BEFORE INDEPENDENT HEARING COMMISSIONERS APPOINTED BY THE CENTRAL OTAGO DISTRICT COUNCIL

IN THE MATTER OF	The Resource Management Act 1991 (**RMA** or **the Act**)
AND	
IN THE MATTER OF	Of the Central Otago Operative District Plan (**CODP**) and Proposed Plan Change 19 (**PC19**)
AND	
IN THE MATTER OF	Applications to the Central Otago District Council (**CODC**) by **D. J Jones Family Trust and N.R Searell Family Trust** for subdivision and land use resource consents for residential subdivision and development at 88 Terrace Street, Bannockburn (**RC230398**)

EVIDENCE OF RICHARD ANDREW FORD ON BEHALF OF THE DOUG JONES FAMILY TRUST AND SEARELL FAMILY TRUST

Dated: 27 September 2024

Presented for filing by:
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INTRODUCTION

1. My full name is Richard Andrew Ford and I am a Licensed Cadastral Surveyor at Landpro Limited in Cromwell. This is a position I have progressed towards within the company since beginning as a graduate in 2012.

2. I hold a Bachelor of Surveying with First Class Honours (2013) as conferred by the University of Otago. I am also a voting member of Survey and Spatial New Zealand (MS+SNZ) and possess a license to undertake cadastral surveys as issued by the Cadastral Surveyors Licensing Board of New Zealand in 2017 and annually since.

3. My recent project work involves advising on and undertaking a number of residential and rural subdivisions across the Lower South Island. This includes preparing resource consent applications, undertaking engineering design, construction management and cadastral surveying.

4. I have been involved with the design and implementation of the proposed development of the subject site since 2016, including numerous site visits.

5. Additionally, I have been a resident property owner in Bannockburn since 2016, so am very familiar with the local context.

6. My role in relation to the application for resource consent (**Application**) to the Central Otago District Council (**CODC**) by D. J Jones Family Trust and N.R Searell Family Trust (**Trust** or **Applicant**), is as an independent expert witness to the Trust on surveying and land development engineering matters.

7. The Application was publicly notified and a number of submissions were received in support of, and in opposition to the Application. On 20 September 2024 the CODC released an Officer Report for prepared under section 42A of the RMA containing an analysis of the Application and a recommendation in response to the Application (**Officer Report**).

8. Although this is not an Environment Court proceeding, I have read the Environment Court's Code of Conduct and agree to comply with it. My qualifications as an expert are set out above. The matters addressed in my evidence are within my area of expertise, however where I make statements on issues that are not in my area of expertise, I will state whose evidence I have

relied upon. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in my evidence.

9. Furthermore, I aim to uphold the principles and ethics of Survey and Spatial New Zealand and adhere to their associated Code of Conduct.

SCOPE OF EVIDENCE

10. My statement provides a brief overview of the proposal and details the relevant surveying and land development engineering considerations regarding the proposed development of the site.

11. The structure of my is evidence focussed upon the following key areas:

    (a) Surveying and Land Development Engineering Assessment,

    (b) those submissions in opposition that address matters within scope of my expertise, with particular emphasis on matters where there is a difference of view between myself and the submitter; and

    (c) those parts of the Officer Report that address matters within scope of my expertise, with particular emphasis on matters where there is a difference of view between myself and the Officer Report.

12. In the course of preparing this statement I have reviewed the following land development engineering documents:

    - NZS4404:2004 New Zealand Engineering and Subdivision Standards
    - 2008 Central Otago District Council Addendum to NZS4404:2004
    - NZS4404:2010 New Zealand Engineering and Subdivision Standards
    - Resource Management Act 1991
    - Operative Central Otago District Plan 2008
    - Plan Change 19 of the Central Otago District Plan (incl. relevant submissions and reporting)
    - RC 230398 incl. application(s), submissions and reporting

THE PROPOSAL

13. In accordance with the application, the development, referred to throughout the balance of my evidence as the *proposed development,* consists:

(a) Lots 1 – 20, being Residential Lots greater than 1500m².

(b) Lot 30, being a Reserve to vest in Council of 0.41 hectares that harnesses views, heritage features and leisurely recreational opportunities.

(c) Lot 40 (4.44 Ha), being intended as a Reserve, that Council have expressed no desire to have vested. This provides for more energetic recreation amongst heritage and landscape features that the community hold valuable.

(d) Lot 50, being the 7.82 hectare balance of Lot 4 DP 339137.

(e) Lot 51, an area of 0.53 hectares containing services and the heritage feature of Pennyweights Sluicings while creating a linkage to wider recreational trails and the balance land.

(f) Lots 100 & 101, being to vest as Road at 20m or greater width for a total of approx. 1.02 hectares.

14. The proposed development is depicted below for ease of reference in Figure 1 being an excerpt of the scheme plan that accompanied the application I played a lead role in developing.

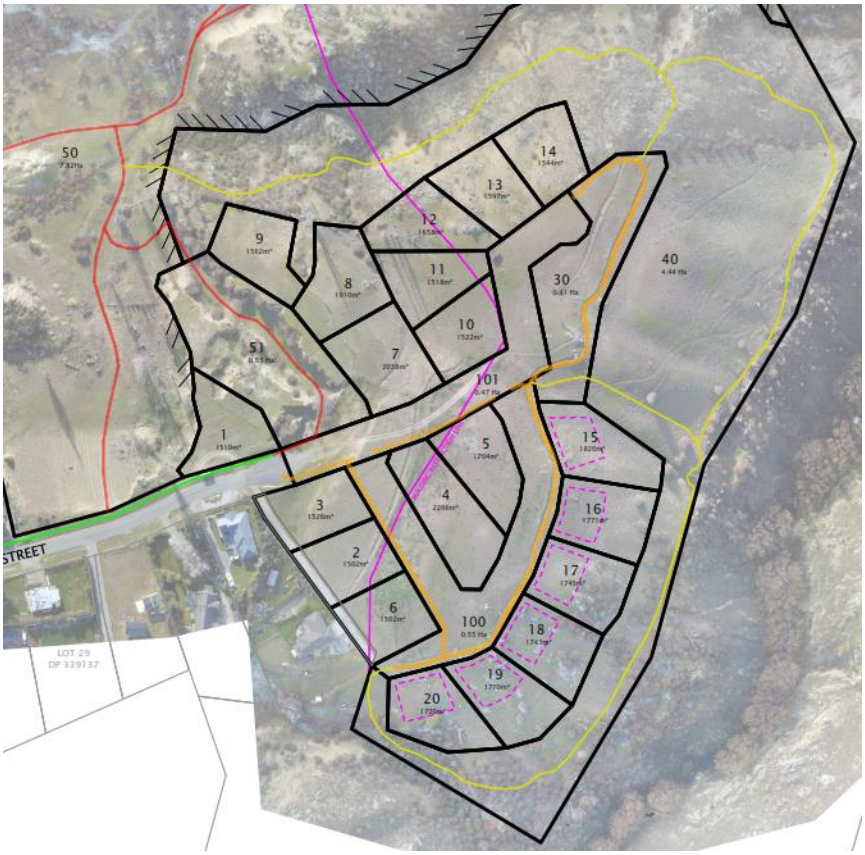

Figure 1 – The proposed development (s15303_RC2_01_REV_C)

SURVEYING AND LAND DEVELOPMENT ENGINEERING ASSESSMENT

15. Prior to the application I have been extensively involved with the *proposed development,* including ongoing liaison with Council staff since 2017. I also have extensive experience with design, construction, supervision & certification of subdivision projects located in Bannockburn since 2015.

