Section 32AA Planning Assessment

eliot sinclair

San Dona Rezoning Submission

Prepared for San Dona Landowner Group

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Quality Control Certificate

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Planning Assessment for Submission

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San Dona Landowner Group ('the Submitter') have made submissions to the Proposed Waimakariri District Plan (PWDP).

The Submission is to request the rezoning of the sites encompassing the land parcels within the San Dona Development in Mandeville at Vicenza Drive, Biella Place, Presaro Lane, Velino Place, Siena Place, Sillano Place, Verona Place and Modena Place from Rural Lifestyle (RL) to Large Lot Residential (LLR).

This report provides the detailed technical information and Section 32AA assessment required to support the original Submission's.

The relief sought is to re-zone the required sites from RL to LLR.

Signature of San Dona Landowner Group (or person authorised to sign on behalf of the applicant)

22/02/2024

Date

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1. Introduction

1. San Dona Landowner Group ('the Submitter's') are making a submission to the PWDP to rezone the sites encompassing the land parcels within the San Dona Development in Mandeville at Vicenza Drive, Biella Place, Presaro Lane, Velino Place, Siena Place, Sillano Place, Verona Place and Modena Place from RL to LLR.

2. This report provides the detailed technical information and Section 32AA assessment required to support the original submissions that each individual submitter made by November 2021.

3. This submission will provide for additional housing supply within the wider Waimakariri District in terms of a residential lifestyle context. This will contribute to allow for additional land to be available for residential housing elsewhere where availability is low.

4. The submission is made on the grounds that there is a current shortfall of large lot residential zoned land which can be used for residential development. There is an increasing housing demand within the Waimakariri District as more people are wanting the opportunity to live outside the Central City.

5. Under Policy 18.1.3.1 of the Operative Waimakariri District Plan it has been outlined that:

   "Mandeville has experienced considerable recent growth that has seen large areas of land developed as Residential 4A, 4B and small lot rural zoning. Further growth and development has the potential to adversely affect the form, function, and character of the Mandeville settlement and its relationship with the surrounding Rural Zone. It is therefore appropriate that further development in Mandeville is limited to within a distinguishable growth boundary in order to achieve a consolidated, cohesive, and sustainable settlement."

6. San Dona as shown under Figure 2 is shown to be within the Mandeville North growth boundary and it should therefore be expected that growth can be undertaken in this development.

7. It is further noted that under Policy 18.1.3.1 that:

   "The area of San Dona is identified as part of the Mandeville Settlement. Although the area is zoned rural, the smaller average size of the lots results in the area having characteristics more aligned with the characteristics of the Residential 4A and 4B Zones."

8. Based on the above it is therefore a logical approach for San Dona to have the same zoning as the rest of Mandeville which under the PWDP is LLR and not RL.

9. Under the notified version of the PWDP the sites would be maintaining a form of rural zoning which would be restricting the level of residential development regarding density which wouldn't be able to contribute towards the increasing demand for housing supply.

10. This submission supports the application of the LLR zoning to the entire site for which there are multiple individual site submission's and that the sites will consist of a well-functioning urban environment.

11. The Submission to the PWDP has been assessed against the relevant higher level planning documents such as the Resource Management Act 1991 (RMA), National Policy Statements, National Environmental Standards and the Canterbury Regional Policy Statement.

12. No changes are proposed in the PWDP other than where specifically noted in which the submission site is proposed to be zoned RL.

13. The following appendices are attached in support of, and form part of, the full submission:

- Appendix A: National Policy Statement Urban Design Assessment
- Appendix B: National Policy Statement Highly Productive Land Assessment
- Appendix C: Canterbury Regional Policy Statement Assessment
- Appendix D: Infrastructure Servicing Report
- Appendix E: Flood Impact Assessment
- Appendix F: Natural Hazard Risk Assessment

2. History of San Dona

14. San Dona was created in 2000-2004 under the Transitional District Plan at the time (prior to the current Operative Waimakariri District Plan) on the basis that olive grove horticulture would be an economically productive use of land (under Economic Use provisions that applied at the time) which purportedly only required 1.2-1.8ha of land. The San Dona Olive Grove area was originally rural farmland and part of this had been used in World War 1 as an airstrip to train pilots because the ground was dry and free draining.[1]

15. Covenants were imposed on the titles to protect the retention of olive trees to ensure the Rural Productive Use continued for ten years following the subdivision. The covenants have now lapsed, and many olive trees have been removed from throughout the San Dona neighbourhood.

16. While some olive trees remain, there is no ability to obtain a viable commercial/productive or economic use from them. Not only are a large proportion of the olive trees an unsuitable variety, one of the more recent challenges is that there is no longer an olive press available within the subdivision for the community to use, leaving landowners to have to pay for commercial pressing at other offsite locations if they desire to.

17. The rest of Mandeville, in Wards Road, Dawsons Road, Truro Close, Roscrea Place, Ohoka Meadows and along Tram Road was developed after the San Dona development, from 2005-2019 under the Operative Waimakariri District Plan. It was not created on the basis of any 'economic use provisions' which by then had been removed in the Operative Waimakariri District Plan. These rural-residential neighbourhoods surrounding San Dona, were created as 'Residential 4A and 4B' zones by way of multiple private plan change processes to allow residential density of one house per 5,000m² or 1ha, very similar, but smaller in size to the San Dona development that had come first. [2]

3. Three Water's History

18. San Dona was originally serviced by a private wastewater scheme which was installed by the developer. This scheme was owned by Ohoka Utilities and provided wastewater services to approximately 110 properties. At the time there were 3 other wastewater schemes in the area: Mandeville 80 lots; Ohoka Meadows 50 lots and Swannanoa 30 lots.

[1] Submission (#388) Ray and Karen Harpur
[2] Submission (#111) CA and GJ McKeever

19. The council in 2011 decided to proceed with a new pump station and network and make allowance for the connection of San Dona at a later date. The Mandeville wastewater pump station was eventually built and commissioned sometime in 2012.

20. When the subdivision of Mandeville occurred, developers installed Septic Tank Effluent Pumping (STEP) systems and low-pressure wastewater reticulation to service each subdivision. This is all now linked to a new central collection point (Bradleys Road pumpstation) from where it is pumped to the Rangiora wastewater treatment plant. San Dona residents paid a one off $2,500 fee to be connected to the new WDC pump system at the time the private community system was decommissioned in 2014-2015.

21. The San Dona development was originally serviced by it's own well but is now connected to the WDC owned Mandeville - Fernside water supply scheme. This is a restricted water supply and is situated at the corner of Tram Rd and Two Chain Road. The primary source is from a 77 metre deep well. There is a second well at this site which is now only used as a backup source.

22. The San Dona development stormwater is usually discharged into soak-pits in the ground. There are also open channels which largely contain water draining from aquifers which arrive from the west of the region. Future growth will have some impact on the systems, but it will be mitigated by the need to control discharges into the drains.

23. Flooding in June 2014 impacted a number of properties within and adjacent to the open drainage system. A number of drain improvement projects have subsequently been undertaken to address immediate flooding concerns. The specific works in San Dona were to the Bradleys Road channel where this drain was made much wider and deeper allowing for a greater volume of water to travel down Bradleys Road and into the Ohoka Stream. The other area of San Dona to have work carried out was to Sienna Place where the roadside drainage has been redefined to allow better flows into the wider network stormwater system.[3]

4. Background of Council Zoning

24. Around 2016 an environment court decision which was in relation to the last private plan change within the area decided to set a "growth boundary" for the Mandeville township to limit urban spread. Since then, many new private plan changes to Rural Residential zones had been granted by Council within this Mandeville boundary. All of Mandeville is currently zoned Residential 4a and Residential 4b under the Operative Waimakariri District Plan except San Dona which is zoned Rural. Previous meetings between Council and Residents of San Dona have since been held where promises of a zone change to match the remainder of Mandeville for San Dona would be made by the Council and that it would only be a matter of time.[4]

25. While the growth of Mandeville has seemingly been led by successive private plan changes, each has been part of a notified RMA plan change process, with consideration given to density and the appropriateness of a lesser residential density than San Dona in the immediate neighbourhood.

[3] Submission (#388) Ray and Karen Harpur
[4] Submission (#388) Ray and Karen Harpur

26. Further, the removal of the "Economic Use" provisions from the Transitional District Plan as it transitioned into the current Operative Waimakariri District Plan would also have been an intentional RMA (publicly involved) decision made at the time for both the environment and community.

27. Ultimately this has led to an inevitable change in what was a 'rural character' to an accepted 'rural -residential character' as Mandeville has grown to become a place that people want to live, can make use of the Mandeville Sports Ground to 'play', and has even led to Council undertaking a Plan Change (2015) to rezone land to provide a Commercial area for the growing community.

28. Council has therefore already acknowledged the existing growth of Mandeville by enabling and providing a place that also allows 'work' for the community. This "live, work and play" mantra is good for the community, supports it and creates a sense of place and belonging while also supporting residents, adding to the village feel of Mandeville as a whole.

29. It is acknowledged that councils concern around future development of the San Dona area have been on the "servicing constraints; flooding and access issues" as highlighted in the latest Rural Residential Development Strategy 2048.

5. Site Description

30. The submission site i.e., the San Dona development encompasses a number of properties which is shown in Figure 1.

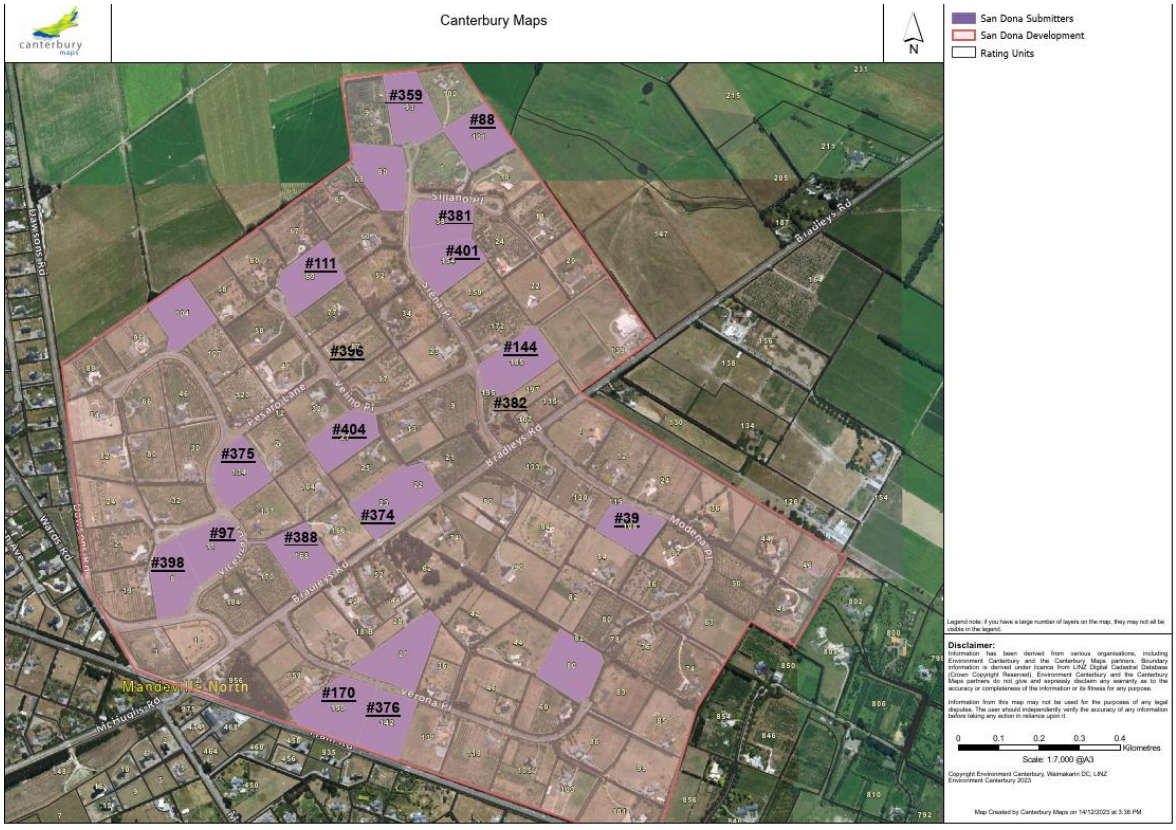

Figure 1. San Dona Development and submitter properties (with submission numbers). (Source: Canterbury Maps Viewer)

31. In terms of the San Dona development as a whole within the Mandeville area Figure 2 shows Map 167 under the Operative Waimakariri District Plan in terms of the Mandeville North growth boundary in which San Dona is located.

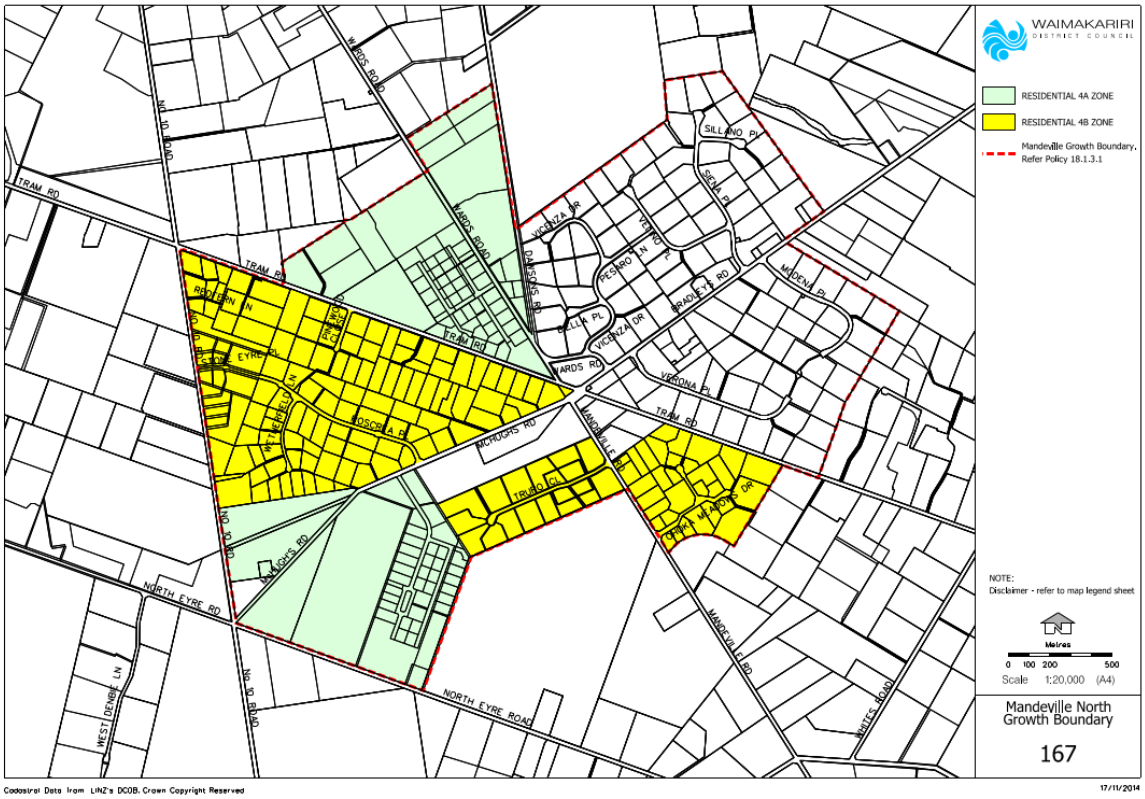

Figure 2. Map 167 Mandeville North Growth Boundary outlined in red. (Source: Operative Waimakariri District Plan).

6. Strategic Context

32. In December 2022, Parliament passed the Resource Management Enabling Housing Supply and Other Matters Amendment Act 2022 (EHA). Amongst other matters, the EHA seeks to increase housing supply through directing Tier 1 & 2 Councils to update their District Plans to provide for medium density housing across all urban environments, unless 'qualifying matters' such as natural hazards or heritage are in play.

33. Councils are also required to have a District Plan for 10 years that sets district wide rules with regard to sustainability, subdivision, developing land, what can and can't be built and what relevant activities can be undertaken.

34. The PWDP is intended to replace the current Operative Waimakariri District Plan (OWDP) once decisions on the PWDP have concluded. Some rules however will have immediate legal effect as soon as the PWDP is notified pursuant to s86B of the RMA.

35. Through the PWDP council have determined that the submission site will be zoned Rural Lifestyle which would effectively carry over the current rural zoning under the OWDP. The submitters request instead is that LLR apply to the whole submission site to recognise the site as its true 'Rural Residential nature and character'.

7. Proposed Rezoning

36. This submission requests that Council as part of the PWDP submission and hearing process rezone the sites from RL to LLR. This zoning will provide for additional housing supply in a low-density capacity which allows for transition between higher density residential zones to more rural zones surrounding the Mandeville area.

37. The proposed rezoning from RL to LLR is considered a rational and logical approach to consolidation of the sites that are supported by the extensive detailed reports in respect of infrastructure, servicing connectivity and amenity. This submission provides specialist assessments that support this assertion. Further, it is noted that San Dona sites at 1-1.6ha do not fit with the 4ha Rural Lifestyle zone. At the moment they remain an illogical size for the PWDP RL zone,

38. The proposed rezoning is generally consistent with the National Policy Statement of Urban Development (NPS-UD) and the Enabling Housing Act (EHA). Assessment against the NPS-UD is attached as Appendix A and provides consideration of all relevant aspects in respect of a well-functioning urban environment. This submission proposes the inclusion of all of the applicants' site and that it will achieve that well-functioning urban environment.

8. Reasons and Purpose

39. The PWDP was notified on the 17th of September 2021 where then after time for submitting on the PWDP was given which closed on the 26th of November 2021. A summary of those submissions was notified on the 5th of November 2022 and the period for further submissions was until the 21st of November 2022.

40. The submitters proposal is to rezone from RL to LLR in order to provide a logical and compliant zone for existing land holdings rather than perpetuate an incongruous zone from outline development plan (ODP) to PWDP.

9. Consultation

41. As part of making a submission on the PWDP consultation with the owners/occupiers of the sites that encompass the San Dona Development was undertaken through community meetings. This was to gauge where they sat regarding the proposal to rezone the development from RL to LLR.

42. Resulting from this a number of initial submissions were made by multiple parties on the PWDP to rezone. The number of initial submissions made by owners/occupiers of properties within the San Dona Development was 39.

43. As part of this technical reporting that will form part of the rezoning hearings within Stream 12 of the District Plan review 20 submitters have continued with the preparation of requesting this further evidence rezoning from RL to LLR.

10. Statutory Assessment

10.1. Resource Management Act 1991

44. The Resource Management Act (RMA) provides the legislative framework that defines the requirements for submissions to District Plan reviews. As this Submission proposes to include land for re-zoning it is appropriate to address these requirements as they relate to the sites the encompass the Sand Dona development within Mandeville.

45. Schedule 1 of the RMA provides the circumstances and requirements of preparation, change, and review of policy statements and plans. Clause 22 of Schedule 1 provides the requirements for changes to the District Plan.

46. Section 74 of the Act sets out the matters to be considered by territorial authorities in the decision making of changes to the District Plan.

74 Matters to be considered by territorial authority.

(1) A territorial authority must prepare and change its district plan in accordance with-

(a) Its functions under section 31; and

(b) The provisions on Part 2; and

(c) A direction given under section 25A(2); and

(d) Its obligation (if any) to prepare an evaluation report in accordance with section 32; and

(e) Its obligation to have particular regard to an evaluation report prepared in accordance with section 32; and

(ea) a national policy statement, a New Zealand coastal policy statement, and a national planning standard; and

(f) Any regulations.

(2) In addition to the requirements of section 75(3) and (4), when preparing or changing a district plan, a territorial authority shall have regard to –

(a) Any –

(i) Proposed regional policy statement or

(ii) Proposed regional plan of its region in regard to any matter of regional significant or for which the regional council has primary responsibility under Part 2; and

(b) Any –

(i) Management plans and strategies prepared under other Acts and

(ii) [repealed]

(iia) relevant entry on the New Zealand Heritage List / Rarani Korero required by the Heritage New Zealand Pouhere Taonga Act 2014; and

(iii) Regulations relating to ensuring sustainability, or the conservation, management, or sustainability of fisheries resources (including regulations or bylaws relating to taiapure, mahinga mataitai, or other non-commercial Maori customary fishing); and

(iv) Relevant project area and project objectives (as those terms are defined in section 9 of the Urban Development Act 2020), if section 98 of that Act applies, - to the extent that their content has a bearing on resource management issues of the district; and

(c) The extent to which the district plan needs to be consistent with the plans or proposed plans of adjacent territorial authorities.

(2A) A territorial authority, when preparing or changing a district plan, must take into account any relevant planning document recognised by an iwi authority and lodged with the

territorial authority, to the extent that its content has a bearing on the resource management issues of the district.

(3) In preparing or change any district plan, a territorial authority must not have regard to trade competition or the effects of trade competition.

47. Section 31 of the RMA outlines the Council functions for giving effect to the Resource Management Act and the Submission has been prepared in accordance with the relevant requirements.

48. Section 32 establishes a procedure to evaluate the appropriateness of the proposed provisions, including objectives, policies, rules and other methods. Noting that Council has provided its own S.32 assessments which do not propose the rezoning of this for any other sites, this report is a further evaluation under S.32AA. A detailed Section 32AA assessment is provided in Section 7 of this report.

49. This submission to request the rezoning of the sites that encompass the San Dona Development from RL to LLR addresses the relevant matters of the RMA, including.

- The purpose and reason for the request.
- The requirement to have regard to the Canterbury Regional Policy Statement.
- Any management plans and strategies prepared under other Acts.
- The requirement to take into account any relevant planning document recognised by Te Runanga o Ngāi Tahu lodged with the Council.
- Provisions of the proposed Waimakariri District Plan.
- Assessment of Environmental Effects (AEE).
- Related Planning Documents

50. The submission to rezone the site has been prepared in accordance with the relevant provisions of the Resource Management Act, as described above.

10.2. National Policy Statements

51. There are six National Policy Statements (NPS) which are currently operative. These are:

(a) New Zealand Coastal Policy Statement
(b) Electricity Transmission
(c) Renewable Electricity Generation
(d) Freshwater Management
(e) Urban Development
(f) Highly Productive Land
(g) Indigenous Biodiversity

52. The relevant National Policy Statements are Highly Productive Land (NPS-HPL) and Urban Development (NPS-UD).

10.2.1. NPS-UD

53. The National Policy Statement on Urban Development 2020 (NPS-UD 2020) applies to all local authorities that have all or part of an urban environment within their district or region. Urban areas are classified into tier 1, 2, and 3. Christchurch is classified as a tier 1 urban environment and includes Canterbury Regional Council, Christchurch City Council, Selwyn District Council and

Waimakariri District Council as Tier 1 local authorities. A full assessment of the NPS-UD is provided within Appendix A.

54. It is important to note that despite not being required to deliver capacity, council still need to be open to development proposals and rezoning requests in areas that are not anticipated for urban development. Guidance for council on this in found within Policy 8 of the NPS-UD. Subpart 2 – Responsive Planning, 3.8" Unanticipated or out of sequence developments" sets out the below:

(2) Every local authority must have particular regard to the development capacity provided by the plan change if that development capacity:

a) would contribute to a well-functioning urban environment; and

b) is well-connected along transport corridors; and

c) meets the criteria set under subclause (3); and

(3) Every regional council must include criteria in its regional policy statement for determining what plan changes will be treated, for the purpose of implementing Policy 8, as adding significantly to development capacity.

55. In terms of (3) above, no such criteria have yet been included in the CRPS as the regional council is currently requesting input into a consultation process that will inform future changes to the CRPS. Therefore, if there are no criteria then it is only the first two matters listed in (2)(a) and (b) that are relevant to this submission.

56. Under the Proposed Waimakariri District Plan an urban environment is described as the below.

means any area of land (regardless of size, and irrespective of local authority or statistical boundaries) that:

a. is, or is intended to be, predominantly urban in character; and

b. is, or is intended to be, part of a housing and labour market of at least 10,000 people.

For Waimakariri District, the urban environment described in (a) and (b) comprises the towns of Rangiora, Kaiapoi, Woodend (including Ravenswood), Pegasus, Oxford, Waikuku, Waikuku Beach, The Pines Beach, Kairaki, Woodend Beach, the small towns of Ashley, Sefton, Cust, Ohoka, Mandeville, and all Large Lot Residential Zone areas and Special Purpose Zone (Kāinga Nohoanga).

57. The proposed rezoning is a natural and logical development to provide further residential capacity in the San Dona development and Mandeville area. Lot sizes are large enough to support housing capacity, but of a reasonable size so as not to have significant adverse effects on the existing rural character and amenity of the surrounding environment.

58. The rezoning will meet objective 2 of the NPS-UD as it will provide for the opportunity for additional housing and development opportunities which can support competitive land and development markets within the Mandeville area and wider environment.

59. The rezoning can meet Objective 3 (b) in terms of being located within 15km of both Rangiora and Kaiapoi which have direct transport links to Central Christchurch.

60. The rezoning will meet Objective 4 as it has considered that over time the diverse and changing needs of people, communities and future generations can vary in that larger allotments can no longer be feasible to maintain and that allowing the opportunity for development potential can help alleviate the pressures of maintain a rural lifestyle allotment.

61. The rezoning can meet Objective 6 (a & b) in that San Dona is an existing development that has established infrastructure which can be integrated within any potential further development. It can also provide through rezoning development potential over the medium and long term.

62. In terms of Policy 1(a) the rezoning would enable the potential for further development of varying housing types that would differ from design, price and location within the development.

63. In terms of Policy (c & d) as described above the development can generally meet Policy 1 and it recognises the scale of development capacity that the rezoning could generate for the San Dona development.

64. Regarding Policy 8 whilst we are not invoking this policy, we do acknowledge that the rezoning can generally contribute towards a well-functioning urban environment. It is also noted that the rezoning is not out of sequence for the San Dona development nor the wider Mandeville area as it was anticipated to have the potential under the OWDP and is considered as infill development.

65. The proposed rezoning to LLR is generally consistent with the objectives of the NPS-UD through being able to achieve a well-functioning urban environment with the current rural-residential context of Mandeville as well as having direct transport links into Christchurch City.

66. The development would enable the further supply of residential land for residential development that is of low density still within what is expected of the LLR zone, thus improving housing capacity and contributing to the housing market and improving housing affordability and supply.

67. It would also create an integrated and strategic residential development that will provide for short to medium term growth and support the reduction in greenhouse gas emissions and climate change.

10.2.2. NPS-HPL

68. The National Policy Statement on Highly Productive Land (NPS-HPL) was made operative on the 17th of October 2022.

69. The NPS-HPL requires councils to consider the availability of highly productive land for primary production now and in the future. Of relevance to this submission, a purpose of the NPS-HPL is to protect highly productive land from inappropriate subdivision, use and development as urban expansion and changing of land-use in rural areas is creating a loss of productive land.

70. Until such time as HPL has been mapped as part of the regional policy statement and these maps have been made operative, the 'transitional definition' of HPL in Clause 3.5(7) applies. Clause 3.5(7) states:

(7) Until a regional policy statement containing maps of highly productive land in the region is operative, each relevant territorial authority and consent authority must apply this National Policy Statement as if references to highly productive land were references to land that, at the commencement date:

(a) is

(i) zoned general rural or rural production; and

(ii) LUC 1, 2, or 3 land; but

(b) is not:

(i) identified for future urban development; or

(ii) subject to a Council initiated, or an adopted, notified plan change to rezone it from general rural or rural production to urban or rural lifestyle.

71. As the San Dona development is proposed to be zoned RL as per clause b(ii) above the land cannot be considered nor does it meet the definition of being highly productive land. A full assessment of the NPS-HPL is provided within Appendix B.

10.3. National Environmental Standards

72. The following National Environmental Standards (NES) are currently operative:

(a) Air Quality
(b) Sources of Drinking Water
(c) Telecommunication Facilities
(d) Electricity Transmission Activities
(e) Assessing and Managing Contaminants in Soil to Protect Human Health
(f) Plantation Forestry
(g) Freshwater
(h) Marine Aquaculture
(i) Storing Tyres Outdoors

73. The NES for Assessing and Managing Contaminants (NES-CS) is considered relevant to this submission.

10.3.1. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health

74. It is considered that the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) is the only relevant Environmental Standard for this proposal. The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) came into effect on 1 January 2012.

75. The site is in a rural zone and has been previously used for rural and residential activities. Council records for the site do not show any previous activity that would indicate that the site has been used for an activity that would potentially contaminate the land. The site is however listed on the Listed Land Use Register (LLUR) on Environment Canterbury's website.

76. While the rezoning proposal would lead to some change of use over time where development potential is created, no subdivision or disturbance of soils is required at this time. Should the submissions be successful, then all future development (whether subdivision or dwelling construction) will be required to provide site specific NES assessment and resource consents as necessary.

10.4. Canterbury Regional Policy Statement

77. The Canterbury Regional Policy Statement (CRPS) sets out objectives, policies, and methods to resolve resource management issues in Canterbury. An assessment of the CRPS full provisions is provided in Appendix C and a summary provided below.

78. Chapter 5 – Land Use and Infrastructure, addresses resource management issues associated with urban and rural-residential development across the entire Canterbury region. Within Chapter 5, the objectives and policies that include Greater Christchurch are annotated as 'Entire Region' and those which are not relevant to Greater Christchurch are noted as 'Wider Region'. Chapter 6- Recovery and Rebuilding of Greater Christchurch focuses primarily on metropolitan areas of Greater Christchurch. The objectives, policies and methods in Chapter 6 take precedence within the Greater Christchurch area.

79. Objective 5.2.1 Location, Design and Function of Development applies to the entire region. Despite Mandeville not being a defined urban area under the CRPS, the proposed LLR rezoning will achieve a consolidated and well-designed future development adjoining the existing rural and residential areas of Mandeville. The rezoning will enable people and communities to provide for their wellbeing by maintaining the quality of the rural environment and environmental values, avoiding adverse effects, and providing a range of housing choice. The proposed rezoning is considered to meet Objective 5.2.1.

80. Chapter 6 of the CRPS has the purpose of providing a resource management framework for the recovery and rebuilding of Greater Christchurch following the Canterbury Earthquake Sequence. It is now considered that the recovery and rebuilding following the earthquakes has mostly been completed, and now the residential demand is stemming from population growth, rather than specifically related to earthquake recovery. In addition to this, the proposed LLR rezoning is not part of a key activity centre and therefore only particular objectives and policies of Chapter 6 are relevant.

81. The proposal is considered consistent with the relevant parts of Objective 6.2.1. Recovery Framework. The proposed rezoning will maintain the character and amenity of the surrounding rural area. The rezoning will intensify the residential density within the site, but in a manner that matches the existing form and density of Mandeville. The proposal will maintain the quantity and quality of groundwater and surface water. The site is not in a high-risk natural hazard area, and it is considered that the rezoning of the site will not increase any natural hazard risk.

82. Objective 6.2.2 (6) relates to urban and priority areas, and Waimakariri District Council has determined that Large Lot Residential is urban. The proposed rezoning will provide additional housing capacity and housing choice of a low-density product. The site is not in or around the Central City, Key Activity Centres, neighbourhood centre, greenfield priority area, future development area, but is considered a brownfield site therefore a higher density living environment is not required.

83. It is acknowledged that the site is not located within an identified Greenfield Priority Area for development within Greater Christchurch and is not located within the projected infrastructure boundary as detailed in Map A. It is also noted that Map A does not identify Rural Residential areas within Greater Christchuch. It is therefore noted that any residential growth at the submission site will not be fully consistent with Objective 6.3.1 and any relevant policies where they relate to Map A due to the limiting nature of the projected infrastructure boundary in Map A which was set at the time of the Christchurch earthquakes.

84. Policy 6.3.9 Rural Residential Development is the most relevant policy for this submission. The policy states that further rural residential development shall be in accordance with an adopted rural residential development strategy.

85. Within the Waimakariri Rural Residential Development Strategy the San Dona development and Mandeville suburb have been identified as being similar to a combination of residential and rural in nature and scale with lots ranging from 1.2-2.2ha's. At the time of the Rural Residential Development Strategy many San Dona residential submitted requesting Mandeville be included. While it was deemed impractical due to servicing constraints and flooding issues at the time, subsequent upgrades to the stormwater and wastewater have been undertaken by Waimakariri District Council.

86. In the PWDP despite Mandeville not being included in the Rural Residential Development Strategy council have proposed to rezone most of Mandeville (4A & 4B zones) to LLR, and yet have continued to ignore San Dona leaving it as RL when none of the sites achieve the RL 4ha minimum

site size. However, like the rest of Mandeville, San Dona can meet all of the criteria listed in the Policy relating to servicing, access, design, effects, natural hazards, cultural protection and enhancement and sprawl. Therefore, the site is partially consistent with Policy 6.3.9.

87. The proposed rezoning will enable a small amount of additional land to be brought forward for the option of LLR development in close proximity to Mandeville and Swannanoa as well as Christchurch City to meet demand and enable the efficient use of the infrastructure network. The proposal will also encourage sustainable growth by providing a residential development to contribute to alleviating demand. The proposed rezoning and any future subdivision will give effect to the principles of good urban design.

11. Section 32AA Assessment

88. The Section 32AA evaluation provided below is in response to Waimakariri District Councils Residential Zones Section 32 Report. A Section 32AA assessment has been undertaken as an amendment to the chapter is sought by the proposed rezoning of the submission sites from RL to LLR.

89. Section 32AA (1)(b) states that a further evaluation required under this Act must be undertaken in accordance with Section 32(1) to (4).

90. A Section 32 report requires the submitter (and the Council) to evaluate, at a level of detail corresponding to the scale and significance of the anticipated environmental, economic, social and cultural effects.

- The extent to which the objectives of the proposal are the most appropriate to achieve the purpose of the RMA.
- Whether the provisions (rules) are the most appropriate way for achieving the objective (purpose), by including consideration of any other reasonably practicable options, the efficiency and effectiveness of the provisions in achieving the purpose, and reasons for deciding on the provisions.

91. This submission is not proposing any new objectives or rules to be added to the District Plan; therefore, the objective of the proposal is the purpose of the rezoning. The purpose of the proposal is to rezone the submission sites from RL to LLR to allow for consistent plan administration.

92. Two options have been assessed below; retain the current proposed rural zoning or provide for a rezoning to LLR, the same as the rest of Mandeville.

93. The Quality Planning Guidance note on Section 32 analysis states that the most appropriate option means "suitable, but not necessarily superior". The most appropriate option does not need to be the most optimal or best option but must demonstrate that it will meet objectives in an efficient and effective way.

11.1. Option 1: Retain proposed RL Zone

	Benefit	Cost
Environmental	■ Maintains the rural lifestyle character of the site. ■ No further residential expansion to Mandeville. ■ Flood modelling would not be required to determine feasibility of any future development.	■ A missed opportunity for providing additional type of low-density residential housing. ■ Within the existing Mandeville boundary. ■ Cost of continued district plan administration. San Dona does not fit the RL zone, so activities on undersized sites are likely to need continual resource consents which is inefficient.
Economic	■ No costs to the owners or Council to retain the proposed zoning under the PWDP.	■ Does not contribute to housing demand/supply. ■ No additional development contributions or increased rateable income of Council. ■ Continued cost of maintenance of 1.2-2.2ha blocks which is becoming difficult for some San Dona residents.
Social	■ No social benefit recognised.	■ The continuation of Rural Lifestyle dominated development in all the rural areas may continue to impact on the ability to undertake rural activities. This would make obtaining land for farming within the district less viable.
Cultural	■ Retains stormwater discharges to ground.	■ Does not reduce potential effects on water quality.

94. Option 1, retaining the land as proposed RL has relatively even benefits and costs. The benefit of this option would be that the current character of the site and the outlook for existing surrounding properties would not change as they are all currently hedged. This option would also not contribute to housing and living options within the area.

95. RL areas used predominantly for a residential lifestyle within a rural environment on lots smaller than those of the General Rural and Rural Lifestyle zones, while still trying to enable primary production to occur is an inefficient use of a land resource and inconsistent with Part 2 of the RMA 1991.

96. The costs of doing nothing and retaining the existing and proposed zoning means that there will be no residential development capacity provided on this site or in Mandeville, and therefore there will be no wider benefit to the Mandeville and Swannanoa suburbs. This would be a missed opportunity for the Council to demonstrate additional low density residential housing capacity options in the short, medium, and long term as required by the NPS-UD.

97. The costs outweigh the benefits, and Option 1 is the least preferred option.

11.2. Option 2: Rezone to LLR

	Benefit	Cost
Environmental	■ Further residential consolidation within existing Mandeville area. ■ Cannot lead to further expansion or sprawl of Mandeville. ■ Provides for consistency of district plan zones for Mandeville (all LLR) and not a combination of RL and LLR. ■ No overall difference between the proposed urban and non-urban flood assessment overlay rules which already applies to the Mandeville suburb where residential is permitted.	■ Potential loss of rural land and outlook (most are hedged anyway so outlook is limited already). ■ Some potential for flood hazard displacement requiring site specific assessment and reports at time of further development.
Economic	■ Provides for increased housing capacity and potential for variety in housing choice where there is limited extra low-density housing capacity within existing serviced areas. ■ Rationalises and recognises a more efficient land use of San Dona sites. ■ Provides income from the greater number of development contributions and rateable sections for Council. ■ Gives effect to the NPS-UD as it contributes to development capacity in small way for whole district. ■ Short-medium term employment opportunities during construction.	■ Economic cost for development of urban infrastructure (services and roading) for landowner. ■ Loss of rural land. ■ Potential to decrease residential intensity momentum in other areas.
Social	■ Is within the existing residential development of San Dona and is in close proximity to Mandeville and Swannanoa. ■ San Dona is in the Swannanoa and Ohoka primary school catchments which may lead to the opportunity for increases in the school roll for those schools.	■ Increase in traffic along Tram Road. ■ Perception of Mandeville may change.
Cultural	■ Integration of services and treatment resulting in improved water quality in accordance with Mahaanui Iwi Management Plan.	■ It is considered that there are limited cultural costs.

98. Option 2 is the preferred option as identified in this submission because the rezoning and development would be formed as a well-functioning urban environment and would meet the NPS-UD.

99. With the rezoning to LLR there will be a consistency between the surrounding area of Mandeville in terms of zoning and would limit the fragmentation of surrounding rural land.

100. Further development within a contained and already established rural residential area provides additional housing choice whilst limiting any potential for adverse amenity effects.

11.3. Efficiency

101. Option 2, rezoning the site to LLR has been assessed as the most efficient use of the land and is the most appropriate option when the costs and benefits and all other options are compared. The benefits of Option 2 outweigh the costs meaning that it is the most efficient option, and therefore the most suitable use of the land.

11.4. Risk of Acting or not Acting

102. This submission to the PWDP has provided technical reports to confirm the suitability of the site for the proposed rezoning to LLR. The information has been provided in as much detail as possible, though final engineering and servicing design is not known at this stage. This would pose a small risk, but any risks will be addressed and dealt with at subdivision consent with a detailed engineering design and approval on a site-by-site basis which is accepted by the submitters.

103. There is a risk that in the short term, the proposed rezoning will be inconsistent with current provisions of the CRPS which is currently under consultation for Greater Christchurch under Chapter 6. This can be managed in conjunction with all other similar sites at the time of the CRPS review under the NPS-UD.

104. The review of the CRPS however is likely to need to take into account of all district plan decisions (in Selwyn and Waimakariri for rezoning) at the time. Therefore, there will be opportunity to update wording restricting "rural-residential" development in instances where they have been demonstrated to be efficient and effective use of land pursuant to s32 requirements. It is also expected the CRPS will be updated to refer correctly to National Planning Standard zone terminology, thus removing 'urban' and 'rural-residential' inconsistencies.

105. We understand the CRPS will be notified to the public in late 2024, likely after the PWDP decisions are likely.

106. There is also a risk of not acting, as detailed in Option 1 costs, in that it has been identified that there is insufficient residential capacity in the Waimakariri District and that by not acting, residential demand will continue to increase with a risk of insufficient residential supply of land for housing. The risk of not acting, also is that Council will not meet their requirements under the RMA to meet the needs of future generations and does not meet their requirements of the NPS-UD for providing sufficient residential capacity. While not seeking to provide urban living LLR provides and alternative choice for the community noting that residential medium density (RMD) is a choice elsewhere that has been legislated.

12. Assessment of Actual and Potential Effects on the Environment

107. The assessment of actual and potential effects on the environment (AEE) has been prepared in accordance with the Fourth Schedule of the RMA. The First Schedule, clause 22(2) of the RMA requires *'Where environmental effects are anticipated, the request shall describe those effects, taking into account the provisions of Schedule 4, in such detail as corresponds with the scale and significance of the actual or potential environmental effects anticipated from the implementation of the change, policy statement, or plan'*.

108. The following actual and potential effects have been considered as part of the Submission to rezone the submission sites from RL to LLR.

- Urban Form and Landscape Amenity
- Infrastructure and Servicing
- Transport
- Natural Hazards
- Health of Land
- Tangata Whenua and Cultural
- Reverse Sensitivity
- Positive Effects

12.1. Effects on Urban Form and Landscape Amenity

109. The proposed rezoning has the potential to alter the existing site where the zoning is rural. It also has the potential to alter the rural/ open space outlook if there is further development to the adjoining rural land to the north, east and south. The effects on urban form and landscape amenity values are discussed below.

110. Rezoning an area from rural lifestyle to large lot residential involves a transition from open space-oriented land to a more densely populated residential setting with larger individual lots. This shift can have a number of effects on urban form and landscape amenity.

111. The rezoning typically allows for larger individual lots, offering residents more space and privacy. This can result in a lower housing density and a suburban or estate-like feel.

112. The rezoning transforms the land from more rural uses to residential purposes. This can lead to changes in the landscape or open spaces by converting into more residential plots. However as discussed within section 2 of this report the use of the olive trees for rural production is now not feasible for the land and it is now better suited for residential use at a lower density.

113. To maintain the existing rural urban form of the development whilst allowing for further development opportunities through the rezoning, developers might be encouraged or required to design future homes that complement the natural landscape, preserving mature trees and keeping sufficient open space.

114. Rezoning from rural lifestyle to large lot residential involves a balance between accommodating increased housing demand and preserving the characteristics of the rural landscape. Comprehensive planning, architectural guidelines, and community involvement are essential to creating a large lot residential area that provides a high quality of life and maintains a strong connection with the surrounding natural environment.

12.2. Effects on Infrastructure and Servicing

115. The effects on existing infrastructure and servicing because of the proposed re-zoning have been discussed below and within the infrastructure report attached as Appendix D.

116. The water supply for the Site could facilitated by the WDC and any upgrades associated with the water supply for the Site could be accommodated with appropriate development contributions from the lot owners at the time of further development for housing or subdivision.

117. The two wastewater options consist of retaining and upgrading the existing STEP system by making both reticulation upgrades and an upgrade to the Bradleys Road pumping system to improve level of service and 2. The second option is replacing the STEP system in Ohoka Utilities and Ohoka Downs with a new Low Pressure Sewer System (LPSS) (E/One or equivalent).

118. Rezoning Ohoka Utilities Area for the wastewater upgrade for the Site are both viable and the WDC could facilitate the wastewater as per these options and any upgrades could be accommodated with appropriate development contributions from the lot owners.

119. Stormwater for the Site requires to maintain a hydraulic neutrality and it could be achieved by maintaining hydraulic neutrality in each lot by discharging new roof stormwater into ground via soakage pits or over-attenuating new roof stormwater in a rainwater harvesting tanks.

120. The service providers for fibre, copper and electricity have confirmed that they can provide the respective services to the new lots. The serviceability of these utilities is subject to preliminary and detailed design in conjunction with appropriate Council Consents being obtained.

12.3. Effects on Transport

121. The potential transportation effects of the rezoning have been assessed on the wider transport network and are discussed below.

122. Coordinated zoning and land use planning help ensure that new residential developments are strategically located to minimize the strain on existing road networks.

123. Well-connected public transportation systems can contribute to sustainable urban development.

124. The San Dona development is serviced by a combination of roads with various classifications including Bradleys Road and Tram Road. The roading and classifications are shown within Figure 3.

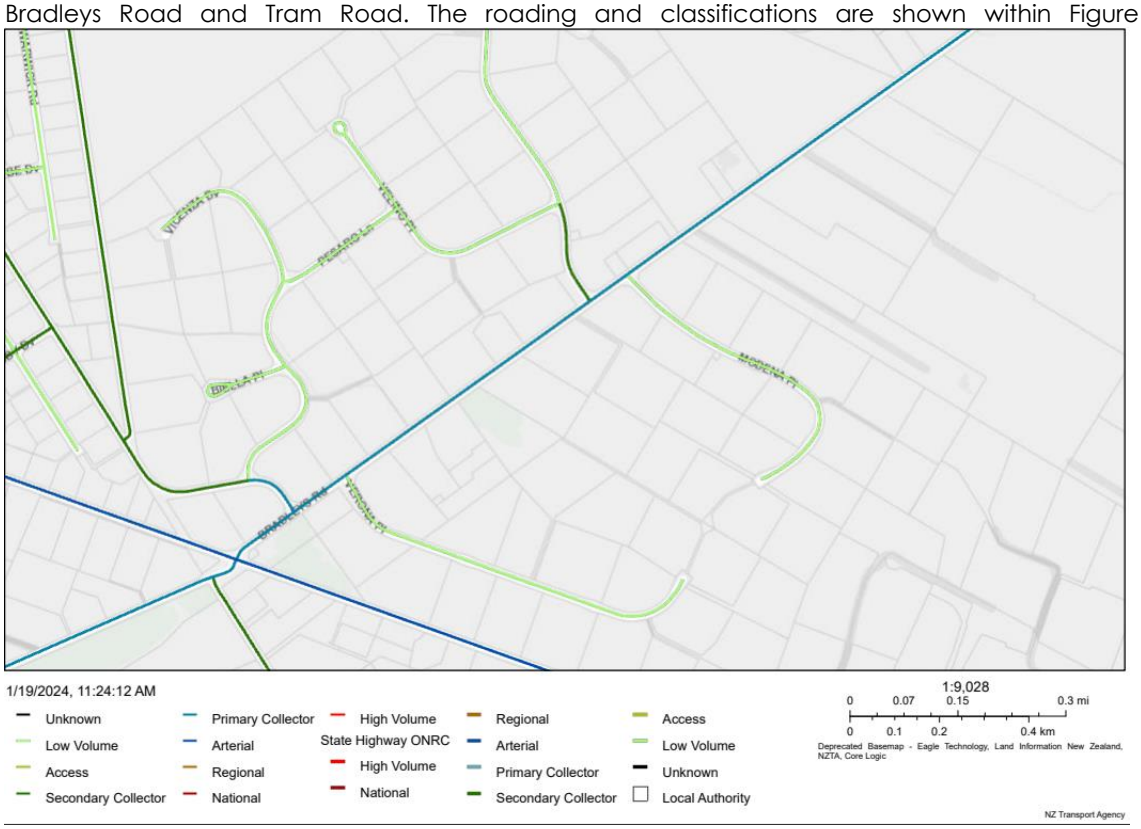

Figure 3. Road classification map of San Dona Development. (Source: 'One Network Road Classification' Waka Kotahi NZ Transport Agency (NZTA)).

