potentials include hiring of the arena by horse riders or clubs, full livery (providing not only for care of horses, but also exercising them), providing horse-riding lessons and perhaps holding equestrian events such as dressage competitions in the indoor arena.

86. In my opinion, the WNP will not affect the potential for these activities to be developed at the Property during the life of the project. As discussed above, noise from rain on the roof of the arena will be far louder than any noise from the Gladstone Pit. Horses that travel to use to the arena at the Property will be transported typically on a float or in a truck and will be habituated to the far greater noise and vibration from being transported than those experienced at the Property.

87. It is also my view that the presence of the Gladstone Pit will not create adverse reputational or perceived risks associated with the arena or breeding at the property. It is not a requirement that arenas are set in a

perfectly tranquil setting in order to be successful, and I am aware of many that are not. What is more important in my experience is the quality of the arena itself, the way in which it is managed and the value of the services offered.

88. Many arenas are located in rural areas that experience a range of typical, but noisy, rural activities such as noise from roads, railway lines, farm activities, quarries, amongst others. As I understand it, the Gladstone Pit will not be visible from the Property. The arena is over 400 m away from the Gladstone Pit and there is a band of established pine trees between the pit and the Property.

Dated: 1 September 2025

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Andrew McLean