16. In lieu of a standalone assessment upon application, extensive advice and plans were provided to inform the application and expert assessments. Such advice has generally been reflected in the Officer Report. Additional detail is provided below where relevant.

17. The assessment focusses upon the following key areas:

- Existing Site
- Access
- Streetlighting
- Water
- Wastewater
- Stormwater
- Earthworks
- Surveying Matters

EXISTING SITE

18. The applicant's property subject to the proposed development consists of land generally depicted in figure 2 below. Being legally described as Lot 4 DP 339137 and held within Record of Title 474127 (**Site/Subject Land**). The Eastern portion of the land, referred to as Water Race Hill, is subject to this proposed residential development, with the remainder held as balance land.

Figure 2 – Lot 4 DP 339137 (red) (Source: LINZ Survey & Title Info, Aerial [CC4.0])

19. The subject land is zoned Residential Resource Area (4) (**RRA(4)**) in the Operative Central Otago District Plan (ODP), which provides for a minimum allotment size of 1500m² and average of 2000m². Plan Change 19 (**PC19**) proposes a zone of LLRZ, with a minimum lot size of 1500m². Figure 3 below depicts the underlying respective zones with regard to the property boundary.

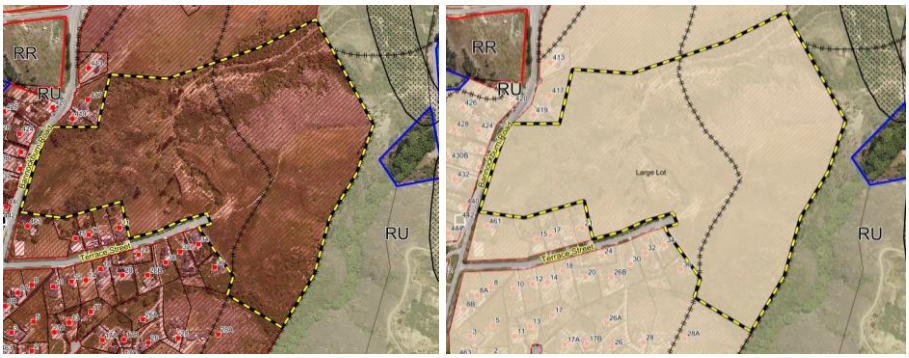

Figure 3 – ODP & PC19 zoning (source: CODC GIS)

20. The site is subject to the presence of the Building Line Restriction (BLR) capturing the Eastern extents of the site as clearly shown also on figure 3 above.

Topography

21. A unique and beneficial feature of the site is the underlying topography with natural features modified by historic mining activity in the area. As a result, areas of steep contour, typical of the landform found in the surrounding Bannockburn area, are found on the site.

22. The subject land is located in the north-east of Bannockburn and is currently semi-rural in nature on account of being vacant. In a general sense the proposed development site consists of the terminus of a terrace, with the final ridge laying approximately NNE, and bounded to the north by a prominent and steep gully system, known as Revell's Gully. Immediately southeast of the development site is the steep and confined Shepherd's Creek.

23. Revell's Gully is a prominent feature of the site and Bannockburn generally, providing historic linkage between Bannockburn Inlet and the township. This gully divides the Water Race Hill from Slaughteryard Hill and drains the site eastwards towards Bannockburn Inlet, although the gully has been influenced by historic mining drainage patterns.

24. The proposed balance land to the west of the development area includes a large open area of gentler relief, also being adjacent to Bannockburn Road. Figure 4 below indicates the current depiction of the site on NZ's Topo50 map series including 20m contours.

Figure 4 – Topography of Site (Source: Topo50 map series)

25. In mid 2016 a comprehensive survey was undertaken of the site (and the Trusts' adjacent land to the North) to quantify the contours and identify key features on the subject land with Figure 5 depicting 1m contours across the site.

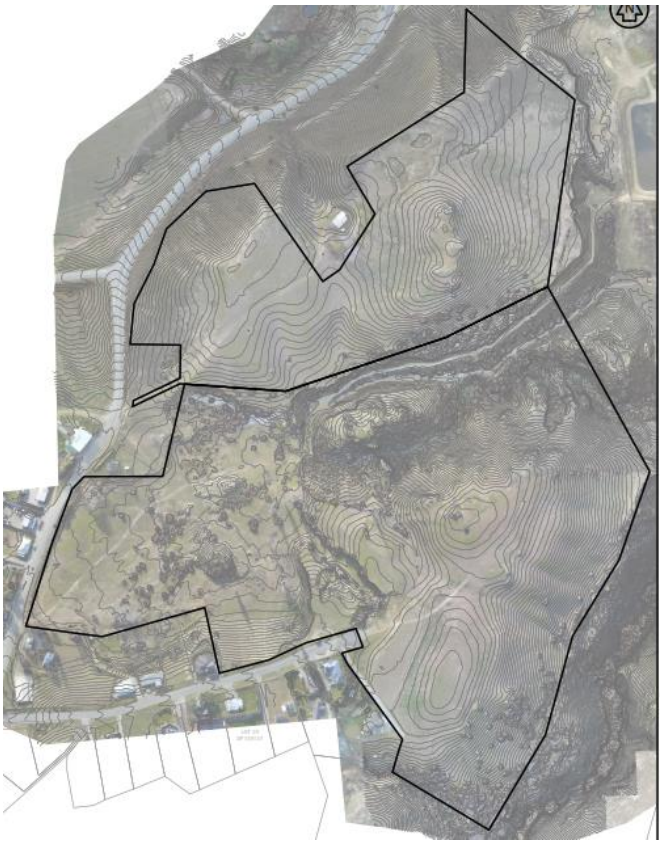

Figure 5 – Contour plan of site (Landpro: s15303_14_04_PC19_REV_B)

26. Mr Milne and Ms Pfluger both describe the topography in further detail within their Landscape Assessments, whilst the brief summary above indicates some topographic considerations to design.

27. Schist outcrops, underground workings and other rock features are also found across the site, constraining the subdivision layout and likely a continuing influence on private landowners with house foundations requiring additional design and construction input. The ENGEO assessment captures these matters in detail.

Existing Connections

28. The site is located within the Cromwell water and wastewater servicing area. The scheme boundary in the Bannockburn area is shown in Figure 6 below with the Trusts' land parcels highlighted. The scheme boundary is contained within the CODC Financial and Development Contributions policy dated 1 July 2021. Further, Lot 4 DP 339137 is considered to be 'connected but vacant' per modelling undertaken in 2017 for another project.

Figure 6 – Cromwell water supply & wastewater scheme boundary & the site (Source: CODC 2021 financial and development contributions policy)

29. Critical wastewater infrastructure intersects the site, particularly the main gravity trunk line for all of Bannockburn's wastewater, but also a number of contributing sewer lines as can be clearly referenced within CODC's GIS system (refer Figure 7).