125. If the existing road network is insufficient, local authorities may need to invest in expanding or upgrading roads. This could involve widening lanes, constructing new roads, or implementing intelligent transportation systems to optimize traffic flow.

12.4. Effects on Natural Hazards

126. The site has been assessed to determine whether the land is subject to any natural hazards that could pose a risk to either the land or future residential development. The site has been determined that under the PWDP it is within the liquefaction overlay and the non-urban assessment area overlay.

127. Currently the San Dona Development area is covered by the Non-Urban Flood Assessment Overlay under the PWDP. However, the residential areas of the Mandeville are covered by the Urban Flood Assessment Overlay. Comparing the rules between the two overlays as there is no real difference between what already applies to the existing urban areas to what applies to existing rural areas then by rezoning the San Dona Development from RL to LLR flooding assessment for the area would effectively not change.

128. A flooding impact assessment has however been carried out and is attached as Appendix E. The flooding impact assessment has modelled within the proposed rezoning area of San Dona as well as considering the impacts on surrounding properties.

129. The pre-development flood depths were calibrated against the Waimakariri flood model. The post-development model surface has included 2 building platforms at an assumed location in each lot within the application site.

130. A comparison between pre- and post-development 200 Year flood depths, indicate the following flood increase within the application, existing carriageways and the neighbouring properties. Within the Site, there is an increase in flood depths ranging from 10 mm to 200 mm in various locations. Within neighbouring properties to the north-east, there are flood depth increases varying between 5mm and 75mm at various locations. Within existing carriageways, there is a flood depth increase of approximately 50mm at the road centreline and up to 100mm at the road edge.

131. Accessibility has been considered and although the angular momentum values have increased along existing carriageways, the highest value is 0.59 m2/s which is less than the Austroads safety criteria for vehicles.

132. A natural hazard risk assessment has been carried out within the San Dona development and is attached as Appendix F.

133. For this submission site, the most relevant natural hazards are earthquake shaking, earthquake-induced land deformation, and flood inundation. Providing normal good practice investigation, design and development controls are implemented no significant risks from natural hazards that would prevent the granting of a rezoning submission.

12.5. Effects on Health of Land

134. The existing San Dona development as part of the original subdivision would have had investigation conducted to determine if the land was susceptible or has contamination. If this was found to be present this would have been addressed as part of the original subdivision consenting process.

135. Any future input on this matter can however be addressed within any future subdivision and land use consenting process if the rezoning submission was successful.

12.6. Effects on Tāngata Whenua and Cultural

136. Within this report under Section 13.1 the Mahaanui Iwi Management Plan (IMP) has been considered and if the re-zoning submission was successful further engagement with the relevant Papatipu Runanga will be conducted in terms of any further development.

12.7. Effects on Reverse Sensitivity

137. The potential for reverse sensitivity effects occurs when a change in land use is incompatible with, and causes new conflicts with, existing activities nearby. Typical rural reverse sensitivity effects are noise, odour, and dust. The change to residential use because of the rezoning request needs to consider the reverse sensitivity effects related to the site's proximity to existing rural activities.

138. It is also noted that there are no existing intensive farming activities (pig or poultry farming) in the vicinity that currently occur that would be of concern in respect of reverse sensitivity effects adjacent to a proposed LLR area.

12.8. Positive Effects

139. In the case of the San Dona Development, the rezoning of the land from RL to LLR would provide for additional residential lifestyle land in close proximity to Mandeville and Swannanoa as well as have excellent transport link to Central Christchurch. The efficient location of the development has good transport links to existing employment hubs of surrounding suburbs.

140. The proposed rezoning would provide better utilisation and increased funding capacity for improvement in terms of infrastructure and transport systems for Mandeville.

141. The proposed rezoning is a natural and logical transition to provide further residential capacity in the San Dona development and Mandeville area. Lot sizes are large enough to support housing capacity, but of a reasonable size so as not to result in significant adverse effects on the existing rural character and amenity of the surrounding environment.

142. With the rezoning to LLR there will be a consistency between the surrounding area of Mandeville in terms of zoning and would limit the fragmentation of surrounding rural land. It would also allow for the retention of rural amenity, whilst increasing housing supply and choice.

143. Further development within a contained and already established development would provide increased support for commercial activities within Mandeville and the wider area.

13. Consistency with other Relevant Planning Documents

144. In accordance with 74(2) the proposed rezoning has been considered in regard of other management plans and strategies. As such the proposal has been assessed against the following relevant planning documents:

- Mahaanui Iwi Management Plan
- Our Space Strategy 2018-2048
- Waimakariri 2048 District Development Strategy

13.1. Mahaanui Iwi Management Plan

145. The Mahaanui Iwi Management Plan (IMP) was lodged with the relevant Councils on the 1st March 2013, including the Waimakariri District Council. The Resource Management Act contains several provisions regarding Māori interests, including the principles of the Treaty of Waitangi, and gives statutory recognition to Iwi Management Plans.

146. The Mahaanui Iwi Management Plan 2013 is a written document, it is an expression of kaitiakitanga which is fundamental to the relationship between Ngai Tahu and the environment. The IMP sets out how to achieve the 'protection of natural and physical resources according to Ngai Tahu values, knowledge, and practices' (IMP section 5.1). It identifies several issues and associated policies, including subdivision and development guidelines. This promotes early engagement at various levels of the planning process to ensure certain outcomes are achieved within the development.

147. The Mahaanui IMP 2013 has been prepared by the six Papatipu Rūnanga of the takiwā:

- Ngāi Tūāhuriri Rūnanga
- Te Hapū o Ngāti Wheke (Rāpaki) Rūnanga
- Te Rūnanga o Koukourārata
- Ōnuku Rūnanga
- Wairewa Rūnanga
- Te Taumutu Rūnanga

148. The site is located within the area covered by the Mahaanui Iwi Management Plan 2013(IMP) and as such it is considered appropriate to assess the application under the IMP, as required under Section 74(2A) of the RMA, to assess any potential effects on Tāngata Whenua vales.

149. The relevant sections and policies to the applications are addressed as follows.

Section 5.1 Kaitiakitanga

150. The objectives of this section of the IMP acknowledge that the Mahaanui IMP 2013 is a Manawhenua planning document for the six Papatipu Rūnanga in the region. It is acknowledged that there is a relationship that the Rūnanga have with the land and water, kaitiakitanga and Treaty of Waitangi. This section of the IMP provides an overarching policy statement on kaitiakitanga and is relevant to all other sections of the IMP.

Section 5.2 Ranginui

151. This section of the IMP addresses objectives and policies for air and provides guidance to the protection and use of air in a manner that respects the life supporting capacity and ensures that it is passed onto the next generation in a healthy state.

152. Air discharges will be changed from rural to residential in nature. This is considered to provide a possible benefit in that residential discharges have less potential to contaminate the air.

153. The IMP identifies that celestial darkness should be protected. The rezoning from rural to residential could have the potential to increase light sources, such as street lighting. However, given the existing residential use to the west of the site, it is considered that the additional street lighting will not significantly change the light sources and celestial darkness currently in the area.

154. The IMP also identifies the need to support reduction of emissions for climate change mitigation. The proposal is within walking and cycling transport connections to Mandeville and Swannanoa. This will encourage future residents to reduce the use of private cars and use more sustainable methods of transportation, therefore contributing less to emissions.

Section 5.3 Wai Māori

155. Section 5.3 addresses objectives and policies for fresh water and provides guidance to freshwater management in a manner consistent with Ngai Tahu cultural values and interests. It is recognised that Ngai Tahu and Rūnanga have interests and a relationship with freshwater resources.

156. It is considered that the application is consistent with the Wai Māori section of the IMP.

Section 5.4 Papatūānuku

157. This section of the IMP addresses objectives and policies of issues of significance in regard to the land. It recognises the relationships and connections between land, water biodiversity and the sea.

158. Consultation and engagement with the relevant Papatipu Runanga will be made within the early stages of any future residential development and subdivision to identify any potential cultural issues and if required supply a Cultural Impact Assessment report.

Section 6.4 Waimakariri

159. This section of the IMP addresses objectives and policies of issues and significance to the Waimakariri River. It recognises the relationship that Ngai Tahu has and the strong mahinga kai associations for Ngai Tahu.

160. The IMP identifies the requirement for recognition that subdivision and development within the Waimakariri Catchment has the potential to affect tāngata whenua values and interests. Any subdivision or future development will not result in changes to the overland flow paths where the Waimakariri River catchment would be impacted or altered.

13.2. Our Space Strategy 2018-2048

161. Our Space 2018-2048: Greater Christchurch Settlement Pattern Update Whakahāngai O Te Hōrapa Nohoanga (Our Space Update) has been prepared by the Greater Christchurch Partnership. The partnership includes.

- Christchurch City Council
- Environment Canterbury
- Selwyn District Council
- Waimakariri District Council
- Iwi – Te Rūnanga o Ngāi Tahu
- Waka Kotahi New Zealand Transport Agency
- Canterbury District Health Board
- Greater Christchurch Group – the Department of Prime Minister and Cabinet

162. The Our Space Update has been prepared to respond to the changes needed to growth and development of the region and complements the Urban Development Strategy (UDS) with addressing the National Policy Statement Urban Development Capacity 2016. As part of the process the report identifies key strategic issues across a number of planning documents. It provides the high-level guidance about future changes needed to accommodate future growth and development in a sustainable and integrated manner.

163. The Our Space strategy identifies the housing development, targets, and sufficiency of capacity for Christchurch, Selwyn and Waimakariri. A shortage of housing capacity was identified in Selwyn, Waimakariri, and Greater Christchurch.

164. Within the Waimakariri Rural Residential Development Strategy the San Dona development and Mandeville suburb have been identified as being similar to a combination of residential and rural in nature and scale with lots ranging from 1.2-2.2ha's. It is however zoned rural under the Operative Waimakariri District Plan and rezoning this area to LLR was initially considered, but deemed impractical due to servicing constraints, flooding, and access issues at the time the strategy was implemented.

165. These previous constraints have been addressed within this report via the expert evidence in respect to flooding and infrastructure.

13.3. Waimakariri 2048 District Development Strategy

166. The Waimakariri 2048 District Development Strategy was published July 2018 and it outlines the strategic direction that Waimakariri District Council expects the district to go over commercial, industrial, and residential development up to 2048.

167. Similar to the Waimakariri Rural Residential Development Strategy rezoning the San Dona development from Rural to LLR was initially considered, but deemed impractical due to servicing constraints, flooding, and access issues at the time the strategy was implemented.

168. These previous constraints have been addressed within this report via the expert evidence in respect to flooding and infrastructure.

14. Part 2 of the Resource Management Act 1991

169. Section 74 of the Act requires the Plan Change Request to be assessed under the provisions of Part 2 of the Act. Part 2 sets out the purpose and principles of the Act.

170. Section 5 of the RMA outlines that the purpose of the RMA is the promotion of sustainable management of natural and physical resources. Sustainable management is defined as the management of:

> *(2) […] the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while –*
>
> *(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
>
> *(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
>
> *(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

171. Section 6 identifies matters of national importance to be recognised and provided for. It is considered that none of these matters are relevant to the proposing rezoning.

172. Section 7 relates to 'other matters' which persons must have regard to. This submission for rezoning has given regard to (a) Kaitiakitanga, (b) the efficient use and development of natural and physical resources, (c) the maintenance and enhancement of amenity values and (f) maintenance and enhancement of the quality of the environment. The submission to rezone the site has had regard to these matters through the consolidation and connectedness of the proposed residential development, the creation of well-designed and high amenity living environments is consistent with the matters in Section 7.

173. Section 8 requires persons to consider the principles of the Treaty of Waitangi. An assessment of the Mahaanui Iwi Management Plan has been undertaken in Section 13 of this report. It is considered that the proposed rezoning is consistent with the principles of the Treaty of Waitangi.

174. Overall, the submission to rezone the site is considered to achieve the principle and purpose of Part 2 of the RMA.

15. Conclusion

175. San Dona Landowner Group is making a submission on the PWDP to rezone the area that encompasses the San Dona development within Mandeville from RL to LLR.

176. The purpose of this submission is to allow for the submission site to provide for large lot residential development opportunities, that can help contribute towards housing supply variety of choice and increase supply in the Waimakariri District.

177. The Section 32 assessment in Section 11 of this report demonstrates that Option 2, rezoning the site to LLR is the most efficient use of the land and is the most appropriate option when the costs and benefits are compared. The benefits of Option 2 outweigh the costs meaning that it is the most efficient option, and therefore the most suitable use of the land.

178. The assessment of environmental effects in Section 12 of this report identifies that the rezoning of the land from RL to LLR would provide for additional residential lifestyle land near Mandeville and Swannanoa as well as have excellent transport link to Central Christchurch. The efficient location of the development has good transport links to existing employment hubs of surrounding suburbs.

179. With the rezoning to LLR there will be a consistency between the surrounding area of Mandeville in terms of zoning and would limit the fragmentation of surrounding rural land.

180. An assessment of the relevant National Policy Statements, CRPS, proposed District Plan and other statutory and non-statutory documents has been undertaken in accordance with Section 74 of the RMA which demonstrates that whilst the area is not identified in the Waimakariri Rural Residential Development Strategy it can meet all other relevant national policy statements and is consistent with the direction in which the PWDP is heading.

181. In conclusion, for the reasons detailed throughout this report, the relief sought is to rezone the San Dona development from Rural to LLR.

16. Disclaimer

This report has been prepared by Eliot Sinclair & Partners Limited ("Eliot Sinclair") only for the intended purpose as a re-zoning submission on the PWDP.

The report is based on:

- Desktop Review
- Site Investigations (Undertaken by ES)
- Specialist Reports (Undertaken by ES and external consultants)
- Canterbury Maps Viewer
- 'One Network Road Classification' Waka Kotahi NZ Transport Agency (NZTA)
- Proposed Waimakariri ArcGIS maps
- Proposed Waimakariri Property Search
- Proposed Waimakariri District Plan (PWDP)

- Environment Canterbury (ECan)
- Canterbury Regional Policy Statement
- Waimakariri 2048 District Development Strategy
- Mahaanui Iwi Management Plan
- Our Space Strategy
- Waimakariri PWDP s32 Reports

Where data supplied by San Dona Landowner Group or other external sources, including previous site investigation reports, have been relied upon, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Eliot Sinclair for incomplete or inaccurate data supplied by other parties.

Whilst every care has been taken during our investigation and interpretation of available data to ensure that the conclusions drawn, and the opinions and recommendations expressed are correct at the time of reporting, Eliot Sinclair has not performed an assessment of all possible conditions or circumstances that may exist at the site. Eliot Sinclair does not provide any warranty, either express or implied, that all conditions will conform exactly to the assessments contained in this report.

The exposure of conditions or materials that vary from those described in this report, may require a review of our recommendations. Eliot Sinclair should be contacted to confirm the validity of this report should any of these occur.

This report has been prepared for the benefit of San Dona Landowner Group and the Waimakariri District Council for the purposes as stated above. No liability is accepted by Eliot Sinclair or any of their employees with respect to the use of this report, in whole or in part, for any other purpose or by any other party.

Appendix A. National Policy Statement Urban Design Assessment

Assessment of NPS-UD (May 2022)

Provision	Text	Assessment
Objective 1	New Zealand has well-functioning urban environments that enable all people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety, now and into the future.	The proposal seeks to rezone land which is currently used and suitable for residential development and is designed such that it provides a well-functioning urban environment. This will enable people and communities to provide for their social, economic, and cultural wellbeing both now and into the future. The proposal is therefore consistent with Objective 1.
Objective 2	Planning decisions improve housing affordability by supporting competitive land and development markets.	A planning decision which enables the proposed rezoning to support competitive land and development markets by providing additional opportunities for future development and housing supply. As such, the rezoning of the site is considered to be consistent with Objective 2
Objective 3	Regional policy statements and district plans enable more people to live in, and more businesses and community services to be located in, areas of an urban environment in which one or more of the following apply: a) The area is in or near a centre zone or other area with many employment opportunities. b) The area is well-serviced by existing or planned public transport. c) There is high demand for housing or for business land in the area, relative to other areas within the urban environment.	The proposed rezoning is consistent with Objective 3. This is on the basis that: - The area is well serviced by existing public transport. - Additionally, further development within the area is likely to encourage the establishment of further public transport links. - Recent further developments in the Mandeville and Swannanoa areas indicate

Provision	Text	Assessment
		that there is high demand for housing in the area.
Objective 4	New Zealand's urban environments, including their amenity values, develop and change over time in response to the diverse and changing needs of people, communities, and future generations.	The proposed rezoning will enable the continuation of the growth to Mandeville which provides options of housing with the changing needs for people, the community and future generations. As such, the proposal is considered to be consistent with Objective 4.
Objective 5	Planning decisions relating to urban environments, and FDSs, take into account the Treaty of Waitangi (Te Tiriti o Waitangi).	Section 104 requires that specific consideration be given to Part 2, Section 8 of the RMA 1991. Any decision on the proposed rezoning will take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi). As sch, the proposal is considered to be consistent with Objective 5.
Objective 6	Local authority decisions on urban development that affect urban environments are: a) Integrated with infrastructure planning and funding decisions; and b) Strategic over the medium term and long term; and c) Responsive, particularly in relation to proposals that would supply significant development capacity.	The proposal is consistent with Objective 6. This is on the basis that: - The proposal will allow for the opportunity for an increase housing supply within the wider Mandeville and Swannanoa urban boundary. - Housing would be supplied in an area which has already undergone significant residential development. - The majority of Mandeville has now been identified as an urban area.

Provision	Text	Assessment
Objective 7	Local authorities have robust and frequently updated information about their urban environments and use it to inform planning decisions	The proposal is consistent with Objective 7. This is on the basis that: - Additional land for housing could be provided within the San Dona area that is consistent with urban development that can help contribute towards the current housing supply shortage.
Objective 8	New Zealand's urban environments: a) Support reductions in greenhouse gas emissions; and b) Are resilient to the current and future effects of climate change.	The proposed rezoning would still allow for low density housing options which works within the existing Mandeville environment. This will ensure that distances travelled by private vehicle use are low compared with residential development further afield, and additionally, residents can utilise existing public transport links. Both of the above matters will support a low/lower emission travel. The proposal is therefore considered to be consistent with Objective 8
Policy 1	Planning decisions contribute to well-functioning urban environments, which are urban environments that, as a minimum: a) Have or enable a variety of homes that: i. Meet the needs, in terms of type, price, and location, of different households; and	The proposal is consistent with Policy 1 on the following basis: - The San Dona development as it is already established has existing stormwater

Provision	Text	Assessment
	ii. enable Māori to express their cultural traditions and norms; and b) have or enable a variety of sites that are suitable for different business sectors in terms of location and site size; and c) have good accessibility for all people between housing, jobs, community services, natural spaces, and open spaces, including by way of public or active transport; and d) support, and limit as much as possible adverse impacts on, the competitive operation of land and development markets; and e) support reductions in greenhouse gas emissions; and f) are resilient to the likely current and future effects of climate change.	management/conservation/recreation use areas as well as active transport routes. - The proposal is within proximity to existing public transport links. - Additionally, further development in the area may help to encourage increased frequency and use of public transport services. - The use of public transport and active transport nodes will support reductions in greenhouse gas emissions. - Additionally, the location of the proposed rezoning will provide lower emission trips when compared with development on the City's urban edge.
Policy 2	Tier 1, 2, and 3 local authorities, at all times, provide at least sufficient development capacity to meet expected demand for housing and for business land over the short term, medium term, and long term.	The proposal seeks to enable further residential development with a Tier 1 local authority boundary. This will assist in meeting expected demand for housing over particularly over the short to medium-term. The proposal is therefore considered to be consistent with Policy 2.
Policy 3	In relation to tier 1 urban environments, regional policy statements and district plans enable: a) in city centre zones, building heights and density of urban form to realise as much development capacity as possible, to maximise benefits of intensification; and	The site is located within Mandeville and is outside the Swannanoa and Rangiora areas in the Waimakariri District and is considered a Tier 1 urban environment. The proposed rezoning would allow for low density residential developments which would reflect the

Provision	Text	Assessment
	b) in metropolitan centre zones, building heights and density of urban form to reflect demand for housing and business use in those locations, and in all cases building heights of at least 6 storeys; and c) building heights of at least 6 storeys within at least a walkable catchment of the following: i. existing and planned rapid transit stops ii. the edge of city centre zones iii. the edge of metropolitan centre zones; and d) within and adjacent to neighbourhood centre zones, local centre zones, and town centre zones (or equivalent), building heights and densities of urban form commensurate with the level of commercial activity and community services.	proposed zoning of Residential Large Lot consistent with the rest of Mandeville with is defined by WDC in the PDP as a local centre. The proposal is therefore considered to be consistent with Policy 3.
Policy 4	Regional policy statements and district plans applying to tier 1 urban environments modify the relevant building height or density requirements under Policy 3 only to the extent necessary (as specified in subpart 6) to accommodate a qualifying matter in that area.	The proposal complies with Policy 4.
Policy 5	Regional policy statements and district plans applying to tier 2 and 3 urban environments enable heights and density of urban form commensurate with the greater of: a) the level of accessibility by existing or planned active or public transport to a range of commercial activities and community services; or b) relative demand for housing and business use in that location	Not Applicable – The proposal is a Tier 1 urban environment.
Policy 6	When making planning decisions that affect urban environments, decision-makers have particular regard to the following matters:	The proposed rezoning is consistent with Policy 6. This is on

Provision	Text	Assessment
	a) the planned urban built form anticipated by those RMA planning documents that have given effect to this National Policy Statement b) that the planned urban built form in those RMA planning documents may involve significant changes to an area, and those changes: i. may detract from amenity values appreciated by some people but improve amenity values appreciated by other people, communities, and future generations, including by providing increased and varied housing densities and types; and ii. are not, of themselves, an adverse effect c) the benefits of urban development that are consistent with well-functioning urban environments (as described in Policy 1) d) any relevant contribution that will be made to meeting the requirements of this National Policy Statement to provide or realise development capacity e) the likely current and future effects of climate change.	the basis that: - The proposed urban built form will not change significantly as the San Dona development is already established and any further development can still provide low density housing options. - The adverse effects arising from the proposed rezoning are likely less than minor and not an overall adverse effect. - The benefits of the urban development will likely be consistent with a well-functioning urban environment and the proposal is consistent with Policy 1.
Policy 7	Tier 1 and 2 local authorities set housing bottom lines for the short-medium term and the long term in their regional policy statements and district plans	The proposed rezoning may contribute to reaching housing bottom lines for short-medium term as provided within the Canterbury Regional Policy Statement and Waimakariri District Plan. The proposal is therefore consistent with Policy 7.
Policy 8	Local authority decisions affecting urban environments are responsive to plan changes that would add significantly to development capacity and contribute to well functioning urban environments, even if the development capacity is: a) unanticipated by RMA planning documents; or b) out-of-sequence with planned land release.	The proposal seeks to undertake a proposed rezoning of the San Dona development that would add to development capacity within the Mandeville urban boundary (previously identified in the Operative District Plan) and will contribute to well-functioning urban environments (consistent with Policy 1)

Provision	Text	Assessment
		The proposal is therefore consistent with Policy 8.
Policy 9	Local authorities, in taking account of the principles of the Treaty of Waitangi (Te Tiriti o Waitangi) in relation to urban environments, must: a) involve hapū and iwi in the preparation of RMA planning documents and any FDSs by undertaking effective consultation that is early, meaningful and, as far as practicable, in accordance with tikanga Māori; and b) when preparing RMA planning documents and FDSs, take into account the values and aspirations of hapū and iwi for urban development; and c) provide opportunities in appropriate circumstances for Māori involvement in decision-making on resource consents, designations, heritage orders, and water conservation orders, including in relation to sites of significance to Māori and d) issues of cultural significance; and operate in a way that is consistent with iwi participation legislation	Council has involved local Iwi and Hapu regarding local plan changes and sort their input into the Proposed Waimakariri District Plan.
Policy 10	Tier 1, 2, and 3 local authorities: a) that share jurisdiction over urban environments work together when implementing this National Policy Statement; and b) engage with providers of development infrastructure and additional infrastructure to achieve integrated land use and infrastructure planning; and c) engage with the development sector to identify significant opportunities for urban development	The proposed rezoning has been undertaken in collaboration with development infrastructure providers (power, telecommunications, etc) to ensure integrated land-use and infrastructure planning occurs. The proposal is therefore consistent with Policy 10.
Policy 11	In relation to car parking:	Not Applicable – Minimum car parking requirements have not been set.

Provision	Text	Assessment
	a) the district plans of tier 1, 2, and 3 territorial authorities do not set minimum car parking rate requirements, other than for accessible car parks; and b) tier 1, 2, and 3 local authorities are strongly encouraged to manage effects associated with the supply and demand of car parking through comprehensive parking management plans.	The market will determine car parking requirements at the time development.

Appendix B. National Policy Statement Highly Productive Land Assessment

Assessment Against the National Policy Statement for Highly Productive Land 2022

Preface: The NPS-HPL requires that any land that is in a general rural zone or rural production zone, and is predominantly LUC 1, 2, or 3 land, and forms a large and geographically cohesive area to be mapped as highly productive land. For the purpose of this assessment, it is determined that the site while classified as highly productive land under the NPS, because the site does not form a large and geographically cohesive area it is not suitable to be used as highly productive land. Notwithstanding this, the following assessment against the objectives and policies of the NPS-HPL has been undertaken.

Provision	Text	Assessment
Objective 1	Highly productive land is protected for use in land-based primary production, both now and for future generations.	The site is not currently used for land-based primary productive purposes and is proposed to be zoned rural lifestyle under the Proposed Waimakariri District Plan. Given the site's current use, and the size of each site within the development, it is considered unlikely that it will be used for land-based productive purposes in the future. It is therefore considered acceptable to re-zone the land as there is not currently or anticipated primary productive use requiring protection. The proposal is therefore considered to be neither consistent nor inconsistent with Objective 1.
Policy 1	Highly productive land is recognised as a resource with finite characteristics and long-term values for land-based primary production.	The site is not currently used for or anticipated to be used for land-based primary productive purposes in the future. This is on the basis that residential infill development is occurring on sites in immediate proximity to the site, and it is anticipated that this area will continue to undergo large lot residential development with the proposed rezoning from rural lifestyle to residential large lot. As such, the proposal is considered consistent with Policy 1, and it has recognised the characteristics while accounting for realised and future long-term values associated with this piece of land.

Provision	Text	Assessment
Policy 2	The identification and management of highly productive land is undertaken in an integrated way that considers the interactions with freshwater management and urban development.	The proposed rezoning seeks to allow further residential development on land which is underutilised and not currently used for land-based primary production. Given surrounding land-uses are primarily residential to rural lifestyle developments, it is expected that future use of the site will be limited to residential residences that would be encompassed by larger lots at a low density. Given the site is unlikely to be used for land-based primary production, the proposal is neither consistent nor inconsistent with Policy 2.
Policy 3	Highly productive land is mapped and included in regional policy statements and district plans.	Not Applicable – The Canterbury Regional Policy Statement and Christchurch District Plan have not been updated to reflect mapping of highly productive land. This is due to recency of the NPS-HPL's commencement. Therefore, the proposal is considered neither consistent nor inconsistent with the Policy 3.
Policy 4	The use of highly productive land for land-based primary production is prioritised and supported.	The site is not currently used for land-based primary production purposes. Rather the site is currently occupied by low density residential dwellings typically like what is expected in the large lot residential zone. It is currently proposed to be zoned rural lifestyle. Additionally, as the site is not being used for productive purposes, it's use as highly productive land is not currently prioritised and/or supported. It is likely that following the proposed rezoning if successful, the overall productive capacity of this specific piece of land will remain unchanged. For these reasons, the proposal is considered neither consistent nor inconsistent with Policy 4.
Policy 5	The urban rezoning of highly productive land is avoided, except as provided in this National Policy Statement.	The proposal is considered to be consistent with Policy 5. This is on the basis that the rezoning may be provided for within Clause 3.6 (1) (a) & (c) of the National Policy Statement.

Provision	Text	Assessment
		The proposed urban rezoning will contribute to provisions of sufficient development capacity to meet demand for housing giving effect to the NPS-UD. The site is not currently used for land-based primary production purposes. Therefore, it is possible that there will be no loss of highly productive land. Additionally, environmental, social, cultural, and economic benefits of rezoning will outweigh the cost of losing the underutilised highly productive land. The proposal is therefore considered to be consistent with Policy 5.
Policy 6	The rezoning and development of highly productive land as rural lifestyle is avoided, except as provided in this National Policy Statement.	Not Applicable – The proposal does not seek to rezone any land as rural lifestyle.
Policy 7	The subdivision of highly productive land is avoided, except as provided in this National Policy Statement.	Not Applicable – The proposal is for rezoning of land.
Policy 8	Highly productive land is protected from inappropriate use and development.	The site is not currently used for land-based primary production purposes. Therefore, it is possible that there will be no loss of highly productive land. Additionally, environmental, social, cultural, and economic benefits of rezoning will outweigh the cost of losing the underutilised highly productive land. The proposal is therefore considered to be consistent with Policy 8.
Policy 9	Reverse sensitivity effects are managed so as not to constrain land-based primary production activities on highly productive land.	The site to which the rezoning applies is not currently used for land-based primary production activities. Therefore, any rezoning and subsequent development will not result in reverse sensitivity effects with potential to constrain productive activities. The proposal is therefore considered to be consistent with Policy 9.

Appendix C. Canterbury Regional Policy Statement Assessment

Assessment of CRPS

The Canterbury Regional Policy Statement sets out objectives, policies and methods to resolve resource management issues in Canterbury. Chapter 5 (Land Use and Infrastructure) and Chapter 6 (Recovery and Rebuilding of Greater Christchurch) are most relevant to this Submission. Chapter 5 – Land Use and Infrastructure, address resource management issues associated with urban and rural-residential development across the entire Canterbury region. Within Chapter 5, the objectives and policies that include Greater Christchurch are notated as 'Entire Region' and those which are not relevant to Greater Christchurch are noted as 'Wider Region'. Chapter 6 – Recovery and Rebuilding of Greater Christchurch focuses on metropolitan areas of Greater Christchurch including Lincoln, Prebbleton, Rolleston, Kaiapoi, Rangiora and Woodend. The objectives, policies and methods in Chapter 6 take precedence within the Greater Christchurch area.

CRPS Chapters	Assessment of re-zoning for the San Dona Development
Chapter 1 - Introduction	Chapter 1 does not contain any objectives or policies
Chapter 2 - Issues of Resource Management Significance to Ngai Tahu	The proposal recognises that Te Runanga o Ngai Tahu is the iwi authority and are recognised mana whenua of the Waimakariri District. Relevant investigations as part of the submission have not identified that the proposal site contains wahi tapu and other taonga.
Chapter 3 - Resource Management Processes for Local Authorities	This chapter discusses the working relationship of the Canterbury Regional Council and the Waimakariri District Council. The proposal does not undermine the ability for these matters to be achieved.
Chapter 4 - Provisions for Ngai Tahu and their relationship with resources	This chapter sets out the tools and processes that the Canterbury Regional Council will use to engage Ngai Tahu as tangata whenua in the management of natural and physical resources. The proposal does not undermine the ability for these matters to be achieved.
Chapter 5 - Land use and infrastructure	The submission will provide integration and cohesion with the existing residential areas of Mandeville and Swannanoa. This will help contribute towards residential growth and housing supply. The site is ideally located with surrounding transport and servicing infrastructure and will

CRPS Chapters	Assessment of re-zoning for the San Dona Development
	not have any adverse effects on the environment. A more detailed assessment of Chapter 5 is provided below.
Chapter 6 - Recovery and Rebuilding of Greater Christchurch	Chapter 6 of the CRPS relates to the purpose of providing a resource management framework for the recovery and rebuilding of Greater Christchurch following the Canterbury Earthquakes. It can now be considered that the recovery and rebuilding following the earthquakes has for the majority been completed and now the residential demand is stemming from population growth rather than being related to earthquake recovery. It is noted under Map A that whilst the Mandeville area is located within the Greater Christchurch area the submission site is not included within the anticipated residential growth boundary nor outlined as a greenfield priority area. The proposal is partially consistent with Chapter 6 because it will provide for a well-designed residential development that will have less than minor effects on the surrounding natural and built environment despite being located outside the expected future residential growth area within Map A. The submission is therefore mostly consistent with this chapter.
Chapter 7 Freshwater	The proposal will not impact water flow, groundwater levels or allocation regimes and does not impact on providing sufficient quantities of water in water bodies. The submission is consistent with this chapter.
Chapter 8 – The Coastal Environment	N/A

CRPS Chapters	Assessment of re-zoning for the San Dona Development
Chapter 9 – Ecosystems and Indigenous Biodiversity	The submission site is located within the ecological district and ecological geographic area overlays under the proposed Waimakariri District Plan. The proposed rezoning will take this into consideration. The submission is consistent with this chapter.
Chapter 10 - Beds of rivers, lakes and their riparian zones	The San Dona development can provide sufficient stormwater management for the existing as well as any future development. The submission is consistent with this chapter.
Chapter 11 – Natural Hazards	It is considered that as the Sand Dona development is established any natural hazards resulting from future residential development from the re-zoning can be addressed within relevant technical reporting. A natural hazard assessment under s.106 of the RMA at the time of subdivision to create new allotments, the same as any other subdivision in the District would be required. The submission is consistent with this chapter.
Chapter 12 - Landscape	The site is not located within an outstanding natural landscape overlay under the proposed Waimakariri District Plan. The submission is consistent with this chapter.
Chapter 13 – Historic Heritage	The proposed submission will not cause any loss of historic or heritage sites. The submission is consistent with this chapter.

CRPS Chapters	Assessment of re-zoning for the San Dona Development
Chapter 14 – Air Quality	The proposal will not cause any deterioration of ambient air quality. With the rezoning proposal to residential this will likely decrease the impact of air quality compared to the site staying zoned as rural. The submission is consistent with this chapter.
Chapter 15 - Soils	The proposal will not result in soil erosion, sedimentation of water bodies or the loss of significant vegetation cover. The submission is consistent with this chapter.
Chapter 16 – Energy	The site is located adjacent to the Mandeville and Swannanoa suburbs. There is existing transport links to Rangiora, Fernside, Ohoka and Oxford as well as Christchurch City. Good urban design will provide efficient use of the site and connectivity to Greater Christchurch. The submission is consistent with this chapter.
Chapter 17 – Contaminated Land	The San Dona development is established, and any contaminated land would have been addressed within the original subdivision of the site. The submission is consistent with this chapter.
Chapter 18 – Hazardous Substances	N/A
Chapter 19 – Waste Minimisation and Management	N/A

Chapter 5 – Land Use and Infrastructure

CRPS Chapter 5 Relevant Objectives and Policies	Assessment of re-zoning for San Dona Development
Objective 5.2.1: Location, Design and Function of Development (Entire Region) Development is located and designed so that it functions in a way that: 1. Achieves consolidated, well designed and sustainable growth in and around existing urban areas as the primary focus for accommodating the region's growth; and 2. Enables people and communities, including future generations, to provide for their social, economic and cultural well-being and health and safety; and which: a. Maintains, and where appropriate, enhances the overall quality of the natural environment of the Canterbury region, including its coastal environment, outstanding natural features and landscapes, and natural values; b. Provides sufficient housing choice to meet the region's housing needs; c. Encourages sustainable economic development by enabling business activities in appropriate locations; d. Minimises energy use and/or improves energy efficiency; e. Enables rural activities that support the rural environment including primary production; f. Is compatible with, and will result in continued safe, efficient and effective use of regionally significant infrastructure;	The majority of Mandeville has now been identified as an urban area. The rezoning of San Dona from Rural to LLRZ will: 1. Accessibility and connectivity remains unchanged from the status quo. 2. Infrastructure in Mandeville has already been contributed by existing San Dona residents (SW, WW and water services) and further connections and contributions to it can assist with further enabling efficient and effective operation by Council through rates and Development Contributions for the benefit of all of Mandeville. 3. Surrounding environmental effects have already been managed with the reticulation of San Dona services that were not previously available (SW), or relied on a small scale (developer led) infrastructure (WW) that are now managed by Council. 4. LLRZ development in San Dona will contribute to existing infrastructure as required at the time of subdivision. The rezoning will be consistent with this objective.

g. Avoids adverse effects on significant natural and physical resources including regionally significant infrastructure, and where avoidance is impracticable, remedies or mitigates those effects on those resources and infrastructure;
h. Facilitates the establishment of papakāinga and marae; and
i. Avoids conflicts between incompatible activities.

Objective 6.2.1 Recovery Framework

Recovery, rebuilding and development are enabled within Greater Christchurch through a land use and infrastructure framework that:

1. Identifies priority areas for urban development within Greater Christchurch;
2. Identifies Key Activity Centres which provide a focus for high quality, and where appropriate, mixed-use development that incorporates the principles of good urban design;
3. Avoids urban development outside of existing urban areas or greenfield priority areas for development, unless expressly provided for in the CRPS;
4. Protects outstanding natural features and landscapes including those within the Port Hills from inappropriate subdivision, use and development;
5. Protects and enhances indigenous biodiversity and public space;
6. Maintains or improves the quantity and quality of water in groundwater aquifers and surface waterbodies, and quality of ambient air;
7. Maintains the character and amenity of rural areas and settlements;

Chapter 6 of the CRPS has the purpose of providing a resource management framework for the recovery and rebuilding of Greater Christchurch following the Canterbury Earthquake Sequence. It can be considered now that the recovery and rebuilding following the earthquakes has mostly been completed, and now the residential demand is stemming from population growth, rather than specifically related to earthquake recovery. It is acknowledged that the site is not located within an identified priority area for development within Greater Christchurch as identified at the time of the Canterbury Earthquakes, and as a result is not located within the "projected infrastructure boundary" as detailed in Map A.

It is noted that Chapter 6 and Map A have been reviewed as part of the Our Space 2048 Greater Christchurch Settlement Pattern Update, however no changes were proposed for the submission site and surrounding area. Therefore, any new residential growth is not currently able to comply with this objective.

The proposal will not adversely affect outstanding natural features or landscapes and will not adversely affect any indigenous biodiversity.

The rezoning will also maintain the character and amenity of existing rural areas, as well as the existing residential areas and suburbs.

8. Protects people from unacceptable risk from natural hazards and the effects of sea-level rise; 9. Integrates strategic and other infrastructure and services with land use development; 10. Achieves development that does not adversely affect the efficient operation, use, development, appropriate upgrade, and future planning of strategic infrastructure and freight hubs; 11. Optimises use of existing infrastructure; and 12. Provides for development opportunities on Maori Reserves in Greater Christchurch.	The proposal will ensure that infrastructure and servicing will be integrated with the existing residential developments and infrastructure. Overall, the proposed rezoning is mostly consistent with Objective 6.2.1 with the exception of subclause 6.2.1(3) of 12.
Objective 6.2.2 Urban form and settlement pattern The urban form and settlement pattern in Greater Christchurch is managed to provide sufficient land for rebuilding and recovery needs and set a foundation for future growth, with an urban form that achieves consolidation and intensification of urban areas, and avoids unplanned expansion of urban areas, by: 1. Aiming to achieve the following targets for intensification as a proportion of overall growth through the period of recovery: a. 35% averaged over the period between 2013 and 2016 b. 45% averaged over the period between 2016 to 2021 c. 55% averaged over the period between 2022 and 2028; 2. Providing higher density living environments including mixed use developments and a greater range of housing types, particularly in and around the Central City, in and around Key Activity Centres, and larger neighbourhood centres, and in greenfield priority areas, Future Development Areas and brownfield sites;	The majority of Mandeville has now been identified as an urban area. The rezoning of San Dona from Rural to LLRZ will enable San Dona to contribute to Mandeville village with the same form, scale and design of development by providing for infill within the bounds of the existing developed area. The rezoning of San Dona from Rural to LLRZ will enable a high quality, low density residential area with a character that: 1. is low density detached residential units on generous sites the same as the rest of Mandeville village with similar environment, noise, traffic, lighting, odour and dust. 2. Will enable a continuation of existing activities for agriculture (olives for those that continue with these), not detracting from the quality residential environment that is Mandeville. 3. Open character and outlook can be maintained as specified by proposed rules for the zone relating to fencing and or hedging. 4. Enable residential activities at current scale to continue and enable further development at a scale that is consistent with the rest of Mandeville village.

3. Reinforcing the role of the Christchurch central business district within the Greater Christchurch area as identified in the Christchurch Central Recovery Plan; 4. Providing for the development of greenfield priority areas, and of land within Future Development Areas where the circumstances set out in Policy 6.3.12 are met, on the periphery of Christchurch's urban area, and surrounding towns at a rate and in locations that meet anticipated demand and enables the efficient provision and use of network infrastructure; 5. Encouraging sustainable and self-sufficient growth of the towns of Rangiora, Kaiapoi, Woodend, Lincoln, Rolleston and Prebbleton and consolidation of the existing settlement of West Melton; 6. Managing rural residential development outside of existing urban and priority areas; and 7. Providing for development opportunities on Maori Reserves.	5. Agricultural activities can continue as effects are already internal to the San Dona sites. 6. No community or commercial activities are anticipated by the consequence of rezoning to allow limited additional residential density. 7. Non-residential activities are not anticipated as a consequence of LLR zoning. 8. Cause no difference in relation to reverse sensitivity effects as San Dona in regard to surrounding land uses that are rural or rural lifestyle in nature. 9. Be able to achieve separation distances anticipated in the LLR zone. The rezoning will enable land to be bought forward for residential development to meet demand and enable the efficient use of the infrastructure network. The proposal will specifically encourage sustainable and self-sufficient growth in a way that provides efficient use of network infrastructure at a rate and in a location that meets subclauses 4 and 5, despite not being a Greenfield Priority Area or Future Development Area. Therefore, it is considered that the rezoning is consistent with the intention of Objective 6.2.2.
Objective 6.2.3 Sustainability Recovery and rebuilding is undertaken in Greater Christchurch that: 1. Provides for quality living environments incorporating good urban design; 2. Retains identified areas of special amenity and historic heritage value; 3. Retains values of importance to Tangata Whenua; 4. Provides a range of densities and uses; and 5. Is healthy, environmentally sustainable, functionally efficient, and prosperous.	The rezoning (and any future residential subdivision) will provide for well-designed quality living environments and provide for residential amenity values can provide for a range of densities or housing, can enhance local amenity values and will be sustainable and functionally efficient. Therefore, the rezoning is consistent with Objective 6.2.3.

Objective 6.2.4 Integration of transport infrastructure and land use Prioritise the planning of transport infrastructure so that it maximises integration with the priority areas and new settlement patterns and facilitates the movement of people and goods and provision of services in Greater Christchurch, while: 1. Managing network congestion; 2. Reducing dependency on private motor vehicles; 3. Reducing emission of contaminants to air and energy use; 4. Promoting the use of active and public transport modes; 5. Optimising use of existing capacity within the network; and 6. Enhancing transport safety.	Accessibility and connectivity remains unchanged from the status quo. Infrastructure in Mandeville has already been contributed by existing San Dona residents (SW, WW and water services) and further connections and contributions to it can assist with further enabling efficient and effective operation by Council through rates and Development Contributions for the benefit of all of Mandeville. LLRZ development in San Dona will contribute to existing infrastructure as required at the time of subdivision. Therefore, the rezoning is consistent with objective 6.2.4
Objective 6.2.5 Key activity and other centres	N/A
Objective 6.2.6 Business land development	N/A
Policy 6.3.1 Development within the Greater Christchurch area In relation to recovery and rebuilding for Greater Christchurch: 1. Give effect to the urban form identified in Map A, which identifies the location and extent of urban development that will support recovery, rebuilding and planning for future growth and infrastructure delivery; 2. Give effect to the urban form identified in Map A (page 6.27) by identifying the location and extent of the indicated Key Activity Centres; 3. Enable development of existing urban areas and greenfield priority areas, including intensification in appropriate locations, where it supports the recovery of Greater Christchurch;	It is acknowledged that the site is not located within an identified priority area for development within Greater Christchurch and is not located within the infrastructure boundary as detailed in Map A. It is noted that Chapter 6 and Map A have been reviewed by ECan, however no changes were proposed to the location of the submission site. Therefore, any new residential growth in will not comply with this objective. It is considered that the proposal does not strictly meet Policy 6.3.1 because the site of the proposed rezoning is not identified in Map A. It is noted that Policy 6.3.1(3) allows development to be enabled in existing urban areas in appropriate locations where it supports recovery.

4. Ensure new urban activities only occur within existing urban areas or identified greenfield priority areas as shown on Map A, unless they are otherwise expressly provided for in the CRPS; 5. Provide for educational facilities in rural areas in limited circumstances where no other practicable options exist within an urban area; 6. Provide for commercial film or video production activities in appropriate commercial, industrial and rural zones within the Christchurch District; 7. Provide for a metropolitan recreation facility at 466-482 Yaldhurst Road; and 8. Avoid development that adversely affects the function and viability of, or public investment in, the Central City and Key Activity Centres.	The recent proposed changes to Map A did not identify any further land for development, despite their being significant residential demand. The NPS-UD provides for unanticipated and out-of-sequence development that significantly adds to development capacity, therefore allowing development to be considered despite not being in accordance with the CRPS.
Policy 6.3.2 Development form and urban design Business development, residential development (including rural residential development) and the establishment of public space is to give effect to the principles of good urban design below, and those of the NZ Urban Design Protocol 2005, to the extent appropriate to the context: 1. Turangawaewae – the sense of place and belonging – recognition and incorporation of the identity of the place, the context and the core elements that comprise the through context and site analysis, the following elements should be used to reflect the appropriateness of the development to its location: landmarks and features, historic heritage, the character and quality of the existing built and natural environment, historic and cultural markers and local stories.	The majority of Mandeville has now been identified as an urban area. The rezoning of San Dona from Rural to LLRZ will in some instances will enable further subdivision. The rezoning of San Dona from Rural to LLRZ will better integrate San Dona with the rest of the existing Mandeville environment. The proposal is consistent with Policy 6.3.2.

2. Integration – recognition of the need for well-integrated places, infrastructure, movement routes and networks, spaces, land uses and the natural and built environment. These elements should be overlaid to provide an appropriate form and pattern of use and development. 3. Connectivity – the provision of efficient and safe high quality, barrier free, multimodal connections within a development, to surrounding areas, and to local facilities and services, with emphasis at a local level placed on walking, cycling and public transport as more sustainable forms of 4. Safety – recognition and incorporation of Crime Prevention Through Environmental Design (CPTED) principles in the layout and design of developments, networks and spaces to ensure safe, comfortable and attractive places. 5. Choice and diversity – ensuring developments provide choice and diversity in their layout, built form, land use housing type and density, to adapt to the changing needs and circumstances of the population. 6. Environmentally sustainable design – ensuring that the process of design and development minimises water and resource use, restores ecosystems, safeguards mauri and maximises passive solar gain. 7. Creativity and innovation – supporting opportunities for exemplar approaches to infrastructure and urban form to lift the benchmark in the development of new urban areas in the Christchurch region.	
Policy 6.3.3 Development in accordance with outline development plans	N/A

Policy 6.3.4 Transport Effectiveness Ensure that an efficient and effective transport network that supports business and residential recovery is restored, protected and enhanced so that it maintains and improves movement of people and goods around Greater Christchurch by: 1. Avoiding development that will overload strategic freight routes; 2. Providing patterns of development that optimise use of existing network capacity and ensuring that, where possible, new building projects support increased uptake of active and public transport, and provide opportunities for modal choice; 3. Providing opportunities for travel demand management; 4. Requiring integrated transport assessment for substantial developments; and 5. Improving road user safety.	Accessibility and connectivity remains unchanged from the status quo and will integrate with existing transport networks within the Mandeville area. The proposal is consistent with Policy 6.3.4.
Policy 6.3.5 Integration of land use and infrastructure Recovery of Greater Christchurch is to be assisted by the integration of land use development infrastructure by: 1. Identifying priority areas for development to enable reliable forward planning for infrastructure development and delivery; Ensuring that the nature, timing and sequencing of new development are co-ordinated with the development, funding, implementation and operation of transport and other infrastructure in order to: a. Optimise the efficient and affordable provision of both the development and the infrastructure;	Accessibility and connectivity remains unchanged from the status quo. Infrastructure in Mandeville has already been contributed by existing San Dona residents (SW, WW and water services) and further connections and contributions to it can assist with further enabling efficient and effective operation by Council through rates and Development Contributions for the benefit of all of Mandeville. LLRZ development in San Dona will contribute to existing infrastructure as required at the time of subdivision. Therefore, the rezoning is consistent with policy 6.3.5.

b. Maintain or enhance the operational effectiveness, viability and safety of existing and planned infrastructure;
c. Protect investment in existing and planned infrastructure;
d. Ensure that new commercial film or video production facilities are connected to reticulated water and wastewater systems; and
e. Ensure new development does not occur until provision for appropriate infrastructure is in place;

2. Providing that the efficient and effective functioning of infrastructure, including transport corridors, is maintained, and the ability to maintain and upgrade that infrastructure is retained;
3. Only providing for new development that does not affect the efficient operation, use, development, appropriate upgrading and safety of existing strategic infrastructure, including by avoiding noise sensitive activites within the 50dBA Ldn airport noise contour for Christchurch International Airport, unless the activity is within an existing residentially zoned urban area, residential greenfield area identified for Kaiapoi, or residential greenfield priority area identified in Map A (page 6-28) and enabling commercial film or video production activities within the noise contours as a compatible use of this land; and
4. Managing the effects of land use activities on infrastructure, including avoiding activities that have the potential to limit the efficient and effective, provision, operation, maintenance or upgrade of strategic infrastructure and freight hubs.

Policy 6.3.6 Business Land	N/A

Policy 6.3.7 Residential location yield and intensification

1. In relation to residential development opportunities in Greater Christchurch:
2. Subject to Policy 5.3.4, residential greenfield priority area development shall occur in accordance with Map A. These areas are sufficient for both growth and residential relocation through to 2028.
3. Intensification in urban areas of Greater Christchurch is to be focused around the Central City, Key Activity Centres and neighbourhood centres commensurate with their scale and function, core public transport routes, mixed-use areas, and on suitable brownfield land.
4. Intensification developments and development in greenfield priority areas shall achieve at least the following residential net densities averaged over the whole of an ODP area (except where subject to an existing operative ODP with specific density provisions):
5. 10 household units per hectare in greenfield areas in Selwyn and Waimakariri District;
6. 15 household units per hectare in greenfield areas in Christchurch City;
7. Intensification development within Christchurch City to achieve an average of:
8. 50 household units per hectare for intensification development within Christchurch City;
9. 30 households units per hectare for intensification development elsewhere.
10. Provision will be made in district plans for comprehensive development across multiple or amalgamated sites.

The site of the proposed rezoning is not located within the greenfield development areas in Map A. However, the site is within the established rural residential San Dona development and would be able to provide the opportunity for intensification if re-zoned.

The proposal will be mostly consistent with Policy 6.3.7.

11. Housing affordability is to be addressed by providing sufficient intensification and greenfield priority area land to meet housing demand during the recovery period, enabling brownfield development and providing for a range of lot sizes, densities and appropriate development controls that support more intensive developments such as mixed use developments, apartments, townhouses and terraced housing	
Policy 6.3.8 Regeneration of brownfield land To encourage and provide for the recovery and regeneration of existing brownfield areas through new comprehensive residential, mixed-use or business developments, provided such activities will ensure the safe and efficient functioning of the transport network and will not have significant adverse distributional or urban form effects on the Central City, Key Activity Centres and neighbourhood centres, or give rise to significant reverse sensitivity effects.	The proposed re-zoning is within an established development (San Dona) which has existing infrastructure that can supply for intensification resulting from re-zoning. It will however still be in keeping within the rural residential values of the Mandeville area. The submission site is also not located near or within the Central City, Key Activity Areas and neighbourhood centres. The proposal will be consistent with Policy 6.3.8.
Policy 6.3.9 Rural residential development In Greater Christchurch, rural residential development further to areas already zoned in district plans as at 1st January 2013 can only be provided for by territorial authorities in accordance with an adopted rural residential development strategy prepared in accordance with the Local Government Act 2002, subject to the following: 1. In the case of Christchurch City, no further rural residential development is to be provided for within the Christchurch City Plan area; 2. The location must be outside the greenfield priority areas for development, Future Development Areas, and existing urban areas;	It is acknowledged that the site is not located within an identified priority area for development within Greater Christchurch and is not located within the infrastructure boundary as detailed in Map A. The rezoning will enable land to be bought forward for residential development to meet demand and enable the efficient use of the infrastructure network. The proposal will specifically encourage sustainable and self-sufficient growth in a way that provides efficient use of network infrastructure at a rate and in a location that meets subclauses 4 and 5, despite not being a Greenfield Priority Area or Future Development Area. It is acknowledged that the submission site is within an existing urban area and is not identified in the Waimakariri Rural Residential Development Strategy as a rural residential growth direction.

3. All subdivision and development must be located so that it can be economically provided with a reticulated sewer and water supply integrated with a publicly owned system, and appropriate stormwater treatment and disposal; 4. Legal and physical access is provided to a sealed road, but not directly to a road defined in the relevant district plan as a Strategic or Arterial Road, or as a State highway under the Government Roading Powers Act 1989; 5. The location and design of any proposed rural residential development shall: a. avoid noise sensitive activities occurring within the 50 dBA Ldn air noise contour surrounding Christchurch International Airport so as not to compromise the future efficient operation of Christchurch International Airport or the health, well-being and amenity of people; b. avoid the groundwater protection zone for Christchurch City's drinking water; c. avoid land between the primary and secondary stop banks south of the Waimakariri River; d. avoid land required to protect the landscape character of the Port Hills; e. not compromise the operational capacity of the Burnham Military Camp, West Melton Military Training Area or Rangiora Airfield; f. support existing or upgraded community infrastructure and provide for good access to emergency services; g. avoid significant reverse sensitivity effects with adjacent rural activities, including quarrying and agricultural research farms, or strategic infrastructure;	Therefore, the site is partially consistent with Policy 6.3.9.

h. avoid significant natural hazard areas including steep or unstable land;
i. avoid significant adverse ecological effects, and support the protection and enhancement of ecological values;
j. support the protection and enhancement of ancestral land, water sites, wāhi tapu and wāhi taonga of Ngāi Tahu;
k. where adjacent to or in close proximity to an existing urban or rural residential area, be able to be integrated into or consolidated with the existing settlement; and
l. avoid adverse effects on existing surface water quality.

6. An outline development plan is prepared which sets out an integrated design for subdivision and land use, and provides for the long-term maintenance of rural residential character.
7. A rural residential development area shall not be regarded as in transition to full urban development.

Policy 6.3.10 Maori Reserves	N/A
Policy 6.3.11 Monitoring and Review	N/A

Appendix D. Infrastructure Servicing Report

Infrastructure Servicing Report

Version A

eliot sinclair

San Dona, Mandeville

Prepared for San Dona Landowner Group

520977

Infrastructure Servicing Report

San Dona, Mandeville

Prepared for San Dona Landowner Group

520977

Quality Control Certificate

Eliot Sinclair & Partners Limited

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Status	Description	Author	Release Date
A	Submission to Proposed District Plan	J. Manandhar	15 February 2024

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Appendix A. Mandeville-Fernside Water Supply Scheme Activity Management Plan (AMP) 2021

Appendix B. Waimakariri District Plan Review Memo to rezoning submitters (via Hearing Panel)

Appendix C. Mandeville Wastewater Modelling – Rezoning Ohoka Utilities Area

Appendix D. Flood Impact Assessment

Appendix E. Austroad Road Design AGRD03-16-Ed13.4 Table 4.5: Single carriageway rural road widths

Appendix F. Capacity Letter from Services

1. Introduction

Eliot Sinclair has been engaged by the San Dona Landowner Group to carry out an infrastructure servicing assessment to assist with the rezoning submission of 117 existing lots in San Dona, Mandeville (referred as "the Site") from Rural Lifestyle (RL) zone to Large Lot Residential (LLR) zone.

This report addresses the servicing requirements of water supply, stormwater, wastewater, transportation and roading, esplanade reserves and utility services.

2. Existing Site

2.1. Location and Surround

The Site is located at Mandeville North, Waimakariri and is bordered by Tram Road to the south, Dawsons Road to the west, and pasture area to the north and east. The Site consists of 117 existing RL lots with existing carriageways including Bradleys Road which runs central of the Site from south-west to the north-east. Generally, the individual lots within the Site consist of residential dwellings with few associated structures and pasture areas.

Aerial imagery illustrating the extent of the Site for proposed zone change submission is shown in Figure 1 below.

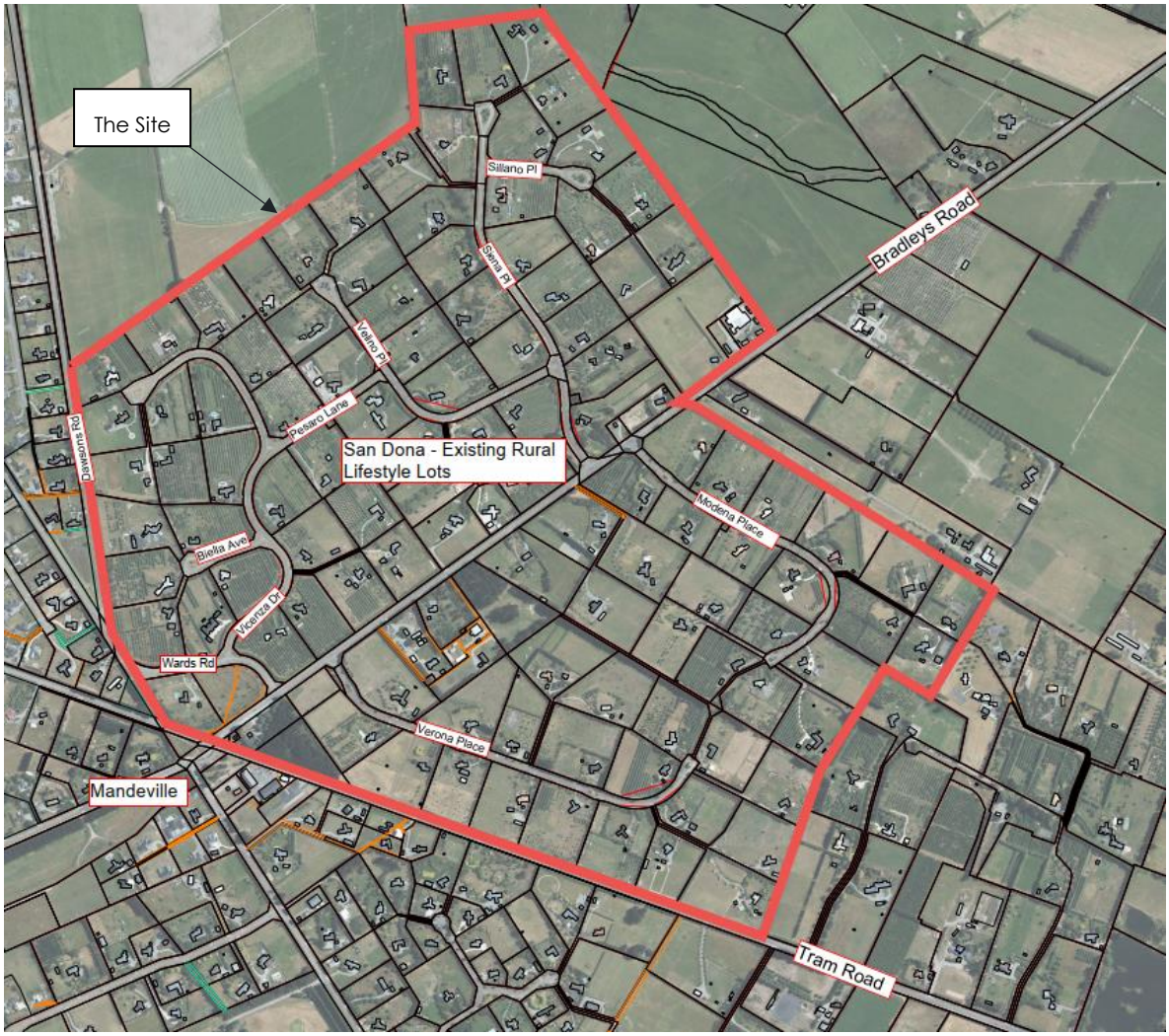

Figure 1. Aerial Imagery illustrating extents of the Site (within red border) for proposed land change.

3. Potential for Development

The proposed change in zone from RL to LLR will allow each of the RL lots within the Site to potentially subdivide into 2 to 3 large residential lots including a driveway. When subdividing each of these lots, the individual owners will need to apply for Subdivision Consent with the Waimakariri District Council (WDC) and the timeframes for the consent application and construction will solely depend on the individual lot owners.

4. Water Supply

4.1. Existing Water Supply

The existing water supply for the Site is serviced by WDC's Mandeville-Fernside Water Supply Scheme with a restricted water supply to each property into a water storage tank. The existing network within the Site comprises of an 80 mm uPVC pipe along Bradleys Road and a 50 mm uPVC submain along internal roads. There are no existing fire hydrants within the Site and the firefighting water is stored in existing water tanks within each lot.

A review of Mandeville-Fernside Water Supply Scheme Activity Management Plan (AMP) 2021 summarised that the connections are predicted to increase by 63 % in next 50 years. The AMP mentions that there is sufficient capacity to meet the current demand. However, source upgrades have been scheduled in years 2024/25 and 2033/34 to meet predicted growth demands. Refer to **Appendix A** for Mandeville-Fernside Water Supply Scheme Activity Management Plan (AMP) 2021.

4.2. Future Water Supply

The individual lot owners will need to anticipate water supply demand as well as firefighting water demand during subdivision consent phase. It is likely that each new subdivided lot will provide water tank for drinking water and firefighting water using the existing WDC restricted water supply reticulation.

The potable water supply network will need to be designed in accordance with the WDC Engineering Code of Practice (CoP) and SNZ PAS 4509:2008 New Zealand Fire Service Fire Fighting Water Supplies Code of Practice. The firefighting water supply classification will be FW2 in keeping with a residential area with 45,000 L minimum firefighting water storage within a distance of 90 m of a residential dwelling.

The WDC could facilitate the water supply (restricted) to the new lots and any upgrades associated with the water supply for the Site could be accommodated with appropriate development contributions from the lot owners. Further to the upgrades in water supply, if the rainwater harvesting tanks are used to mitigate stormwater within each lot, these tanks could be used for the greywater reuse in the new dwellings as well as firefighting water storage. Also, the existing water supply tank within the lot could be shared for firefighting purposes in the new subdivision, if acceptable to the New Zealand Fire Service and upgraded to current requirements.

5. Stormwater

5.1. Existing Stormwater

The stormwater from road carriageways within the Site are discharged into roadside drains. The roof stormwater of existing dwelling within each lot is discharged to the ground via on-site soakage pits. There is an existing stormwater drain west of Dawsons Road which passes through the Site and connects into Bradleys Road Drain. There is another stormwater drain which originates from the north of the Site and goes through Siena Place and connects into Bradleys Road Drain. The existing stormwater drains are shown in Figure 2 below.

Figure 2. Existing SW Drains (Source: Waimakariri District Council Three Waters Viewer)

It is noted that the WDC has recently upgraded the stormwater channels and water races as part of the Capital Works in Mandeville area and the new rates for stormwater applies to the existing lot owners.

5.2. Future Stormwater

The "Waimakariri District Plan Review Memo to rezoning submitters (via Hearing Panel) – Appendix A (Proposed District Plan Stream 12 – Engineering matters for consideration)" requires the rural stormwater to consider the effects of stormwater neutrality and to maintain the hydraulic neutrality within the Site for any developments.

Refer to **Appendix B** for Waimakariri District Plan Review Memo to rezoning submitters (via Hearing Panel).

As shown in Figure 4, the 1 in 200 year flood event conveys through the Site from the west to east. The rezoning from RL to LLR would increase the impermeable areas within the Site and thus, increasing the post-development runoff which will eventually increase the flood depth downstream of the Site.

Hydraulic neutrality can be maintained for the Site by maintaining hydraulic neutrality within individual lots during subdivision consent stage by the following:

- discharging new roof stormwater into soakage pits.
- flood modelling individual lots which are subject to 1 in 200 year flood event so that the flood paths are not altered significantly by potential future development.

Alternatively, the roof stormwater could be over attenuated in rainwater harvesting tanks and discharged via a suitable restricted orifice, so that the post-development flow does not exceed pre-development flow from sites subject to further subdivision. This stormwater could be reused for grey water within the dwelling or firefighting water storage.

5.3. Flooding Hazard

From the 1 in 200 year Waimakariri District Flood Hazard Maps, as shown in Figures 3 and 4 below, the Site (Figure 3) is located in a low and medium flooding hazard area much like the surrounding areas within the District as shown in Figure 3 below.

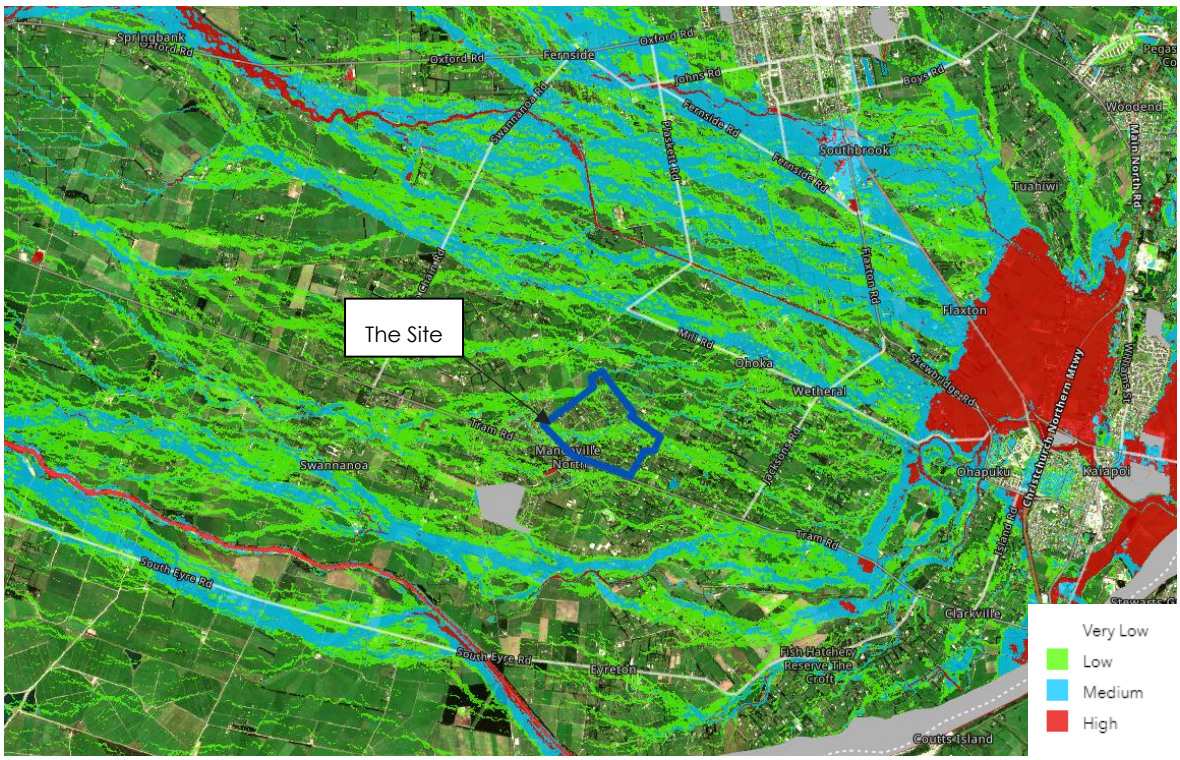

Figure 3. 1 in 200 year Flood Hazard Maps for surrounding area of Waimakariri District (Source: Waimakariri District Flooding Hazard Maps)

Figure 4. 1 in 200 year Flood Hazard map for the Site (Source: Waimakariri District Flooding Hazard Maps)

5.4. Minimum Floor Levels

The review of Waimakariri Operative District Plan for the neighbouring residential zones states a minimum freeboard of 300 mm from 1 in 200 year flood event. However, the "Waimakariri District Plan Review Memo to rezoning submitters (via Hearing Panel) – Appendix A (Proposed District Plan Stream 12 – Engineering matters for consideration)" states that the current practice for freeboard allowance of 400 mm to 500 mm for setting finished floor levels.

Refer to **Appendix D** for Flood Impact Assessment and **Appendix B** for Waimakariri District Plan Review Memo to rezoning submitters (via Hearing Panel).

5.5. Flood Modelling

If all the individual lots within the Site were to be subdivided, then there could be a potential downstream effect.

The Flood Impact Assessment was completed to analyse the effects of rezoning the Site on the 1 in 200 year flood event flow paths. The post-development flood model, simulated with an assumed location of future dwellings indicates an increase in depth up to 155 mm within some of the individual lots within the Site.

The post-development model indicates that the flood depths around the existing dwellings are less than 400 mm and assuming 400 mm free board from surrounding ground to the floor level, it can be concluded that the existing dwellings will not be affected by the 200 year flood event; subject to the assumed freeboard of existing dwellings, final location and size of future dwellings and driveways, and subdivision of upstream lots.

The LiDAR for pre and post development of flood modelling did not account for any upgrades in the stormwater channels and water races as part of the Capital Works. These upgrades will help the flooding to some extent and reduce the flood flow depths within the Site.

Refer to **Appendix D** for Flood Impact Assessment.

As there is uncertainty of which existing lots will subdivide, it is recommended that a site specific flood assessments would need to be undertaken for each lot located in the flood flow paths at the time of subdivision or further site development.

5.6. Groundwater Resurgence

It is noted that the ground water table is within 1 m – 2.5 m below ground level and resurgence of groundwater into the stormwater drains has been reported by the client. Refer to Section 8 for geotechnical assessment.

The Mandeville area has a history of flooding which is generally caused by heavy rain, and the extent and depth of the flooding can be exacerbated by high groundwater levels and resurgence flow. The Council has two staged plans on implementing upgrading to improve the stormwater management and resurgence flows through Mandeville upstream of the Site. Refer to WDC news feed on https://letstalk.waimakariri.govt.nz/mandeville-resurgence-channel-upgrades?tool=news_feed#tool tab.

There have been recent upgrades and regrades to the existing stormwater channels and water races as part of the Capital Works and are seen as positive for the Site and the wider community. The future upgrades to the channels as per the Capital Works will improve the capacity of drains to manage the stormwater and resurgence flows within the Site.

6. Wastewater

6.1. Existing Wastewater

The wastewater for the individual lots within the Site is currently serviced by Septic Tank Effluent Pumping (STEP) systems discharging to the Bradleys Road pumping station, from where the wastewater is pumped to the Rangiora Waste Water Treatment Plant via the 200 mm diameter Mandeville-Ohoka rising main. Figure 5 below shows the existing wastewater reticulation within the Site.

6.2. Future Wastewater

The rezoning of the existing 117 RL lots within the Site to the LLR lots would potentially subdivide each lot into 2 - 3 residential lots and thus increase the wastewater flows within the existing WDC wastewater reticulation.

The "Mandeville Wastewater Modelling – Rezoning Ohoka Utilities Area" is a study conducted by WDC (dated 24th November 2021) to understand the impact of rezoning the Site to LLR by updating the wastewater model in the Mandeville area. The study concluded that the existing WDC wastewater reticulation does not have enough capacity to service the additional wastewater flows generated from this proposed zone change in 1 in 5 year level of service. The study considers two options for wastewater network upgrades in order to meet a 1 in 5 year level of service:

1. Retaining and upgrading the existing STEP system by making both reticulation upgrades and an upgrade to the Bradleys Road pumping system to improve level of service.
2. Replacing the STEP system in Ohoka Utilities and Ohoka Downs with a new Low Pressure Sewer System (LPSS) (E/One or equivalent), together with some reticulation upgrades but without the need for an upgrade to the Bradleys Road pumping system.

Refer to **Appendix C** for "Mandeville Wastewater Modelling – Rezoning Ohoka Utilities Area" memo from WDC (dated 24th November 2021).

Figure 5. Existing Wastewater Drainage (Source: Waimakariri District Council Three Waters Viewer)

Both options mentioned in Mandeville-Wastewater Modelling – Rezoning Ohoka Utilities Area for the wastewater upgrade for the Site are viable and the WDC could facilitate the wastewater as per either option and any upgrades could be accommodated with appropriate development contributions from the lot owners.

By using a E/One LPSS system the WDC could alternatively require use of flow control devices such as IOTA Control Panel to control the storage of peaking flows from the Site and discharge them to the Bradleys Road pumping station at off peak times when the pumping station and rising main have capacity.

7. Transportation and Roading

The existing roads are rural roadways without line marking and are surfaced with chipseal. The roads drain towards the road side drains from the centre of road. The roads do not consist of any kerb and channel.

There are 8 roads within the Site and the speed limit is 50 km/hr for all roads. The roads at the intersection of Bradleys Road include line markings, give way signs and kerb and channels. The road intersections with Wards Road consist of only line markings. The remaining road intersections within the Site are not line marked or signed.

Table 1 below shows the roads within the Site and associated road widths, available WDC traffic count figures and predicted future traffic count figures.

Road Name	Road Width (m) *1	Maximum Design AADT based on Road Width *2	Average Daily Traffic *3	Future Average Daily Traffic *4
Vicenza Drive	6.52	1000	171	513
Biella Place	5.72	500	-	-
Verona Place	6.05	500	106	318
Pesaro Lane	6.70	1000	-	-
Velino Place	6.21	1000	-	-
Siena Place	6.22	1000	292	876
Sillano Place	5.22	500	-	-
Modena Place	6.05	500	-	-

Table 1. Road Traffic Counts

Notes: 1) Road Widths are approximate only and are measured from Canterbury Maps. The accuracy of measurement is subject to the accuracy of maps and measuring tool by Canterbury Maps.

2) The maximum design AADT is obtained from Austroad Road Design AGRD03-16-Ed13.4 Table 4.5: Single carriageway rural road widths.

3) The traffic count data for Average Daily Traffic is obtained from https://www.waimakariri.govt.nz/__data/assets/excel_doc/0029/136559/WDC-Traffic-Data-April-20.xlsx . The traffic count data for other roads within the Site was not available.

4) As the individual lots could potentially subdivide into 3 LLR sites, the Future Average Daily Traffic was calculated by multiplying the Average Daily Traffic by 3.

The Rural Road Widths from Austroad Road Design AGRD03-16-Ed13.4 Table 4.5: Single carriageway rural road widths is shown in **Appendix E**.

The expected future AADT for Vicenza drive, Verona Place and Siena Place is within the limits for rural road widths as stated in Austroad Road Design AGRD03-16-Ed13.4 Table 4.5: Single carriageway rural road widths. Therefore, the existing roads will be able to accommodate additional traffic volume generated by proposed zone change as per Rural Road Widths from Austroad Road Design AGRD03-16-Ed13.4 Table 4.5 without further upgrade of the road widths.

8. Geotechnical Assessment

Refer to Desktop Natural Hazards Risk Assessment Report included as a part of the application for submission to proposed District Plan.

9. Esplanade Reserves

The existing drains from the west of Dawsons Road and the north of Siena Place pass through the Site and connect to the Bradleys Road Drain as shown in Figure 2.

There are few existing properties which are within the 20 m setback provision of these existing drains. If required, WDC may enforce a 20 m setback provision from these drains for any future subdivision consent applications.

10. Common Services (Power / Telecommunications / Gas)

Power and telecommunications services will be provided to service all allotments in accordance with utility company and industry standards at the time of development. All cables and ducts will be placed below ground, and kiosks will be placed within individual allotments during subdivision consent and construction phase by individual lot owners.

Amuri Net have provided a Capacity Letter confirming that they have necessary infrastructure and capacity to support the further subdivision of existing lots.

Mainpower have provided a Capacity Letter confirming that their High Voltage Reticulation in the vicinity of the Site has the capacity to supply the proposed subdivision.

Chorus have confirmed that they can provide telecommunications services to additional lots.

There is no reticulated gas supply to the Site.

Refer to **Appendix F** for capacity letter from service providers.

Common service designs will be provided to WDC for their approval and comment as part of the Engineering Approval process for subdivision applications.

11. Conclusion

The water supply for the Site could be facilitated by the WDC through the existing restricted supply. Any required upgrades associated with the water supply for the Site could be accommodated with appropriate development contributions from the lot owners.

Both wastewater options mentioned in Mandeville-Wastewater Modelling – Rezoning Ohoka Utilities Area for the wastewater upgrade for the Site are viable. Alternatively, a flow-controlled discharge of a LPSS could be used to minimise required upgrades to existing reticulation and the pump station. Once capacity is reached, the WDC could facilitate any required wastewater upgrades through appropriate development contributions from the lot owners.

Stormwater for the Site could be serviced within each lot by discharging new roof stormwater into ground via soakage pits or over-attenuating new roof stormwater in a rainwater harvesting tanks.

The 1 in 200 year flood event conveys through the Site and a Flood Impact Assessment is completed for post-development based on the assumed location of the future dwellings indicating an increase in flood depth up to 155 mm in some of the individual lots within the Site. As there is an uncertainty of which existing lots will subdivide, it is recommended that a site specific flood assessments are to be undertaken for each lot located in the flood flow paths at the time of subdivision or further site development.

The existing roads will be able to accommodate additional traffic volumes generated by the proposed zone change without further upgrade to the road widths being necessary.

The utility service providers for fibre, copper and electricity have confirmed that they can provide the respective services to the new lots.

The Site can be serviced with roading, water supply, wastewater, stormwater, power and telecommunications subject to preliminary and detailed subdivision design in conjunction with appropriate Council Consents being obtained. On this basis, the submission for rezoning the Site from Rural Lifestyle to Large Lot Residential can be supported in respect to infrastructure and servicing capacity.

12. Disclaimer

This report has been prepared by Eliot Sinclair & Partners Limited ("Eliot Sinclair") only for the intended purpose as an Infrastructure Servicing Report.

The report is based on:

- Canterbury Maps (2023).
- Waimakariri District Council Maps (2022).
- Correspondence with relevant authorities.
- GNS Science Interactive Maps (2023).

Where data supplied by San Dona Landowner Group or other external sources, including previous site investigation reports, have been relied upon, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Eliot Sinclair for incomplete or inaccurate data supplied by other parties.

Whilst every care has been taken during our investigation and interpretation of available data to ensure that the conclusions drawn, and the opinions and recommendations expressed are correct at the time of reporting, Eliot Sinclair has not performed an assessment of all possible conditions or circumstances that may exist at the site. Eliot Sinclair does not provide any warranty, either express or implied, that all conditions will conform exactly to the assessments contained in this report.

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Appendix A. Mandeville-Fernside Water Supply Scheme Activity Management Plan (AMP) 2021

WAIMAKARIRI
DISTRICT COUNCIL

Activity Management Plan 2021

Mandeville-Fernside Water Supply Scheme

3 Waters | July 2021

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Document Acceptance

Action	Name		Signed	Date
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1 Executive Summary

The following table provides a summary of the key asset management components that have been assessed for the Mandeville-Fernside Water Supply Scheme. These have been identified through consideration of the levels of service, consents, asset condition, risk analysis, disaster resilience, growth projections, and capacity assessment:

Table 1: Key Asset Management Components

Resource Consents	The scheme continues to comply with its resource consent conditions.
Levels of Service (LoS)	The Mandeville –Fernside water supply scheme meets most of its levels of service. Those that have not been met relate to the aesthetic requirements of the drinking water standards, sampling issues, restricted supplies flow requirements, losses and storage Turbidity requirements of the drinking water standards, which are not mandatory as they are part of aesthetic requirements, were not met for short periods. The LoS target is being adjusted from 2021 forward – see the Overview document A maximum period of time between samples was exceeded in 2019, which affected the bacterial compliance of the scheme. An alert system has been put in place to prevent a re-occurrence Flow for restricted connections does not meet the LoS because of insufficient data, which the restrictor inspection programme will address with time. Implementation of actions within the Water Conservation Strategy is required before the losses LoS can be met. New storage is planned to be constructed in 2021/22
Capacity & Performance	In terms of capacity and performance, a second primary well is planned to assist with redundancy requirements, and an additional reservoir to improve available storage and cater for growth. The scheme is not currently included in the Fire Service Area, and there are currently no plans to alter this.
Asset Condition	The majority of the scheme is in excellent condition, with only minor renewals required over the next 50 years.
Risk Assessment	The risk assessment identified no extreme or high risks associated with the supply.
Disaster Resilience	The Disaster Resilience Assessment indicates the Two Chain Road headworks are at a moderate risk from wildfire, which should be further investigated and mitigated.
	Earthquake resilience assessments for the Tram Road headworks are also required as this is identified as a moderate earthquake hazard.
Growth Projections	The connections served by the scheme are predicted to increase by 63% in the next 50 years. The previous possibility that there could be considerable additional growth from rural residential development has been significantly reduced as it is not intended that the proposed District Plan review will include rural residential zoning in this area

2 Introduction

The purpose of this Activity Management Plan (AMP) is to:

- Provide an overview of the Kaiapoi water supply scheme and the assets that make up the scheme;
- Outline any significant issues associated with the assets, and show how the Council will manage these;

This plan summarises the various components of the Kaiapoi water supply scheme, its condition and performance, and identifies future funding requirements including upgrades where necessary.

The data that has been relied upon to produce this document was taken at the end of the 2019/20 financial year (i.e. 30 June 2020). There are more up to date scheme statistics available on document 121108078783 which is intended to be updated quarterly.

Further details of the asset management practices used by Council to manage this scheme are summarised in the District Water Supply AMP Overview document (200120006283).

Projects identified to improve asset management processes for this scheme will also benefit the performance of other 3 waters schemes and are managed at a District level for efficiency.

Projects are also identified within this AMP that will maintain or improve levels of service.

All figures within this AMP exclude inflation.

3 Related Documents

The following related documents have been used as reference documents or for guidance in the development of some of the sections in this Activity Management Plan

- Waimakariri District Plan
- Population in the Waimakariri District (TRIM 170328030077)
- New Projections for LTP 2021-2031 (TRIM 200908117997
- WDC Asset Management Policy (TRIM 180605062091)
- 2019 Customer satisfaction Survey (TRIM 200313034937)
- Development Contributions Policy 2021/22 (TRIM 200729095963)

4 Scheme Description (What Do We Have?)

The Mandeville-Fernside water supply scheme is a restricted water supply. The primary source is currently a 77 metre deep well on Two Chain Road (Two Chain Road Well No. 2).

This well previously had secure groundwater status, however this was removed following E. coli contamination of the source in 2012.

There is a second well at the primary headworks at Two Chain Road (Two Chain Road Well No.1) however this experiences high turbidity at times, and this is only retained as a backup source, as the turbidity can affect the compliance of the UV system as well as the aesthetic compliance of the water.

Following the E. coli contamination of the primary well in 2012, an investigation into upgrade options was undertaken in order to achieve compliance with the Drinking-water Standards for New Zealand

(DWNSZ). Ultimately, an ultra-violet (UV) disinfection system was installed in 2017 to achieve compliance with both the bacterial and protozoal requirements of the DWSNZ.

The Fernside scheme was also assessed to have a source that does not comply with the DWSNZ. An options assessment and community consultation was carried out, and it was resolved by Council that the Fernside scheme would join with the Mandeville scheme, as means of upgrading the source for Fernside. This was implemented in 2018 by way of construction of a new pipeline to link the schemes, hence the previously separate schemes are now considered as one scheme.

Some key statistics (2019/20 year) of the scheme are shown in Table 2 to 5. The extent of the currently serviced area and comprehensive flow data records are presented in Figure 13 and Figure 17

A schematic view of the principal source, treatment, and distribution system is presented below in Figure 1.

Table 2: Scheme Statistics for 2019/2020

Scheme Parameter	Statistics		Source
	Mandeville	**Fernside**	
Type of Supply	Restricted	Restricted	
Principal Source	Two Chain Road No. 2 (non-secure groundwater)	Primary source relegated to a back-up source following joining with Mandeville.	
Back-up Source	Two Chain Road Well No.1 and Tram Road Well (non-secure groundwater)	Fernside well (non-secure groundwater).	
Treatment	UV treatment, chlorination and pH correction.	Chlorine disinfection and pH correction (only when backup in use)	
Nominal Storage Capacity	Four 30,000 litre tanks - Total 120 m^3	69m^3	
Length of Reticulation	73.0 km	8.1 km	Water Asset Valuation Tables 7-4 and 7-5, pages 53 - 55.
Total Replacement Value	$10.1 mil		
Depreciated Replacement Value	$7.96 mil		
Number of Connections	879	85	Rate strike 2019/20
Number of Rating Charges	1,848	180 units	
Average Daily Flow (5 year average)	1,171 m^3/day	143 m^3/day	Flow Data Analysis – Water
Peak Daily Flow (5 year average)	1,652 m^3 /day	211 m^3/day	
Resource Consent Abstraction Limit (Combined Well No.1 and No. 2)	3,024 m^3/day (expires 22 Dec 2039) combined for both Two Chain Road wells	432 m^3/day (expires 22 April 2034)	CRC990952.1 CRC990925 200409044078
Average Daily Flow per Connection (5 year average)	1,379 L/day/conn.	1,687 L/day/conn.	Flow Data Analysis – Water
Peak Daily Flow per Connection (5 year average)	1,950 L/day/conn.	1,950 L/day/conn.	

Table 3: Water Supply Pipe Data Summary

Water Supply pipe length (m) by diameter and pipe material						
Pipe material	**Pipe Diameter (mm)**					
	< 50	**50**	**100**	**150**	**200**	**Total**
PE	1,361m	33,879m	1,859m	24m	0m	37,122m
PVC	335m	21,964m	14,814m	6,619m	229m	43,961m
Other	17m	0m	0m	0m	0m	17m
Total	**1,713m**	**55,843m**	**16,673m**	**6,643m**	**229m**	**81,101m**

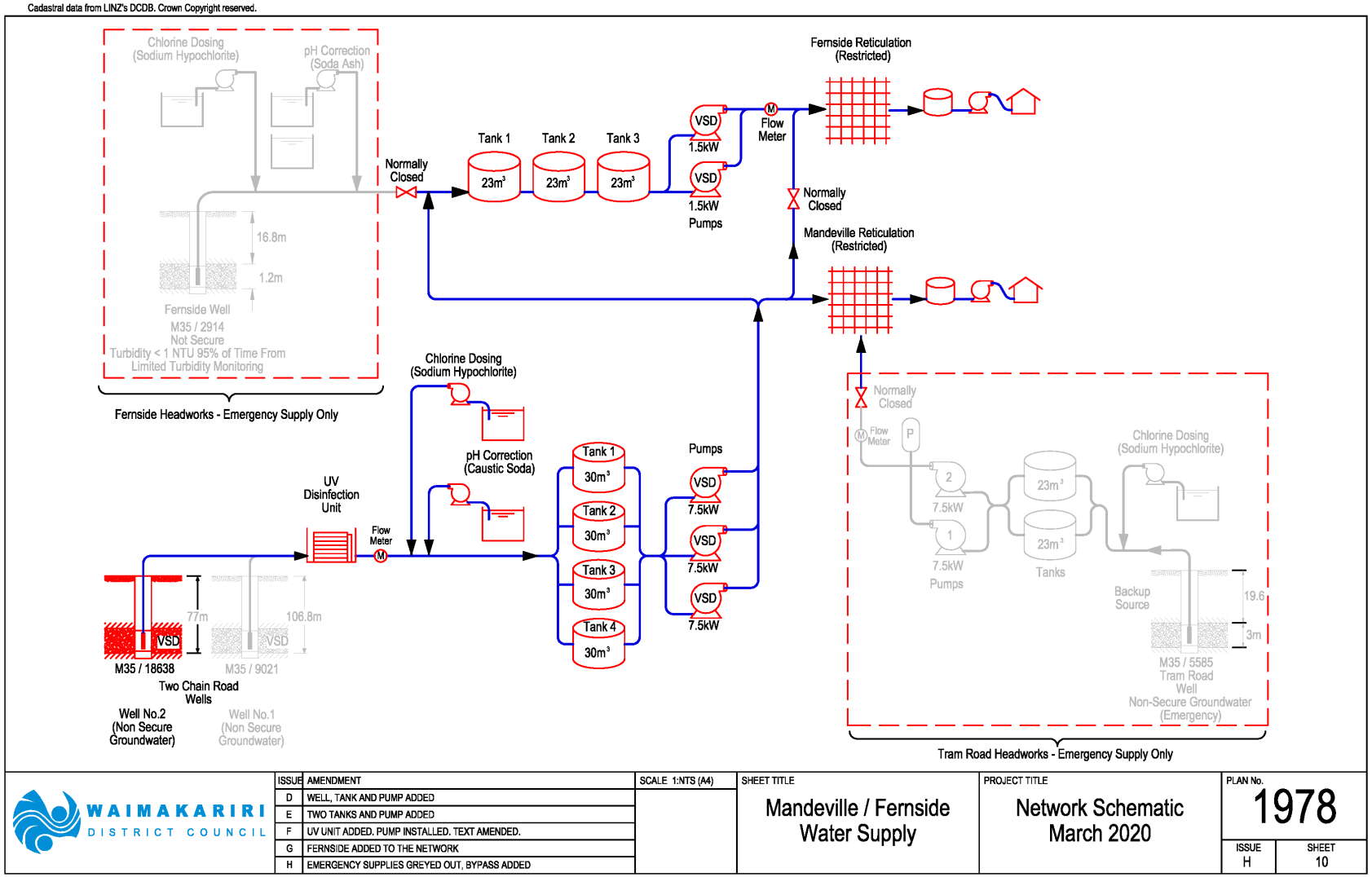
Table 4: Water Supply Valve Data Summary

Water Valves	
Diameter (mm)	**Count**
< 50	6
50	154
100	47
150	8
Total Valves	**215**
Fire Hydrants	**31**

Table 5: Data References

Data Reference	Trim Reference
Flow Data Analysis – Water	121108078783
2020 3 Waters Asset Valuation	200824109857
2020 Water Conservation Strategy	200501050668
2020 50 Year Water and Sewer Growth Forecast	200224024348
2014 Water Safety Plan	141205133567
2014 Water Supply System Assessment	141205133565
2020 Fire Fighting Code of Practice Compliance Update	200904117110

Figure 1: Network Schematic



5 Scheme Management Issues (What Do We Need to Consider?)

There are a number of key aspects to consider when managing a water supply; these include:

- Target & actual levels of service
- Asset condition & criticality
- Capacity & performance of the supply
- Risks associated with the supply
- Growth predictions for the scheme

These issues have been assessed in detail and are explained in the following sections.

5.1 Levels of Service

Table 6 sets out the performance measures and targets specific to the Mandeville-Fernside scheme, and records achievement against targets since 2008.

Mandatory performance measures are measured at the district wide level and are not included in the individual water supply scheme AMPs. They are located in the District Overview Water Supply Activity Management Plan. However there is considerable overlap between the measures at Scheme and District levels. Mandatory measures cover drinking-water standard compliance, water losses, time to respond to faults, and complaints. The scheme LOS measures also include drinking-water standard compliance, water losses and outages, among other measures. However, within the scheme AMP, these are assessed at the scheme level rather than at a district level. These scheme level results then feed into the district level results in the overview document.

None of the WDC targets are planned to change over the 10 year LTP period, so only the one target value has been shown in this document.

Performance in Table 6 is measured against the performance measures set in 2018, as part of the 2018-28 Long Term Plan process. Going forward from 2021 onwards, performance will be against the modified set of performance measures that were presented to the Council's Utilities and Roading Committee in 2020 (refer report 200406043184[v2]), and subsequently approved by Council. These revised levels and targets are detailed in the District Overview Water Supply Activity Management Plan.

Table 6: Elective (non-mandatory) Levels of Service Targets and Performance Measures as Assessed in 2020

**** Note "Y" indicates that the LOS has been met, and "N" indicates it has not been met***

[#] Details of performance measures may have been modified between various revisions of the AMP. The Previous Results reported are as assessed against the most relevant performance measure at the time of assessment.