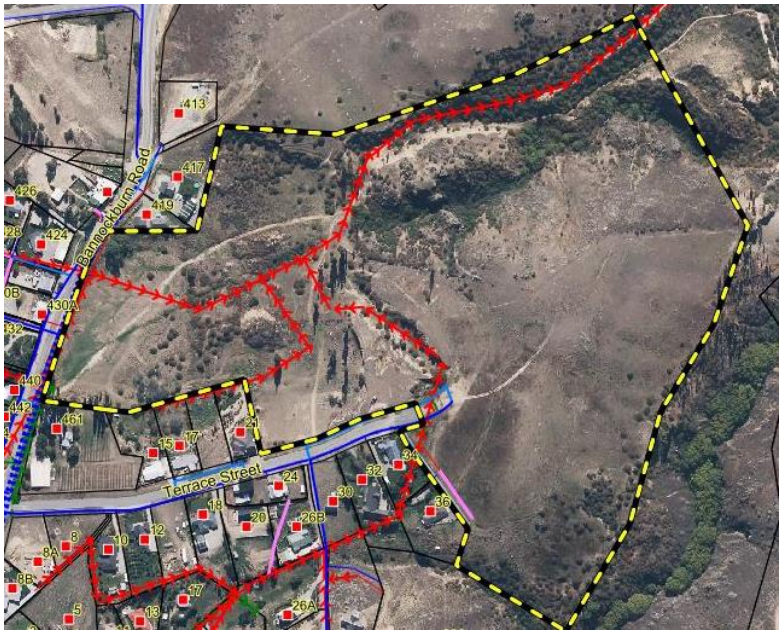

Figure 7 – Existing Wastewater Pipes on Lot 4 DP 339137 (source: CODC GIS)

30. The subject land is also burdened by services and discharge of stormwater that are not currently registered upon the title as easements in gross in favour of CODC or relevant third parties.

31. A number of existing connections are present on the subject land and were installed upon previous phases of development in the area. Although they do

not align exactly with the *proposed development*, some lots are able to make use of those connections per the table in Figure 8 below.

LOT	H_2O	FS	Access	Comment
1	✓		✓	
2	✓	✓	*	* Access would necessitate upgrade of the existing ROW, or extension of the existing Terrace St formation.
3	✓	✓	✓	
6	✓	^	*	^ Standard and condition of existing FS pipe needs confirmation to vest in CODC. * Per above

Figure 8 – Summary of Existing Service Connections proposed to utilise.

32. Remaining connections are not being utilised upon this stage of development, or are rendered redundant.

ACCESS

33. While access is also covered in the transportation assessment, I'll cover some pertinent matters below to reinforce that access is adequate to service the proposed development.

34. Shared right of ways are the most noteworthy access consideration on this site. With design priority placed on the adaptive re-purposing of the water race, per Figure 9 below prepared for RC 190154, maximum longitudinal gradients are proposed to be in compliance with NZS 4404:2010, which allows for maximum gradients of 20% for a right of way. Longitudinal gradients aside they will otherwise comply with CODC's 2008 Addendum to NZS 4404:2004.

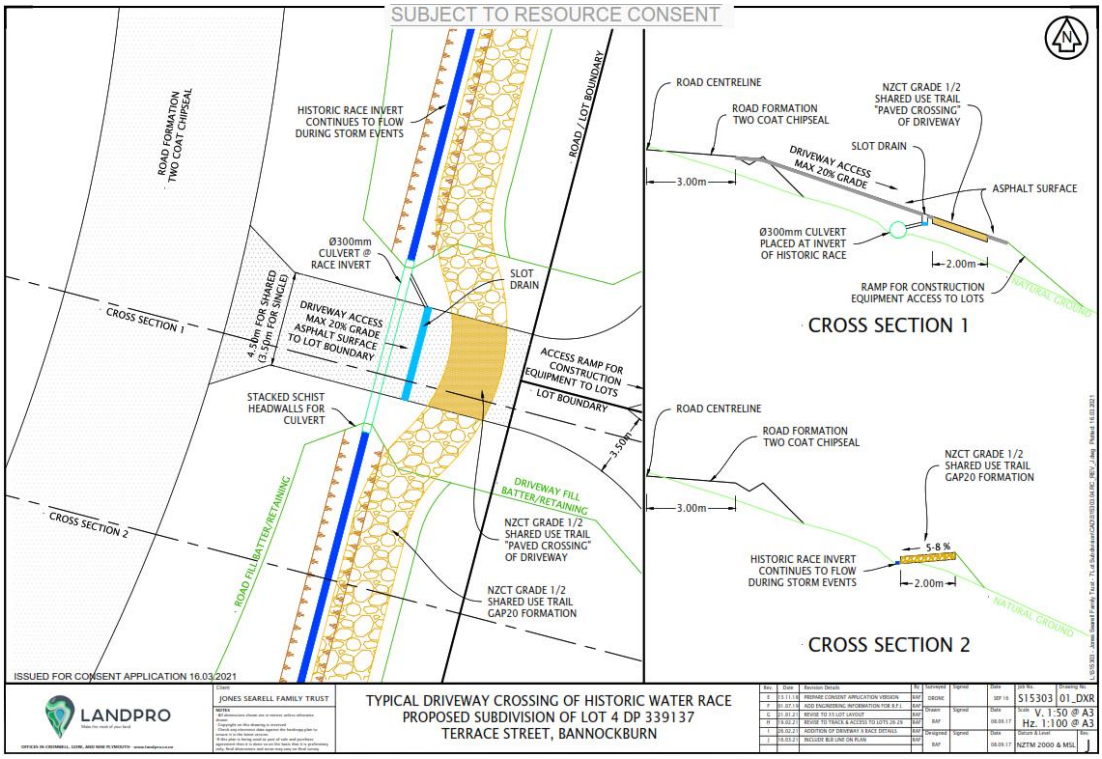

Figure 9 – Proposed Steep ROW water race crossing detail (Landpro Plan s15303_01_DXR_Rev_J)

35. Adjacent landowners at Lot 36 DP 339137 (36 Terrace Street) that are currently extended a right of way across the subject land to date have expressed a viewpoint that they are unwilling to have the formation of such upgraded, despite its deterioration since construction. This has resulted in this route not being proposed as a formal primary access for any new allotments. As this right of way will continue to burden proposed Lots 2, 3 & 6, it is anticipated that continued access to Lot 36 DP 339137 can be readily achieved without upgrade to the existing formation. Primary access points direct from the legal road to Lots 2, 3 & 6 will be constructed and captured by a consent notice for each of these proposed lots.

36. The footpath alongside Terrace St to its current terminus is proposed to be 1.5m width asphalt construction. Beyond this point, there are a number of different types of pedestrian access and linkages proposed, with all being outlined on the supplied plans.

37. As outlined in the heritage assessment, adaptive re-use of a water race (F41/369) in Lot 100/30 is proposed. This is intended to involve construction of a walking track following the alignment of the water race constructed to the NZCT Grade 1/2 specification. This will result in a similar style trail to the

nearby Lake Dunstan cycle trail and the pedestrian and cycle linkage to Cromwell alongside Bannockburn Road.

38. Some logical areas are set aside for carparking to allow access for the use of the recreational reserve space associated with the development. This is intended to provide some additional capacity for visitors to the area without unnecessarily impacting resident's driveways.