Section	Level of Service	2018 – 2021 Performance Measure	2018 – 2021 Target	2020				Previous Results[#]			
				Result	Commentary	Status	Action to Address	2017	2014	2011	2008
Resource Consents	Consent Breach – Action Required	Number breaches of consent conditions that result in an ECan report that identifies compliance issues.	Nil/yr	Nil	No non-compliance reports from Ecan.	Achieved	NA	Y	Y	Y	Y
DWSNZ	DWSNZ - Aesthetic Compliance	Water supply delivers water that complies to a standard suitable for compliance with the aesthetic requirements of DWSNZ	Complies	Doesn't comply	Some turbidity samples exceeded 2.5 NTU for short periods during backup well operation.	Not achieved	LoS amended from 2021 onwards. Refer Overview document.	Y	Y	Y	Y
	DWSNZ – E. Coli Presence	Number of instances where the presence of E coli was detected at the headworks or within the reticulation	Nil/yr	Nil	No E. coli detected	Achieved	NA	Y	N	Y	Y
	DWSNZ - Protozoa Compliance	Water supply delivers water that achieves a standard suitable for compliance with the health requirements of DWSNZ	Complies	Complies	UV treatment to achieve protozoal compliance. Primary source compliant.	Achieved	NA	Y	N	Y	Y

Section	Level of Service	2018 – 2021 Performance Measure	2018 – 2021 Target	2020				Previous Results#			
				Result	Commentary	Status	Action to Address	2017	2014	2011	2008
					One day scheme did not comply in 19/20, however this was only during backup well operation.						
	DWSNZ - Sampling Non-compliance	Number of instances where sampling programme did not comply with DWSNZ, as demonstrated by Water Information NZ (WINZ) database	Nil/yr	1	One sample that was programmed was not taken in July 2019, which meant the 'max days between samples' was exceeded.	Not achieved	An alerting system is now set up to ensure that samples that are programmed will not be missed.	Y	Y	N	Y
Water Flow	Flow – Allocated Units	Water flow at the point of supply in Restricted or Semi Restricted schemes, excluding outages, as demonstrated by programmed restrictor audits, that tests restrictors at not less than 5 yearly intervals.	>0.69 L/min/unit	Insuf. Data	Restrictor checks are programmed to be undertaken every 4 years. However, there is currently insufficient data.	Not achieved	Implement Phase 2 of AMIS project, to allow adequate data collection and analysis.	N	-		

Section	Level of Service	2018 – 2021 Performance Measure	2018 – 2021 Target	2020				Previous Results#			
				Result	Commentary	Status	Action to Address	2017	2014	2011	2008
Water Losses	Water losses as determined by measured or calculated minimum flow	Water losses as determined by measured or calculated minimum flow for On Demand schemes	< 240 litres/ connection/ day	663	Based on weighted average of figures for Mandeville and Fernside. Data as per Water Conservation Strategy (200501050668).	Not achieved	Implement actions as identified in Water Conservation Strategy.	N	Y	Insuf. Data	N
Service Outages	Outages - Events >8 hours	Number of events that cause water not to be available to any connection for >8 hours	Nil/yr	Nil	No events > 8 hours during 19/20 period	Achieved	NA	Y	Insuf. Data	Y	Y
Water Pressure	Pressure - Point of Supply - On Demand	Water pressure at the point of supply in On Demand and Semi-Restricted schemes, excluding outages, as demonstrated by a reticulation model or audits.	>150kPa for 100% of the time	Complies	Validated by water model, running scheme at target demand and ensuring target pressure is achieved.	Achieved	NA	Y	Y	Y	Y
Scheme Capacity	Scheme Capacity - On Demand	Actual peak capacity of the scheme for domestic use - On Demand	>1150 litres/ allocated unit/ day	Complies	Validated by water model, running scheme at target demand and ensuring	Achieved	NA	Y	Y	Y	Y

Section	Level of Service	2018 – 2021 Performance Measure	2018 – 2021 Target	2020				Previous Results#			
				Result	Commentary	Status	Action to Address	2017	2014	2011	2008
					target pressure is achieved.						
Storage Volume	Storage - On Demand	Volume of available and usable storage for On Demand and Semi-Restricted schemes (dependant on source type)	Source and demand dependent	0.8 hours	Deficiency identified.	Not achieved	Capital project planned in 2021/22 to address.	N	-		
Water Usage	Usage - Average Day	Actual usage on average day	Maintain the average daily water use below 100% of the assessed reasonable water use	59%	Refer to Water Conservation Strategy (200501050668)	Achieved	NA	Y	Y	Y	NA
Water Usage	Usage - Peak Day	Actual usage on Peak Day	Reduce the peak daily usage to below 110% of the assessed reasonable water use	64%	Refer to Water Conservation Strategy (200501050668)	Achieved	NA	Y	Y	N	Y

**Previously the Mandeville and Fernside schemes had separate AMPs, when the schemes were separate. The previous results above are carried through from the Mandeville AMP. For previous Fernside results, past Fernside AMPs should be referred to.*

5.2 Asset Condition

The asset condition for the reticulation has been determined based on criteria set out in the International Infrastructure Management Manual (IIMM), published by the Institute of Public Works Engineering Australasia (IPWEA), combined with updated calculations of base lives for the pipeline asset types.

The IIMM sets out criteria for converting remaining useful life as a percentage to a Condition Grade from 1 (Very Poor) to 5 (Very Good). This is a relatively simple conversion. However the process for determining the base lives, which in turn gives the condition grading is more complex. The details of this process are outlined in the Water Overview AMP. The following expected asset lives have been adopted:

Table 7: Adopted Reticulation Asset Base Lives for Pressure Pipes

Pipe Category and Definition	Calculated Asset Life (years)
PVC Modern (PVC pipe installed post 1997)	100
PVC Old (PVC pipe installed prior to 1997)	60
PE Modern (PE pipe installed post 1990)	100
PE Old (PE pipe installed prior to 1990).	35
AC Small (AC pipe with diameter < 100mm)	55
AC Medium (AC pipe with diameter 100mm to 150mm)	60
AC Large (AC pipe with diameter >= 200mm)	90

Asset Condition Calculation

With the asset base lives calculated as per the process described above, and the condition defined as a function of remaining useful life, the remaining data required to calculate the condition of each asset is the year of installation of the asset. This information is held for each asset within the Council's TechOne asset database. Thus, through a combination of expected asset life, year of installation, remaining useful life of asset, the condition grade for each asset is able to be assigned.

Figure 2 below has been generated using the above process, to show the assessed condition of all the pipe assets on the scheme. Also included within this is the pipe burst data held against each asset.

Figure 3 shows this same information graphically, and also includes headworks assets, and Table 8 presents this information is tabular format.

It is noted that "Headworks" is inclusive of all above ground assets associated with the water supply scheme (e.g. reservoirs, buildings, pump sets). "Reticulation" covers the remainder of the assets, which are typically below ground pipework related assets.

Figure 2: Pipe Condition Assessment Plan

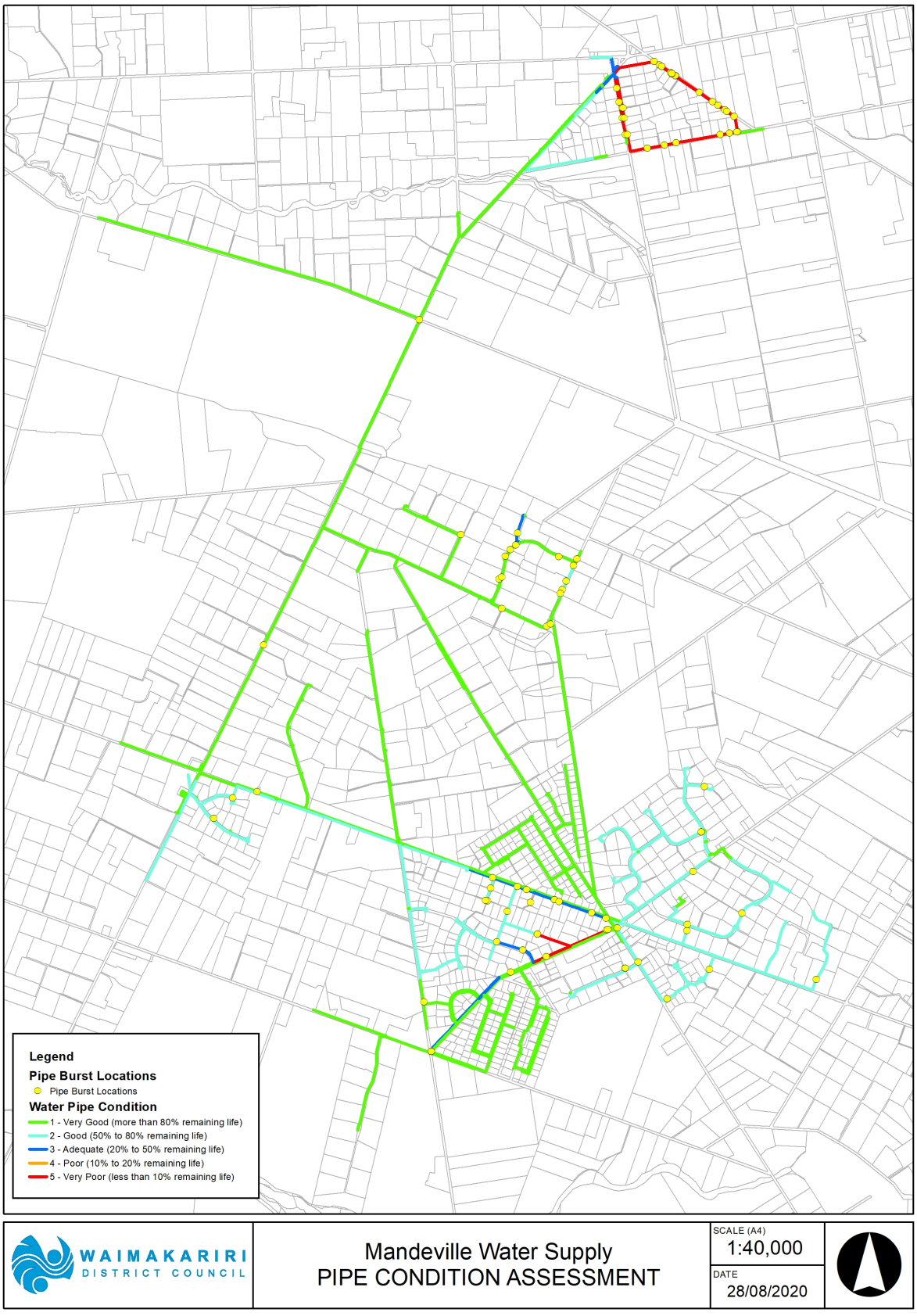


Figure 3: Asset Condition Summary

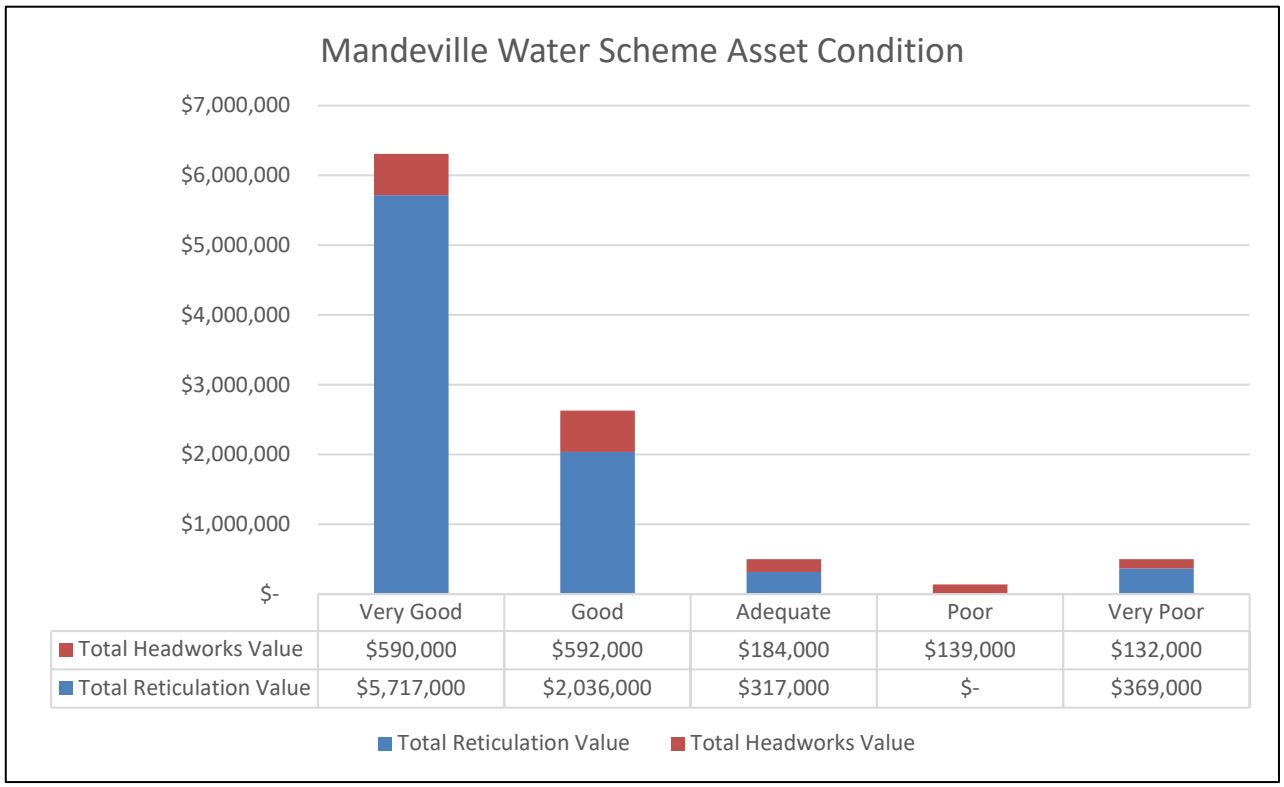


Table 8: Pipe Condition Summary

Condition Grade	Definition	Pipeline Quantity	Total Reticulation Value	Total Headworks Value	Total Value
1	Very Good *More than 80% of life remaining*	50.1 km *62%*	$ 5,717,000 *68%*	$ 590,000 *36%*	$ 6,307,000 *63%*
2	Good *Between 50% and 80% of life remaining*	23.2 km *29%*	$ 2,036,000 *24%*	$ 592,000 *36%*	$ 2,628,000 *26%*
3	Adequate *Between 20% and 50% of life remaining*	3.4 km *4%*	$ 317,000 *4%*	$ 184,000 *11%*	$ 501,000 *5%*
4	Poor *Between 10% and 20% of life remaining*	0.0 km *0%*	$ - *0%*	$ 139,000 *8%*	$ 139,000 *1%*
5	Very Poor *Less than 10% of life remaining*	4.4 km *5%*	$ 369,000 *4%*	$ 132,000 *8%*	$ 501,000 *5%*
Total		**81.1 km**	**$ 8,439,000**	**$ 1,637,000**	**$ 10,076,000**

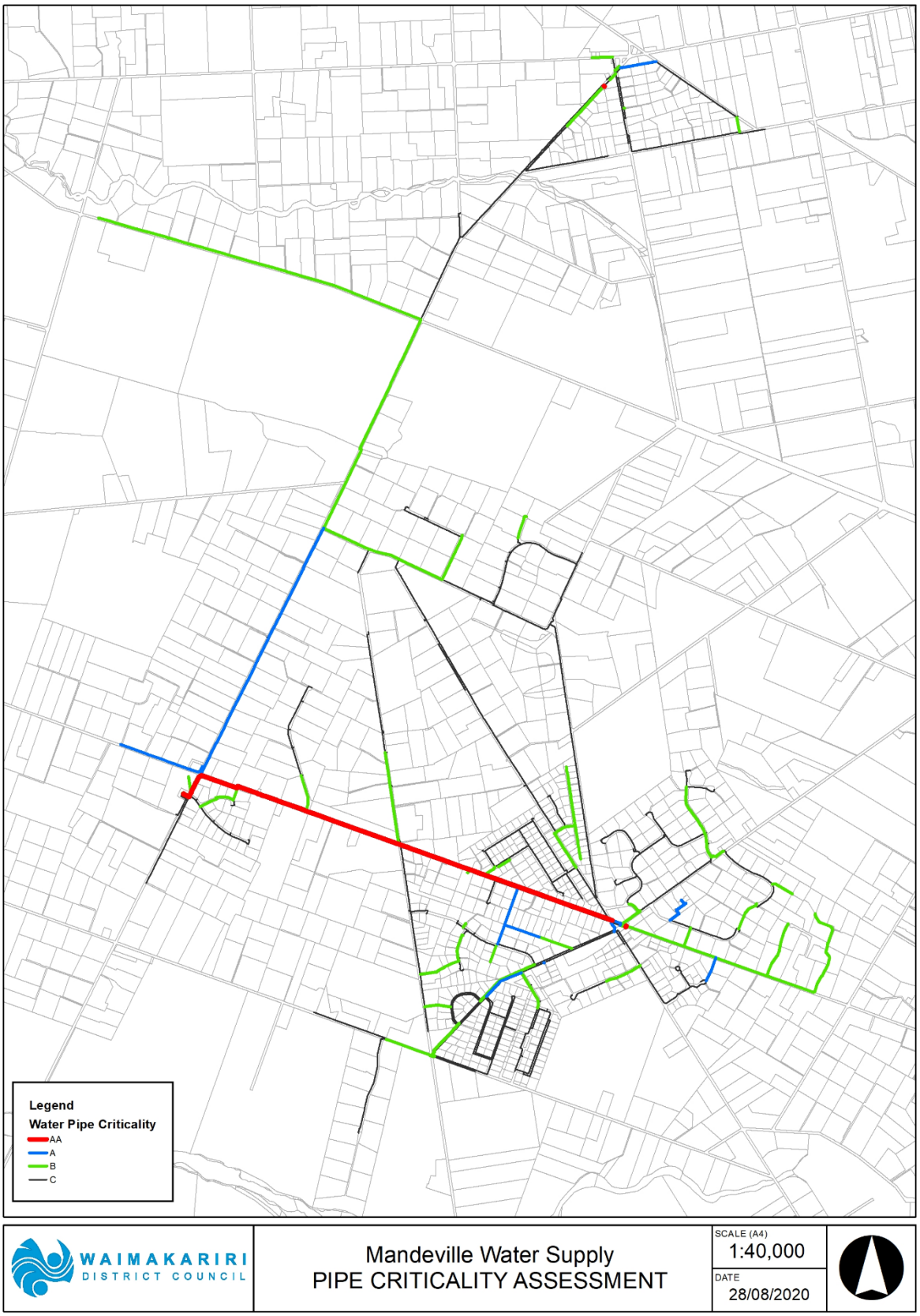
5.3 Asset Criticality

Asset criticality provides an indication of the importance of an individual asset and the corresponding impact on the service delivery should the asset fail for any reason. Criticality is used in risk based investment decisions to help decide when an asset should be replaced to avoid the consequences of failure. The Council has developed an assessment process which scores assets from most critical 'AA' to least critical 'C'. Further details of the criticality assessment methodology is covered in the WS Overview AMP.

The pipe criticality scoring process has been significantly improved through automation and dynamic links to GIS data layers for this AMP.

Figure 4 provides a spatial view of asset criticality for the scheme.

Figure 4: Pipe and Facilities Criticality



5.4 Risk Assessment

An Operational Risk Assessment was first undertaken for the Mandeville-Fernside Water Supply Scheme in 2004, and it has been regularly updated since that time. It was last updated for the 2015 AMP review. Reviews have revealed no extreme or high risks for the Mandeville-Fernside water supply scheme.

The District Wide Overview details the risk events considered and includes a summary of the risk assessment results for all the water supply schemes and is useful in indicating overall water supply network priorities.

Table 9 below shows a summary of the number of events at each level of risk for the Mandeville-Fernside water supply scheme.

Table 9: Number of Events per Level of Risk

Risk Level	2004	2008	2011	2014
Extreme risks	0	0	0	0
High risks	0	0	0	0
Moderate risks	17	15	16	15
Low risks	26	31	34	35
Not applicable	12	9	8	8
Total	55	55	58	58

There are no high or extreme risks for this scheme.

District wide, moderate risks are being deferred until extreme and high risks have been addressed.

5.5 Water Safety Plan

Mandeville-Fernside has an approved Water Safety Plan (WSP). This provides a summary of how the scheme is operated, undertakes a risk assessment for the scheme, identifies preventative measures, and recommends any upgrades to address unacceptable risks. Under the Health Act, these are required to be renewed every 5 years. The Mandeville-Fernside WSP was last approved in 2018, which means it will be due for renewal next in 2023.

Budgetary requirements arising from the plan are incorporated into the draft LTP.

When the Water Services Bill comes into effect, which is expected to be in mid-2021, the requirement for WSPs to be produced will be transferred from the Health Act to the Water Services Bill. The plans will then be submitted to Taumata Arowai, rather than the current Drinking-water Assessors which operate under the Ministry of Health.

5.6 Disaster Resilience Assessment

The 2009 Disaster Resilience Assessment (DRA) is a desk top study that primarily considered the risks to above ground structures presented by natural hazard events to above ground assets across all Council operated 3 Waters schemes. The original assessment was updated in 2012 using revised hazard and asset behaviour information captured during the 2010-11 Canterbury earthquake sequence.

Risk from earthquake events that could induce liquefaction, on brittle pipes (AC and earthenware) is managed using a reticulation vulnerability score. This is used as an input to the risk based renewals assessment.

Above Ground Facilities

The above ground facilities were assessed for risk of failure against 13 natural and 2 manmade hazard scenarios. The following risk profile (Table 10) reflects the likelihood of the event occurring and the consequence on the community of the facility failing. Hazards classified as having 'No Known Risk' have been omitted from the table.

Table 10: Risks to Above Ground Facilities

Threat	Tram Rd Headworks	Two Chain Rd Headworks
100 yr Local Flooding	L	L
475 yr Earthquake Induced Slope Hazard	L	L
Earthquake (50 yr)	M	L
Earthquake (150 yr)	L	L
Earthquake (475 yr)	L	L
Wildfire (threat based)	L	M
Snow (150 yr)	L	L
Wind (150 yr)	L	L
Lightning (100 yr)	L	L
Pandemic (50 yr)	M	M
Terrorism (100 yr)	L	M
E = Extreme, H = High, M = Moderate, L = Low		

The scheme is located outside the zone of potential liquefaction thereby reducing possible impact and asset damage from an earthquake event.

The low earthquake resilience of the Tram Road Headworks as a wooden framed colour steel clad structure has resulted in a moderate earthquake risk.

The wildfire and terrorism risk to the Two Chain Road Headworks is considered sufficient to warrant further investigations to increase resilience.

The Councils response to these risks is being managed at a district level via the DRA Action Plan and related projects. Refer to the District level AMP for details. Since there is some overlap of the DRA and Operational Risk Assessment, a review and integration of the risk assessment methodologies is planned, prior to risk assessments next being carried out.

5.7 Growth Projections

Situation

The Mandeville-Fernside water supply scheme is projected to experience steady growth for a considerable period. This will involve extensions to the existing supply areas to service residential lot sizes ranging from 1 to 4 ha, and also as infill converting rural lots to smaller rural residential lots. In 2017 the Fernside and Mandeville schemes were joined.

The overall district population growth scenario used for the 2021 AMP update was supplied by Council's Development Planning Unit, broken into towns and rural areas. Water supply growth projections were calculated using the New Projections for LTP 2021-2031 (TRIM 200908117997), which was the basis for infrastructure planning.

Due to issues that have occurred with the Census 2018, the population projections that would normally be used as a basis for updating the work previously developed by the Council's Development Planning Unit have not been released by Stats NZ in time for the development of this assessment.

However, based on the historical growth patterns of new dwelling Building Consents over the last three years (636 in 2017/18, 661 in 2018/19 and 615 in 2019/20), the projections used for the previous LTP/infrastructure strategy remain valid to be used for infrastructure planning. As the timeframe for this infrastructure planning is for the thirty years between 2021 to 2051, the previous population projections have been extended out a further three years, as documented in New Projections for LTP 2021-2031 (TRIM200908117997)

It is important to provide a brief comment on COVID19 and the impact it could have on population projections. At the time of writing this paragraph (August 2020), New Zealand is currently in Level 3 restrictions in Auckland and Level 2 restrictions in the remainder of the country. While international migration is currently low arising from the COVID19 travel restrictions, a significant number of New Zealanders are returning home due to the impact of COVID19 on overseas countries. This has contributed to a high level of population growth nationally over the last six months, which has had a flow on effect to growth in the Greater Christchurch and Waimakariri Districts. How long this might continue for and when international migration (from other countries) might return to pre COVID levels is still to be determined. However the existing population projections remained the most appropriate to use for infrastructure planning at this time.

Demand

Demand on the Mandeville-Fernside water supply scheme is expected to increase by 17%, by the end of the 2021-31 Long Term Plan (LTP) period.

This projection is based on 161 new dwellings and connections being established from 2019/20 to 2030/31, identified in the 2020 50 Year Water and Sewer Growth Forecast Report (TRIM reference number 200224024348).

The number of restricted connections will be increased by an average of 15 per year during the 2021-31 LTP period to accommodate this demand. Demand beyond the 2021-31 LTP period (to 2070/71) is forecast to transition to a slightly lower growth profile resulting in an average of 11 new connections per year (Table 11).

Table 11: Growth Projections

Mandeville-Fernside	Rates Strike July 2019	Years 1 - 3	Years 4 - 10	Years 11 - 20	Years 21 - 30	Years 31 - 50
	2019/20	2021/22 to 2023/24	2024/25 to 2030/31	2031/32 to 2040/41	2041-42 to 2050/51	2051/52 to 2070/71
Projected Connections	952	1,019	1,113	1,241	1,352	1,552
Projected Rating Units	2,012	2,146	2,334	2,589	2,812	3,213
Projected increase in Connections		7%	17%	30%	42%	63%
Projected Average Daily Flow (m3/day)	1,319	1,407	1,529	1,694	1,839	2,100
Projected Peak Daily Flow (m3/day)	1,801	1,956	2,171	2,465	2,721	3,182

Note that the time frames have been chosen to reflect the periods 3, 10, 20 and 30 years from the AMP release date, however due to the time it takes to complete the analysis the base rates strike data used was from 2019/20.

Longer term, connections are projected to increase by 63%. This long term projection is similar to the 2017 growth projection, 67% (used for the 2017 AMP). Both projections utilised the best data and information available to project the connections for the water schemes at the time. The base population projections given to PDU for 2019 infrastructure planning were more area specific than the 2017 projections (separating the Mandeville area into residential and rural), and has given a better projection for the Mandeville-Fernside scheme.

Water use predictions for the Mandeville-Fernside water supply scheme have been based on the standard assumption used when modelling the future water demands within the water distribution models, average and peak daily water use per day of 1,000 litres and 2,500 litres respectively (including losses).

Projections

Figure 5 and Figure 6 present the projected growth and corresponding demand trends for the Mandeville-Fernside-Fernside Water Supply Scheme.

Figure 5: Population Projections

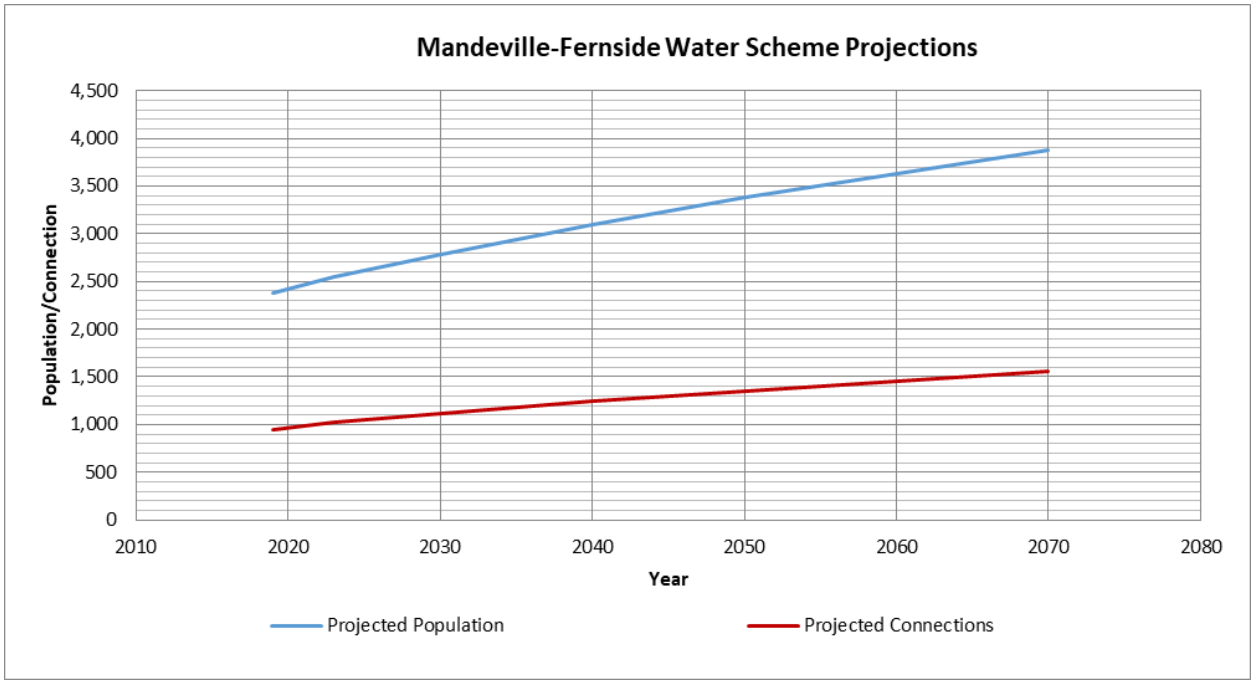
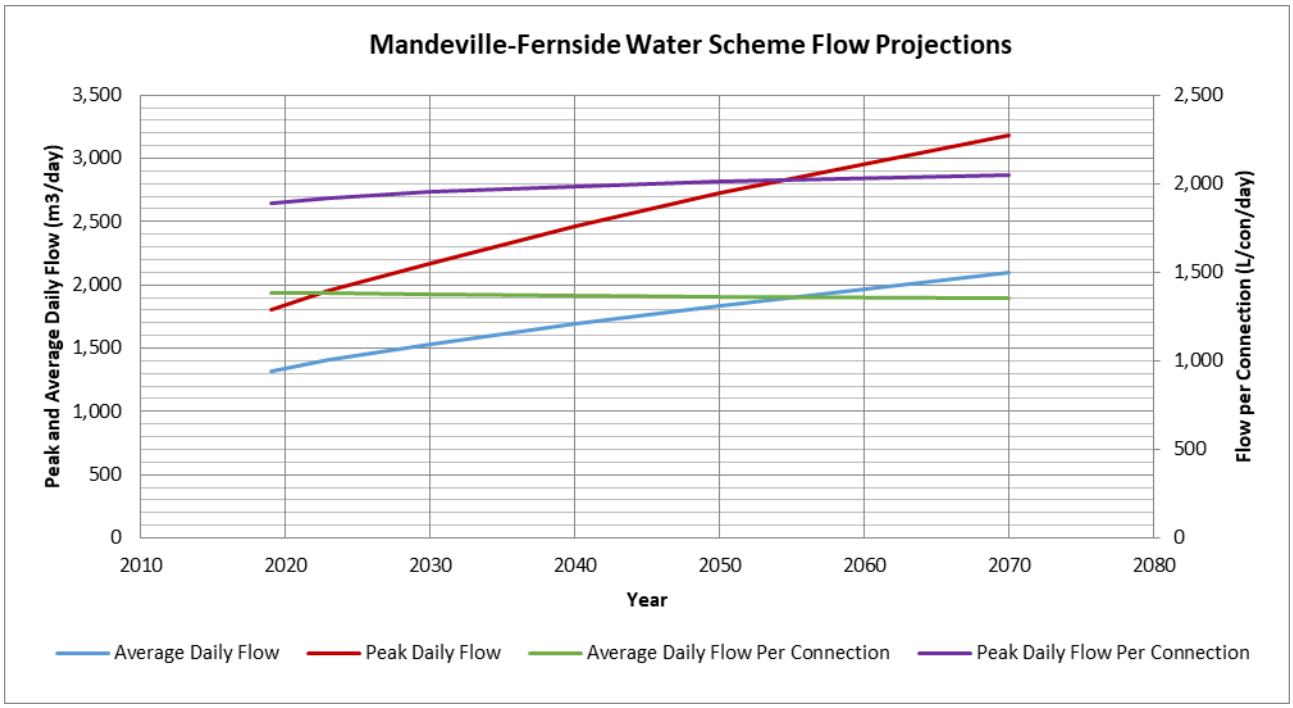


Figure 6: Flow Projections



5.8 Capacity & Performance

This section of the AMP considers the capacity and performance of the Mandeville-Fernside Water Supply, both given the current demand, and also taking into account the forecast growth. The specific aspects of the scheme that have been considered are the source, treatment, storage, headworks, and reticulation system. These are discussed in more detail in the following sub-

sections. All of the upgrades mentioned in the following sections necessary to maintain capacity for growth have been included in the Long Term Plan budgets.

Source

The Mandeville-Fernside Water Supply Scheme draws water from the following sources (Table 12).

Table 12: Scheme Sources

Well name	Well No.	Diameter (mm)	Depth (m)
Two Chain Road No. 1	M35/9021	300	106.8
Two Chain Road No. 2	M35/18638	300	77
Tram Road	M35/5585	200	22.6

The resource consent (CRC990952.1) conditions for the Two Chain Road Well No. 1 and Well No.2 limit the allowable abstraction to 1,103,760 cubic metres per year (or 3,024 m3 per day) at a maximum rate of 35.0 L/s.

The Two Chain Road No. 2 well is the primary source with a pump capacity of about 25 L/s. This is a measured flow based on flowmeter readings. This well yielded 26 l/s in the drawdown test.

Two Chain Road Well No. 1 has a reduced capacity after the earthquakes. While the well can achieve a stable yield of approximately 6 L/s, it has elevated turbidity upon start-up, and can make it challenging to achieve compliance of the UV system. For this reason, this source is now considered a backup. When / if it is used, it is required to be manually run to waste for an extended period of time, then left running permanently in order for turbidity to be stable.

A shallow emergency backup well is also available at the old Tram Road Headworks. The Tram Road well pump has a capacity of 8 L/s or 690 cubic metres per day. Resource consent limits the extraction rate to 10 L/s and can be used for 30 days per year.

Council plans capacity for its water supplies on the basis that one of the primary wells is out of operation at any given time. This concept was used in deciding when source capacity upgrades would be required. This ensures that each scheme has an acceptable level of redundancy. A source upgrade is scheduled in the LTP period to meet redundancy requirements, as currently there is only one primary well, with no redundancy other than to utilise non-compliant backup wells.

The following table presents the projected water demand and associated required source capacity for the Mandeville-Fernside supply (Table 13). To calculate the required source capacity, a contingency is introduced through assuming 10% down time, which increases required source capacity above the Peak Daily Flow.

Table 13: Project Demand and Required Capacity for Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Projected Peak Daily Flow (L/s)	27	35	38	41	44
Required Source Capacity (L/s)	30	39	42	46	49

There is sufficient capacity to meet the current demand. However source upgrades have been scheduled in years 2024/25 (for an additional 35L/s) and 2033/34 (for an additional 25L/s) to meet predicted growth demands and improve redundancy.

Treatment

During 2014/15 the design and installation of a UV disinfection unit for the Two Chain Road well no. 2 (principal source) was undertaken. This was implemented in the 2016/17 financial year and has meant that the scheme is now fully compliant with the bacterial and protozoal requirements of the DWSNZ. The system is reliant on stable turbidity and UV transmittance (UVT) with the source water. This is something that is required to be monitored and managed on an ongoing basis to ensure that compliance is maintained.

Chlorine disinfection has been maintained to ensure residual disinfection where the water enters private tanks, as well as provide an additional barrier to contamination.

The source water also requires pH correction through dosing with caustic soda. The scheme was experiencing high costs of frequent delivery of caustic soda to site, as well as posing some health and safety issues to staff, with the system for storing the chemical on site. For this reason a bulk storage system with a dedicated and isolated fill point was constructed in the 2016/17 financial year.

The original Tram Road headworks back-up supply does not provide secure groundwater. On the rare occasions when this backup water source is used, it is treated with chlorine to meet the bacterial requirements of the Drinking Water Standards. However the existing treatment system at the Tram Road headworks provides no protection against protozoan contaminants. This is the same case as for the old Fernside well which provides additional redundancy in the event of a failure at the primary headworks. Therefore, as these sources as not fully compliant with the DWSNZ, they are considered emergency backups only.

Certain water supplies have a risk of being plumbosolvent. The definition of plumbosolvent water is water that is able to dissolve lead easily. Water that has low pH and alkalinity tends to be slightly corrosive and therefore plumbosolvent. The Council complies with the requirements of the Drinking Water Standards for plumbosolvency by advertising twice per year advising customers to flush the first 500 mls of water before taking water for drinking purposes. Adverts are district wide and do not distinguish between water supplies. The pH correction of the water at Mandeville also lowers the risk of plumbosolvency.

Storage

The Mandeville-Fernside water supply scheme has a total storage capacity of 98 cubic metres made up from four 25 cubic metre tanks at the Two Chain Road headworks.

Emergency storage requirements for Mandeville-Fernside are 4.94 hours of Average Daily Flow, based on a 2020 update of the work carried out in the Water Supply Source Resilience Analysis (170623064893).

Table 14 presents the required storage capacity.

Table 14: Required Storage Capacity for Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Required Storage Volume (m3)	463	301	326	350	377
Planned Storage Volume (m3)	120	500	500	500	500

A new 500m^3 reservoir is scheduled for construction in 2021/22 to replace the existing four 30m^3 reservoirs. This will be built to meet storage requirements (emergency storage requirements) for the existing scheme, and beyond the next 50 year period. It is noted that the addition of a second primary well within the first 10 years lowers the ongoing storage requirements, as it increases the resilience and redundancy of the headworks infrastructure.

Headworks

The existing Mandeville-Fernside Two Chain Road headworks consists of three supply pumps connected to VSD's (variable speed drives). The pumps operate as duty-assist-assist. Two pumps of the pumps have a capacity of 9L/s each and the third has a capacity of 8.3L/s. For redundancy it is assumed that one of the main pumps is unavailable, therefore the total assessed capacity is currently 17.3L/s.

Table 15 presents the projected peak hourly flows for the Mandeville-Fernside supply and includes the flows from the Fernside scheme.

Table 15: Projected Peak Hourly Flows for Surface Pumps in Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Expected Peak Hourly Flow (L/s)	26.7	31.4	34.0	36.5	39.2

Partial fire flows are achieved on Tram Road & McHughs Road.

For redundancy, a surface pump upgrade is scheduled for 2021/22. This work would increase the headworks capacity to 31L/s (including redundancy), with 4 pumps operating duty-assist-assist-standby. There is also an additional upgrade scheduled in year 2030/31 to upgrade the remaining 9L/s pumps to 13L/s pumps (total capacity, including redundancy, of 39L/s).

Reticulation

The capacity of the water supply headworks and reticulation has been assessed using an uncalibrated but verified reticulation model. The model and associated monitoring has confirmed that the existing reticulation system has adequate capacity for the existing and future demands. However, substantial reticulation extensions will be required over the next 50 years to accommodate future growth into the larger supply area.

6 Future Works & Financial Projections (What Do We Need To Do?)

This section covers the future works required to meet the target levels of service, maintain the asset in an acceptable condition, reduce the risks to an acceptable level and accommodate growth.

Financial forecasts do not include inflation

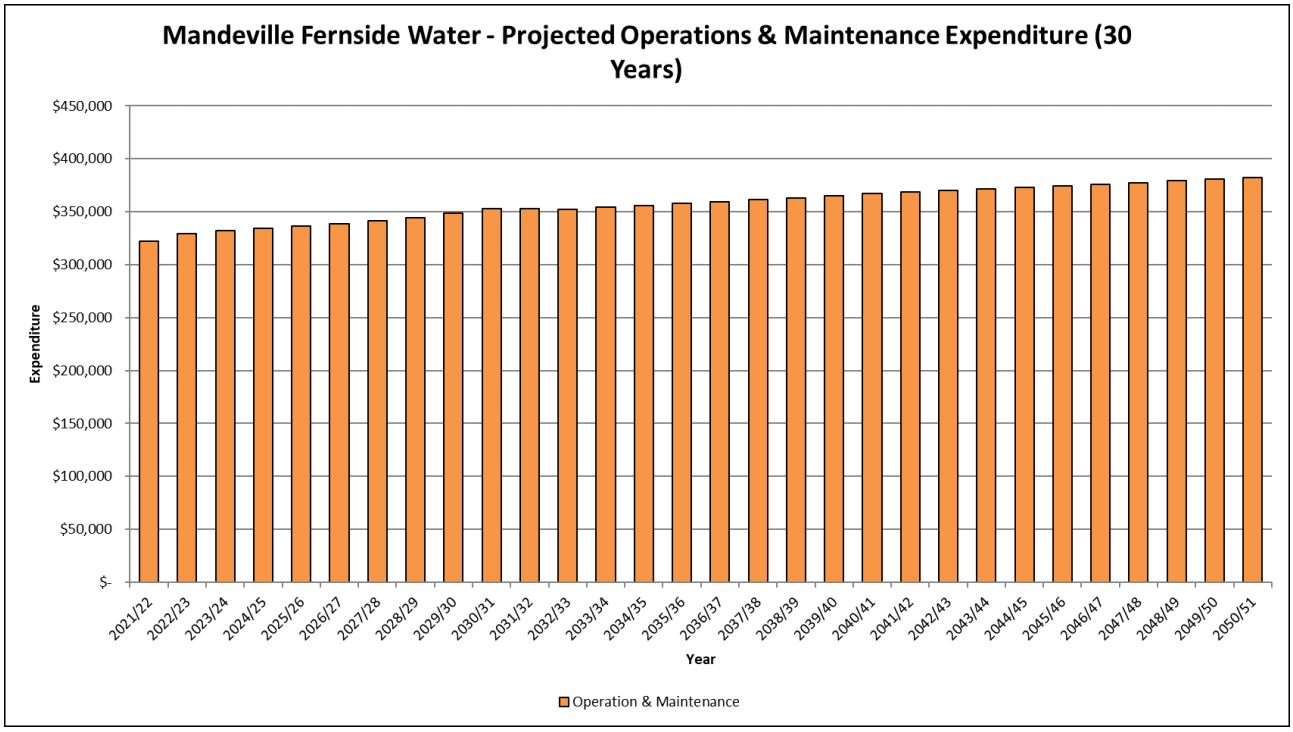
6.1 Operation & Maintenance

Operation and maintenance (O&M) expenditure incorporates the day to day running of the water supply network and allows the system to carry on functioning to deliver the agreed levels of service.

The O&M programme includes a combination of reactive and planned tasks. Examples of the differing nature of these tasks is summarised within the Overview document.

O&M budgets are set based on a combination of past expenditure (for reactive tasks), cost estimates for planned works, and adjustments going forward to account for growth, inflation, depreciation and any significant new works planned. Further detail of this process is provided in the Overview document. The end result of this is shown in Figure 7. There are no known deferred maintenance items

Figure 7: Annual Water Operation & Maintenance 30-Year Budget



6.2 Renewals Programme

A renewals model is used to generate renewal timeframes for each reticulation asset on each scheme. This model takes into account the remaining life from the asset condition data, and the criticality of each asset, and recommends an acceptable renewals window for each pipe. More information on the model is provided in the overview document.

Renewal of pipework assets are then programmed on an annual basis, taking into account the outputs from the renewals model, but also being informed by other works that may be planned in the area, as well as local burst history for the cases where a particular asset may be performing differently than its base life suggests.

The outputs from the renewals model are summarised in Figure 8 below, with category bands depicting how soon renewal is required of each asset. This data is available to staff for analysis on the Council's GIS mapping system (Waimap).

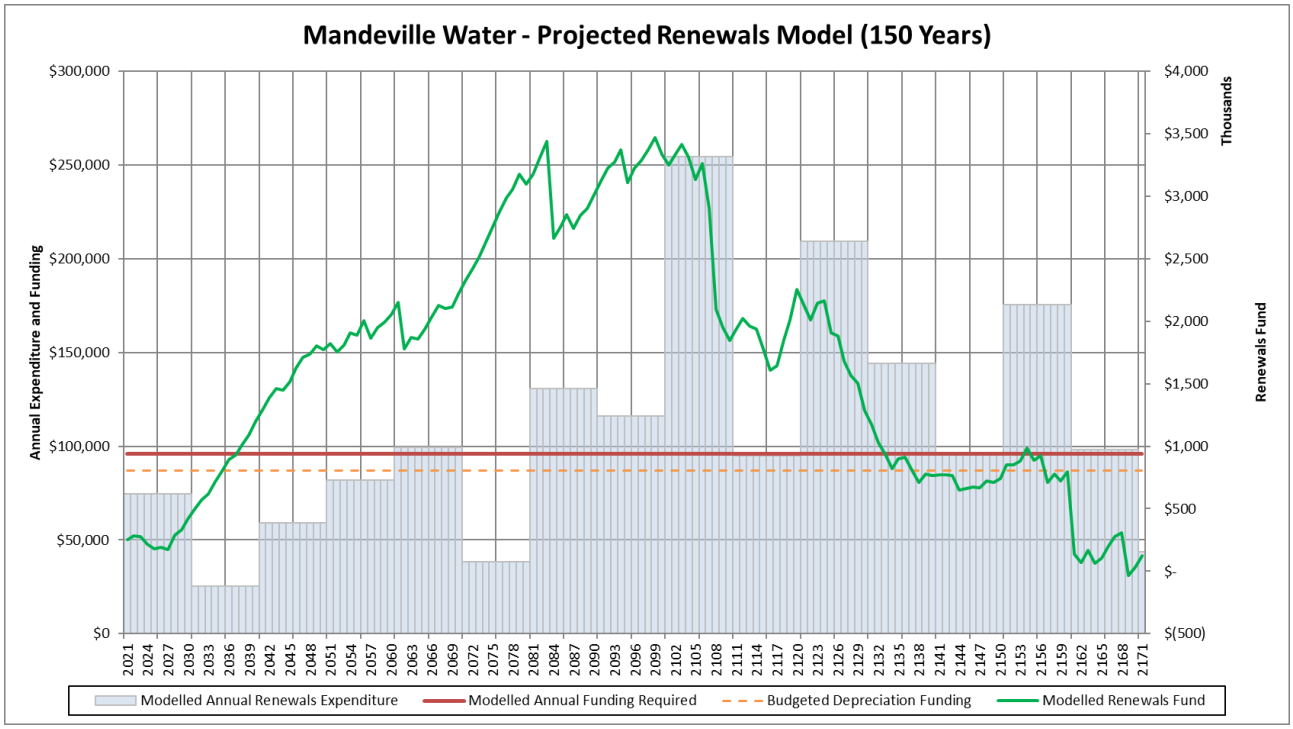
The first ten years of the programme are based on the above assessments by the Asset Manager, but from year 11 forward expenditure is taken directly from the model.

Figure 8: Pipe Renewal Time Frames

Figure 9 below shows the financial output from the model alone. Over a 150 year period it shows the projected expenditure; the value in the renewals fund; the level of funding required to ensure the fund can meet the required renewals programme, and the annual depreciation.

The figure only shows the output from the model, so expenditure shown in the graph for the first ten years may be different from the expenditure shown in the LTP, as adjustments may have been made by the Asset Manager from the direct renewals model outputs. Individual scheme AMPs detail the actual planned renewals budgets for the first ten years.

Figure 9: Annual Water Renewals 150-Year Budget



The key parameters in the figure above are explained below:

- **Modelled Annual Renewals Expenditure:** This is the direct output from the renewals model, recommending the annual investment to be made in renewals each year.
- **Modelled Annual Funding Required:** This is the amount of annual renewals funding required, to ensure there are sufficient funds available to carry out the recommended annual renewals each year.
- **Budgeted Depreciation Funding:** This is the actual amount of depreciation being collected, which is extracted from the Council's budgets.
- **Modelled Renewals Fund:** This is the modelled balance in the renewals account, assuming the annual funding and annual expenditure is completed as per the recommendations from the renewals model.

The key point to note is that the Budgeted Depreciation Funding is slightly less than the Modelled Annual Funding Required. The reason for this discrepancy is twofold:

- **Depreciation Discount Factor:** Council's financing of future renewals incorporates the expectation that depreciation funding can be invested at a higher rate of return over the life

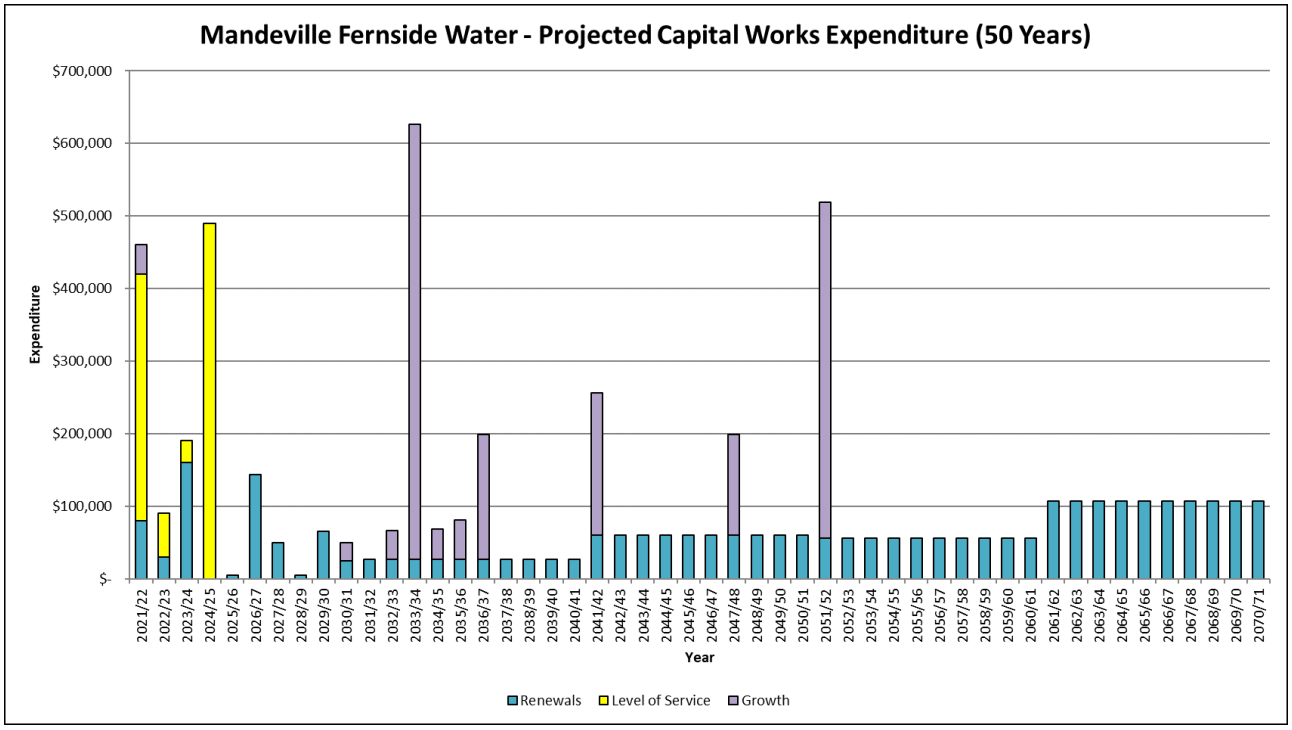
of the assets than the rate of inflation. Further information regarding this approach is provided in the Finance Policy. This concept is embodied in the scheme budgets in the form of a discount rate (referred to in the budgets as the 'Depreciation Discount Factor'). This reduces the annual depreciation funding required from rates, while still ensuring that there will be sufficient funding available to renew assets at the end of their useful life. The renewals model takes a simpler and more conservative approach to the way this effect is calculated, which accounts for some of the difference shown in Figure 9.

Improvement in Asset Base Lives: The second, and more significant, factor explaining this difference particular to this LTP, is a consequence of recent analysis work carried out on the base lives of all water pressure pipe (refer 200508053285 for a record of this analysis, or refer to the Asset Condition section). A significant difference from the previous base lives to the updated ones is that the previous 100 year life for old PVC (defined as pre-1997 installation) pipe, should be reduced to 60 years. This reduced life for this particular pipe class increases the depreciation rate, and therefore increases the annual renewals funding required for schemes with a high proportion of old PVC mains. The analysis was undertaken after asset lives were finalised for the three yearly valuation update, so the updated depreciation rates from the pipe burst analysis work were not able to be incorporated into the 2020 valuation work. However they have been incorporated into the renewals model, which is the primary cause of the difference shown in Figure 9. This will be self-correcting at the next LTP, as a common life for old PVC pipes will be used for both the valuation and the renewals modelling work. Going forward this improved understanding of the expected base lives of pressure pipes will ensure that the required amount of depreciation funding is allowed for.

6.3 Capital Works

The following graph shows the 50 year budget for new work derived from growth and levels of service (Figure 10). Renewals expenditure showing in the first ten years of the graph, includes the actual planned programme, not the model output. District funded projects are not shown.

Figure 10: Projected Capital works Expenditure



The significant expenditure showing in 2021/22 is for planned new storage capacity to meet WDC storage standards, and the 2024/25 spike is for an additional well to provide redundancy in case of a primary well outage

Table 16 summarises the projected capital works for the next 50 years. Including renewals. An additional row has been added below the grand total to show the project funded by the district wide rates for UV installation. Figure 11 shows the corresponding location of the projected capital works, including the district wide funded project.

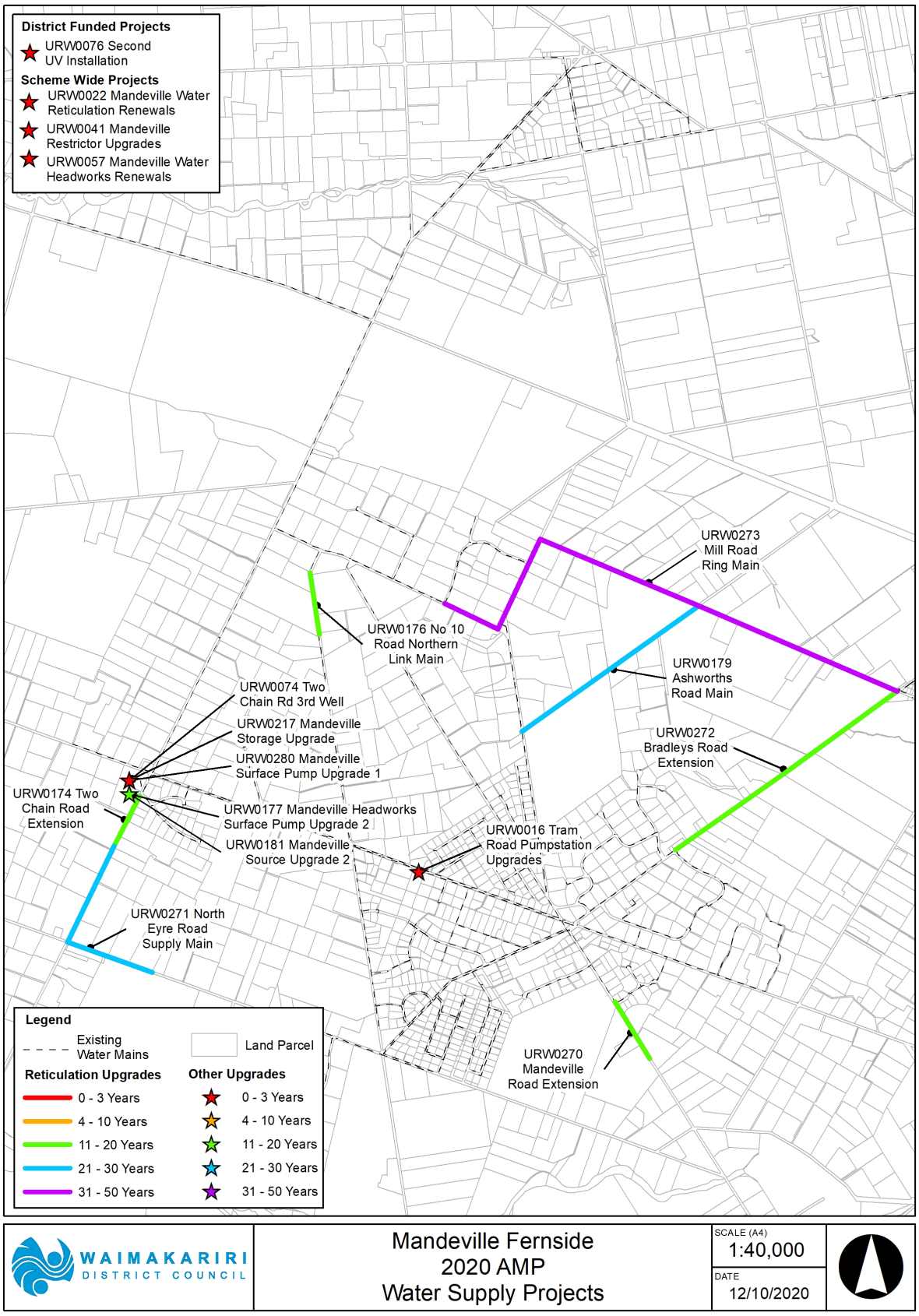
The level of confidence in the budget for the works (High / Medium / Low) is presented in the table. For a more complete discussion on the level of optimisation, refer to the introductory chapter of the AMP. The figures in the table are not adjusted for inflation.

Any programme or project that occurs over a number of years, such as the renewals programme, is only shown within the table for the first year in which it occurs. The Project Value indicates the projected full total cost of the project over the number of years it occurs.

Table 16: Summary of Capital Works (Includes Renewals)

Year	Project ID	Project Name	Level of Confidence	Project Value	LOS Component	Renewals Component	Growth Component
Year 1 - 10							
2022	**URW0022**	Mandeville Water Reticulation Renewals	**3 - Low**	**$ 1,380,014**	**$ -**	**$ 1,380,014**	**$ -**
2022	**URW0041**	Mandeville Restrictor Upgrades	**5 - Medium**	**$ 120,000**	**$ 120,000**	**$ -**	**$ -**
2022	**URW0217**	Mandeville Storage Upgrade	**5 - Medium**	**$ 280,000**	**$ 280,000**	**$ -**	**$ -**
2022	**URW0280**	Mandeville Surface Pump Upgrade 1	**3 - Low**	**$ 50,000**	**$ -**	**$ 10,000**	**$ 40,000**
2023	**URW0016**	Tram Road Pumpstation electrical upgrades	**5 - Medium**	**$ 20,000**	**$ -**	**$ 20,000**	**$ -**
2023	**URW0057**	Mandeville Water Headworks Renewals	**3 - Low**	**$ 1,611,262**	**$ -**	**$ 1,611,262**	**$ -**
2024	**URW0074**	Two Chain Rd 3rd Well	**3 - Low**	**$ 520,000**	**$ 520,000**	**$ -**	**$ -**
2031	**URW0177**	Mandeville Headworks Surface Pump Upgrade 2	**3 - Low**	**$ 50,000**	**$ -**	**$ 25,000**	**$ 25,000**
Year 11 - 20							
2033	**URW0176**	No 10 Road Northern Link Main	**3 - Low**	**$ 40,000**	**$ -**	**$ -**	**$ 40,000**
2034	**URW0181**	Mandeville Source Upgrade 2	**3 - Low**	**$ 600,000**	**$ -**	**$ -**	**$ 600,000**
2035	**URW0270**	Mandeville Road Extension	**3 - Low**	**$ 42,000**	**$ -**	**$ -**	**$ 42,000**
2036	**URW0174**	Two Chain Road Extension	**3 - Low**	**$ 55,000**	**$ -**	**$ -**	**$ 55,000**
Year 21 - 30							
2042	**URW0271**	North Eyre Road Supply Main	**3 - Low**	**$ 197,000**	**$ -**	**$ -**	**$ 197,000**
2048	**URW0179**	Ashworths Road Main	**3 - Low**	**$ 139,000**	**$ -**	**$ -**	**$ 139,000**
Year 31 - 50							
2037	**URW0272**	Bradleys Road Extension	**3 - Low**	**$ 172,000**	**$ -**	**$ -**	**$ 172,000**
2052	**URW0273**	Mill Road Ring Main	**3 - Low**	**$ 463,000**	**$ -**	**$ -**	**$ 463,000**
Grand Total				**$ 5,739,276**	**$ 920,000**	**$ 3,046,276**	**$ 1,773,000**
2022	**URW0076**	**Second UV Unit (funded from district wide rates)**	**3- Low**	**$ 75,000**	**$ 75,000**		

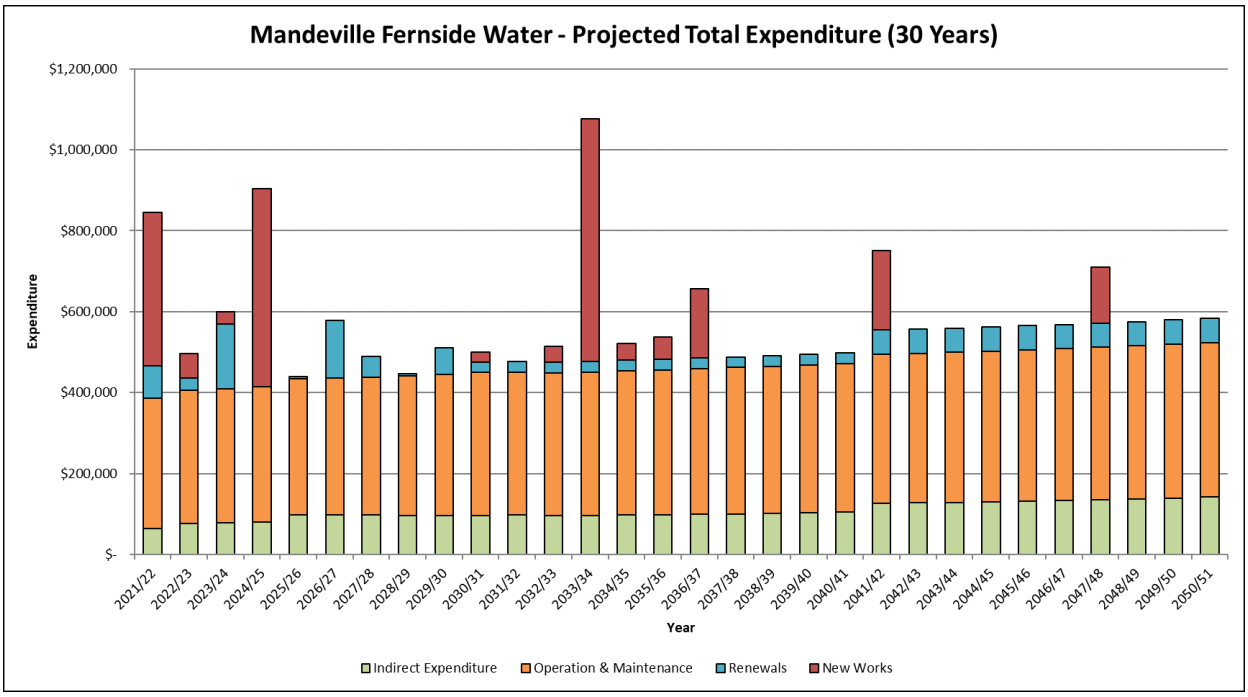
Figure 11: Projected Capital Upgrade Works (not to scale)



6.4 Financial Projections

The following graph summarises the breakdown of projected total expenditure over a 30 year time horizon. It includes both operational and capital expenditure. Operational costs include operations and maintenance, and indirect expenditure. Indirect expenditure includes interest, rating collection costs, costs associated with maintaining the Asset Register, and internal overhead costs. Capital includes expenditure for growth, levels of service and renewals. District wide funded projects are not included

Figure 12: Projected Expenditure



6.5 Valuation

A full peer reviewed valuation of assets is carried out on a three yearly cycle, using the asset data in our asset management information system. Table 17 below provides a summary of the replacement cost, depreciated replacement cost and annual depreciation for this scheme

Table 17: Asset Valuation

Asset Type	Unit	Quantity	Replacement Cost	Depreciated Replacement Cost	Annual Depreciation
Valve	No.	215	$553,907	$475,079	$5,735
Main	m	81,101	$6,828,765	$5,571,138	$73,474
Hydrant	No.	36	$93,145	$85,353	$931
Service Line	Properties	896	$954,448	$768,733	$10,461
Facilities			**$1,637,130**	**$1,062,644**	**$42,929**
Total			**$10,067,395**	**$7,962,947**	**$133,530**

6.6 Revenue Sources

Revenue is provided from two key sources; targeted rates and Development Contributions. Development contributions are calculated in accordance with Council's Development Contributions Policy (TRIM 191129168016), while targeted rates are charged in accordance with Council's Revenue and Financing Policy (TRIM 180522056008).

A further revenue source is the district wide rate that has been set up specifically to fund installation of UV disinfection at all schemes that do not already have it. This scheme already has a UV system, with ongoing operating costs covered by the UV cost centre, rather than the Mandeville-Fernside cost centre.

7 Improvement Plan

7.1 2021 Improvement Plan

Error! Reference source not found. details the scheme specific improvements and relevant district wide improvements recommended to address the management issues identified in Section 3. Each improvement item has been tagged to either a capital project or, a process improvement project to help manage and track Councils response. Short term indicates within the first three years of the LTP, long term, out beyond that timeframe.

If the table is empty, this indicates that all improvements required are either district wide improvements (covered by the Overview AMP), or covered by a capital project or projects, covered in the Capital Works section.

Table 18: 2021 AMP Improvement Plan

Project Ref	AMP Section	Project Description	Priority	Status	Estimated Cost
NA	NA	NA	NA	NA	NA

8 Changes to AMP as a result of Long Term Plan consultation

Some changes to budgets have arisen as a consequence of a staff submission report to Council during LTP hearings 25-26 May (TRIM 210420063358). Projects themselves have not changed, but budgets have been modified as a consequence of detailed designs progressing. The table below provides a summary of the changes to capital budgets for this scheme

Budget Name	Draft 2021-31 LTP (2021/22)	Proposed Revised Budget (2021/22)	Difference	Notes
Mandeville Water Renewals	$ 70,000	$ 90,000	$20,000	Design completed and cost estimate revised
Mandeville Pump Upgrade – Renewal	$ 10,000	$ 20,000	$10,000	Concept design completed and cost estimate revised
Mandeville Pump Upgrade – Growth	$ 40,000	$ 60,000	$20,000	
Mandeville Storage Upgrade (Partially Growth)	$ 280,000	$ 500,000	$220,000	Early concept design completed and cost estimate revised.

APPENDIX 'A'. PLANS

Figure 13: A1 - Plan of Serviced Area – Fernside

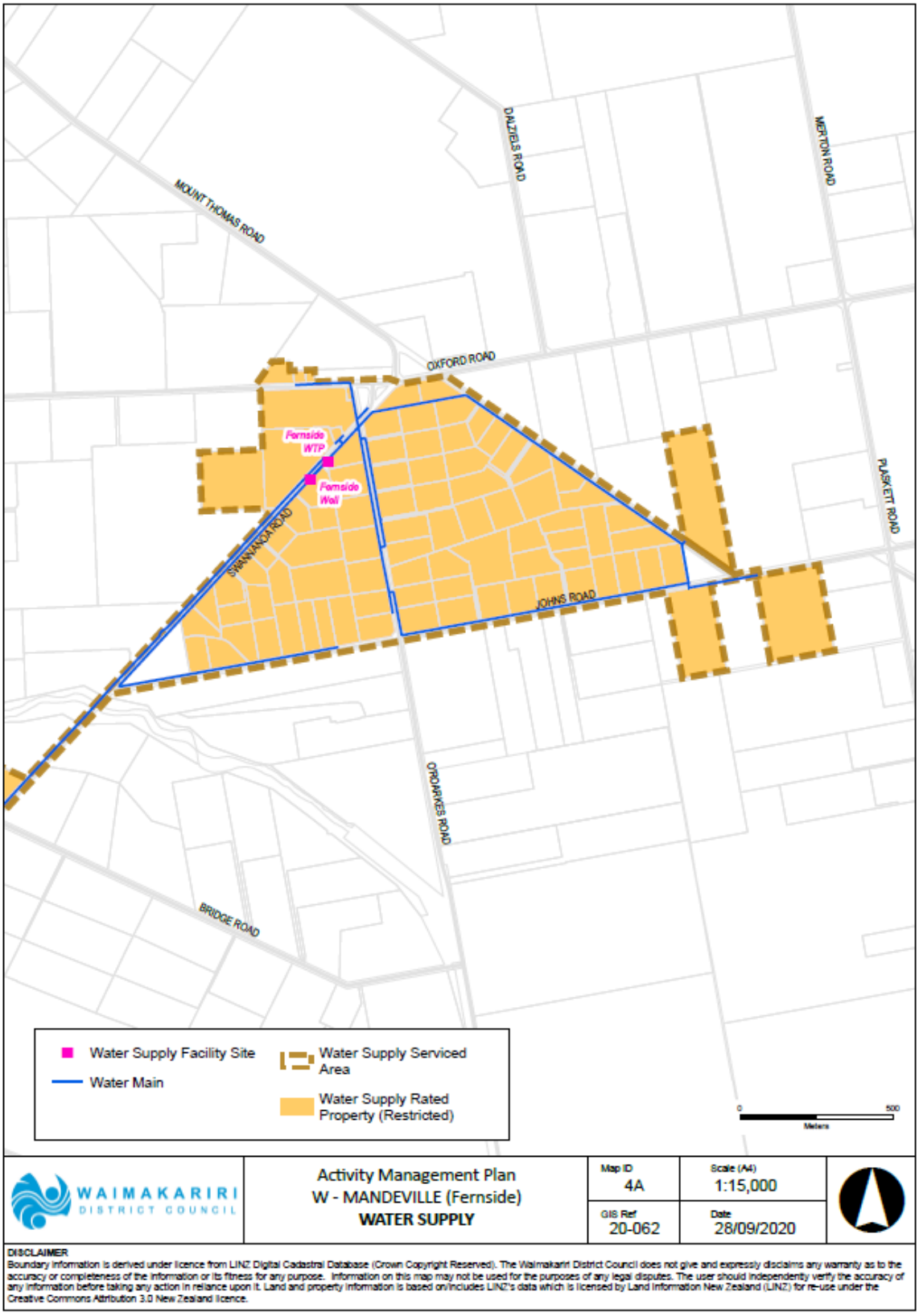


Figure 14: A1 - Plan of Serviced area – Mandeville

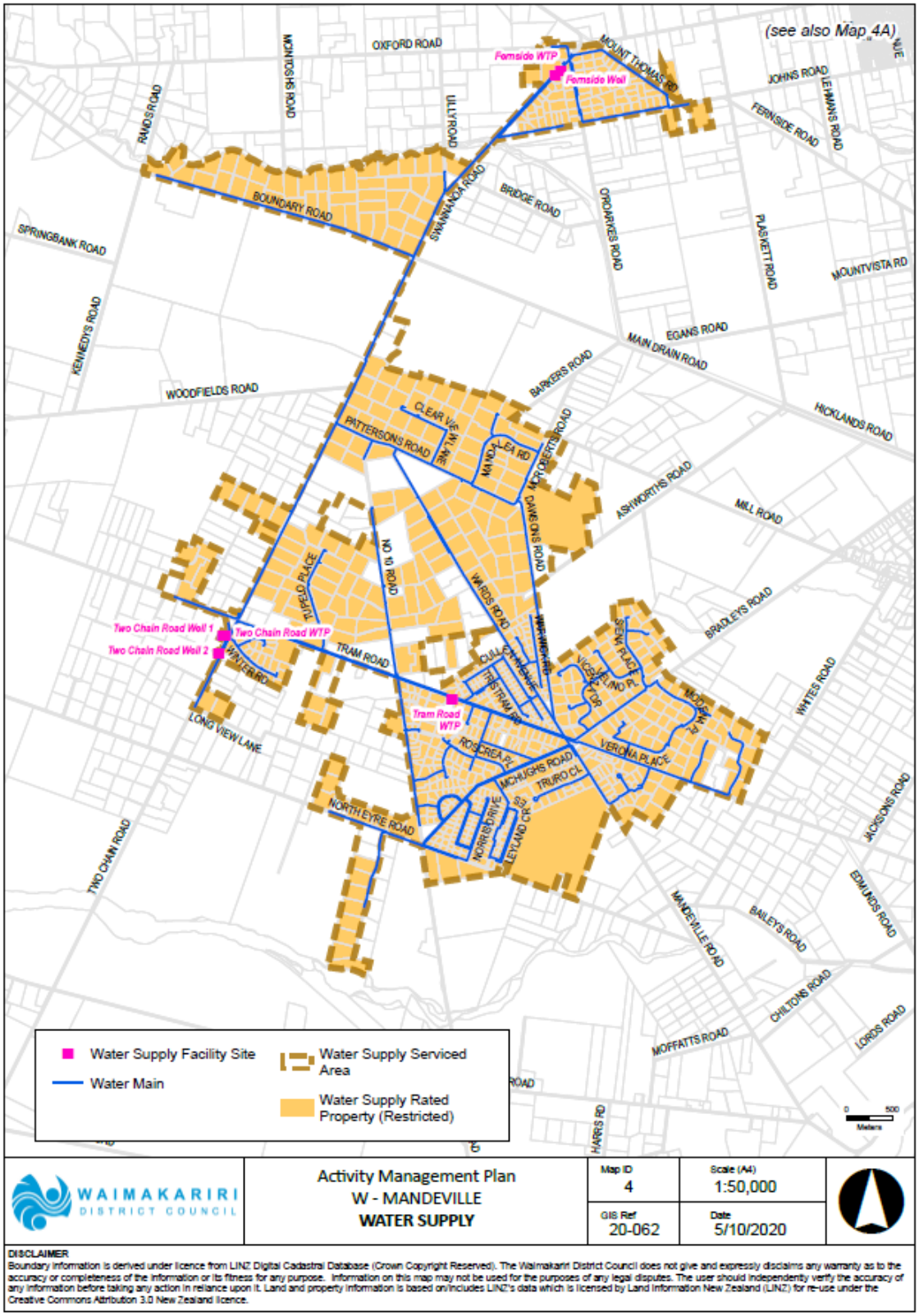
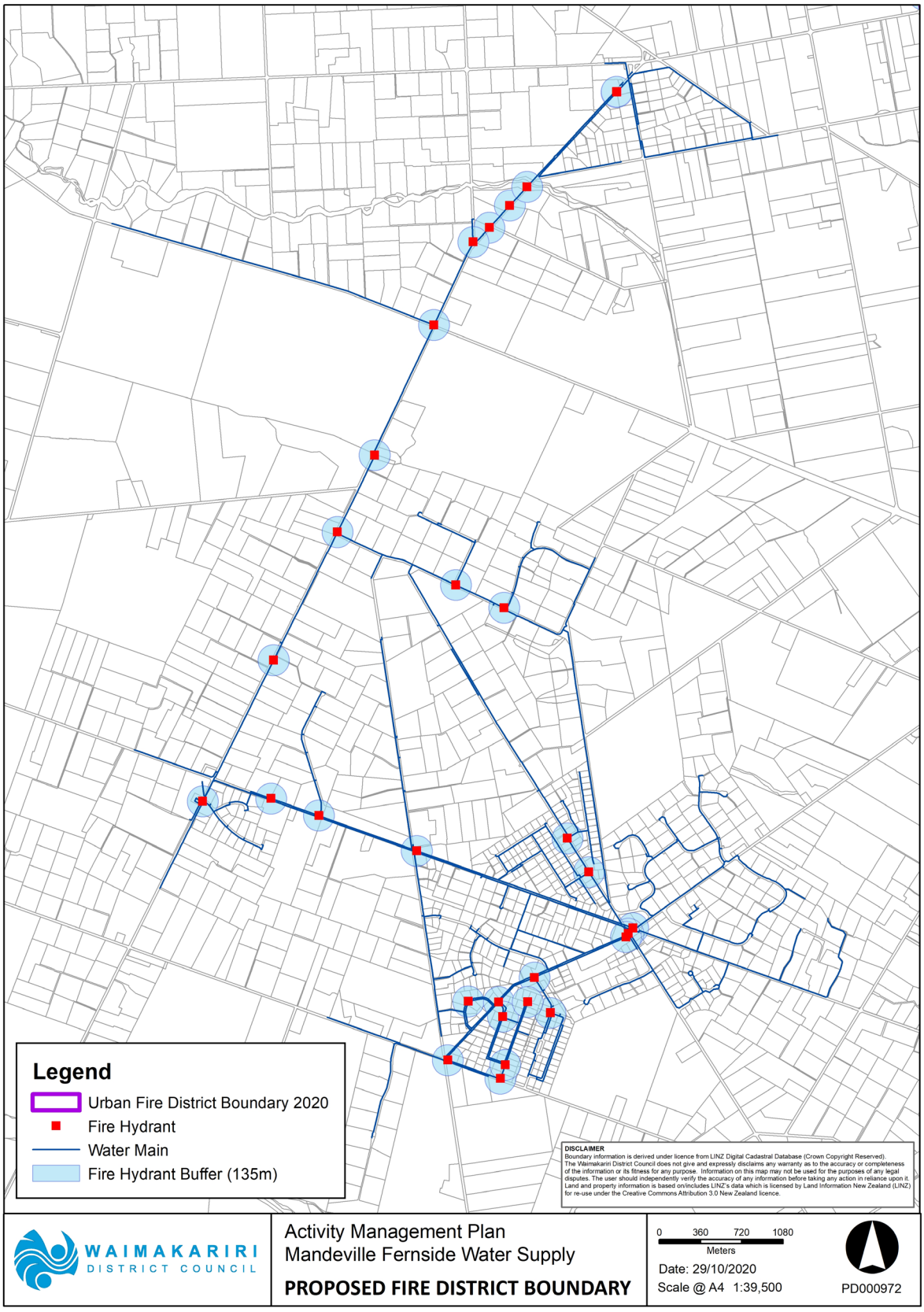


Figure 15: A2 - Plan of Fire District & Extent of Fire Mains



The Mandeville-Fernside Water Supply is not included in a Fire District but a plan of hydrants is provided for reference.

Figure 16: Mandeville Water Supply Statistics

Mandeville Historic Water Supply Statistics

Mandeville Historic | 19/20 | Last Update Jun-20

Note that shading indicates the relative quantity measured for the ten year period (i.e. the lowest value has no shading, the highest has complete shading.)

		July '09 - June '10	July '10 - June '11	July '11 - June '12	July '12 - June '13	July '13 - June '14	July '14 - June '15	July '15 - June '16	July '16 - June '17	July '17 - June '18	July '18 - June '19	July '19 - June '20	5 yr Average	10 yr Average
Nightly Flow	L/s	-	-	-	-	-	-	-	-	8.40	9.30	-	8.85	8.85
Average Daily Flow	m^3/day	559	555	585	653	750	1,001	1,047	1,140	1,129	1,196	1,341	1,171	940
Peak Daily Flow	m^3/day	892	799	809	1,015	1,183	1,542	1,512	1,650	1,731	1,641	1,728	1,652	1,361
Peak Weekly Flow	m^3/day	794	752	765	929	1,081	1,360	1,412	1,472	1,647	1,579	1,697	1,561	1,269
Peak Monthly Flow	m^3/day	736	696	715	871	1,011	1,335	1,294	1,463	1,492	1,500	1,600	1,470	1,198
Peak Hourly Flow	L/s	-	-	-	-	-	-	-	-	25.9	-	-	25.9	25.9
Peak Month		Feb	Dec	Jan	Feb	Feb	Jan	Dec	Feb	Dec	Feb	Jan		
Peak Week		Week 53	Week 49	Week 4	Week 3	Week 6	Week 2	Week 49	Week 8	Week 50	Week 7	Week 5		
Peak Day		25/12/2009	3/12/2010	22/01/2012	28/11/2012	4/02/2014	19/01/2015	28/11/2015	5/03/2017	10/12/2017	10/02/2019	25/01/2020		
Peaking Factor		1.6	1.4	1.4	1.6	1.6	1.5	1.4	1.4	1.5	1.4	1.3		
Total Annual Volume	m^3	205,068	203,582	214,611	239,546	275,422	367,189	384,163	418,550	414,228	439,039	492,131	429,622	344,846
Resource Consent	m^3/day	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024
Well Pump Capacity	m^3/day	2,678	2,678	2,678	2,678	2,678	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,367
Surface Pump Capacity	m^3/day	1,434	1,434	1,434	1,434	1,434	2,938	2,938	2,938	2,938	2,938	2,938	2,938	2,336
On-Demand Connections		-	-	-	-	-	-	-	-	-	-	-		
Restricted Connections		534	534	556	572	734	745	810	841	841	866	879		
Total Connections		534	534	556	572	734	745	810	841	841	866	879		
Average Daily Demand	L/con/day	1,046	1,040	1,052	1,141	1,022	1,343	1,292	1,356	1,342	1,381	1,526	1,379	1,250
Peak Daily Demand	L/con/day	1,670	1,497	1,455	1,775	1,612	2,070	1,867	1,962	2,058	1,895	1,966	1,950	1,816
Allocated Water Units	m^3/day	1,082	1,081	1,098	1,458	1,491	1,517	1,686	1,744	1,746	1,815	1,848		
Average Daily Flow per Unit	L/unit/day	516	513	533	448	503	660	621	654	646	659	726	661	596
Peak Daily Flow per Unit	L/unit/day	824	739	737	696	793	1,017	897	946	991	904	935	935	866
On-Demand Rating Charges		-	-	-	-	-	-	-	-	-	-	-		
Restricted Rating Charges		-	-	-	-	-	-	-	-	-	-	-		
Total Rating Charges		-	-	-	-	-	-	-	-	-	-	-		
Data Quality		very high	very high	very high	very high	very high	very high	high	very high	very high	very high	very high		

Figure 17: Fernside Water Supply Statistics

Fernside Historic Water Supply Statistics

Fernside Historic | 19/20 | Last Update Jun-20

Note that shading indicates the relative quantity measured for the ten year period (i.e. the lowest value has no shading, the highest has complete shading.)

		July '09 - June '10	July '10 - June '11	July '11 - June '12	July '12 - June '13	July '13 - June '14	July '14 - June '15	July '15 - June '16	July '16 - June '17	July '17 - June '18	July '18 - June '19	July '19 - June '20	5 yr Average	10 yr Average
Nightly Flow	L/s	-	-	-	-	-	-	-	-	1.30	0.90	-	1.10	1.10
Average Daily Flow	m^3/day	121	124	133	136	115	134	133	145	168	123	148	143	136
Peak Daily Flow	m^3/day	177	178	196	177	185	216	182	203	240	169	262	211	201
Peak Weekly Flow	m^3/day	158	160	168	165	155	204	174	196	229	163	254	203	187
Peak Monthly Flow	m^3/day	149	155	160	161	142	187	161	179	219	158	204	184	173
Peak Hourly Flow	L/s	475.2	475.2	475.2	475.2	475.2	-	-	-	-	-	-	-	475.2
Peak Month		Feb	Dec	Jan	Aug	Feb	Feb	Dec	Feb	Nov	Feb	Apr		
Peak Week		Week 48	Week 48	Week 4	Week 36	Week 47	Week 10	Week 49	Week 6	Week 50	Week 8	Week 19		
Peak Day		7/02/2010	7/02/2011	9/06/2012	15/07/2012	18/11/2013	4/03/2015	5/12/2015	6/02/2017	22/11/2017	27/01/2019	2/05/2020		
Peaking Factor		1.5	1.4	1.5	1.3	1.6	1.6	1.4	1.4	1.4	1.4	1.8		
Total Annual Volume	m^3	44,462	45,623	48,861	50,026	42,369	49,347	48,904	53,071	61,813	45,186	54,138	52,622	49,934
Resource Consent	m^3/day	432	432	432	432	432	432	432	432	432	432	432	432	432
Well Pump Capacity	m^3/day	1,555	1,555	1,555	1,555	1,555	389	389	389	389	389	389	389	855
Surface Pump Capacity	m^3/day	631	631	631	631	631	449	449	449	449	449	449	449	522
On-Demand Connections		-	-	-	-	-	-	-	-	-	-	-		
Restricted Connections		85	85	85	85	85	85	85	85	85	85	85		
Total Connections		85	85	85	85	85	85	85	85	85	85	85		
Average Daily Demand	L/con/day	1,425	1,463	1,566	1,604	1,358	1,582	1,568	1,701	1,982	1,448	1,735	1,687	1,601
Peak Daily Demand	L/con/day	2,082	2,094	2,306	2,082	2,179	2,541	2,137	2,388	2,819	1,987	3,078	2,482	2,361
Allocated Water Units	m^3/day	172	176	176	176	178	178	180	180	180	180	180		
Average Daily Flow per Unit	L/unit/day	704	706	756	774	649	755	740	803	936	684	820	797	762
Peak Daily Flow per Unit	L/unit/day	1,029	1,011	1,114	1,006	1,040	1,213	1,009	1,128	1,331	938	1,453	1,172	1,124
On-Demand Rating Charges		-	-	-	-	-	-	-	-	-	-	-		
Restricted Rating Charges		-	-	-	-	-	-	-	-	-	-	-		
Total Rating Charges		-	-	-	-	-	-	-	-	-	-	-		
Data Quality		very high	very high	very high	very high	very high	very high	high	very high	very high	very high	very high		

Appendix B. Waimakariri District Plan Review Memo to rezoning submitters (via Hearing Panel)

WAIMAKARIRI DISTRICT PLAN REVIEW
MEMO TO REZONING SUBMITTERS (VIA HEARING PANEL)

DATE:	12 December 2023
MEMO TO:	Submitters on Proposed District Plan with rezoning requests & Hearings Panel
FROM:	Waimakariri District Council Hearing Stream 12 s42A Reporting Officers
SUBJECT:	PDP rezoning request process and information requirements

1. In Council's memorandum to the Hearings Panel dated 18 August 2023 in response to Minute 5 (Variation 1 and Rezonings), Council's s42A officers proposed to issue a memo with some considerations for submitters prior to the rezoning hearings, including:
    a. Where information can be found on Council's infrastructure planning, including forward planning;
    b. Information on natural hazards; and
    c. Other sources of information that may contain matters relevant to rezonings such as Environment Canterbury's Listed Land Use Register in respect of site contamination matters.[1]

2. The purpose of this memorandum is to assist submitters who have made rezoning requests by providing information that may be useful for their evidence and / or submission to the Hearings Panel in support of their rezoning request.

3. This memo provides a preliminary, general/non-specific, non-exhaustive list of matters that submitters may wish to address as part of their evidence and / or submission to the Hearings Panel in support of a rezone request.

4. Submitters should seek their own legal, planning and / or technical advice regarding their submissions seeking rezoning and the evidence to be submitted and / or presented to the Hearings Panel in support of their submission.

Enquiries

5. Council is able to answer general enquiries about the hearings process and procedures. Enquiries of this nature should be emailed to districtplanhearing@wmk.govt.nz All other enquiries specific to the content of specific submissions should be emailed to developmentplanning@wmk.govt.nz

Background

6. The PDP set out a proposed zoning framework that was informed by Section 32 evaluation reports that were undertaken prior to notification[2].

7. A number of submissions were lodged on the PDP seeking that land be rezoned.

[1] See paragraph 17.
[2] https://www.waimakariri.govt.nz/council/district-development/district-plan-review/district-plan-review-documents

8. The Hearing Procedures in Minute 1 set out the timetable for technical evidence for rezoning submissions[3]. In summary, the Hearings Panel directed that submissions seeking substantial rezonings (whether upzoning or down zoning) to provide any technical evidence that they wish to have considered by Council in preparing their s42A reports by no later than 60 working days before the rezoning hearings. Council has subsequently recommended that all rezonings be heard within Hearing Stream 12[4].

9. Various memoranda to the Hearings Panel, and Minutes have been issued by the Hearings Panel, relevant to rezoning requests.[5]

10. For some submitters, Council Officers anticipate that the technical information required to support their rezoning proposals may be extensive and include expert assessments on a range of matters that could include such things as transport, urban design, landscape (including rural character), natural features (including wetlands and springs), geotechnical stability, natural hazards, soil contamination, three waters infrastructure including flood hazard issues, and an assessment of the proposal against the relevant regional and district council policy documents, amongst others.

11. Following the receipt of submitters' technical evidence, Council Officers will also prepare s42A reports which will address the submissions seeking rezonings. Section 42A reports are prepared in accordance with the requirements of the RMA and provide the Council officers' assessment and recommendations in relation to submissions to assist the Hearings Panel. The Hearings Panel may choose to accept or reject the conclusions and recommendations made in a s42A report and may come to different conclusions or make different recommendations, based on the information and evidence before them.

12. Council Officers have grouped rezoning requests by the zoning requested in the submissions, (e.g., a submission seeking a property to be rezoned from Rural Lifestyle Zone to General Residential Zone would be considered in the 'Residential rezonings requests' group). As noted above, a number of rezoning requests have been made. To provide context, the following webmap (public viewer) shows the indicative rezoning requests received via submissions. Note that some rezone requests were not able to be shown on this map due to their broad, or very refined, nature.

13. The map can be accessed here:
https://www.waimakariri.govt.nz/council/district-development/proposed-district-plan-hearings/hearing-streams/hearing-stream-12

14. All rezoning requests, except two submissions and one further submission in relation to The Pegasus Resort Zone that are being addressed in Hearing Stream 10, are being heard in Hearing Stream 12[6] which is scheduled to commence on approximately 27 May 2024. Technical evidence from submitters is required to be lodged 60 working days before the commencement of the hearing.

[3] Paragraph 74 and 75
[4] Excepting where set out in paragraph 13 below
[5] See for example, Minute 5, Memorandum to the Panel dated 18 August 2023; Minute 9 and Minute 10.
[6] As confirmed in Minute 9 at paragraph 18.

15. Where technical evidence is provided in advance in accordance with the Hearings Panel's directions, the Hearings Panel requested Council review the evidence and advise the submitter of the completeness and adequacy of that evidence in a timely manner, so the submitter has the opportunity to provide further information as necessary. Noting the timing and procedural constraints within the hearings process, this Council Officer review of evidence is likely to be limited to a high-level review of information provided and comment on any potential missing information based on those Officers' experience in receiving and processing development proposals. The purpose of this approach is primarily to assist the Hearings Panel by potentially narrowing issues prior to the hearing of submissions. It is reiterated that the Officers consider that in the first instance that submitters are responsible for progressing their individual rezoning requests.

Information and matters to consider

16. The remainder of this memo provides links to documents or information about matters that submitters may wish to address in their technical evidence and/or evidence and legal submissions to the Hearings Panel in support of their submission seeking rezoning. As noted above, the below are general matters and not intended to be exhaustive or comprehensive. The evidence required to support a rezoning request is a matter for submitters and ultimately the Hearings Panel to determine.

Rural character

17. Rural character is an important consideration for rezoning requests relating to the General Rural Zone and Rural Lifestyle Zone in particular. The following reports informed the PDP rural zoning framework:
    - Rural Character Assessment Report: https://www.waimakariri.govt.nz/__data/assets/pdf_file/0020/136109/24.-RURAL-S32-REPORT-DPR-2021..pdf
    - Rural s32 Report: https://www.waimakariri.govt.nz/__data/assets/pdf_file/0020/136109/24.-RURAL-S32-REPORT-DPR-2021..pdf
    - Rural boundary outline for District Plan Review memo: https://www.waimakariri.govt.nz/__data/assets/pdf_file/0022/136165/Rural-Boundary-Outline-for-District-Plan-Review-DPR-REVISION.pdf

National Policy Statements (NPS) & National Environmental Standards (NES) in force

18. A number of NPS and NES are in force and some may be relevant to rezoning requests, such as the following:
    - NPS on Urban Development (NPS-UD);
    - NPS for Highly Productive Land (NPS-HPL);
    - NPS for Freshwater (NPS-FM);
    - NPS for Indigenous Biodiversity (NPSIB);
    - NES for Freshwater;
    - NES for Assessing and Managing Contaminants in Soil to Protect Human Health; and
    - NES for Sources of Drinking Water.

19. The above documents can be found on the Ministry for the Environment's website or the NZ legislation page.

Canterbury Regional Policy Statement (RPS)

20. The RPS contains objectives and policies relating to the sustainable management of Canterbury's natural and physical resources. The District Plan must give effect to the RPS (as per s75(3) of the RMA). Accordingly, submitters should consider and address the RPS in their evidence and/or legal submissions in support of their rezoning requests. Below is a list of some key provisions and requirements from the RPS. The list is not exhaustive, and submitters should consider whether there are any other relevant provisions / issues to address.

21. The following chapters are of particular relevance to development in either whole or part of the District:

- Chapter 5 (Land-Use and Infrastructure) sets out a framework for growth which applies to the entire Canterbury Region (some provisions exclude the Greater Christchurch area);
- Chapter 6 (Recovery and Rebuilding of Greater Christchurch) sets out the high-level considerations for development within Greater Christchurch (defined on Map A of the CRPS); and
- Chapter 11 (Natural Hazards) sets out a framework for managing natural hazard risk.