STREETLIGHTING

39. Rather than being a rigid requirement, streetlighting is only recommended in the transportation assessment, in accordance with the CODC's 2008 Addendum to NZS4404:2004.

40. In a rural (or rural hybrid) road environment such as that in Bannockburn, streetlighting is generally provided for benefit of pedestrians rather than vehicles, which have headlights to illuminate their path.

41. Extension of streetlighting down Terrace Street (until the BLR) is proposed to continue in a similar manner as the rest of the street, and that found in wider Bannockburn.

42. Liaison with CODC engineering staff indicated that overhead streetlights would only be necessary, and appropriate, up until the BLR, which also coincides with the final intersection between Terrace Street and the Loop Road.

43. Where beyond the BLR, it is proposed that bollard style lighting can be implemented to minimise the impact on local residents and those viewing the area from outside the development.

44. There are a number of bollard style products available on the market, some of which are solar powered, can be capped with output at only 180°, are considered to be "dark sky approved", or provide a number of aesthetically designs. Selection and approval of such products is a matter for engineering approval as these are generally an asset vested in council.

45. In order to attain adequate output of light for users, bollard lighting usually requires a significantly increased number of fixtures in comparison to overhead lighting. So, while the illumination causes less upward light spill, there are a greater number of luminaires necessary, and requiring ongoing maintenance.

WATER

46. I am of the opinion that the site is able to be adequately serviced for potable and firefighting water supply. The basis of this opinion is centred around ongoing liaison with various CODC engineering staff since 2017, extensive familiarity with the site and Bannockburn generally, alongside my local industry experience. This opinion is reflected by the Officer Report, which has been informed by CODC staff with respect to infrastructure.

47. Currently an existing Ø150mm mPVC main runs along the Southern side of Terrace Street with Ø50mm HDPE rider mains servicing the Northern properties. A further Ø50mm HDPE dead end line services 36 Terrace Street (and a number of existing connections to the subject site).

48. Proposed and existing water infrastructure is shown on the preliminary engineering layout plan and will be subject to detailed design for engineering approval.

49. To summarise the layout presented in the application:

- One main loop of Ø150mm HDPE pipe traverses the proposed development (approx. length 590m),
- Extension of existing Ø150mm line to supply main loop (approx. length 25m),
- Extension and endcap of a Ø150mm line through Lot 40 to the NW of Lot 9 to allow for future network extension (approx. length 25m),
- Linkage of existing approx. 150m length Ø50mm HDPE dead end line to the main loop to create a looped rider main (approx. additional length 70m),
- New Ø50mm line to service Lots 4 & 5 (approx. length 20m),
- New Ø50mm line to service Lots 19 & 20 (approx. length 20m),
- New Ø20mm supply connections with toby box, etc. provided to Lots 4, 5 & 7 – 20,
- Lots 1, 2, 3 & 6 can make use of existing water supply points (refer existing connections section above),

- Possible Ø20mm supply connections with toby box, etc. provided to Lots 30, 40 and/or 51 for Council maintenance/water fountains, etc. pending Council advice.

50. I note that since the preliminary engineering design was prepared, and circulated upon the application, further liaison with CODC engineering staff has indicated that the infrastructure proposed for water supply could be scaled back with terminal lines and smaller diameter rider mains than the looped main design proposed.

51. Flexible HDPE pipe is typically preferred for water infrastructure as it allows for appropriate alignments and provides a robust system with noted longevity. This is the reason such construction has been chosen for this development.

52. Where possible, water infrastructure is proposed to be located within areas of road to vest in CODC (Lots 100 & 101). In some areas, to ensure a looped main is constructed, provide new connections and allow for future network extension, private property is traversed and will result in appropriate easements being registered across Lots 7, 8, 9, 11, 12 & 40. Existing infrastructure will have easements registered across Lot 2, 3 & 6.

WASTEWATER

53. I am of the opinion that the site is able to be adequately serviced for wastewater by using both gravity and private pumped pressure sewer systems. The basis of this opinion is centred around ongoing liaison with various CODC engineering staff since 2017, extensive familiarity with the site and Bannockburn generally, alongside my local industry experience. This opinion is reflected by the Officer Report, which has been informed by CODC staff with respect to infrastructure.

54. The subject site has a number of Ø150mm uPVC foul sewer lines present. It is proposed that connection is made into two of the existing manholes on the property. One additional lateral connection direct to the existing network is also required to be made for Lot 1.

55. The new wastewater infrastructure to be provided is proposed to involve both conventional gravity sewer and private pumped sewer systems (as are common in other areas of Bannockburn and wider CODC area). Each type of

wastewater infrastructure is identified on the preliminary engineering layout plan and will be subject to detailed design for engineering approval.

56. To summarise the layout presented in the application:

- Southern Ø150mm uPVC gravity sewer line of approx. 70m with 2 manholes,
- Southern Ø50mm HDPE pressure sewer line of approx. 235m,
- Northern Ø150mm uPVC gravity sewer line of approx. 160m with 4 manholes,
- Northern Ø50mm HDPE pressure sewer line of approx. 120m,
- Ø100mm uPVC gravity sewer lateral connections with cleaning eyes for Lots 1 – 12
- PSS boundary kit connection with backflow preventer (eg mono style) for Lots 13 – 20

57. Lot 12 could easily be alternately serviced by PSS, but this will come down to design of the dwelling on the property and preference of the owner with both systems able to enter the network via a gravity lateral connection and cleaning eye.

58. Flexible pressurised pipe allows for appropriate alignments of the sewer system, reduces the effect of maximum and minimum grades and allows buildings floor levels to be lower than the area able to be serviced by gravity. They also provide a positive effect on the wider network due to attenuation of peak flows due to on site storage.

59. Where possible, wastewater infrastructure is proposed to be located within areas of land to vest in CODC (Lots 100, 101 and 51). In some areas, private property is traversed and will result in appropriate easements being registered across Lots 8, 9, 11, 12 & 40. Existing infrastructure will have easements registered across Lot 3 & 51 and possibly Lot 2 subject to confirmation of assets location.

STORMWATER

60. Stormwater in Bannockburn (and the wider Cromwell basin) is generally easily disposed of via soakpit due to favourable ground conditions, noting that there

are some exceptions where poor soakage rates exist in conjunction with comparatively large catchments.

61. This site has highly modified drainage patterns and like much of Central Otago, presents a unique situation in that an area typically high in soakage has historically been subject to sluicing and wild flooding, both activities that have subjected natural and modified flowpaths to excess flows.

62. Permeability testing and soakpit sizing will be undertaken in the detailed design phase associated with Engineering Approval applications. However, initial design parameters based on extensive experience on other sites across Bannockburn have been confirmed based on information in the ENGEO geotechnical investigation reporting.

63. In a broad sense those design parameters were informed thus:

    (a) Soakage rates in Bannockburn based on my experienced can be in excess of 500mm/hour, but are typically assumed at 250mm/hour with targeted selection of discharge material.

    (b) No specific permeability testing or reporting has been included within the ENGEO assessment.

    (c) A number of test pits and investigations were undertaken with records included upon the ENGEO assessment.

    (d) All test pits indicate dry material, which is generally characterised as sand or gravel, if not bedrock.