Outline Development Plans (ODPs)

22. Land can only be rezoned where an ODP exists in accordance with the RPS. The RPS[7] has a range of requirements relating to ODPs, that we consider include:

- Policy 6.3.3 – requires development within greenfield areas and rural residential areas to be in accordance with an ODP and sets out the requirements for ODPs, including density considerations; and
- Policy 6.3.9 – restricts new areas of rural residential development to only occur within areas identified in a Rural Residential Development Strategy.

23. The PDP contains ODPs for existing development areas and new development areas (refer to Part 3 – Area specific matters > Wāhanga waihanga - Development Areas of PDP[8]) and as notified, requires development to be in accordance with these.

24. However, ODPs do not exist for all land sought by submissions to be rezoned. If there is no ODP for land sought to be rezoned, submitters should prepare an ODP.

25. Policy SUB-P6 of the PDP also outlines the proposed criteria for ODPs. Council Officers suggest consideration be given to this proposed policy and the relevant RPS policies in preparing an ODP (noting that submissions that relate to SUB-P6 are to be heard in Hearing

[7] https://www.ecan.govt.nz/your-region/plans-strategies-and-bylaws/canterbury-regional-policy-statement/
[8] https://waimakariri.isoplan.co.nz/draft/rules/0/232/0/0/0/226

Stream 8).

Other particularly relevant documents

Rural Residential Development Strategy 2019 (RRDS)

26. The RRDS identifies general growth directions for rural residential development across the whole Waimakariri District to meet projected demand.

27. RPS Policy 6.3.9 requires that new areas of rural residential development located within the Greater Christchurch area may only occur within areas identified in a Rural Residential Development Strategy.

28. Council's RRDS can be found here:

https://www.waimakariri.govt.nz/council/district-development/rural-residential-development

2013 Iwi Management Plan (IMP)

29. The IMP provides a values-based policy framework for the protection and enhancement of Ngāi Tahu values, and for achieving outcomes that provide for the relationship of Ngāi Tahu with natural resources. It can be found here:
https://www.mahaanuikurataiao.co.nz/iwi-management-plan/

2018 Waimakariri District Development Strategy (DDS)

30. The Waimakariri District Council DDS Our is a high-level strategic document intended to provide a framework to guide development in the district over the next 30 years. It focuses on several aspects of development including our towns, rural areas, business areas, community facilities and our natural environment. It can be found here:

https://www.waimakariri.govt.nz/__data/assets/pdf_file/0018/132822/180525057771-District-Development-Strategy-DDS-2018-FINAL-Web.pdf

Waimakariri Residential Capacity and Demand Model – IPI 2023 Report

https://www.waimakariri.govt.nz/council/district-development/proposed-district-plan-hearings/hearing-streams/hearing-stream-12

31. This report summarises the Waimakariri Capacity for Growth Model 2022. It outlines the approach adopted in the residential components to the model, the assumptions used within the modelling, including demand (location, typology, etc) and capacity (plan enabled, feasibility, etc), and specific outputs for urban environments within Waimakariri (Rangiora, Kaiapoi, and Woodend/Pegasus) for the residential components of the model.

32. It is noted that this report does not consider capacity that may or may not be provided through the PDP review process.

Waimakariri District Business Land Assessment update 2021

https://www.waimakariri.govt.nz/__data/assets/pdf_file/0022/136147/28.-Formative-WDC-business-land-assessment-update-district-plan-review-0921.PDF

33. This report outlines the capacity of the Commercial and Mixed Use Zones and Industrial Zones in the PDP to provide for the needs of growth, and provides an update to findings of the Waimakariri District Business Land Assessment[1] from 2019 findings.

34. These reports have been provided to assist submitters in understanding the notified PDP response to development capacity.

Contaminated land information

35. Environment Canterbury maintains a Listed Land Use Register (LLUR) database of sites where hazardous activities and industries have been, or are likely to have been, located throughout Canterbury.

36. The LLUR is not exhaustive, and submitters may wish to obtain a site-specific preliminary site investigation and/or a detailed site investigation. For further information, refer to:

    https://environment.govt.nz/publications/contaminated-land-management-guidelines-no-1-reporting-on-contaminated-sites-in-new-zealand/

    https://environment.govt.nz/publications/contaminated-land-management-guidelines-no-5-site-investigation-and-analysis-of-soils/

    https://llur.ecan.govt.nz/home

Engineering related information

37. Council Development Manager Ms Jennifer McSloy has prepared a memo, provided in **Appendix A**, that outlines engineering information and Council's requirements for developments.

Archaeological sites

38. Submitters may need to be aware of their obligations in relation to archaeological sites under the Heritage New Zealand Pouhere Taonga Act 2014.

39. 'Archsite' maintains a database of recorded archaeological sites and can be accessed here:

    https://nzaa-archsite.hub.arcgis.com/

40. Canterbury Maps also stores archaeological information:

    https://opendata.canterburymaps.govt.nz/datasets/d47cab3c8b114308af29a4ddfac1d94c/about

[1] https://www.waimakariri.govt.nz/__data/assets/pdf_file/0021/136146/27.-Market-Economics-Waimakariri-District-Growth-Business-Property-Report-0619.PDF

Appendix A – Engineering information and Council's requirements for developments

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO AND TRIM NO:	DDS-14-05-12 / 231017164998
DATE:	12 December 2023
MEMO TO:	Rezone request s42A Officers
FROM:	Jennifer McSloy (Development Manager – Project Delivery Unit – Waimakariri District Council)
SUBJECT:	Proposed District Plan Stream 12 - Engineering matters for consideration

Introduction

1. In my role as Development Manager, I lead the team of engineers that provide advice to the Plan Implementation Unit during the processing of resource consent applications. I have been asked to consider what engineering related information requirements may be relevant when considering rezoning submissions on the district plan, from an engineering perspective.

2. The memo is intended to provide an outline of typical engineering matters and requirements which submitters may wish to consider addressing in their rezoning submission(s). This is intended as general guidance based on the experience of Council in processing development applications and is not a complete list of all matters which may be of relevance to all sites.

3. This memo also provides information on Council requirements in relation to infrastructure and design matters to assist submitters. I note that Council requirements at different stages of the development process do not necessarily directly equate to matters that are relevant to consideration of zoning outcomes.

4. Similar to our role assisting with the assessment of engineering matters in resource consent applications, Council staff will assist the s42A Report Officers with review of the engineering matters relevant to rezoning submissions.

5. As also highlighted in the accompanying memo, I consider Council staff's role in reviewing engineering information is not to act as a peer reviewer of technical information. I consider that the onus for providing sufficient information to support a rezoning submission lies with the submitter and their consultants. This is something a submitter needs to assess.

6. Council s42A reporting officers will provide recommendations to the hearing panel commissioners on rezoning applications, including their expert opinion on the evidence provided by the submitter in support of the rezoning request.

7. As a general statement, Council staff are able to share network information e.g., where capacity constraints are known to exist, but will not undertake submission specific modelling or investigations to identify solutions. This work needs to be done by the submitter and their consultant(s). Council staff can provide model inputs and reports which have already been produced as part of our network and growth planning, where available. This memo provides links to Council's website, available reports, and further details on how to find information and who to ask at Council.

8. This memo outlines typical requirements for:
   - Three Waters Servicing;
   - Hazards;
   - Finished Floor Levels;
   - Greenspace Level of Service Requirements, and
   - Transport.

9. This memo is not intended to be expert advice. It is intended to provide information to assist submitters in preparing evidence for the proposed district plan hearings and understanding the information and/or requirements Council has for development in the District.

Useful Links

10. Three waters networks can be viewed online here:

    https://waimakariri.maps.arcgis.com/apps/webappviewer/index.html?id=2d2eed5205ce4def9ee635548628d4a7

11. The "all flooding 200 year" hazard map (note that there are separate layers for Localised Flood Depth, Ashley Breakout Flood Depth and Coastal Hazard Flood Depth that can be interrogated), liquefaction, fault, tsunami and coastal erosion layers can be viewed here:

    https://waimakariri.maps.arcgis.com/apps/MapSeries/index.html?appid=16d97d92a45f4b3081ffa3930b534553

12. The urban and non-urban flood overlays included in the Proposed District Plan can be viewed here (select "Proposed Waimakariri District Plan" and then "view map"):

    https://canterburymaps.govt.nz/waimakariri/

13. For capacity in the three waters systems and servicing availability, refer to Activity Management Plans (AMPs) which discuss upcoming projects:

    https://www.waimakariri.govt.nz/council/documents-bylaws-plans/reports

With regards to three waters system capacity:

14. Please review the relevant AMPs first. If after reviewing an AMP it is not clear what the capacity constraints are, submitters can email developmentplanning@wmk.govt.nz for assistance. Please reference the AMP sections already reviewed in the email request so the team can focus on a specific query. Due to the volume of requests, responses may take several working days. To re-iterate, the Council will not be able to undertake additional modelling work to assess the viability of a given rezoning request, however, may be able to provide clarification or outputs of work already undertaken.

Water Servicing

15. Current water scheme boundaries are shown on this map:

    https://www.waimakariri.govt.nz/__data/assets/pdf_file/0022/130297/Water-Schemes-Waimakariri.pdf

16. Refer to the Engineering Code of Practice Part 7, which details the engineering requirements for water supplies:

    https://www.waimakariri.govt.nz/__data/assets/pdf_file/0024/134295/QP-C816-Part-7-Water-Supply-Is4.pdf

17. Refer to the relevant Activity Management Plans (AMPs) for planned projects in the first instance. The current AMPs are those from 2021. Given the complexity and volume of analysis required, Council may not be able to undertake additional modelling work to determine the feasible of individual proposals. However, where modelling does exist, this can be provided as well as any supporting information that is already held that may be of use to submitters.

Rural/Rural Lifestyle

Ashley Rural Water Supply

18. Submitters seeking rezoning outcomes within the general areas of Ashley, Sefton and surrounds are reminded that the Hurunui District Council administers the Ashley Rural Water Supply scheme[9]. A map of this boundary and further information on the process to confirm capacity is available at https://www.hurunui.govt.nz/roading-water/water

Waimakariri Rural Water Supply Schemes

19. Council operates the following rural/rural residential schemes:
    - Oxford Rural No 1 (restricted)
    - Oxford Rural No 2 (restricted), noting this is supplied from the Oxford Urban supply.
    - West Eyreton - Summerhill – Poyntzs Road (restricted, with some historical semi-restricted in Poyntzs Road)
    - Mandeville-Fernside (restricted)
    - Cust (on demand)[10]
    - Ohoka (restricted, with some semi-restricted)
    - Garrymere (restricted, with some historical semi-restricted).

20. **Capacity in the systems:** Generally, the schemes have capacity for some growth around the outer edges of the system, and for infill developments. However, major greenfield developments are generally not anticipated on rural schemes, so submitters should not assume there is capacity available. If there is no capacity available, I consider that submitters are likely to need to consider providing evidence about the ability to service the development in light of the capacity constraints. Check the relevant AMP for further information on a particular scheme.

[9] https://www.hurunui.govt.nz/repository/libraries/id:23wyoavbi17q9ssstcjd/hierarchy/Infrastructure_Services/Three%20Waters/Water%20Scheme%20Pamphlets/Ashley-water-supply-updated.pdf

[10] This is a residential scheme however operates similar to rural/rural residential supply schemes

Urban

21. Council operates the following urban schemes. It is noted that urban schemes are generally on-demand, however, most generally have some restricted connections for either rural lots around the periphery of the urban area, or for larger lots for which an urban on-demand connection is not appropriate:

    - Kaiapoi – Pines Kairaki
    - Woodend – Pegasus - Tuahiwi
    - Waikuku Beach
    - Rangiora
    - Oxford Urban

22. **Capacity in the system:** Generally for infill development within existing urban areas (i.e. brownfield sites), capacity will be available in the system.

23. Council's usual practice is that if an area needs to install its own servicing, the evidence that a new source is achievable should be provided.

24. For large greenfield developments proposed on the edges of existing townships, it is generally unlikely there would be capacity in any system to support significant growth. New pipelines and source upgrades would likely be required; essentially the area will need to install its own servicing or contribute towards significant upgrades to existing scheme infrastructure to support the proposed development. Refer to relevant AMP for comment on specific schemes and planned projects. If an AMP does not consider the area proposed for rezoning, specific upgrades have not yet been identified and it cannot be assumed that there are upgrades that can provide the capacity required for the development. In these situations, Council's usual practice is for the submitter to demonstrate that a suitable supply is available.

Rural/Rural Lifestyle where NO reticulated supply available (as per the requirements of Proposed District Plan rule EI-R45)

25. It is Council's usual practice that if alternative water source is proposed i.e., a well, that evidence that a water supply is achievable via well(s) should be provided.

26. Alternatively, submitters could consider the need for evidence to be provided in relation to how an existing supply will be extended, including an assessment that the scheme being extended either has capacity or can be upgraded to provide capacity.

Wastewater Servicing

27. Wastewater scheme details can be found here:

    https://www.waimakariri.govt.nz/services/3-waters/wastewater

Rural/Rural Lifestyle

28. Council operates the following rural/rural residential schemes:

    - Mandeville/Ohoka (Septic tank effluent pumps and pressure) (initial treatment plant – Rangiora)

- Loburn Lea (gravity) (initial treatment plant – Rangiora)
- Fernside (pressure sewer) (initial treatment plant – Rangiora)
- Woodend Beach (gravity) (initial treatment plant – Woodend)

29. **Capacity in the system:** The Mandeville/Ohoka scheme has limited capacity to service additional growth areas/increased density over and above the proposed zoning in the PDP. For further information, contact the Council for the memo 'Mandeville Wastewater Modelling – Rezoning Ohoka Utilities Area' (Trim record 211124188129).

30. The Loburn Lea system has some capacity available to service new growth areas including in the Ashley village area. Fernside and Woodend Beach systems have limited capacity for growth. Refer to Activity Management Plans for further information.

Urban

31. Council operates the following urban schemes:

    - Rangiora (gravity) (initial treatment plant – Rangiora)
    - Kaiapoi (gravity and pressure) (initial treatment plant – Kaiapoi)
    - Pines & Kairaki (gravity) (initial treatment plant – Kaiapoi)
    - Pegasus (gravity, pressure & STEP) (initial treatment plant – Woodend)
    - Woodend (gravity) (initial treatment plant – Woodend)
    - Tuahiwi (pressure) (initial treatment plant – Woodend)
    - Waikuku Beach (gravity and pressure) (initial treatment plant – Waikuku Beach, then Woodend)
    - Oxford (gravity, pressure & STEP) (treatment plant – Oxford)

32. **Capacity in the system:** similar to water, for infill brownfield development there is likely to be capacity, but for large new areas on the edges of towns there is generally not capacity to service new areas. Reticulation upgrades, new pump stations and Wastewater Treatment Plant (WWTP) upgrades are generally anticipated to be required to support developments on the edges of townships. Refer to relevant AMP for comment on specific schemes.

Rural/Rural Lifestyle where NO reticulated service available

33. Private on-site septic disposal systems will likely need to be allowed for where no reticulated service is available. Note Environment Canterbury rules apply to on-site systems, and submitters should consider demonstrating that the systems are a viable solution for the site, taking into account any constraints from an Environment Canterbury consenting perspective.

34. Note also that Rule EI-R45 of the Proposed District Plan specifies the circumstances where a development is required to connect to a reticulated network.

Stormwater Servicing

35. Councils standard practice is that all new development in the district must achieve stormwater neutrality i.e. post-development stormwater flows off the site must not exceed pre-

development flows. Stormwater quality must also be considered[11]. Refer to the Stormwater Drainage and Watercourse Protection Bylaw 2018, the Engineering Code of Practice (ECoP) (link below) and Environment Canterbury Requirements. Stormwater design is site specific, and dependent on availability of local servicing and ground type. Although site specific, general requirements for both rural and urban developments are summarised below.

36. Refer to Engineering Code of Practice part 5 https://www.waimakariri.govt.nz/__data/assets/pdf_file/0022/134293/Part-5-Stormwater-and-Land-Drainage.pdf (section 5.5.2 in particular) for minimum protection standards for new developments (including water quality and quantity requirements).

Rural

37. Rural sites are generally outside of formal stormwater drainage schemes and need to consider effects related to stormwater neutrality. As with any development, post-development flows off the site should be considered and generally must not exceed pre-development flows.

38. If an infiltration solution is proposed, Council expects that sufficient information will be provided to demonstrate that this is a feasible solution for the site.

Urban

39. Stormwater & drainage scheme details can be found here:

    https://www.waimakariri.govt.nz/services/3-waters/stormwater-and-drainage

40. Generally, existing urban drainage schemes are able to support infill development in existing urban areas as long as impermeable site coverage does not exceed approximately 65% in its fully developed state.

41. New urban developments proposed that are not infill developments will potentially need to install stormwater management systems, which may include stormwater ponds intended to vest with Council. It will need to be demonstrated sufficient land area is made available for properly sized stormwater management areas. Ground conditions should be considered, including whether a pond would be close to an aquifer or groundwater levels at certain times of year, and how this would impact upon the viability of the proposed system. Refer to ECoP Part 5 (link above) for detailed requirements. Also consider location of overland flowpaths, loss of storage on the site, and how these will be accommodated.

Hazards

42. The Canterbury Regional Policy Statement sets out requirements regarding development within flood hazard areas. Submitters should consider using the online hazard viewer to assess the hazards applicable to the site and consider how this can be managed/mitigated without causing effects upstream or downstream.

[11] in circumstances where the stormwater system is a vested activity and in consideration of regional council requirements at the time of development.

43. Generally from an engineering design perspective, development should be avoided in overland flow paths. Refer to Council flood mapping to aid in identifying if a site is subject to an overland flow path; consider if the flooding originates from a river breakout, localised rainfall or coastal inundation. Interference with overland flow paths is generally not supported, and if redirection of an overland flow path is under consideration this needs to be carefully modelled to demonstrate how the new flow path will function without having effects upstream or downstream.

    https://waimakariri.maps.arcgis.com/apps/instant/portfolio/index.html?appid=c6bc05f87d4f47ecae975e5241657913

44. If flood hazard mitigation is proposed, and this will alter ground levels, proposals should explain and demonstrate impact upstream or downstream in accordance with the requirements within relevant planning documents.

45. Council would anticipate that submitters also consider how future residential units will have an appropriate freeboard above the modelled flood depth.

46. Consideration of flood hazards taking into account the specific rezoning site context should be provided.

47. It is expected that if submitters are considering suitable Finished Floor Levels as part of assessing the viability of the proposed zoning, submitters should take into account the Building Act requirements, the Council's Proposed District Plan, and the Regional Policy Statement. Current practice is that a freeboard allowance of 400mm to 500mm is provided for in setting finished floor levels.

48. For both rural and residential developments, consideration of access and egress from proposed residential unit locations during a flood event should also be provided. The council's road network is designed to be trafficable in a 50-year event and therefore accesses are generally expected to achieve the same. Refer to Austroads standard AGRD05-13 section 4.5.2 for definition of trafficable.

Geotechnical

49. Geotechnical hazards may require assessment. Matters such as erosion, avulsion, falling debris, subsidence, inundation, slippage, liquefaction and fault lines may be present on a site.

50. A Geotechnical assessment may also be required in order to demonstrate that the ground is suitable for development.

51. If a submitter concludes a geotechnical report is required to support the rezoning submission, a suitably qualified and experienced geotechnical engineer or engineering geologist should prepare that report. It is likely that this report would consider standards such as NZS4404:2010, NZS4431:2022, MBIE guidance and refer to Engineering Code of Practice Part 4 which sets out some of the matters to be considered in planning and constructing a land development project:

    https://www.waimakariri.govt.nz/__data/assets/pdf_file/0020/134291/Part_4_QP-C813-GeotechnicalRequirements.pdf

52. Rural or residential development should assess potential risk to life and property when located within the fault awareness overlay or the Ashley Fault avoidance overlay.

Greenspace Requirements

53. Requirements apply to developments within proposed residential zones to ensure appropriate Greenspace provision is made within new urban areas. Developments within rural zones are not subject to the same requirements.

54. A brief summary of requirements is set out below. Detail can be found in the Engineering Code of Practice Part 10:

    https://www.waimakariri.govt.nz/__data/assets/pdf_file/0027/134298/Part_10_QP-C819-Reserves_Streetscapes_and_Open_Spaces.pdf

55. Council also has a Parks Categories and Levels of Service document which may assist submitters and is available on request.

56. 'Neighbourhood Park' provision is a key community provision requirement for residential zones. WDC level of service guidelines are:

    - Most residents to be within a 500m radius, or a ten-minute walk, of a neighbourhood park.
    - A minimum one hectare of neighbourhood park space per 1,000 residents (avg. 2.4 residents per household).
    - Local category neighbourhood parks should be 0.3 to 0.5ha+ in size; and located on relatively flat well drained land.

Esplanade Reserves

57. If there is a watercourse running through the development site, Esplanade Reserve provision may be triggered by the RMA (which is reinforced through the District Plan). This equates to 20m provision each side of the watercourse (annual high-water mark).

Transport Requirements

58. A submitter may conclude a submission warrants a transport assessment. If this is the case, a suitably qualified and experience transportation engineer should provide an Integrated Transport Assessment (ITA).

59. Refer to Proposed District Plan TRAN MD-11, https://waimakariri.isoplan.co.nz/draft/rules/0/186/0/8736/0/226, which sets out proposed ITA requirements. Note that this rule is subject to submission in the PDP and submitters should refer to the lasted version of the provision as set out in the Transport Joint Witness Statement for Stream 5.

60. Traffic count data is available here: https://www.waimakariri.govt.nz/__data/assets/excel_doc/0029/136559/WDC-Traffic-Data-April-20.xlsx , and the Roading Team can be contacted for more traffic volume information if required.

61. Refer to the Engineering Code of Practice Part 8: Roading for detailed requirements https://www.waimakariri.govt.nz/__data/assets/pdf_file/0025/134296/Part_8_QP-C817-Roading.pdf.

Rural

62. The types of matters that have been considered with relation to transport in past rezoning requests have included the following:

    - How much traffic will be generated by the proposed number of new lots (refer to appropriate standards to calculate such as NZTA Research Report 453);
    - The condition of the existing road (width, seal type, line markings, shoulders, intersection condition, intersection safety, proximity to intersections) as additional traffic may trigger the need for localised upgrades;
    - The traffic count of the existing road (refer link or available from Council on request) and how much it will be increased by the development proposed;
    - Vehicle crossing locations;
    - Accessway/right of way locations, widths; avoid crossing overland flow paths where possible. Where a flowpath is crossed, we suggest submitters consider how the right of way will be trafficable as per Austroads standard AGRD05-13 section 4.5.2.
    - Impact of traffic to non-motorised users on the road network, e.g., on the footpath, shared-use path, etc.
    - Opportunities to provide pedestrian/cycleway connectivity (where relevant);
    - Vehicle kilometres travelled (VKT) reduction.

Urban

63. Developments proposing to extend urban areas will generally have a greater opportunity to contribute towards public transport and non-vehicular linkages. The types of matters that have been considered with relation to transport in past rezoning requests have included the following:

    - Traffic generated by the new development (again with reference to appropriate standards to calculate);
    - Impact of traffic on existing road network, an assessment of this impact, and requirement for new roads/upgrades that may be triggered as a result;
    - Condition of road network adjacent to the development e.g. is urbanisation required? Is there sufficient space for refuse collection if bins are to be placed on existing footpaths? Is localised road/shoulder widening required?
    - Are new vehicle crossings proposed on existing roads? Can separation distances be met? Are there conflicts with existing infrastructure (street lights, signs, sumps, pedestrian crossings)?
    - Assessment of the increased traffic and parking demand generated by the proposed development, and whether this will impact the safe operation of the transport network. To mitigate these effects additional parking provision may be required.
    - On-site manoeuvring: can cars manoeuvre to exit in a forward gear, especially onto higher classification roads?
    - For new roads required to service the development, has sufficient width been indicated in the ODP to cater for roads at the widths required by the Proposed District Plan? What is the proposed hierarchy of new roads?
    - For private right of ways or accesses, are minimum width requirements met?

- Is there safe pedestrian linkage available through the development? How does the new development connect into and promote existing pedestrian linkages?

64. These lists are neither exhaustive nor prescriptive. The required contents of an ITA should be assessed by a suitably qualified and experienced transport engineer. Each rezoning submission is different, and submitters are reminded of the need to assess their own submissions and identify what they consider necessary evidence to support their submission.

Appendix C. Mandeville Wastewater Modelling – Rezoning Ohoka Utilities Area

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO AND TRIM NO:	SEW-03-20-06/ 211124188129
DATE:	24 November 2021
MEMO TO:	Kalley Simpson, 3 Waters Manager
FROM:	Alex Meredith
SUBJECT:	Mandeville Wastewater Modelling – Rezoning Ohoka Utilities Area

1. Summary and Recommendations

This study updated the Mandeville area wastewater model to understand what the impact of rezoning the Ohoka Utilities and Ohoka Downs areas as large lot residential would be. Results show that a 1 in 5 year level of service cannot be achieved in the current network with this intensification. Two options were considered to allow the network to meet a 1 in 5 year level of service:

1. Retaining and upgrading the existing STEP system by making both reticulation upgrades and an upgrade to the Bradleys Rd pumping station to improve level of service
2. Replacing the STEP system in Ohoka Utilities and Ohoka Downs with a new LPSS system (E/One or equivalent), together with some reticulation upgrades but without the need for an upgrade to the Bradleys Rd pumping station

Based on these options some conclusions were made

- More reticulation upgrades may be required if the STEP system was retained but as the pressure class of the current reticulation is unknown it is possible the full reticulation would need to be upgraded for a LPSS system
- A LPSS system would have a lower operational cost but the up-front cost would be greater to retrofit the system
- The STEP system upgrades could be carried out over time as growth occurs where many of the LPSS upgrades would be required all at once when the system is converted
- Both options would allow the 1 in 5 year level of service is currently being achieved.

It is recommended that:

- The 3 Waters Manager receives this report
- This report be considered in decision making around the zoning of the Ohoka Utilities and Ohoka Downs areas
- If these areas are rezoned large lot residential then the two options proposed should be considered further including a net present value calculation to understand financial viability

2. Background

The Mandeville Area Wastewater Scheme is primarily a Septic Tank Effluent Pumping (STEP) system which mostly services Large Lot Residential and Settlement Zones in Mandeville, Swannanoa and Ohoka. A model of the current state of this scheme was completed in August 2021 (TRIM 210813133061) and this was updated to take into account growth under the current District Plan (TRIM 210908143533) and the proposed district plan (TRIM 211115181977). This model shows that the scheme currently meets at least a 1 in 5 year level of service with full

development without any tanks overflowing and that the critical event has a 48 hour duration. However, it does not meet a 1 in 50 year level of service.

The Ohoka Utilities Area, which is serviced by the Mandeville STEP system, is currently zoned rural lifestyle and is adjacent to the large lot residential areas in Mandeville. Landowners in this area have questioned whether they could be rezoned as large lot residential as this would allow them to subdivide down to significantly smaller lot sizes. The adjacent Ohoka Downs subdivision has also considered for further development in this study. It is believed that the rezoning of these areas could potentially have a large impact on the wastewater network. The scope of this work is therefore to update the model to account for this potential growth and undertake a system performance analysis on the updated model, determining whether any upgrades would be required in order to service this growth.

3. Model Update

3.1. Additional Lots Zoning

Additional lots were added in the Ohoka Utilities and Ohoka Downs areas to the future, fully developed model based on maximum lot yield under the large lot residential subdivision rules in the proposed district plan. A comparison of minimum and average parcel sizes between large lot residential and rural lifestyle zones are shown in Table 1. This shows that lots could be up to eight times smaller under large lot residential zoning. It is unlikely any new lots could be developed under the proposed rural lifestyle zoning as most lots in this area are already smaller than the minimum lot size under these subdivision rules.

Figure 1 shows the current zoning under the proposed district plan with a dashed line outlining the area considered in this study.

Table 1: Minimum and Average Allotment Sizes under Proposed District Plan

Zone	Minimum Allotment Size (m^2)	Minimum Average Allotment Size within Subdivision (m^3)
Large Lot Residential	2,500	5,000
Rural Lifestyle	40,000	40,000

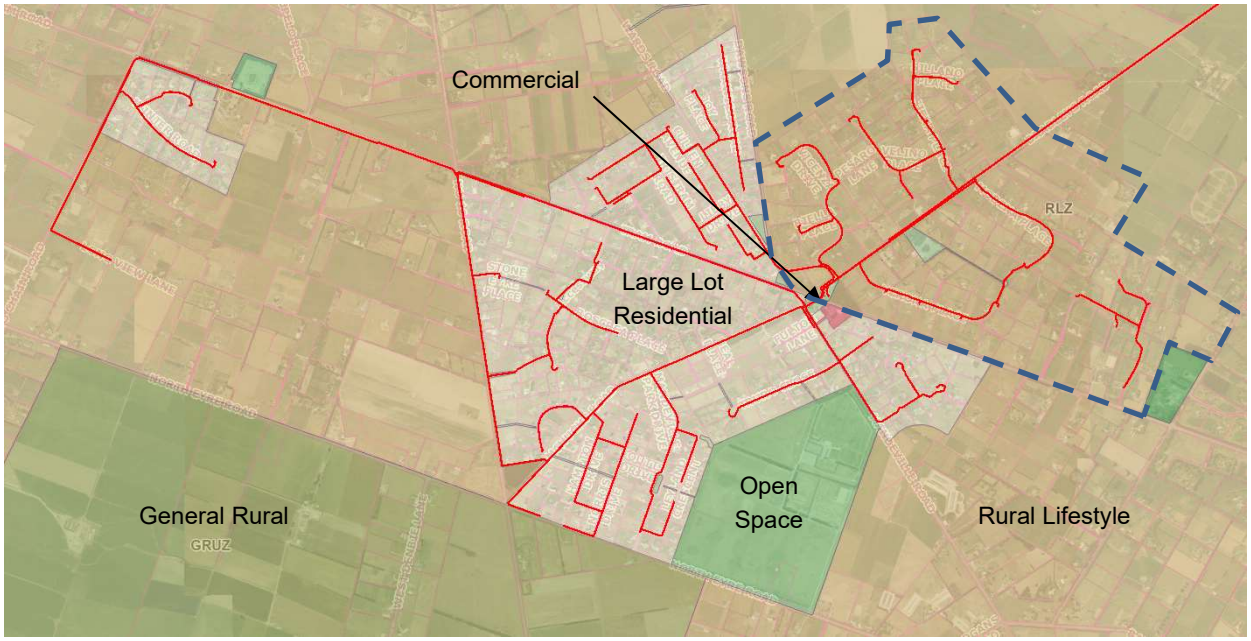


Figure 1: Swannanoa and Mandeville Land Zones under Proposed District Plan

3.2. Additional Lots Summary

Table 2 summarises the additional lots added to produce the new development model. On average each lot in this area could be divided into approximately 3, though this was calculated on a lot by lot basis. Wet weather flow loads for the additional lots were added to match those present in the western catchments in the Rangiora future model as outlined in the previous future Mandeville model build report.

Table 2: Additional lots added for future development model

Area (Previous zoning)		Existing Lots	Future Lots under Proposed District Plan	Additional Lots	Total Lots with Ohoka Utilities Intensification
Mandeville Area	Swannanoa Large Lot Residential	29	44	0	44
	Mandeville Large Lot Residential	406	598	0	598
	Rural – Ohoka Utilities & Ohoka Downs	113	136	286	422
	Rural - Other	0	0	0	0
Total Mandeville STEP Sewer		***548***	***778***	***286***	***1064***
Ohoka Area	Ohoka Settlement	8	94	0	94
	Ohoka Large Lot Residential	10	186	0	183
	Rural	3	3	0	3
Total Ohoka LPS Sewer		***21***	***283***	***0***	***283***
Total Mandeville-Ohoka Scheme		**569**	**1061**	**286**	**1347**

4. Results

4.1. System Performance during Critical 1 in 5 Year Event

Figure 2 shows the minimum available freeboard in each tank in a 1 in 5 year, 48 hour rainfall event (where freeboard < 0 shows overflowing tanks). It can be seen that the intensification of this area causes a number of tanks in the Ohoka Utilities Area to begin to overflow and a number more to come close to overflowing in a 1 in 5 year rainfall event.

Figure 3 shows the tank depth with time at Bradleys Rd during the 1 in 5 year, 48 hour rainfall event where the rainfall event is run 4 times as described above. In every event the tank briefly overflows during the event peak. Therefore, the Bradleys Rd pumping station would be undersized for a 1 in 5 year event if the Ohoka Utilities Area became fully developed as a large lot residential zone.

Two different options are considered for upgrades to ensure that the network could meet a 1 in 5 year level of service with the additional development

1. Upgrading the internal reticulation in the Ohoka Utilities area and the Bradleys Rd pumping station, keeping the Ohoka Utilities area as a STEP system
2. Converting the Ohoka Utilities Area to a LPSS system connecting downstream of the Bradleys Rd pumping station

Results from these simulations are shown in the following sections. As a comparison for required pipe upgrades, Figure 4 shows current diameters. It should be noted that the Ohoka Downs connection is assumed as these properties are currently on a private scheme.

4.2. Retaining existing STEP system and upgrading Bradleys Rd Pumping Station

- Figure 5 shows the internal upgrades required to ensure that none of the septic tanks would overflow in a 1 in 5 year rainfall event.
- Alongside these, the Bradleys Rd pumps would need to be upgraded such that they could provide a flow of 30 l/s up to a maximum pressure of 100 m.
    - The rising main is PN12.5 so this pressure would be allowable
- One advantage of this option is that the reticulation upgrades could be staged as growth occurs and that the upgrades would be relatively straightforward
- The downside to this is it retains a large number of step connections which can be more costly to operate long term than LPSS connections and that it would require an upgrade to the Bradleys Rd pumping station

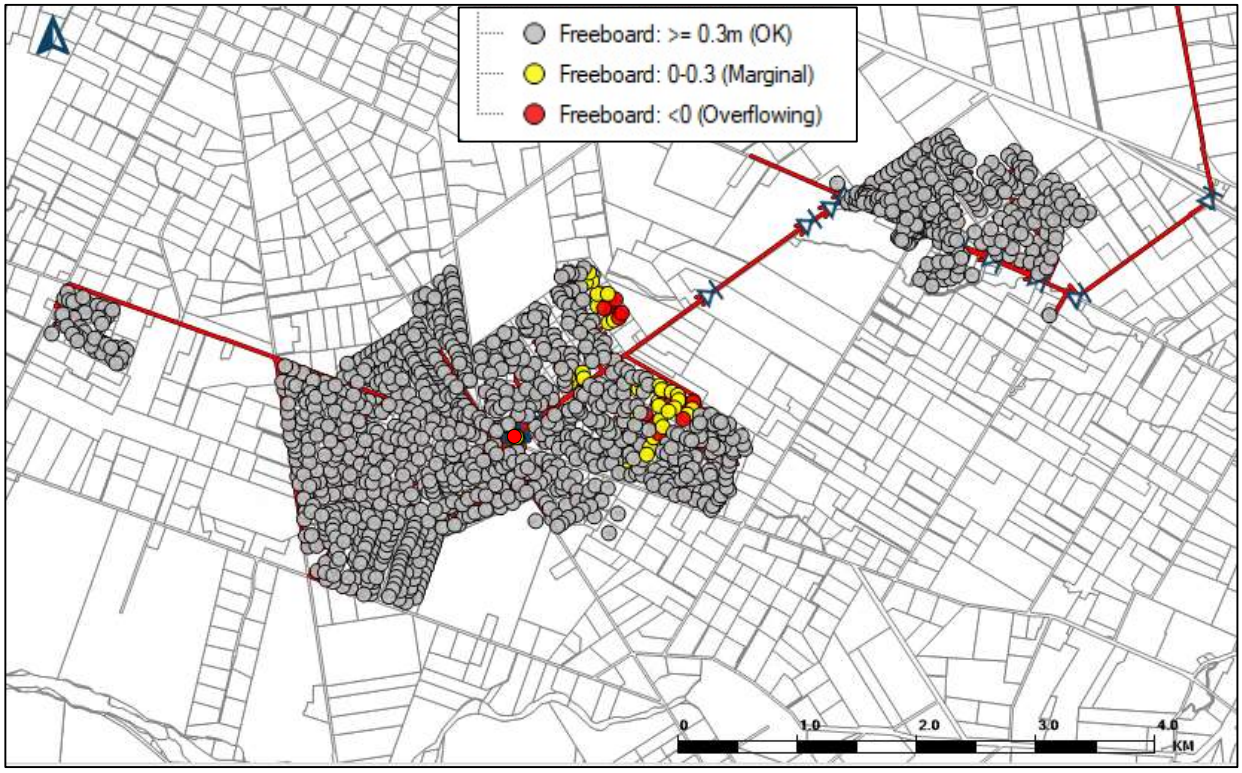


Figure 2: Tank Freeboards in 1 in 5 year, 48 hour rainfall event

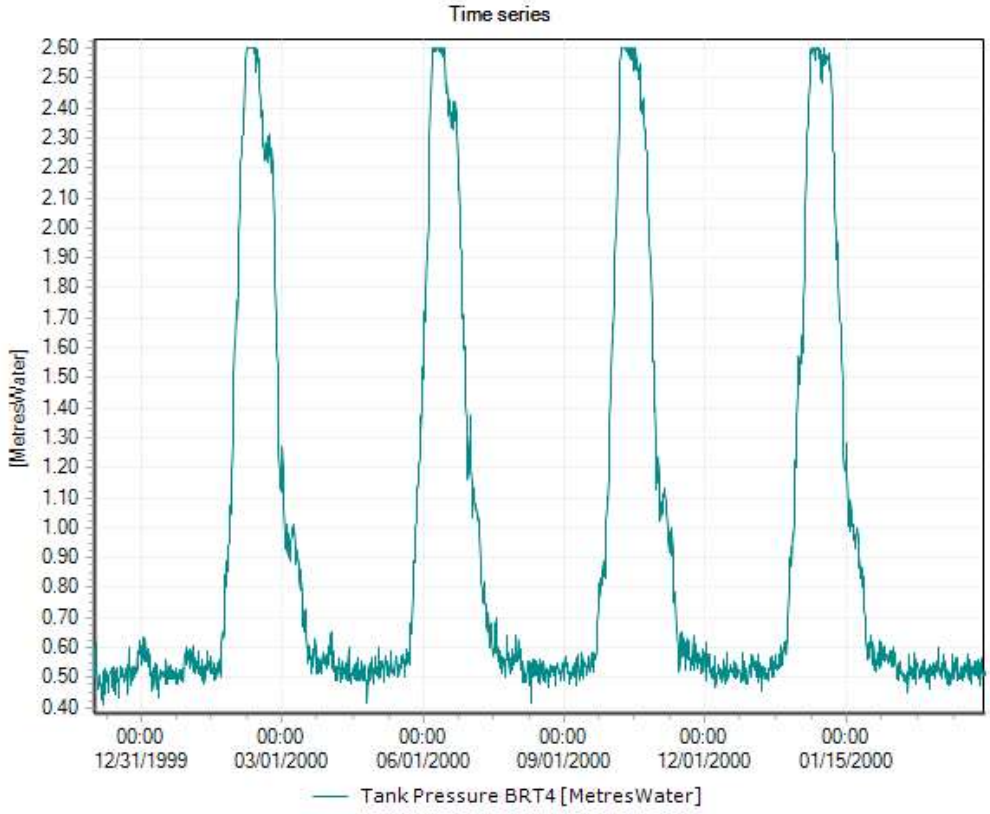


Figure 3: Bradleys Rd tank depth with time during 1 in 5 year, 48 hour rainfall event

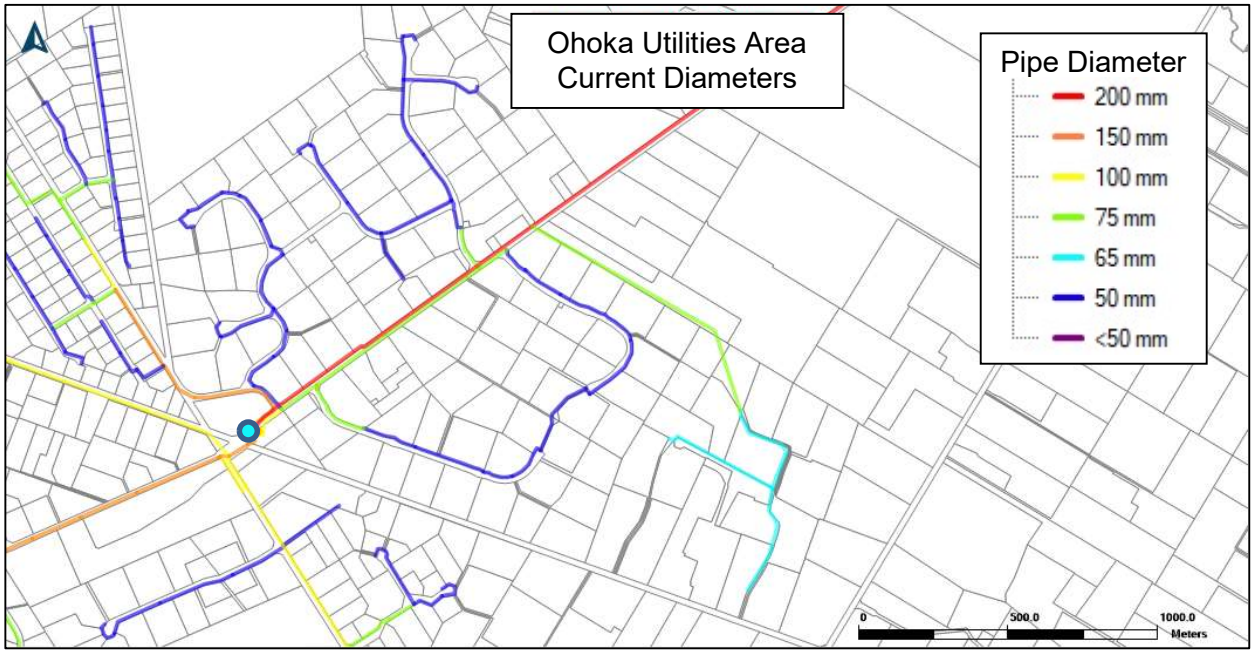


Figure 4: Current Pipe Diameters in Ohoka Utilities Area

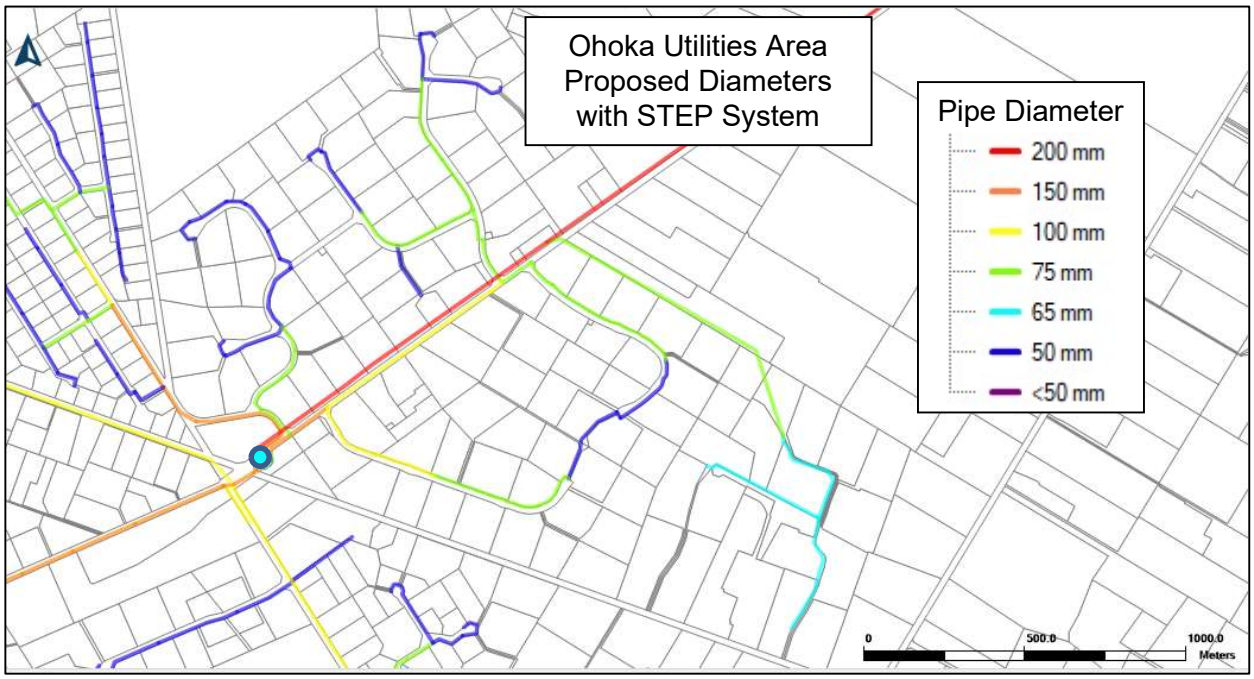


Figure 5: Required Pipe Diameters for Growth of STEP System in Ohoka Utilities Area

4.3. Conversion of Ohoka Utilities Area to LPSS

Modelling showed that even with the Ohoka Utilities Area converted to LPSS and connected to the rising main downstream of the Bradleys Rd pumping station the LPSS pumps would struggle to generate enough pressure to pump into the rising main. Therefore some pipe upgrades would be required. These are shown in Figure 6. Some further considerations are as follows

- The majority of internal pipes in the Ohoka Utilities area are likely to need replacing for this option due to a larger pressure class required for LPSS compared to STEP connections
- The Bradleys Rd pumping station would not need to be upgraded for this option
- This option has the advantage that the number of STEP connections, which can be costly to operate, would be reduced
- The main disadvantage of this option is if the system was to be converted to LPSS a large amount of capital works would need to be done up front

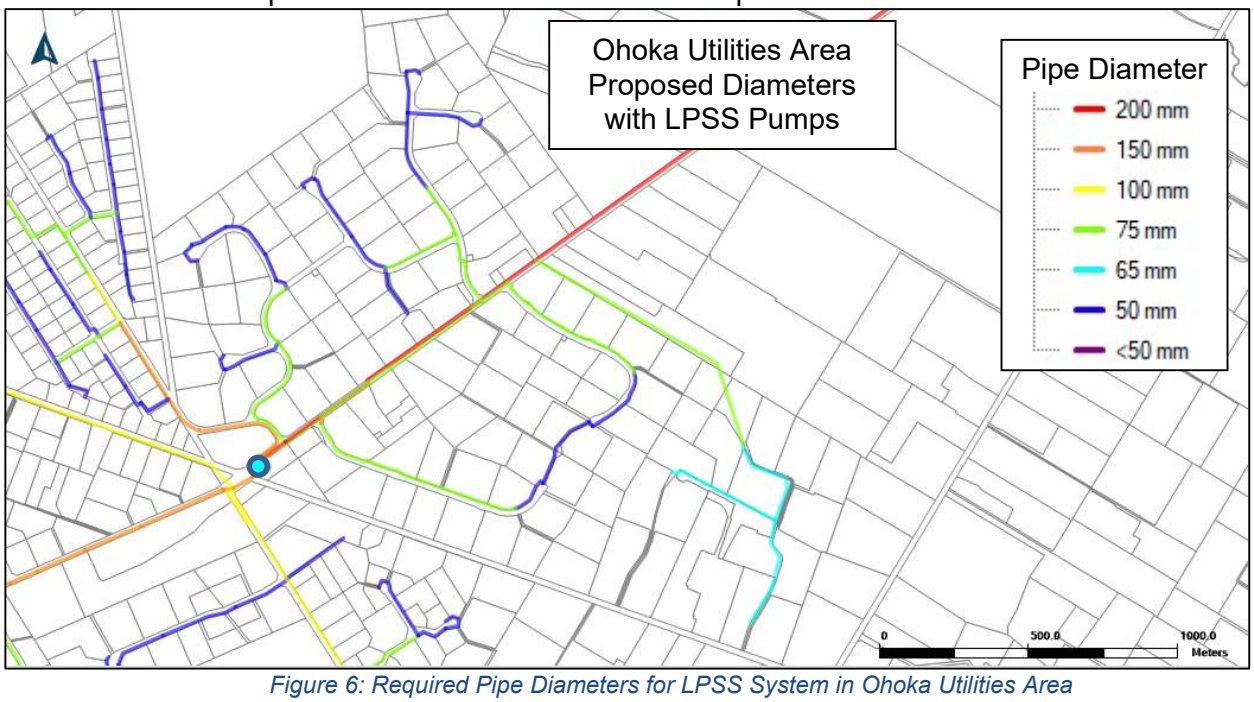


Figure 6: Required Pipe Diameters for LPSS System in Ohoka Utilities Area

5. Conclusions

The Mandeville wastewater model was updated assuming that the Ohoka Utilities and Ohoka Downs areas are rezoned as large lot residential areas. Lots were added based on maximum allowable intensification under large lot residential rules outlined in the proposed plan and I&I was set to approximately match code of practice levels. It was found that the current network could not meet a 1 in 5 year level of service with this intensification.

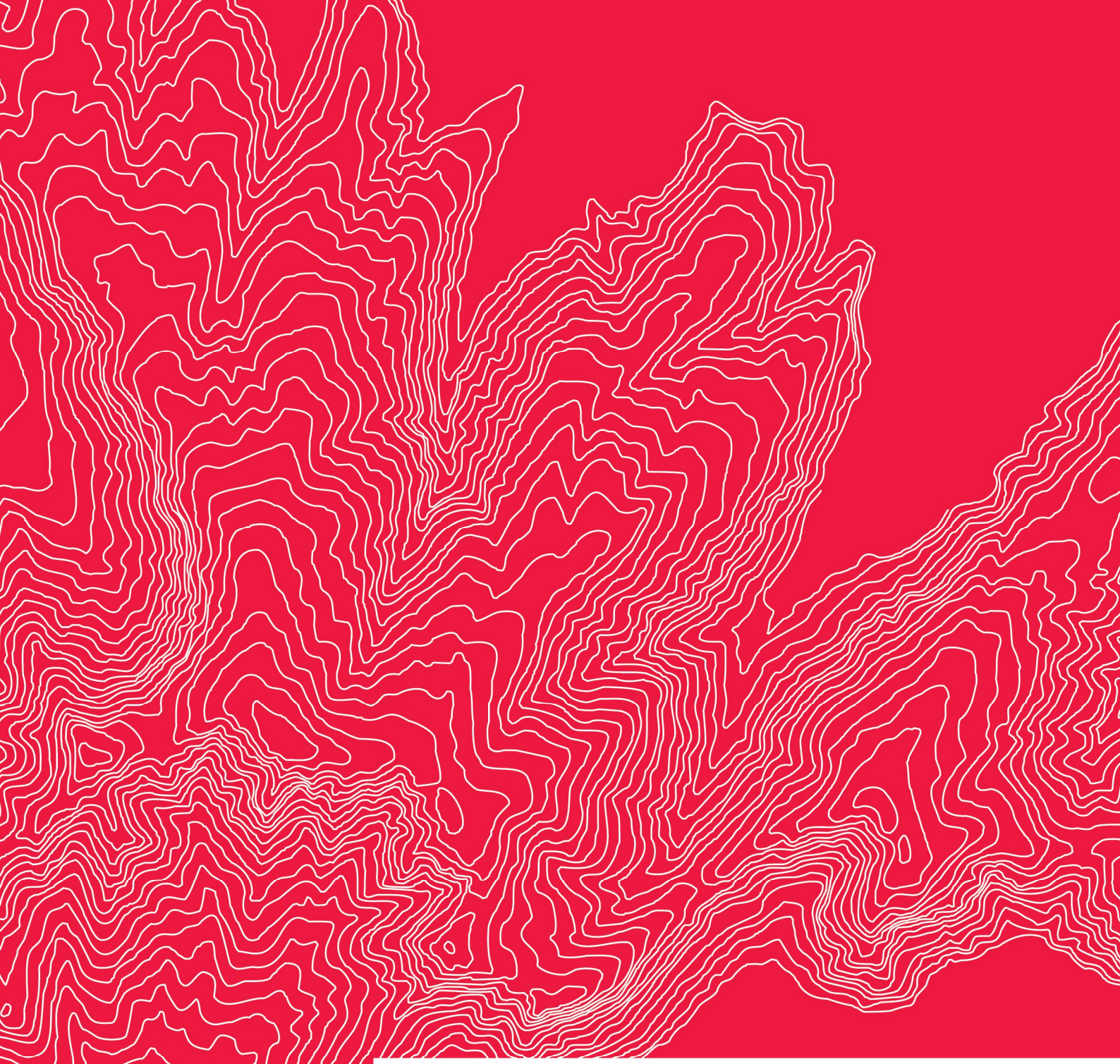
Two options were presented which would allow the area to meet a 1 in 5 year level of service

1. This area is kept as a STEP system with the internal reticulation upgraded and the Bradleys Rd pumping station upgraded to be able to deliver 30 l/s at 100 m
2. This area is changed to a LPSS system with some internal reticulation upgrades but without an upgrade to the Bradleys Rd pumping station

Some conclusions can be made based on this analysis

- More reticulation upgrades may be required if the STEP system was retained but as the pressure class of the current reticulation is unknown it is possible the full reticulation would need to be upgraded for a LPSS system
- A LPSS system would have a lower operational cost but the up-front cost would be greater to retrofit the system
- The STEP system upgrades could be carried out over time as growth occurs where many of the LPSS upgrades would be required all at once when the system is converted
- Both options would allow the 1 in 5 year level of service is currently being achieved.

Appendix D. Flood Impact Assessment



Flood Impact Assessment

Version A

eliot sinclair

San Dona, Mandeville

Prepared for San Dona Landowner Group

520977

Flood Impact Assessment

San Dona, Mandeville

Prepared for San Dona Landowner Group

520977

Quality Control Certificate

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1. Introduction

Eliot Sinclair has been engaged by San Dona Landowner Group to carry out a Flood Impact Assessment to assist with the rezoning application of 117 existing lots in San Dona, Mandeville (referred as "the Site") from rural lifestyle lots to the large residential lots.

2. Scope of works

Eliot Sinclair has prepared this Flood Impact Assessment for 117 existing lots in San Dona, Mandeville to support the application for land use plan change. The report has been prepared to provide an assessment of the flooding effects of the proposed development on:

- Existing overland flow paths
- Flooding at surrounding properties
- Accessibility within existing council vested carriageways

3. Site description

The Site is located in Mandeville North, Waimakariri and is bordered by Tram Road to the south, Dawsons Road to the west, and pastures to the north and east. The Site consists of 117 existing rural lifestyle lots with existing carriageways including Bradleys Road which runs central of the Site from south-west to the north-east. Generally, the individual lots within the Site consist of residential dwellings with a few associated structures and pasture areas.

The aerial imagery illustrating the extent of the Site for the proposed land change application is shown in Figure 1 below.

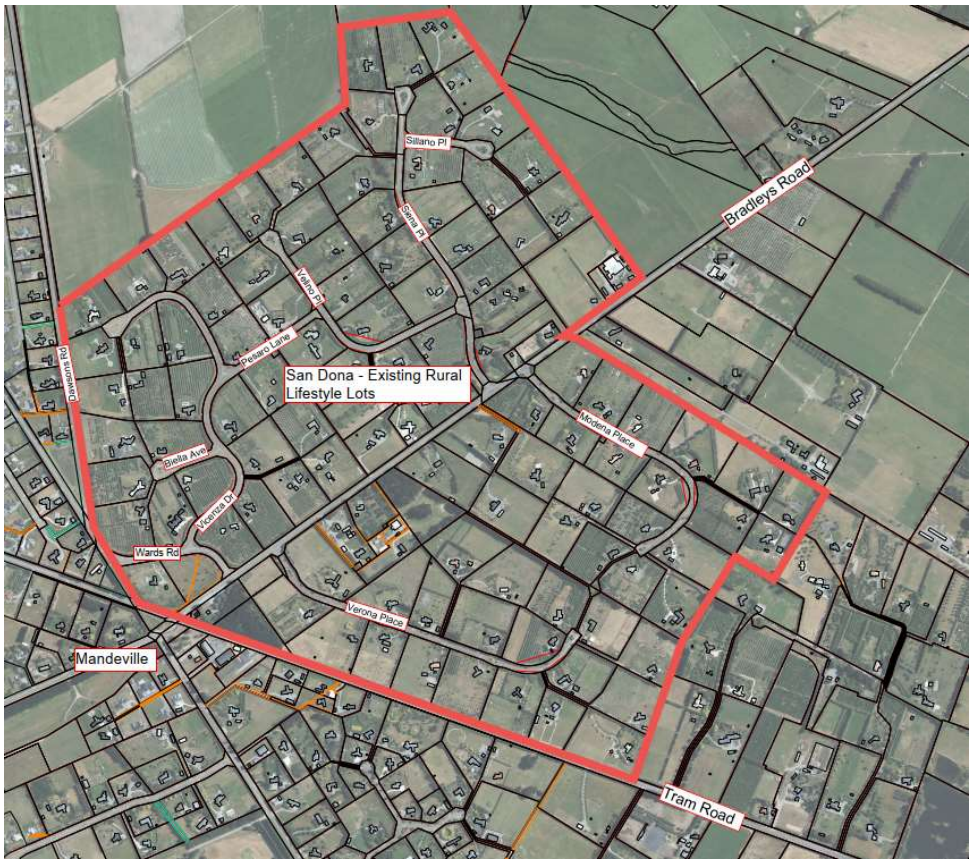


Figure 1. Aerial Imagery illustrating extent of the Site (within red border) for proposed land change.

4. Waimakariri Flood Hazard Maps

The Waimakariri Flood Hazard Map gives the predicted flood depths at the Site for the 200 Year Annual Recurrence Interval (ARI) rainfall event as shown in Figure 2.

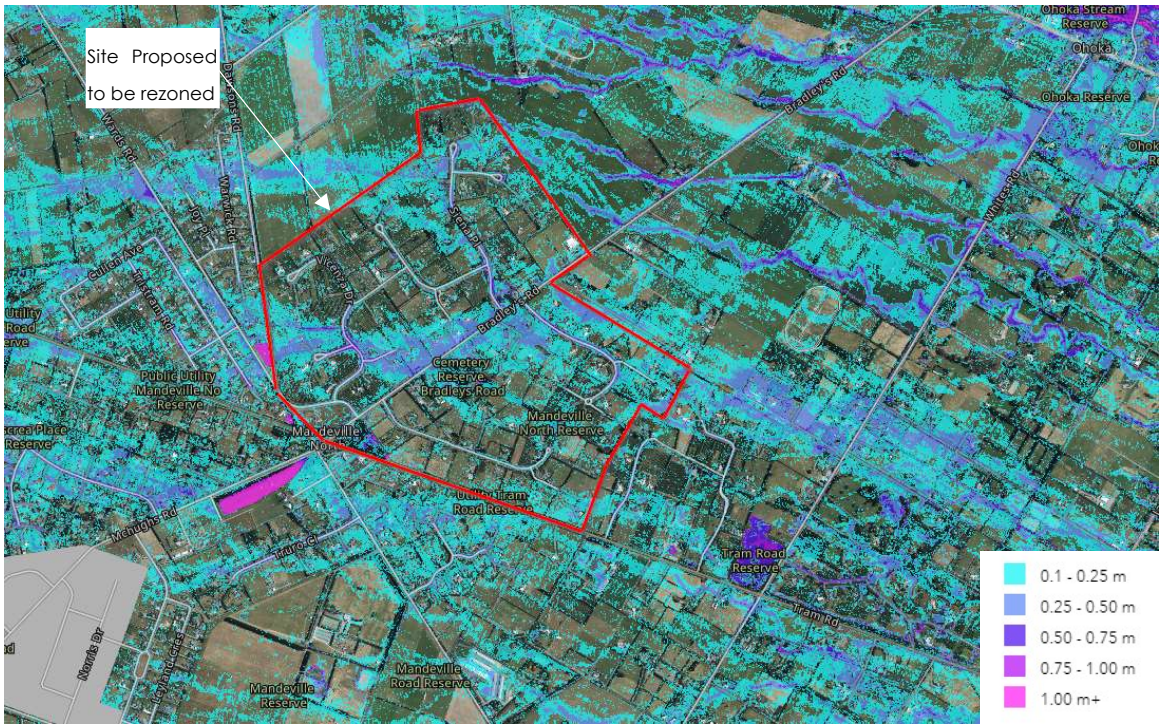


Figure 2. Predicted 200 Year Flood Depths (source: Waimakariri Flood Model)

Figure 3 indicates that the flood hazard within the Site is Low to Medium.

Figure 3. Current Level of Flood Hazard at the Site (source: Waimakariri Flood Hazard Map)

5. HEC RAS Flood Modelling Setup

200year ARI Flood modelling has been carried out using the U.S Army Corps of Engineers' Hydrologic Engineering Center (HEC) River Analysis System (RAS) software to determine the effects of the rezoning from rural lifestyle to large residential lots at San Dona, Mandeville.

HEC RAS has been used to model the pre and post development flood flow patterns within the Site and surrounding properties. Figure 4 shows the extent of the model layout.

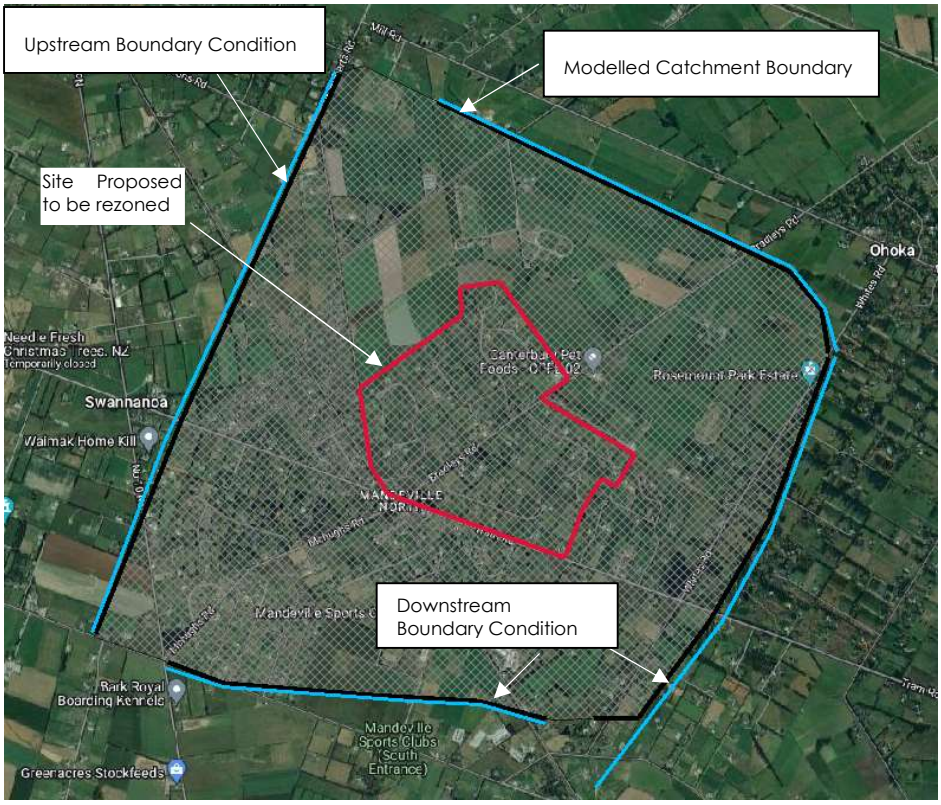


Figure 4. Flood Model Extents

5.1. Modelling Parameters and Data

The Site is sloping towards the east and therefore the flow in the HEC RAS model was applied in the same direction with the upstream boundary condition to the west and the downstream boundary condition to the east.

The 200year flow hydrograph provided by Waimakariri District Council, shown in Figure 6, was applied to the catchment along the upstream boundary condition. A precipitation hyetograph for the 200year ARI 24-hour duration provided by Waimakariri District Council, shown in Figure 5, was also applied as rain on grid across the modelled catchment.

The downstream boundary condition was set to normal depth with the slope of the downstream LiDAR surface.

The pre-development flood depths were visually calibrated with the Waimakariri Flood Map depths. The same flow and rainfall depths were applied in the post-development model.

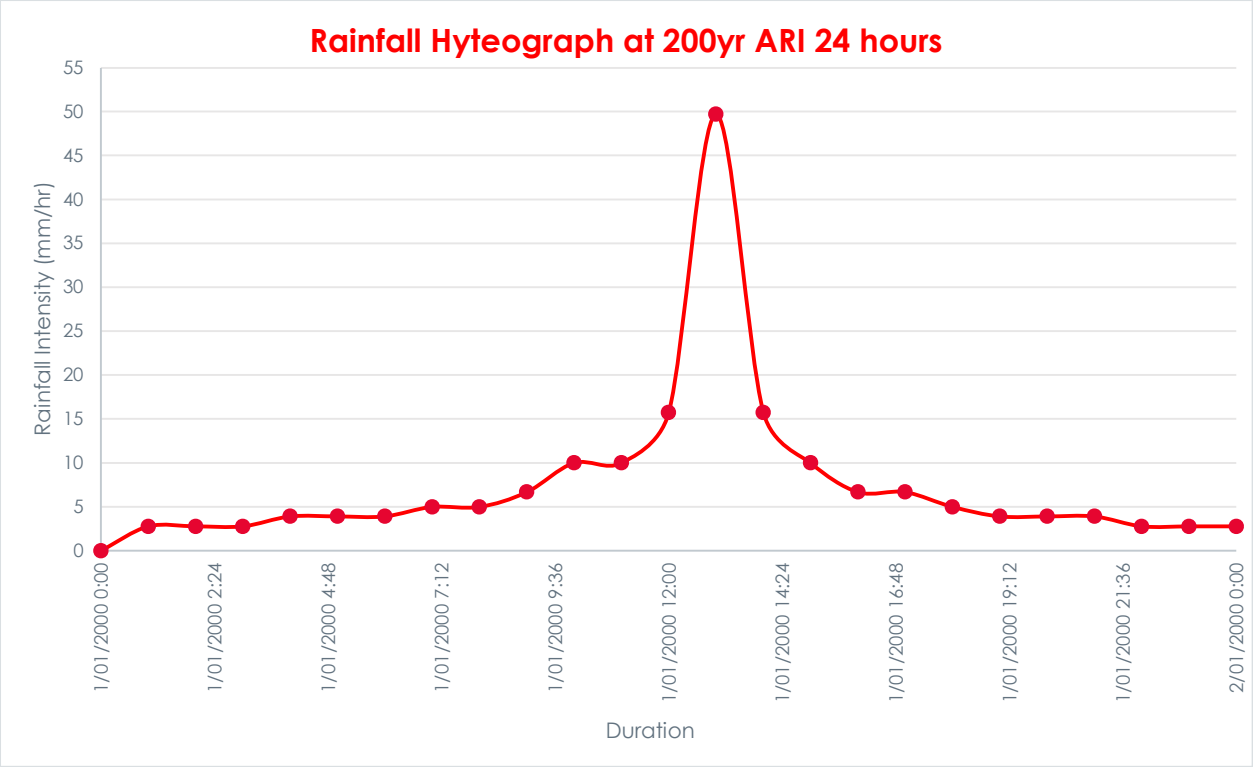


Figure 5. Rainfall Hyetograph for 200yr ARI 24 hrs Duration

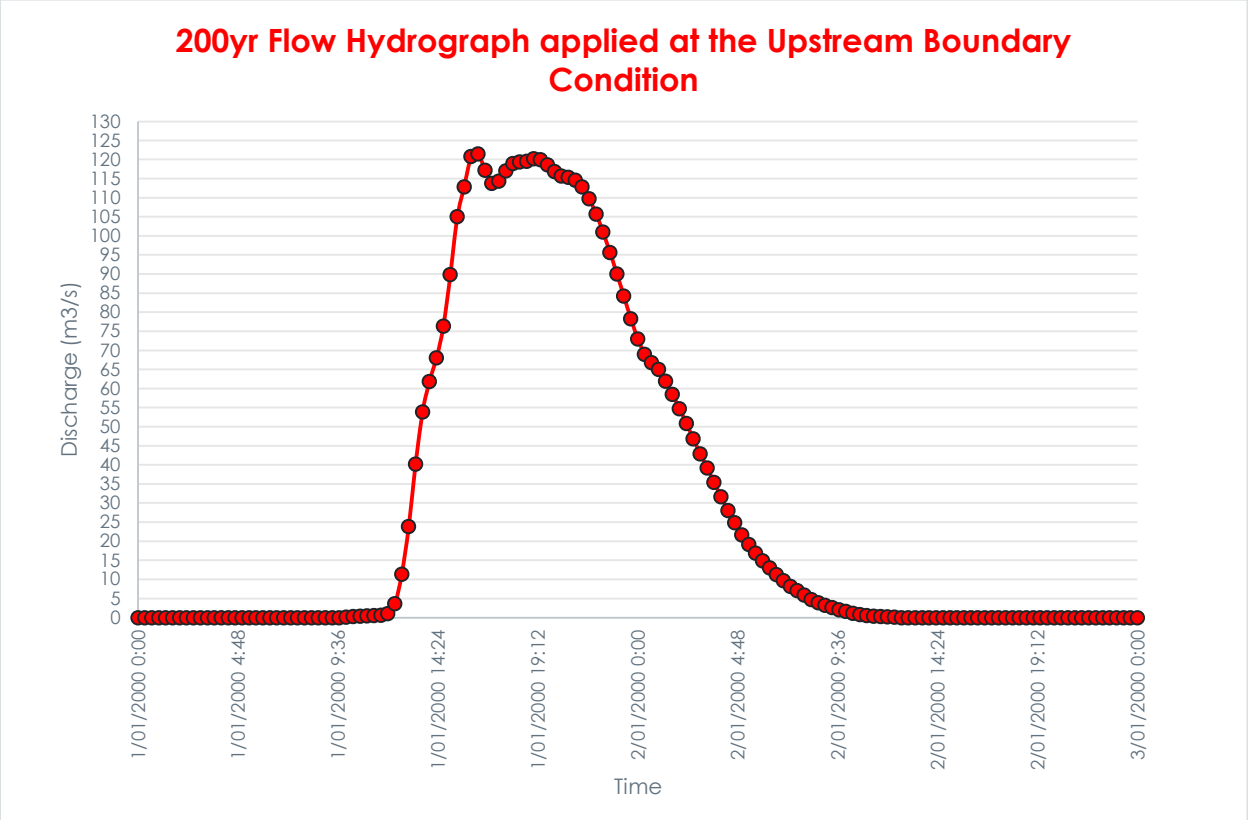


Figure 6. 200yr ARI flow Hydrograph Provided by Waimakariri District Council

5.1.1. Pre-development model surface

The pre-development model surface was based on the most recent LINZ LiDAR data (2020-2022) as shown in Figure 7.

A default roughness coefficient of 0.06 for short grass was applied for the pre-development scenario.

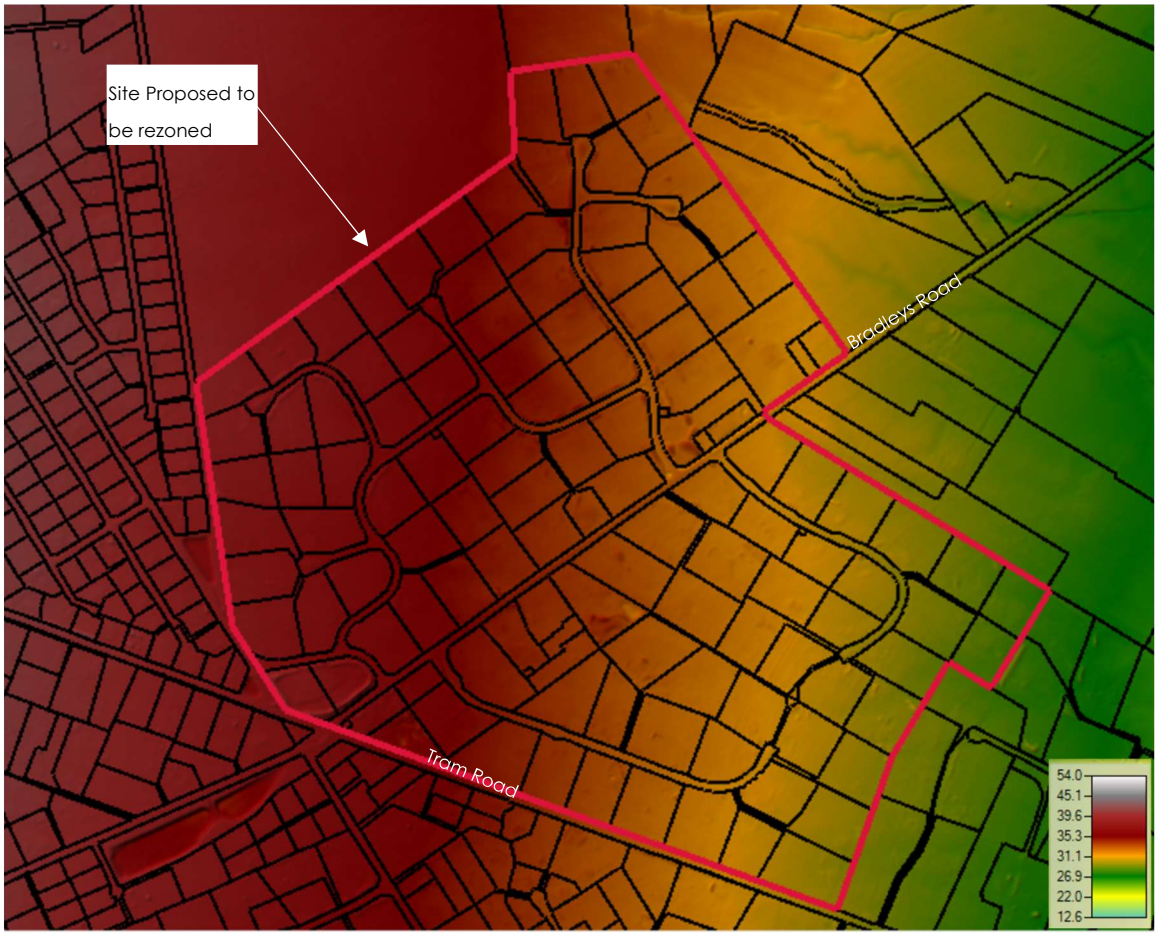


Figure 7. Pre-development 3D Topographical Surface

5.1.2. Post-development model surface

The post-development model surface was based on the most recent LINZ LiDAR (2020-2022) with 2 building platforms added within each lot with elevation R.L. 40.0 m, as shown in Figure 8. The proposed building platforms is a preliminary assumption of the proposed location of the future dwellings within each lot for modelling purposes only.

Figure 8. Post-development 3D Topographical Surface

5.1.3. Modelling Computation

Both pre-development and post-development models were computed with a time step of 2 seconds. A grid size of 5 m x 5 m was used for the overall model extent.

5.1.4. Soil Infiltration

Soil infiltration was not included within the modelling therefore, it is assumed that the ground is fully saturated throughout the simulation.

5.1.5. Ground Water Resurgence

Ground water resurgence was not included within the modelling therefore, it is assumed that the ground water table does not affect the overland flows generated from 200yr flood event.

5.1.6. Margin of Error

The pre and post-development flood modelling will have an unknown margin of error resulting from the following:

- The flow hydrograph and rainfall hyetograph provided by Waimakariri District Council was applied on the model and was used to produce flood depths that match the Waimakariri Flood map depths. The flood depths were calibrated visually against Waimakariri Flood Maps.
- Exclusion of fence lines, trees and other potential obstruction to the flood passage.
- Accuracy of the LINZ LiDAR Surface
- The size of the grid used throughout the catchment and timesteps will incorporate a level of sensitivity error.
- Soils infiltration has not been included

6. HEC RAS Flood Modelling Results

6.1. Effects on Overland Flow Path

Figure 9 shows the existing overland flow paths conveyed through the Site. As indicated, the overland flows are conveyed from west to east over the Dawsons Road, through the Site, Vicenza Drive and Wards Road into the Bradleys Road Drain. Eventually during the storm, the Bradleys Road Drain reaches a maximum capacity and overflows over the Bradleys Road into the lots east of Bradleys Road and flows towards the east of the Site. Another overland flow from the north flows into the Site through existing lots, Siena Place and Sillano Place and flows east of the Site. Refer to Figure 1 for existing road names and location.

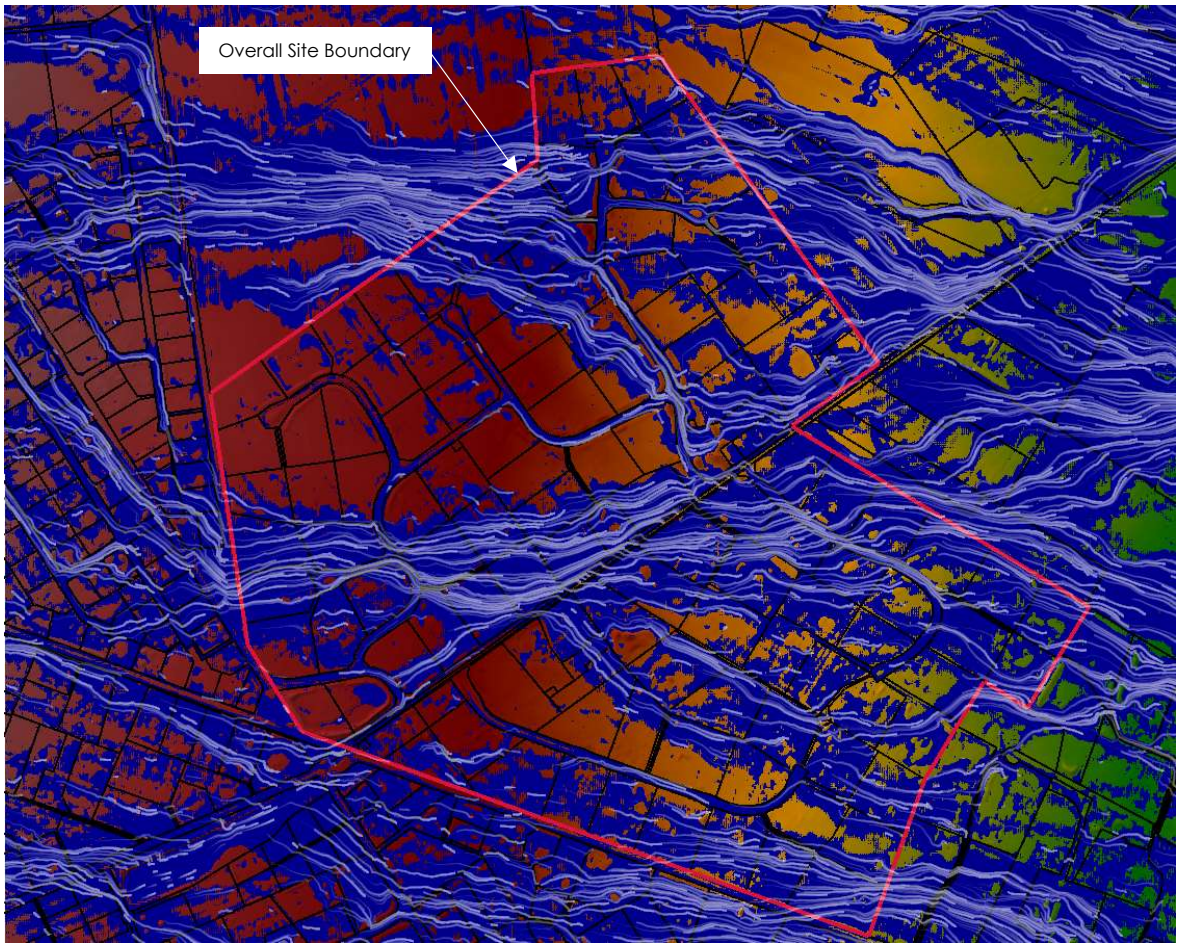


Figure 9. Pre-development Overland Flow Paths

Figure 10 shows the post-development overland flow paths. As indicated, the overland flow paths flowing through the Site are now flowing around the assumed locations of future building platforms.

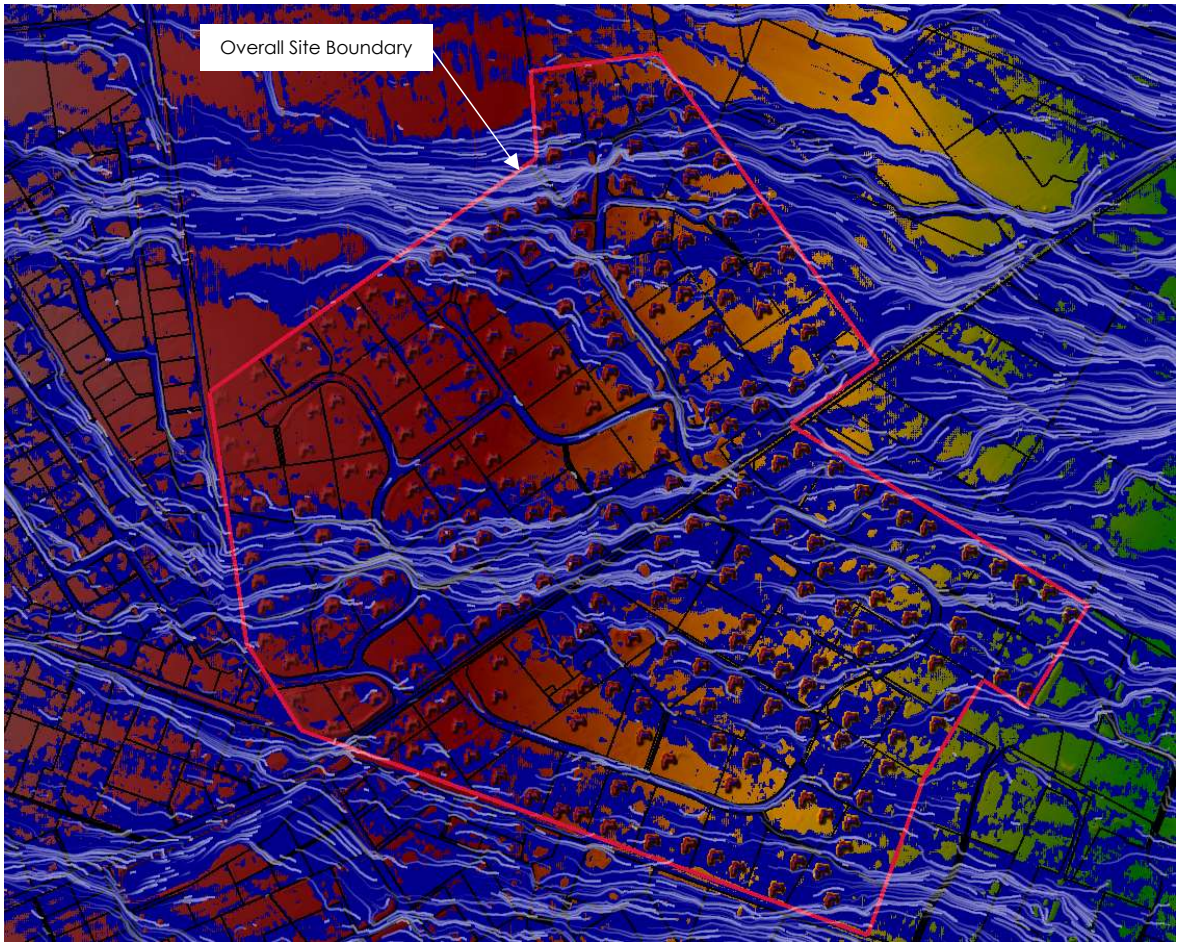


Figure 10. Post-development Overland Flow Paths

However, by visual comparison of the pre and post-development overland flow paths, the overall pre-development and the post-development flow paths are similar and the flow characteristics of pre-development flow paths are generally maintained.

6.2. 200 Year Flood Depths

Figure 11 provides the HEC RAS pre-development flood depths results map. As shown the pre-development flood depths generally match the Waimakariri 200 Year Flood Maps depths shown in Figure 2.

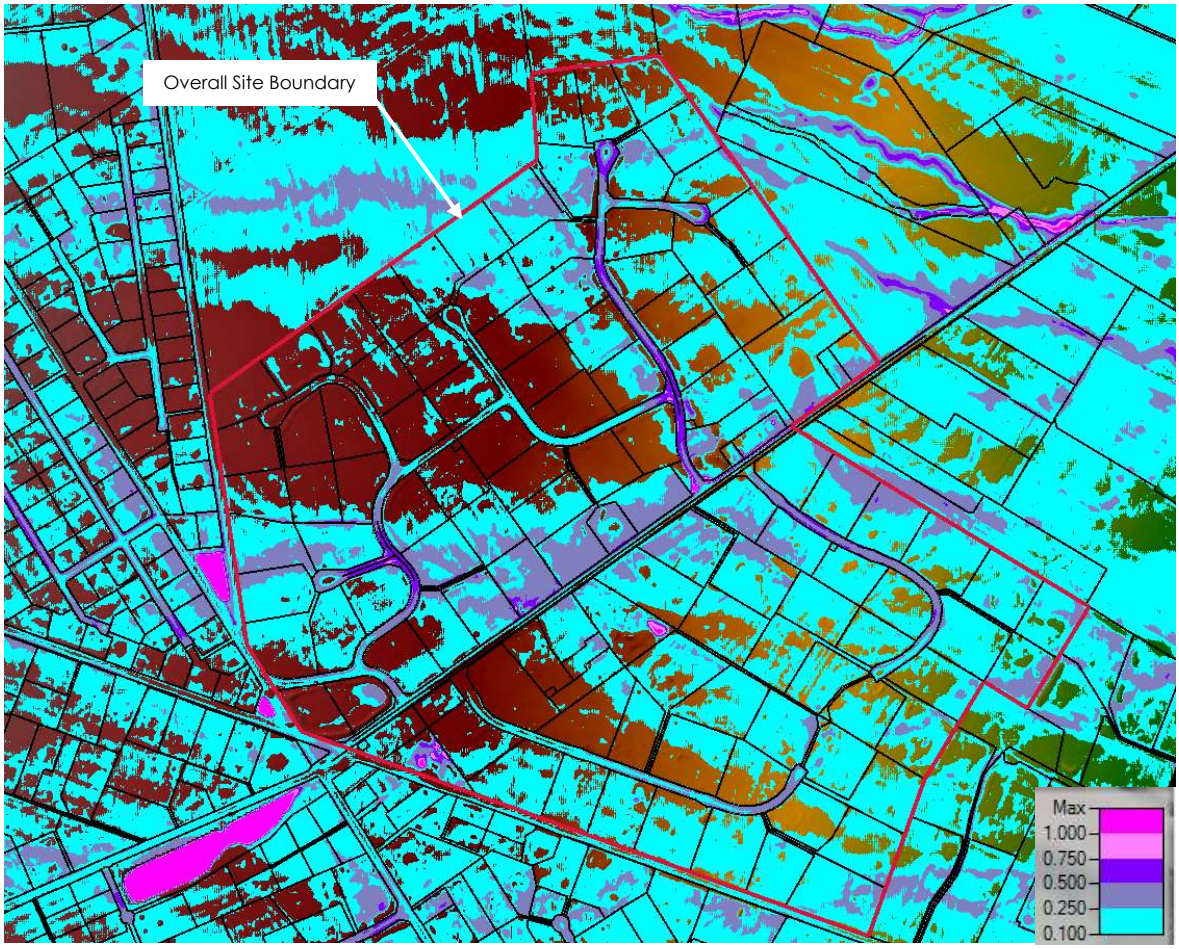


Figure 11. 200 Year Pre-development Flood Depths

It should be noted that the WDC 200 Year Flood Map (Figure 2) does not include the flood depths less than 100 mm, whereas the HEC RAS pre-development model does not include flood depths less than 50 mm.

The HEC RAS post-development flood depths results map is shown in Figure 12 .

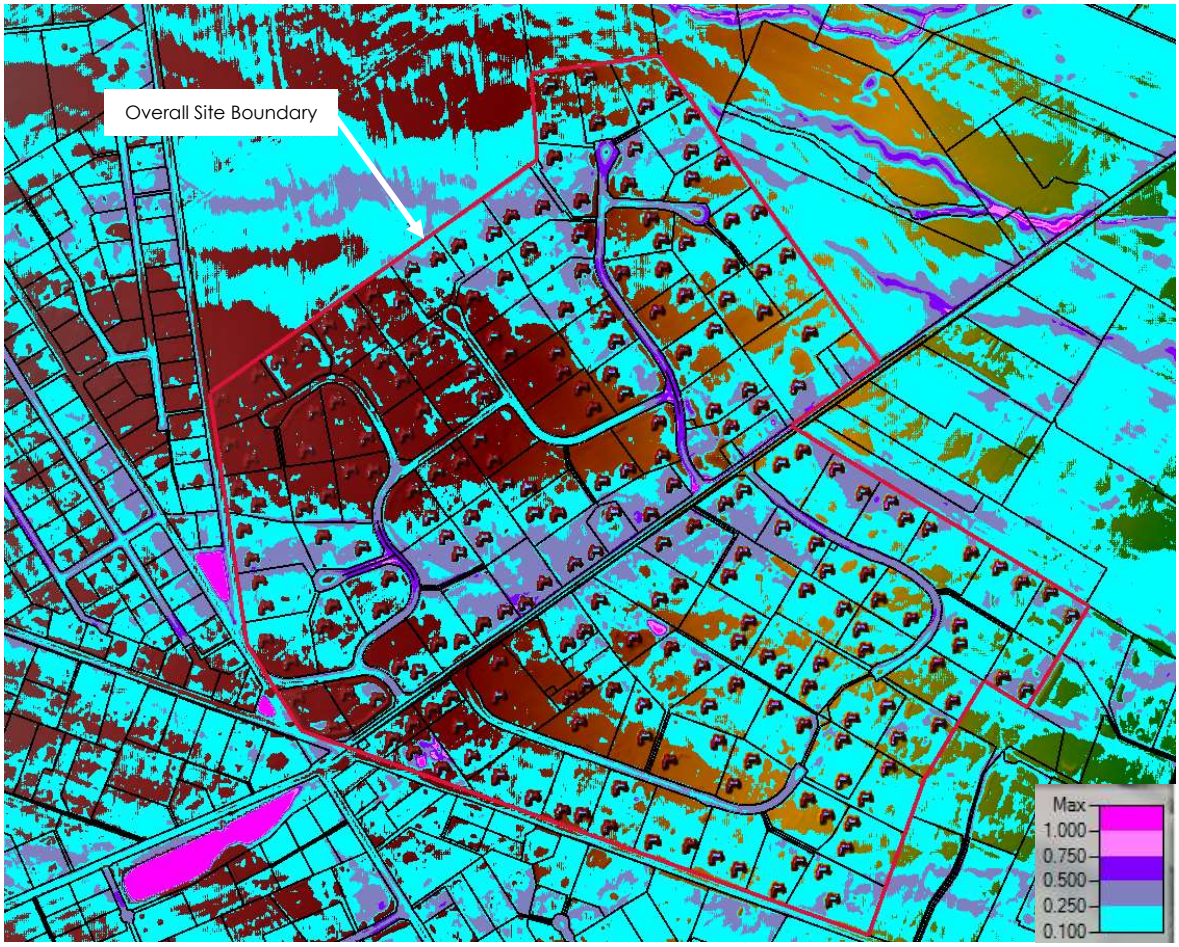


Figure 12. 200 Year Post-development Flood Depths

Figure 13 shows the difference between the pre-development and post-development flood depths and the flood effects associated with the proposed rezoning of land. As shown, there is a flood depth increase around the proposed building platforms, as the overland flows go around each building. This also results in a flood depth increase to some neighbouring properties to the north of the Site, which is further discussed below.

Note: The differences less than 5 mm are not shown on the results map.