    (e) Test pit records or reporting do not indicate that subsoil conditions will prevent disposal via soakpit (eg no silty clay, high moisture content or standing water levels present).

    (f) Soakage Testing and sizing of soakpits will be addressed upon Engineering Approval for roading, and revised during construction based on conditions encountered as necessary.

    (g) Further geotechnical involvement is required for foundation design upon Building Consent, so a consent notice regarding disposal on site is appropriate for individual lots.

64. These initial design parameters have informed preliminary road design and provision of attenuation areas and secondary flow paths, indicating that

stormwater is able to be adequately discharged to soakpit and natural flow paths, with post development flows similar to the current stormwater regime.

65. Soakpit and sump locations indicated on the preliminary layout depict where stormwater is required to be captured and managed in some manner. It is also proposed that soakpits are able to deal with stormwater from impervious surfaces on individual allotments (via consent notice).

66. Detailed design will confirm the pre vs post development discharge at each of the existing natural and historic flow paths, further refining attenuation design and necessary capacity of soakpits for discharge and storage. This will also allow stormwater treatment options to be developed both for during construction and in perpetuity.

67. Regardless of the resultant discharge and permeability testing results, roads throughout Bannockburn (like those proposed by RC 230398) are in keeping with the rural nature of the town with side drains and grassed swales rather than kerb and channel. These discharge to rural soakpits or rock sumps and into natural flow paths.

68. Grassed swales allow for additional ponding during significant storm events and soak trenches can be integrated longitudinally into the swale to achieve a large soakage area without encumbering private property or vested assets.

69. Further engineering control may be required to traverse the steep entrance to Pennyweights Sluicings. This steep entrance is the terminus of those sluicings and currently has between 2 and 5 metres of fall over a short distance. Short lengths of pipework currently convey stormwater into this area, from the existing terminus of Terrace Street, an approach that may be similarly applied, or improved and could coincide with a more formal walking access from Terrace Street into Pennyweights Sluicings.

70. The biggest factor affecting stormwater disposal in Bannockburn is an isolated and intense storm of short duration, the type of event that causes flash flooding. Aside from engineering controls (determined alongside the detailed engineering design), this requires adequate identification of overland flow paths which ideally results in easements being registered where a risk to people or property is otherwise likely.

71. A unique factor of the development are the twin water races (F41/369) subject to adaptive re-purposing. This means the feature will continue to function as a

cut off drain, albeit high in the catchment. While this concentrates flow, it allows for further attenuation of flows to a typical context.

72. Water races by their nature have a flat and consistent gradient. This aids attenuation of stormwater discharge, by slowing travel time and concentrating discharge to an appropriate location, preventing widespread or uncontrolled sheet flow into Shepherds Creek.

73. The twin water races (F41/369) have historically discharged into a sluice gulch in Revell's Gully, since the canvas flumed pipe was abandoned (circa 1860s). Revell's Gully is an area subject to sluice mining and has been subject to this point discharge for many years, it is also distant from any private or Council assets.

74. It should be noted that the proposed adaptive re-use will greatly enhance the capacity of the water race during adverse events, with the ability for the trail to be partly submerged during significant storm events. Positively contributing to the post-development flows not exceeding the pre-development outflows for the site.

75. I also understand that the water races had historically been used for wild flooding style irrigation of the subject land. Indicating that the development will improve the impact of stormwater from the current regime, which has essentially been left fallow following historic mining and irrigation uses.

EARTHWORKS

76. The earthworks plan that accompanied the application depicts the extent of earthworks required and indicative volumes associated with the development, using the preliminary engineering design as a basis.

77. Figure 10 below indicates the extent of those earthworks. Beyond track and road construction and incidental trenching for servicing, it is not anticipated that extensive earthworks are to be undertaken for this development.

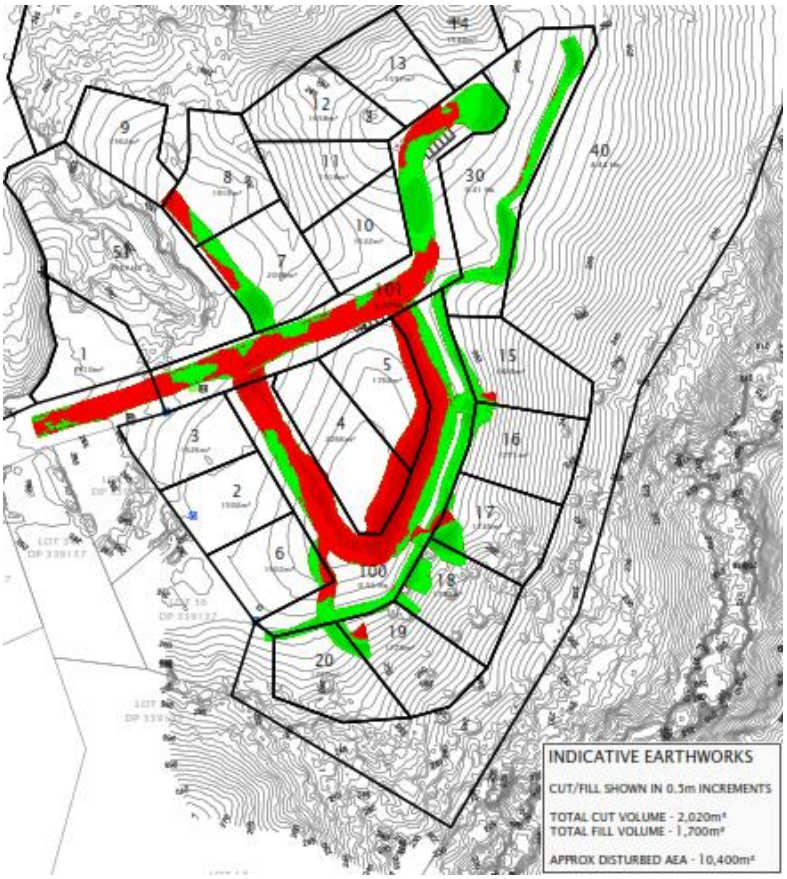

Figure 10 – Indicative Earthworks (Landpro Plan s15303_12_01c_Rev_A)

78. It is noted that footpath construction or ancillary disturbance for landscaping matters is not included on this plan, but will be refined alongside the Engineering Approval process and compliance (or consented) with the requirements of Otago Regional Council.

79. Indicative earthworks volumes displayed are a simple comparison of the original ground to the final proposed ground. A further volume of undercut to account for pavement construction or the presence of unsuitable material may be required to arrive at this final proposed ground level.

80. Across the site the main access earthworks will entail depths of both cut and fill of up to 1.5 metres in places. It is anticipated that this could extend to 2 metres with works associated with access to building platforms.

81. Typical cut batters have been designed at 1:4 but in some locations on site may necessitate flattening or steepening depending upon constraints. Likewise typical fill batters are 1:3, but anticipate some areas of steepening or flattening

required with 1:2 batters expected in steeper areas of the site not subject to excessive heights, which may be achieved by retaining if necessary.

82. It is likely that some schist is encountered during earthworks for roads and services. This will also influence the final maximum batter slope angle if deemed competent.

83. Geotechnical reporting has been undertaken by ENGEO as part of the application and those findings will inform the final earthworks necessary on site.

84. Significant earthworks on individual allotments will be subject to LUC and ideally each site will have a sympathetic dwelling design developed to minimise such.

85. Control of sediment-laden water during the earthworks and up to full site stabilisation is addressed via the Erosion and Sediment Control Plan (ESCP); adherence with the draft ESCP provided in support of the application is required by the Consent Holder and any Contractor. Finalisation and council approval of this ESCP is required prior to the start of any works.

86. It is anticipated that this matter will be addressed during or in parallel to the engineering approval process. This would also allow any additional concerns (such as noise, vibration, dust, etc.) to be captured by upon a comprehensive Environmental Management Plan (EMP) in substitution of the ESCP.

87. Provided the ESCP (subject to finalisation) is suitably implemented onsite and controls are actively inspected, maintained and (where necessary) amended or upgraded, offsite discharge of sediment-laden water is not expected to be significant.

88. It should be noted that while this draft ESCP was created prior to the relevant Regional Water Plan: Water rules coming into effect, the ESCP will be consistent with Otago Regional Council's Residential Earthworks in Otago guidelines (2023).

SURVEYING MATTERS

Datum

89. In line with direction for standardisation from Land Information New Zealand to "*Modernise Height Data*" across NZ, CODC have adopted New Zealand Vertical Datum 2016 (NZVD16) as the official height standard for the district from 1 July 2024.

90. Previously used was a local vertical datum, being Dunedin 1958, which is an approximate representation of sea level. Although there are some recognised limitations with the use of multiple local datums around the country. An inland location such as Central Otago tends to exacerbate those limitations.

91. Therefore, historic as built information of council assets is not necessarily consistent, nor well understood by third parties across various industries. In simple terms, mean sea level (MSL) has often been commonly referred to, but "zero" isn't necessarily in the same place for all applications or sites.

92. In the vicinity of the site, the difference between NZVD16 and Dunedin 1958 is assumed to be within the order of 400mm.

93. The magnitude of this difference will be confirmed by field survey with accurate observation of reduced levels of local survey benchmarks, Council assets (eg. Wastewater manhole lids and inverts) and topography on site.

94. The original survey data utilised in design work and referenced by the Landscape Assessments was captured (by aerial survey and ground truthing) with respect to the local datum, due to its predating the availability of NZVD16 and CODC's infrastructure as built records in general reference to the same.

95. Those levels listed as "*masl*" within the application are correct with respect to the previous local datum and the contours shown on plans in the application. Thus, they are accurate in a relative sense to the surrounding environment.

96. The key matter is ensuring that any reduced levels listed in any final conditions of consent (eg invert levels, max build heights) are correct in a relative sense, while also being accurately referenced to CODC's (and NZ's current) official height standard, being NZVD16.

97. If a decision to grant the consent is forthcoming, reduced levels associated with each relevant condition can be confirmed prior to issue of the decision.

98. While currently in a transitional period, it is important that the implementation of the proposed development is with respect to NZVD16 as CODC's official height standard. Reduced levels are proposed to be registered in perpetuity against the records of title, so this will provide consistent and standardised interpretation of those reduced levels into the future.

RESPONSE TO SUBMISSIONS

99. Some submissions are opposed to the Application. A range of reasons are given for their opposition, some of which relate to my area of expertise.

100. The approach I have adopted in this statement of evidence is to identify those parts of submissions in opposition where I disagree with the submission and to explain my reasons for disagreement.

101. On Page 14, the submission in opposition by Bannockburn Responsible Development Incorporated[1] states:

> *Ms Muir stated in her s42A evidence for PC19 that: "to service this site would require significant upgrading to existing water reticulation and storage capacity. Water would need to be pumped to this area which would result in higher operating costs. It would also require capacity increases in wastewater treatment. Concluding that these upgrades "exceed current infrastructure planning provisions for level of service and growth".*
>
> *Ms Muir further states, with respect to water, that capacity constraints relate to the volume of water that can be delivered through the main Bannockburn pipeline to the Bannockburn reservoir.*
>
> *The application should be rejected until additional analysis on the ability to service this, and the any further development of the site, has been completed.*

[1] Submission number 10, which appears to have been used as a general proforma by a number of submissions including submission numbers 11, 12, 24, 25

102. I do not agree with this statement. In brief, this was dealt with by various parties upon PC19 proceedings. Comments in the Officer Report reinforce this, but for the avoidance of doubt, extended detail is included below.

103. Ms Muir has since confirmed in her response to PC 19 Minute 4 that the hierarchy of servicing places priority on "*the existing network and customers (including land already zoned for development)*" over proposed PC19 zones or extensions.

104. The 'site' as contemplated by RC 230398 is currently serviced for network connections (despite being vacant) and is located within the RRA(4) zone, meaning it is included in *"…current infrastructure planning provisions for level of service and growth."* per Ms Muir's reporting.

105. In further regard to the statement that *"water would need to be pumped to the area…"*. This statement was recorded at para 265 in the PC19 decisions report. It appears that the PC19 hearings panel have misrepresented Ms Muir's s42A evidence and how it applies to the Trusts' land. Ms Muir's evidence makes no mention of pumping with respect to the Trusts' land when referring to #82 in the table found on page 9. That statement is however regularly applied to other parcels of land requesting re-zoning though.

106. From a practical standpoint, additional pumping to service the 'site' is also extremely unlikely due to its location adjacent to, and lower than, areas of Bannockburn that are currently adequately serviced, alongside the existing presence of a fire hydrant and Ø150mm main on the site.

107. At paragraph 8. f), the submission in opposition by Timothy James[2] states *"there is no reporting on the pre and post development Stormwater Controls for Road and House sites."*

108. I do agree with this statement. Reporting of stormwater management was not reported in the detail anticipated by the submitter upon the application. Stormwater in Bannockburn is generally disposed of via soakage, as reflected by the engineering comment sought for the Officer Report.

109. As indicated in my evidence above regarding stormwater management, disposal of stormwater is considered readily able to be achieved on this site,

[2] Submission number 06

based on local experience and initial design parameters. Confirmation of permeability testing will be undertaken upon detailed design to accompany engineering approval.

110. At paragraph 8. g), the submission in opposition by Timothy James[3] states:

> " *The application does not include an infrastructure report, this is required to ensure that the is sufficient water pressure and flow to service the development and if there is sufficient fire fighting flows. This report should also comment on the local network's wastewater capacity."*

111. I do not agree with this statement. Whilst not within a standalone report, relevant information was presented in the application regarding how the development was proposed to be serviced, including water and wastewater. This is reflected with relative accuracy in the s95 report (pp. 16-17) and the Officer Report and has been included in the assessment above.

112. As indicated above in my evidence, this proposal has been developed in conjunction with CODC engineering staff over an extended period of time (since 2017) – with agreement that there are no significant impediments to servicing the site with respect to access, water, wastewater or stormwater at the densities proposed.

113. On page 6, at the first paragraph of section 4 of the submission in opposition by Charles and Nicola Hughes[4] states:

> *"The application includes a public reserve lot 40 area 0.41ha located on the ridgeline. It encompasses some archeological features. Water races which are converted to walkways and provides a good lookout particularly of Bannockburn Inlet and Shepherds creek to the east and limited view of Bannockburn to the west."*

114. In subsequent paragraphs on Page 6, the submission in opposition by Charles and Nicola Hughes[5] states *"Lot 40 4.44ha should be included as a public*

[3] Submission number 06

[4] Submission number 15

[5] Submission number 15

reserve…" and *"Lot 51 0.53ha Pennyweights Slucings shown as a balance lot to be retained by the applicant should be included as a public reserve."*

115. I do agree with the two above statements. As a local industry practitioners with an enduring positive influence on the district, Charles and Nicola recognise the positive aspects of Lot 30 including adaptive re-use of the water race and highlight the value of the outlook from the public space. The subsequent suggestion of Lots 40 and 51 being held as a public reserve is also welcome. This approach was presented, but per details contained in the application was not supported by CODC Reserves Team. If there are any willing community groups or similar ownership structure to take responsibility for the "public ownership" in lieu of CODC, this would be a fantastic outcome.

116. On page 6, the submission in opposition by Charles and Nicola Hughes[6] also states:

> *"Little regard has been made of the stormwater runoff from existing and future roading which will accumulate in vicinity of lot 3 and subsequently flow down gully scouring out the wastewater pipeline."*

117. I do not agree entirely with this statement. While the existing drainage pattern is accurately described, due regard has been made upon the preliminary designs and liaison with CODC's Engineering team per evidence above.

118. Scouring will be prevented by the proposed attenuation within grassed swales, and further engineering controls upon detailed design, which will restrict post development flows to the same peak flows as pre development.

119. The gradient through Pennyweights Sluicings is not particularly steep at less than 6% (roadside drainage should be rock lined where greater than 10%) and unlikely to cause scouring if subjected to the same flow regime as currently, particularly in an area that has been historically subject to large volumes of overland flow associated with sluicing.

120. It is noted that this area has since been modified with the installation of wastewater infrastructure, to which connection is proposed. Therefore, any works will reinstate or improve the ground and flowpaths in an appropriate

[6] Submission number 15

manner. Final design of that connection may also require some form of control of stormwater to traverse the steep entrance to Pennyweights Sluicings. This steep entrance is the terminus of those sluicings and currently has between 2 and 5 metres of fall over a short distance. Short lengths of pipework currently convey stormwater into this area, an approach that may be similarly applied, or improved.

121. In the same paragraph on page 6, the submission in opposition by Charles and Nicola Hughes[7] states *"Provision should be made to pipe the stormwater down through Pennyweights sluicing's to Rivells gully."*

122. I do not agree with this statement. I suggest that an overland flow path or channel, with appropriate engineering controls, is a better solution than piping stormwater in this location. This will more efficiently deal with flash flood type events and will not be subject to failure due to blockages. In this location, this could also be coincident with a more formal walking trail to connect with Revell's Gully and any future similar development on Lot 50.

123. At paragraph 5.9, the neutral submission by Kā Rūnaka [8] states:

> *"Appropriate consent conditions are sought to manage the effects of the proposed subdivision and subsequent residential development. The potential adverse impacts of subdivision earthworks and stormwater generated by residential development are of concern to Kā Rūnaka, given the potential for sediment-laden waters to enter the Bannockburn Inlet. Furthermore, it is the preference of Kā Rūnaka that all wastewater infrastructure be fully reticulated."*

124. I do agree with this statement. Per my evidence above siteworks will be undertaken in line with the Residential Earthworks in Otago guidelines (2023) and an EMP will be implemented containing the finalised ESCP.

125. Further, wastewater is proposed to be fully reticulated for the subdivision. Where possible the wastewater network (eg not existing) will be constructed to reduce the likelihood and impact of stormwater inflows during significant storm events.

[7] Submission number 15

[8] Submission number 31

126. At paragraph 5.11, the neutral submission by Kā Rūnaka [9] states:

> *"Kā Rūnaka submit that best practice environmental design solutions should be required to attenuate, treat, and soak stormwater runoff from the development and residential lots. The implementation of soft engineering solutions to manage stormwater throughout the design of the development including additional planting, soakage pits, and rain gardens is supported by Kā Rūnaka, to prevent the runoff of sediment into the Bannockburn Inlet and its tributaries, Kawarau Arm and Te Wairere (Lake Dunstan)."*

127. I do agree with this statement. The EMP will ensure best practice during construction, while the use of soft engineering solutions to manage stormwater on a permanent basis are noted and proposed for integration into the detailed design, where possible – and agreed to by CODC, as these may need to be vested assets. Private lots will be encouraged to implement best practice environmental design alongside their obligations for landscaping.

128. On page 2, the neutral submission from Fire and Emergency New Zealand[10] states that *"Fire and Emergency seeks that the accesses for Lots 15 – 20 have a gradient not steeper than 1:5 (20%) and confirmation of the surfacing of these accesses."*

129. I agree with this statement. It aligns with NZS4404:2010, which has been used as the basis for preliminary access design for each of Lots 15 – 20.

130. In line with Fire and Emergency New Zealand preference, each shared access to those lots has a gradient of 12.5% or less until crossing the historic water race. Beyond the historic water race, a maximum gradient of 20% or less is achieved to the boundary of each of those Lots.

131. Internal site access may require steeper gradients, in accordance with NZS4404:2010 straight lengths (<20m) of up to 1:4.5 (22.2%) with high friction surfacing being acceptable. The final internal site access will be informed by dwelling design and are a matter for building consent, but where accesses are registered as a right of way, they will comply with NZS4404:2010.

[9] Submission number 31

[10] Submission number 30

132. Furthermore, access directly adjacent to each property is easily achieved in an emergency, with plenty of working space available on the carriageway which avails alternate access (ie not a dead end), due to building platforms being adjacent[11] to the road reserve.

133. Streetlighting is discussed on page 2 of the submission by Paul Newman[12]. Mr Newman states "*if the application is approved then as a minimum the street lighting along Terrace Street needs to use Dark Sky approved products and ideally all existing street lighting in Terrace Street should be upgraded to use such products.*"

134. I agree that that integration of "dark sky products" is included where possible in modern development. However, I note that often Local Authorities are unwilling to receive assets which are "non-standard".

135. I disagree that retrofitting of the existing streetlights on Terrace Street is within the remit of RC 230398 due to streetlighting in CODC being primarily for pedestrian benefit. The provision of a footpath captures any obligations in regard to the existing streetlighting. Retrofitting luminaires is a matter that should be raised with CODC (eg via Long Term Plan), to ensure budget is set aside for replacing end of life luminaires with dark sky approved products.

136. The submission in opposition of Robert and Robyn Galvin[13] indicated at its beginning that withdrawal of their opposition would be considered if *"the Applicant developed the proposed Subdivision within the basin that is adjacent to Bannockburn Road and Opposite the Bannockburn Hotel and Black Rabbit Café."* followed by some preferred outcomes which included matters such as public access, provision of small scale retail or community facilities, a central reserve and an increase in density.

137. I agree that this area, proposed as Lot 50, being the 7.82 hectare balance of Lot 4 DP 339137, is a suitable area of future development that could integrate many of those suggestions.

11 With compliant road setbacks in accordance with Rule 7.3.6 iii) or varied by consent

12 Submission number 19

13 Submission number 33

138. The submission in opposition of Robert and Robyn Galvin[14] also outlined in its closing remarks that:

> *"... Council would impose a condition for the Applicant at its own expense, to provide curb and channelling with widened pavements, berms as well as stormwater facilities and downward facing street lights to Terrace Street, and that the view of on-coming traffic at the corner of Terrace Street and Bannockburn Road is widened to cope with the increased traffic, all to be carried out prior to subdivision construction works being undertaken."*

139. I do not agree with that statement. In the rural context of Bannockburn, roads are constructed with a grassed swale, rather than kerb and channel per an urban environment. Kerb and channel is only present in Bannockburn where areas of steep gradient or other special circumstances necessitate such. Considering a rural context, kerb and channel also offers less optimal stormwater disposal due to the decreased attenuation and capacity. It also generally requires structures that can become blocked or require ongoing maintenance on a more regular basis.

RESPONSE TO OFFICER REPORT

140. The Officer Report recommends acceptance of the Application. A range of reasons are given for their recommendation, some of which relate to my area of expertise.

141. The approach I have adopted in this statement of evidence is to identify those parts of the Officer Report where I disagree with the Officer Report and to explain my Reasons for disagreement.

142. At paragraph 9, the Officer Report outlines a number of documents supporting the application.

As a point of clarification, I note that a preliminary engineering layout plan was also included in the Application at **Appendix A**, alongside the preliminary earthworks plan and scheme plan of subdivision.

143. At paragraph 139, the Officer Report states:

[14] Submission number 33

With regard to access gradients, the applicant has proposed to construct these accesses at gradients of up to 24% in one case. Engineering considers this gradient to be unreasonable, as an urban 2-4 Lot ROW permits up to 16% and a Rural 1 to 6 Lot ROW permits up to 16.7% gradient, but only an urban 1-lot access or ROW permits 20%. The applicant is encouraged to determine a compliant method of servicing the Lots for access, but if unachievable, the engineer recommends a maximum gradient of 16.7%; with a proviso that the rights-of-way may be constructed with excessive gradient only with specific approval of Councils Infrastructure Manager at time of Engineering Acceptance/Approval, and with specific additional surfacing treatments. It is noted that this proviso is included as an option for the Commissioners but is not generally supported by CODC Engineering.

144. I do not agree with this statement which appears to be based on outdated information. The proposed 24% was discussed at an early stage (based on examples elsewhere in NZ). Upon the most recent revision of accesses, prior to application, the longitudinal gradients of each shared access have been designed in a preliminary manner to be in compliance with NZS 4404:2010, as detailed above.

145. Compliance with NZS 4404:2010 is not directly reflected by proposed Conditions 6. i) – l) xii) & xiii) and those conditions will require revision. It is also suggested that a single condition is applicable to all proposed new right of way construction rather than having four identical conditions.

146. Retention of those proposed conditions creates a risk that refusal of a gradient between 16.7% and 20% by the Council's Infrastructure manager upon Engineering Approval would cause additional earthworks, potential landscape effects and a detrimental effect on heritage features and their adaptive re-purposing as a walking track, when it has already been confirmed in a preliminary sense that compliance with NZS4404:2010 is feasible.

147. It is suggested that xii) is substituted for a condition that generally outlines "Maximum longitudinal gradient will be in compliance with NZS 4404:2010".

148. The Officer Report also presents proposed Condition 6. m), with respect to upgrade of the existing right of way servicing Lot 36 DP 339137:

> *Condition 6. m)*
>
> *The existing right-of-way over Lots 2, 3, and 6 serving neighbouring Lot 36 DP 339137 must be demonstrated to be in compliance with or upgraded in accordance with the right-of-way (2-4 lots/DUs) standards in Table 3.1 of Council's 2008 Addendum to NZS 4404:2004, with the following modifications and requirements:*

149. I do not agree with this proposed condition. Lots 2, 3 and 6 are provided primary access directly from the extension of Terrace Street (Lot 101) or the Loop Road (Lot 100) and will not necessitate upgrade of the existing right of way. Installation of vehicle crossings will formalise this matter, alongside a consent notice registered against those titles. It is also proposed that Lots 2 & 6 do not have a formal benefit of the right of way registered upon their record of title, only the existing burden. This means that proposed upgrades would only be to enable secondary access for Lot 3.

150. Appurtenant to Lot 36 DP 339137 is the benefit of a right of way over the subject land. This right of way is currently not compliant with the standard described in proposed condition 6. m) and the easement corridor has a legal width of only 5.2 metres. The current owners of Lot 36 DP 339137[15] have clearly communicated their wish that the current right of way is not to be upgraded or converted to a road to provide a greater standard of access. This has informed the subdivision layout materially, necessitating a shift of Lot 100 to the east of Lots 2, 3 & 6.

151. Enforcing those upgrades proposed by condition 6. m) creates an unnecessary conveyancing risk where authority and instruction from those adjoining landowners will be necessary to implement any variation to that existing easement facility. Due to the existing width of that easement, amendment to the easement facility with respect to Lot 36 DP 339137, would be necessary upon upgrade to the proposed standard. It is acknowledged that there is a legal pathway to pursue to attain relevant signatures, but this would add

[15] Submission number 09

significant unnecessary time and costs to enable, which for the avoidance of doubt I repeat, secondary access to Lot 3, of a sporadic nature.

152. Many alternatives were considered to address this matter, including a dedication and vesting process by CODC, disposal of that strip of land to Lot 36 DP 339137 or inclusion of that strip of land in some other parcel of land or as a separate access lot. However, each of these options would still necessitate a variation of the easement facility in some manner. Consequently it was determined by the Applicant to provide access to Lots 2, 3 and 6 in the manner proposed in the Application.

153. At paragraph 125, the Officer Report states:

> *The applicant proposes to vest Lot 30 with Council. Given that the acceptance and creation of the reserve include additional processes outside of the resource consent process, rather than requiring the vesting of the reserve, I have recommended a condition which requires the applicant to offer Lot 30 to Council as a reserve.*

154. Further, proposed Condition 6. p), with respect to Lot 30, which is intended as a public reserve to vest in CODC reads "*Formally offer Lot 30 to Central Otago District Council as a recreation reserve and, if accepted, vest the reserve with Council."*

155. I do not agree with the above statement or this proposed condition. Land transfer plans for the subdivision will need to adequately deal with this parcel(s) of land, in compliance with conditions of consent to enable certification pursuant to s223 and s224c of the Resource Management Act 1991. Therefore, certainty is required upon the conditions of consent.

156. At paragraph 151, the Officer Report states "*Financial Contributions have been calculated in accordance with Council's Policy on Development and Financial Contributions July 2021."* including highlighting "*Reserves $45,530.54 +GST"* which has informed proposed *Condition 6. r)*.

157. I do not agree entirely with this statement when considered in parallel to the Officer Report statement at paragraph 125 above. The acceptance, or otherwise of the recreation reserve would also have an influence on financial

contributions with respect to the credits associated with provision of land as a reserve.

CONCLUSION

158. For the reasons considered above, I am of the opinion that neither surveying or land development engineering matters present an impediment to the proposed application for resource consent.

159. Thank you for the opportunity to present my evidence.

Richard Ford
27 September 2024