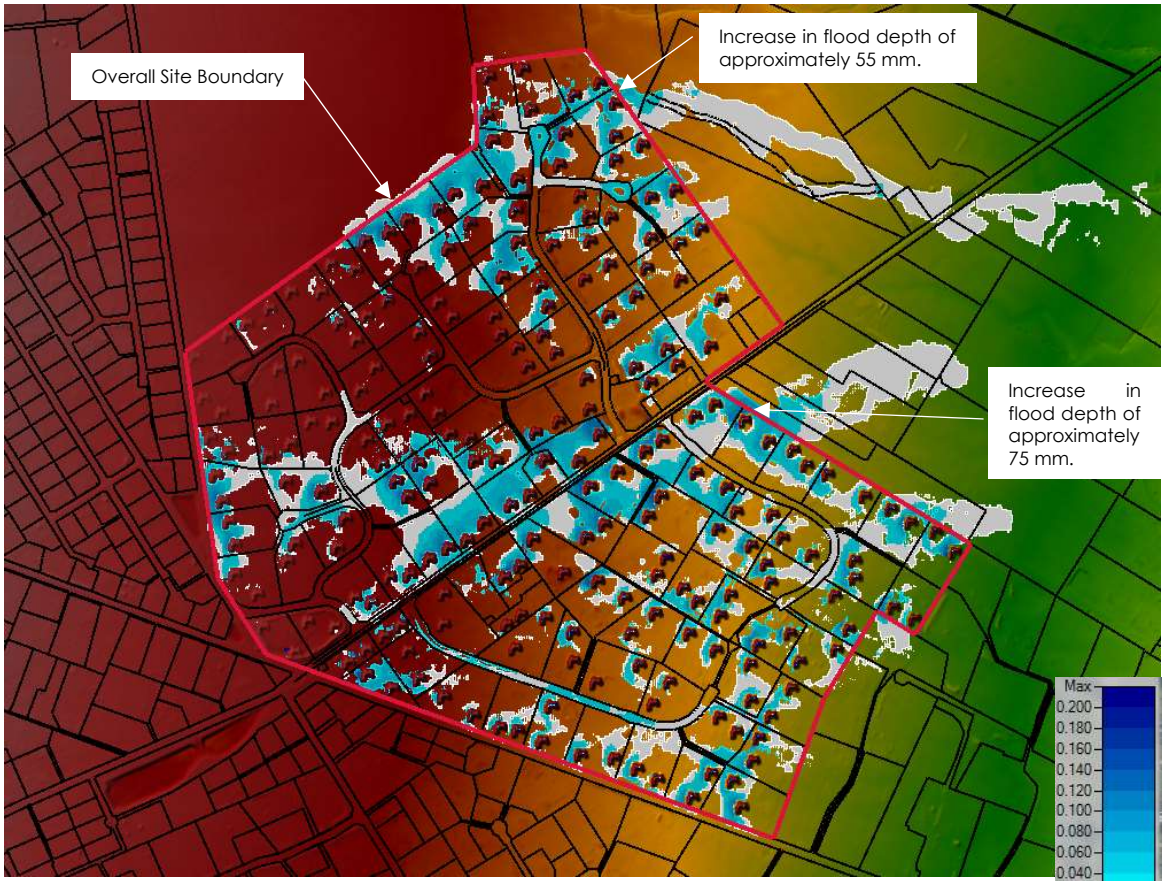


Figure 13. Post-development vs Pre-Development Difference Map

6.2.1. Effects on Existing Lots within the Site

As shown in Figure 13, there is increase in flood depths within the existing lots due to the proposed new buildings. The flood depth increase varies from 10 mm up to 155 mm.

6.2.2. Effects on Existing Roads

The maximum increase in flood depths on existing carriageways due to proposed rezoning is shown in Table 1.

Table 1. Flood Effects on Existing Roads

Road Name	Increase in Flood Depth at Road Centreline (mm)	Increase in Flood Depth at Road-side Drain (mm)
Bradleys Road	50	100
Siena Place	25	25
Velino Place	-	20
Vicenza Drive	15	15
Modena Place	15	20
Wards Road	5	5
Dawsons Road	-	30
Biella Place	35	35

Road Name	Increase in Flood Depth at Road Centreline (mm)	Increase in Flood Depth at Road-side Drain (mm)
Verona Place	25	30
Sillano Place	26	30
Pesaro Lane	10	8

6.2.3. Effects on Neighbouring Properties

Figure 14 shows the surrounding properties (highlighted in blue) that are affected by the post-development flood effects.

Figure 14. Surrounding Properties considered for flood effects (highlighted in blue)

Table 2 provides the flood depths increase at surrounding properties.

Table 2. Flood Depth Effects at Surrounding Properties

Property Address	Increase in Flood Depths (mm)	Comments
Part RS 3591	25	The increase in flood depth has not affected any dwellings and this depth is within the pasture land.
RS 6459	41	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 1 DP 357102	20	The increase in flood depth has not affected any dwellings and this depth is within pasture land.

Property Address	Increase in Flood Depths (mm)	Comments
Lot 4 DP 3755	17	The increase in flood depth is up to 191 mm. The increase in flood depth has not affected anu dwellings and this depth is within pasture land.
Lot 9 DP 314202	55	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 2 DP 8301	8	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 1 DP 83609	8	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 3 DP 83609	7	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 1 DP 400028	18	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 2 DP 400028	25	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 1 DP 63843	34	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 2 DP 63843	70	The increase in flood depth around the existing dwellings is around 15mm. The increase in flood depth up to 70 mm is within pasture land.
Lot 3 DP 69126	10	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 3 DP 74232	65	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 4 DP 74232	15	The increase in flood depth has not affected any dwellings and this depth is within pasture land.

6.2.4. Egress Hazard Assessment

Austroads Guide to Road Design, Part 5: Drainage Design specifies that the maximum pedestrian safety criteria within flood waters is 0.4 m^2/s (also known as angular momentum). Where pedestrian safety is not of concern, the maximum value for vehicle safety is 0.6 m^2/s.

Figure 15 shows the Depth x Velocity Map for pre-development scenario. As shown, the angular momentum in most roads is less than 0,4 m^2/s with the exception of Vicenza Drive where the angular momentum is 0.50 m^2/s, Biella Avenue where the angular momentum is 0.57 m2/s and Siena Place where the angular momentum is 0.345 m^2/s.

Figure 15. Pre-development Map for Depth x Velocity

Figure 16 shows a map of depth x velocity for the post-development scenario. The graphs below show the increase in flood depths along the roads in more detail.

Figure 16. Post-development Map of Depth x Velocity

As shown on Figure 17, the angular momentum along the Vicenza Drive has increased from a maximum of 0.50 m^2/s to 0.56 m^2/s. Since the road does not have a footpath and it is considered that pedestrians are unlikely to be using the road in a flood event, therefore it is considered the road complies with the Austroad Guide maximum angular momentum requirement of 0.6 m^2/s for vehicle safety.

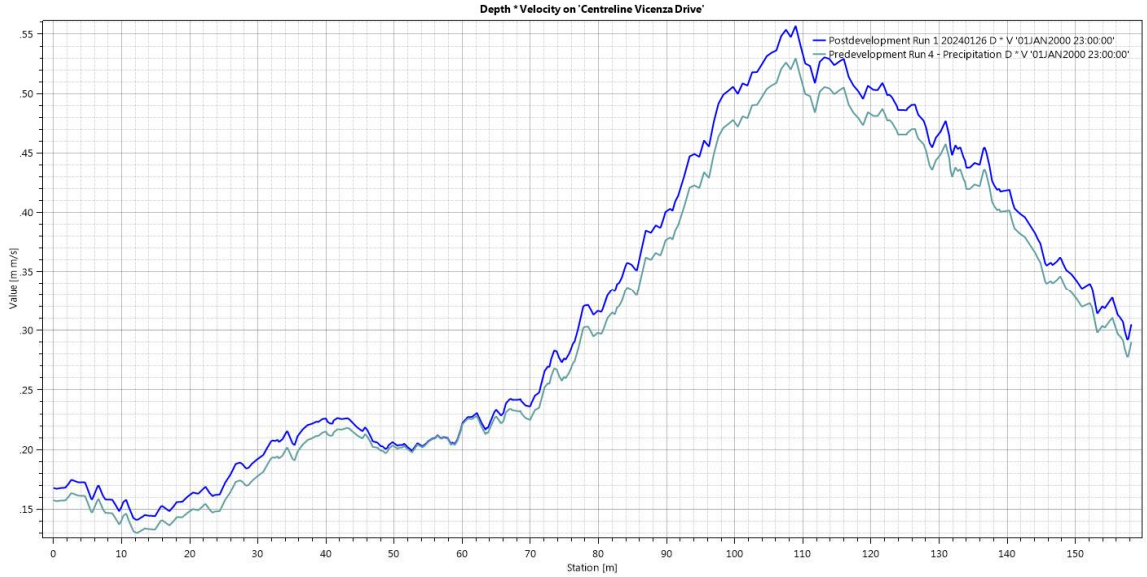


Figure 17. Depth x Velocity on Centreline of Vicenza Drive

As shown on Figure 18, the angular momentum along the Biella Place has increased from a maximum of 0.57 m^2/s to 0.59 m^2/s. As the road does not have a footpath and it is considered that pedestrians are unlikely to be using the road in a flood event, therefore it is considered the road complies with the Austroad Guide maximum angular momentum requirement of 0.6 m^2/s for vehicle safety.

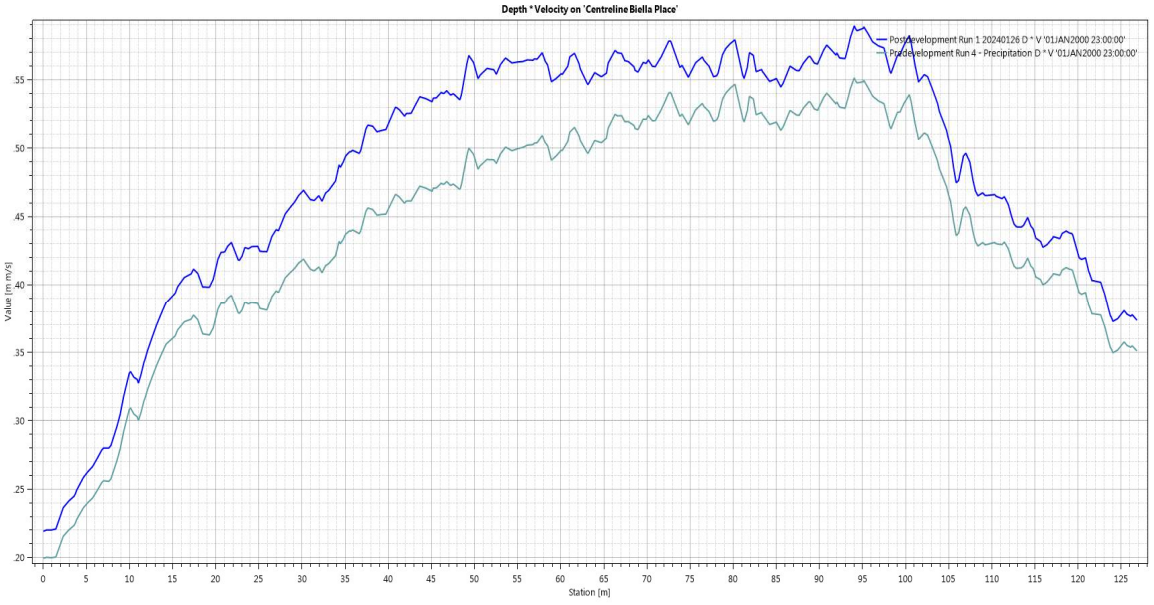


Figure 18. Depth x Velocity on Centreline of Biella Drive

As shown on Figure 19, the angular momentum along the Biella Place has decreased from 0.345 m^2/s to 0.34 m^2/s. As the road does not have a footpath, however the angular momentum is lower than 0.4

m^2/s, which complies with the maximum pedestrian safety criteria of 0.4 m^2/s from Austroad Guide to Road Design, Part 5: Drainage Design.

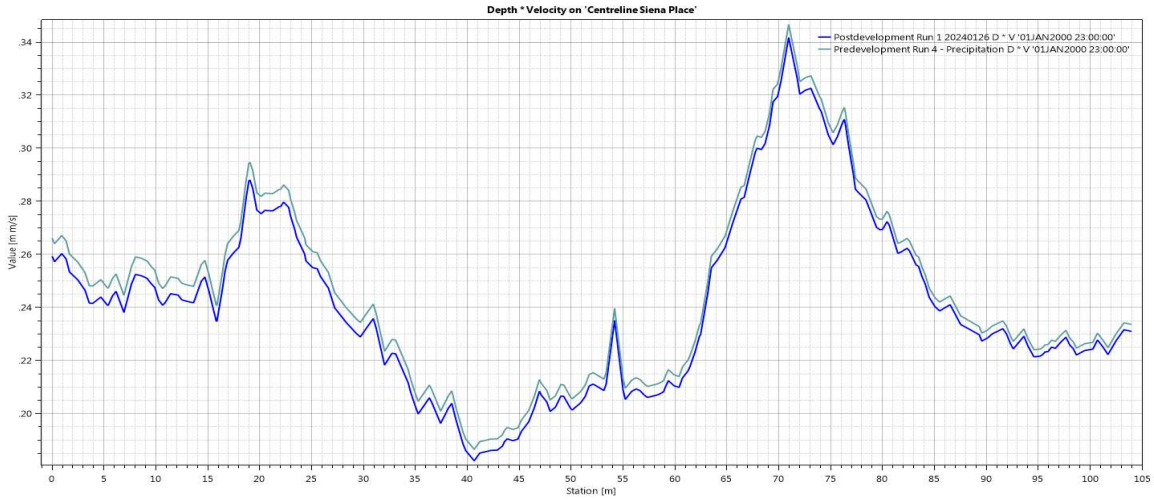


Figure 19. Depth x Velocity on Centreline of Siena Drive

All the other roads have angular momentum less than 0.4 m^2/s, which complies with the maximum angular momentum requirement for pedestrian safety from Austroad Guide to Road Design, Part 5: Drainage Design.

7. Proposed Building Finished Floor Level

The Waimakariri District Council (WDC) requires that the proposed building finished floor level be 500 mm above the 200 Year ARI flood level in a Medium Hazard Flood area and 400 mm above the 200 Year ARI flood level in a Low Hazard Flood area.

In accordance with the Waimakariri District Flood classification, areas with flood depths less than 0.3 m are considered Low Hazard Flood areas and with flood depths between 0.3 - 1m are considered Medium Hazard.

The post-development flood model for the Site (as shown in section 5) indicates that the flood depths within the Site vary from 10 mm to approximately 420 mm, therefore it is considered that parts of the Site are Low Hazard and parts Medium Hazard Flood areas.

Therefore, it is proposed that all the future residential dwellings should be 500 mm above the 200 Year ARI flood level.

The exact proposed building floor levels are not advised in this report and will need to be advised at building consent stage once the exact proposed building locations are known. However, the proposed future building floor levels should consider the increased flood depths indicated in Figure 13 of this flood assessment.

8. Conclusion

HEC RAS flood modelling has been carried out to determine the 200 Year flood effects of the proposed rezoning at San Dona, Mandeville on the surrounding properties and roads.

Pre and post-development scenarios were modelled within the plan change area and the surrounding properties. The pre-development flood depths were calibrated against the Waimakariri

flood model. The post-development model surface has included 2 building platforms at an assumed location in each lot within the Site.

A comparison between pre and post-development 200 Year flood depths, indicate the following flood increase within the Site, existing carriageways and the neighbouring properties:

- Within the Site, there is an increase in flood depths ranging from 10 mm to 200 mm in various locations.
- Within neighbouring properties to the north-east, there are flood depth increases varying between 5mm and 75mm at various locations
- Within existing carriageways, there is a flood depth increase of approximately 50mm at the road centreline and up to 100mm at the road edge.

Accessibility has been considered and although the angular momentum values have increased along existing carriageways, the highest value is 0.59 m2/s which is less than the Austroads safety criteria for vehicles.

9. Disclaimer

This report has been prepared by Eliot Sinclair & Partners Limited ("Eliot Sinclair") only for the intended purpose as a Flood Impact Assessment Report.

The report is based on:

- Lidar data (2020-2022) obtained from LINZ
- Waimakariri Flood Hazard Maps
- Flow Hydrograph and Rainfall Hyetograph obtained from Waimakariri District Council

Where data supplied by San Dona Landowner Group or other external sources, including previous site investigation reports, have been relied upon, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Eliot Sinclair for incomplete or inaccurate data supplied by other parties.

Whilst every care has been taken during our investigation and interpretation of Lidar data and the District flood maps to ensure that the conclusions drawn, and the opinions and recommendations expressed are correct at the time of reporting, the accuracy of the flood model and results is based on the accuracy of the Lidar data and a calibration of that data against the Waimakariri Flood Hazard maps. As such the post development flood modelling may include a margin of error, the extent of which is unknown at the time of writing this report. Eliot Sinclair does not provide any warranty, either express or implied, that all conditions will conform exactly to the assessments contained in this report.

The exposure of conditions or materials that vary from those described in this report, or any update to Lidar data or District flood maps may require a review of our recommendations. Eliot Sinclair should be contacted to confirm the validity of this report should any of these occur.

This report has been prepared for the benefit of San Dona Landowner Group and Waimakariri District Council for the purposes as stated above. No liability is accepted by Eliot Sinclair or any of their employees with respect to the use of this report, in whole or in part, for any other purpose or by any other part.

Appendix E. Austroad Road Design AGRD03-16-Ed13.4 Table 4.5: Single carriageway rural road widths

Element	Design AADT				
	1–150	150–500	500–1000	1000–3000	> 3000
Traffic lanes[1]	3.7 (1 x 3.7)	6.2 (2 x 3.1)	6.2–7.0 (2 x 3.1/3.5)	7.0 (2 x 3.5)	7.0 (2 x 3.5)
Total shoulder	2.5	1.5	1.5	2.0	2.5
Minimum shoulder seal[2],[3],[4],[5],[6]	0	0.5	0.5	1.0	1.5
Total carriageway	8.7	9.2	9.2–10.0	11.0	12.0

Appendix F. Capacity Letter from Services

29 January 2024

Jenish Manandhar
Civil Engineer
Eliot Sinclair

Dear Jenish,

RE: Confirmation of Support for Subdivision Project in Mandeville

We are writing to confirm our full support for the proposed subdivision project in Mandeville, particularly the rezoning of existing rural lifestyle lots to large residential lots. We appreciate your thoroughness in conducting the servicing capacity check and your inquiry regarding our network's ability to accommodate the anticipated development.

After careful evaluation, we are confident that Amuri Net possesses the necessary infrastructure and capacity to support the further subdivision of the existing lots. With 117 lots earmarked for potential rezoning, we understand the importance of ensuring that our network can adequately serve the increased demand resulting from this proposed change.

Based on our assessment, we have identified several indicative network upgrades that may be required to facilitate the subdivision process effectively. These upgrades encompass expanding our existing infrastructure, boosting capacity to handle increased data traffic, and integrating seamlessly with other essential utility services. We are committed to implementing these upgrades as needed to ensure the successful development of the residential lots.

Thank you for considering Amuri Net as your partner for this project. We are committed to supporting your efforts to enhance residential opportunities in Mandeville and look forward to collaborating closely with you throughout this endeavour.

Please do not hesitate to reach out to us should you have any questions or require further assistance. We are here to help.

Best regards,

Chris Roberts
Director
Amuri.net
021987691

12/02/2024- via email

Network Reference: MACK00061988

MainPower New Zealand Limited
172 Fernside Road, RD 1 Kaiapoi 7691
PO Box 346, Rangiora 7440
T. 0800 30 90 80

J Manandhar
Eliot Sinclair and Partners
20 Troup Drive
Christchurch 8011

Dear Jenish,

Re: Power Connection for Proposed Further Subdivision of existing San Dona subdivision Bradleys Road Mandeville.

MainPower confirms that the High voltage Network in the vicinity of San Dona, Bradleys Road Mandeville has the capacity to supply the proposed subdivision.

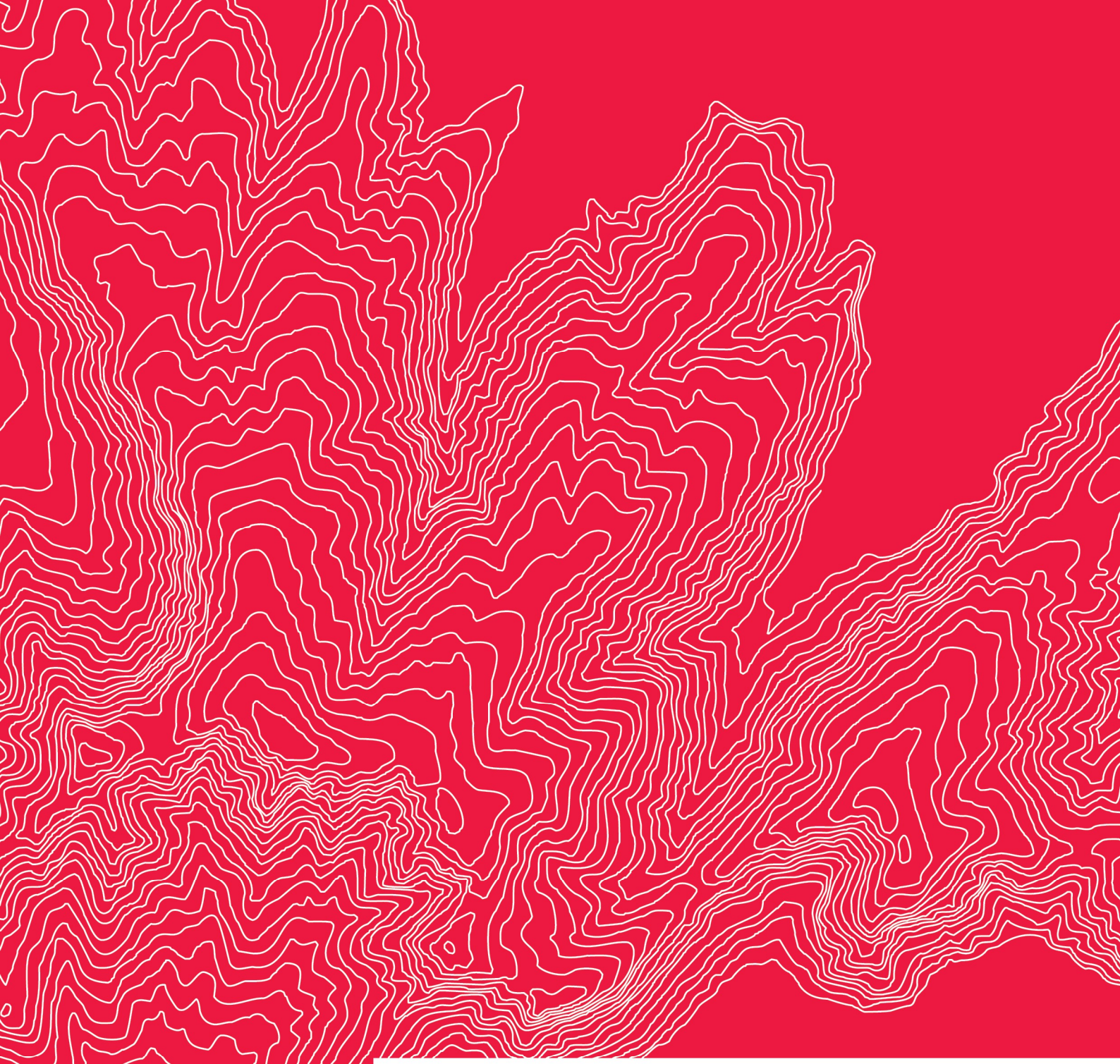
This letter is to advise you that MainPower's network has the capacity for the proposed subdivision. This does not mean that there is an electrical supply to the boundary of the proposed lots.

Please do not hesitate to contact the MainPower NZ Ltd NSR Team on 03 311 8311 or NSR@mainPower.co.nz if you have any questions.

Yours sincerely,

Matthew Bate
Network Services Representative

Appendix E. Flood Impact Assessment



Flood Impact Assessment

Version A

eliot sinclair

San Dona, Mandeville

Prepared for San Dona Landowner Group

520977

Flood Impact Assessment

San Dona, Mandeville

Prepared for San Dona Landowner Group

520977

Quality Control Certificate

Eliot Sinclair & Partners Limited

eliotsinclair.co.nz

Action	Name	Signature	Date
Prepared by:	Jenish Manandhar Civil Engineer DipEng Civil jenish.manandhar@eliotsinclair.co.nz		02 February 2024
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Directed and approved for release by:	Stephany Pandrea 3 Waters Engineer BE(Hons) Civil CMEngNZ CPEng stephany.pandrea@eliotsinclair.co.nz		02 February 2024
Status:	Version A		
Release date:	02 February 2024		
Distributed to:	San Dona Landowner Group Waimakariri District Council		

Version History

Status	Description	Author	Release Date
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1. Introduction

Eliot Sinclair has been engaged by San Dona Landowner Group to carry out a Flood Impact Assessment to assist with the rezoning application of 117 existing lots in San Dona, Mandeville (referred as "the Site") from rural lifestyle lots to the large residential lots.

2. Scope of works

Eliot Sinclair has prepared this Flood Impact Assessment for 117 existing lots in San Dona, Mandeville to support the application for land use plan change. The report has been prepared to provide an assessment of the flooding effects of the proposed development on:

- Existing overland flow paths
- Flooding at surrounding properties
- Accessibility within existing council vested carriageways

3. Site description

The Site is located in Mandeville North, Waimakariri and is bordered by Tram Road to the south, Dawsons Road to the west, and pastures to the north and east. The Site consists of 117 existing rural lifestyle lots with existing carriageways including Bradleys Road which runs central of the Site from south-west to the north-east. Generally, the individual lots within the Site consist of residential dwellings with a few associated structures and pasture areas.

The aerial imagery illustrating the extent of the Site for the proposed land change application is shown in Figure 1 below.

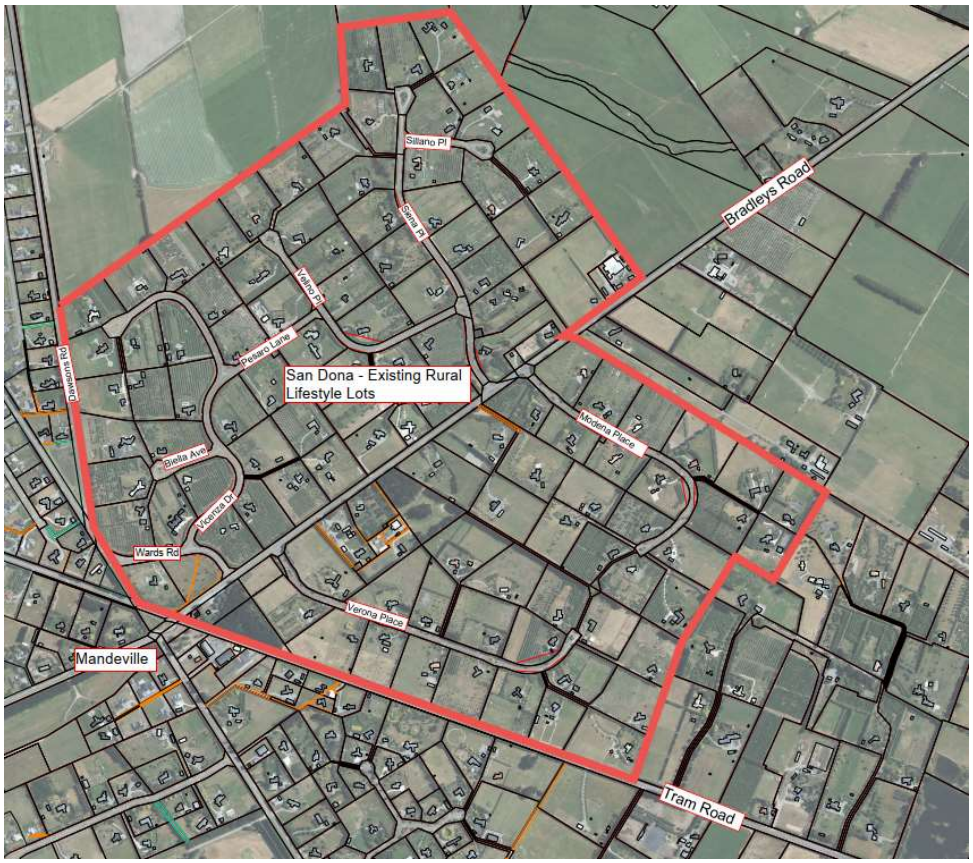

Figure 1. Aerial Imagery illustrating extent of the Site (within red border) for proposed land change.

4. Waimakariri Flood Hazard Maps

The Waimakariri Flood Hazard Map gives the predicted flood depths at the Site for the 200 Year Annual Recurrence Interval (ARI) rainfall event as shown in Figure 2.

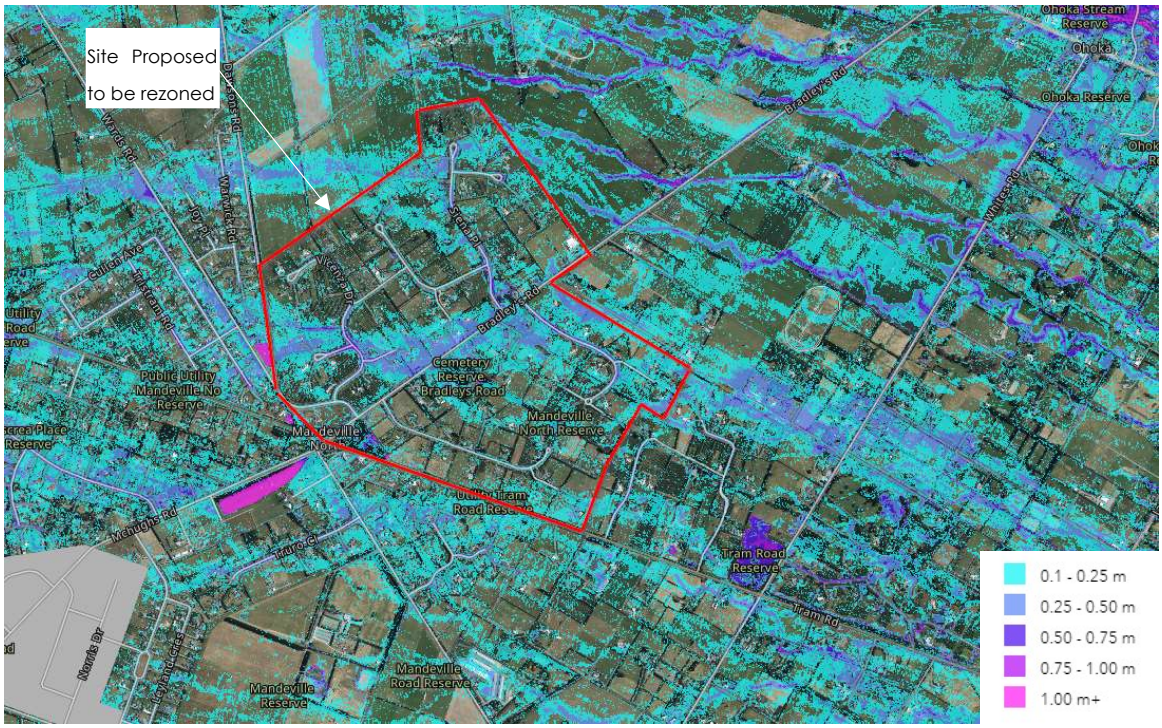

Figure 2. Predicted 200 Year Flood Depths (source: Waimakariri Flood Model)

Figure 3 indicates that the flood hazard within the Site is Low to Medium.

Figure 3. Current Level of Flood Hazard at the Site (source: Waimakariri Flood Hazard Map)

5. HEC RAS Flood Modelling Setup

200year ARI Flood modelling has been carried out using the U.S Army Corps of Engineers' Hydrologic Engineering Center (HEC) River Analysis System (RAS) software to determine the effects of the rezoning from rural lifestyle to large residential lots at San Dona, Mandeville.

HEC RAS has been used to model the pre and post development flood flow patterns within the Site and surrounding properties. Figure 4 shows the extent of the model layout.

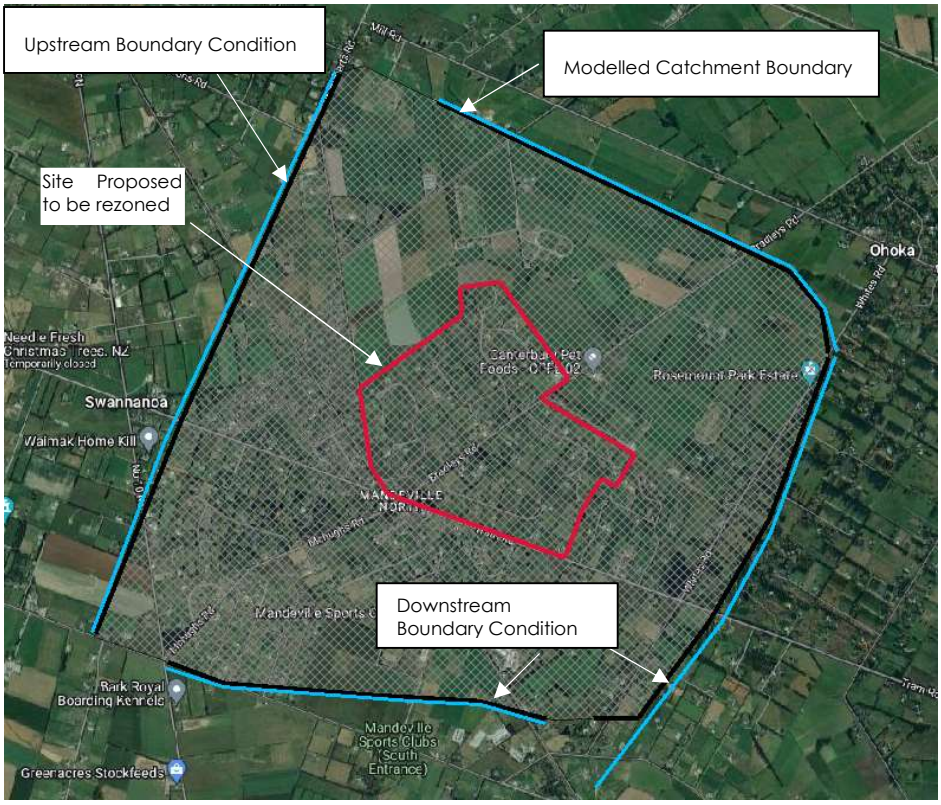

Figure 4. Flood Model Extents

5.1. Modelling Parameters and Data

The Site is sloping towards the east and therefore the flow in the HEC RAS model was applied in the same direction with the upstream boundary condition to the west and the downstream boundary condition to the east.

The 200year flow hydrograph provided by Waimakariri District Council, shown in Figure 6, was applied to the catchment along the upstream boundary condition. A precipitation hyetograph for the 200year ARI 24-hour duration provided by Waimakariri District Council, shown in Figure 5, was also applied as rain on grid across the modelled catchment.

The downstream boundary condition was set to normal depth with the slope of the downstream LiDAR surface.

The pre-development flood depths were visually calibrated with the Waimakariri Flood Map depths. The same flow and rainfall depths were applied in the post-development model.

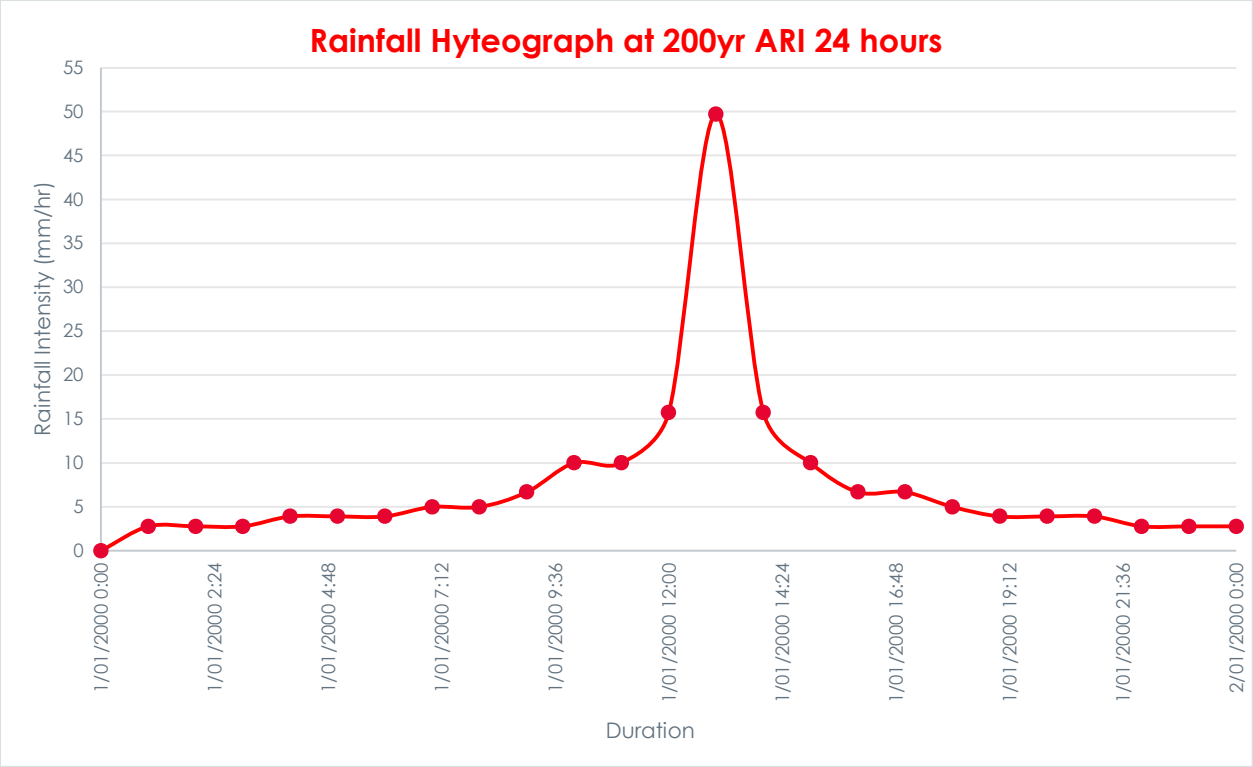

Figure 5. Rainfall Hyetograph for 200yr ARI 24 hrs Duration

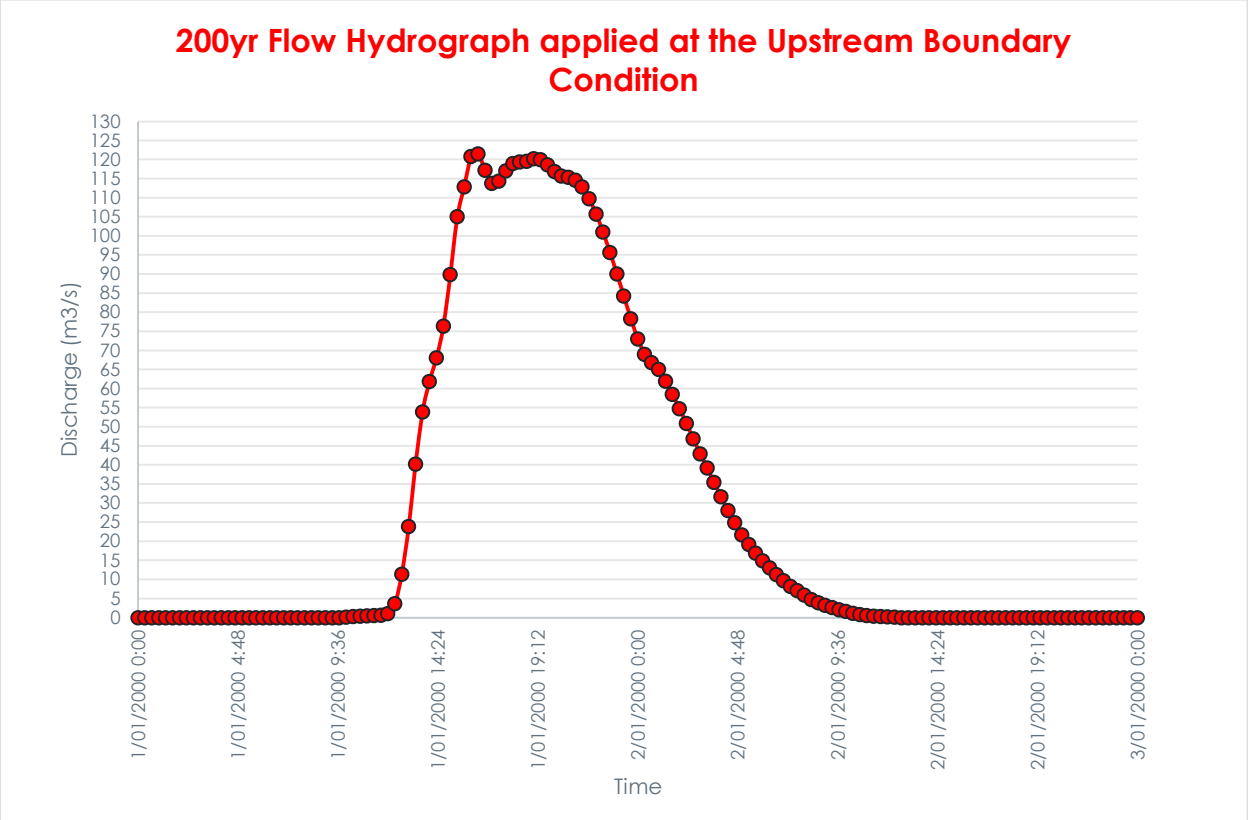

Figure 6. 200yr ARI flow Hydrograph Provided by Waimakariri District Council

5.1.1. Pre-development model surface

The pre-development model surface was based on the most recent LINZ LiDAR data (2020-2022) as shown in Figure 7.

A default roughness coefficient of 0.06 for short grass was applied for the pre-development scenario.

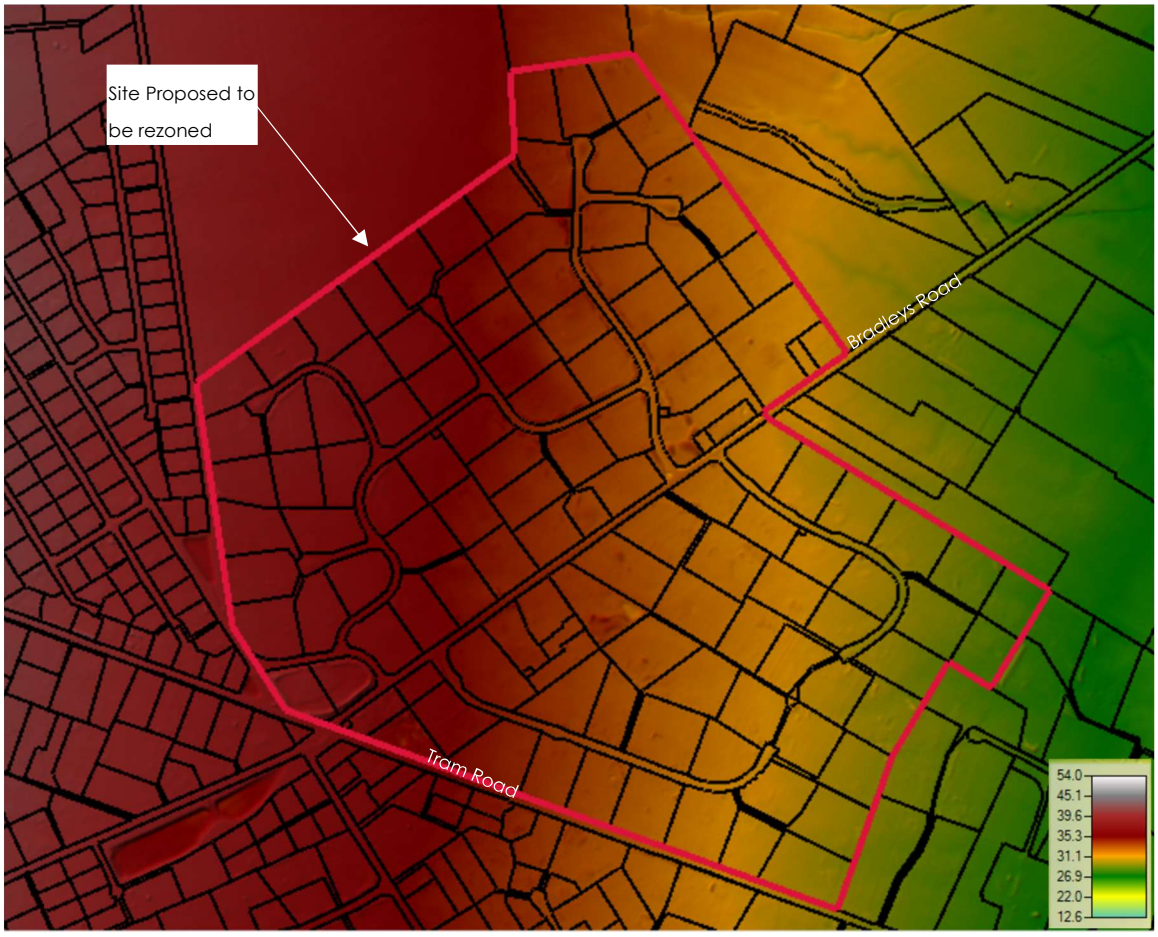

Figure 7. Pre-development 3D Topographical Surface

5.1.2. Post-development model surface

The post-development model surface was based on the most recent LINZ LiDAR (2020-2022) with 2 building platforms added within each lot with elevation R.L. 40.0 m, as shown in Figure 8. The proposed building platforms is a preliminary assumption of the proposed location of the future dwellings within each lot for modelling purposes only.

Figure 8. Post-development 3D Topographical Surface

5.1.3. Modelling Computation

Both pre-development and post-development models were computed with a time step of 2 seconds. A grid size of 5 m x 5 m was used for the overall model extent.

5.1.4. Soil Infiltration

Soil infiltration was not included within the modelling therefore, it is assumed that the ground is fully saturated throughout the simulation.

5.1.5. Ground Water Resurgence

Ground water resurgence was not included within the modelling therefore, it is assumed that the ground water table does not affect the overland flows generated from 200yr flood event.

5.1.6. Margin of Error

The pre and post-development flood modelling will have an unknown margin of error resulting from the following:

- The flow hydrograph and rainfall hyetograph provided by Waimakariri District Council was applied on the model and was used to produce flood depths that match the Waimakariri Flood map depths. The flood depths were calibrated visually against Waimakariri Flood Maps.
- Exclusion of fence lines, trees and other potential obstruction to the flood passage.
- Accuracy of the LINZ LiDAR Surface
- The size of the grid used throughout the catchment and timesteps will incorporate a level of sensitivity error.
- Soils infiltration has not been included

6. HEC RAS Flood Modelling Results

6.1. Effects on Overland Flow Path

Figure 9 shows the existing overland flow paths conveyed through the Site. As indicated, the overland flows are conveyed from west to east over the Dawsons Road, through the Site, Vicenza Drive and Wards Road into the Bradleys Road Drain. Eventually during the storm, the Bradleys Road Drain reaches a maximum capacity and overflows over the Bradleys Road into the lots east of Bradleys Road and flows towards the east of the Site. Another overland flow from the north flows into the Site through existing lots, Siena Place and Sillano Place and flows east of the Site. Refer to Figure 1 for existing road names and location.

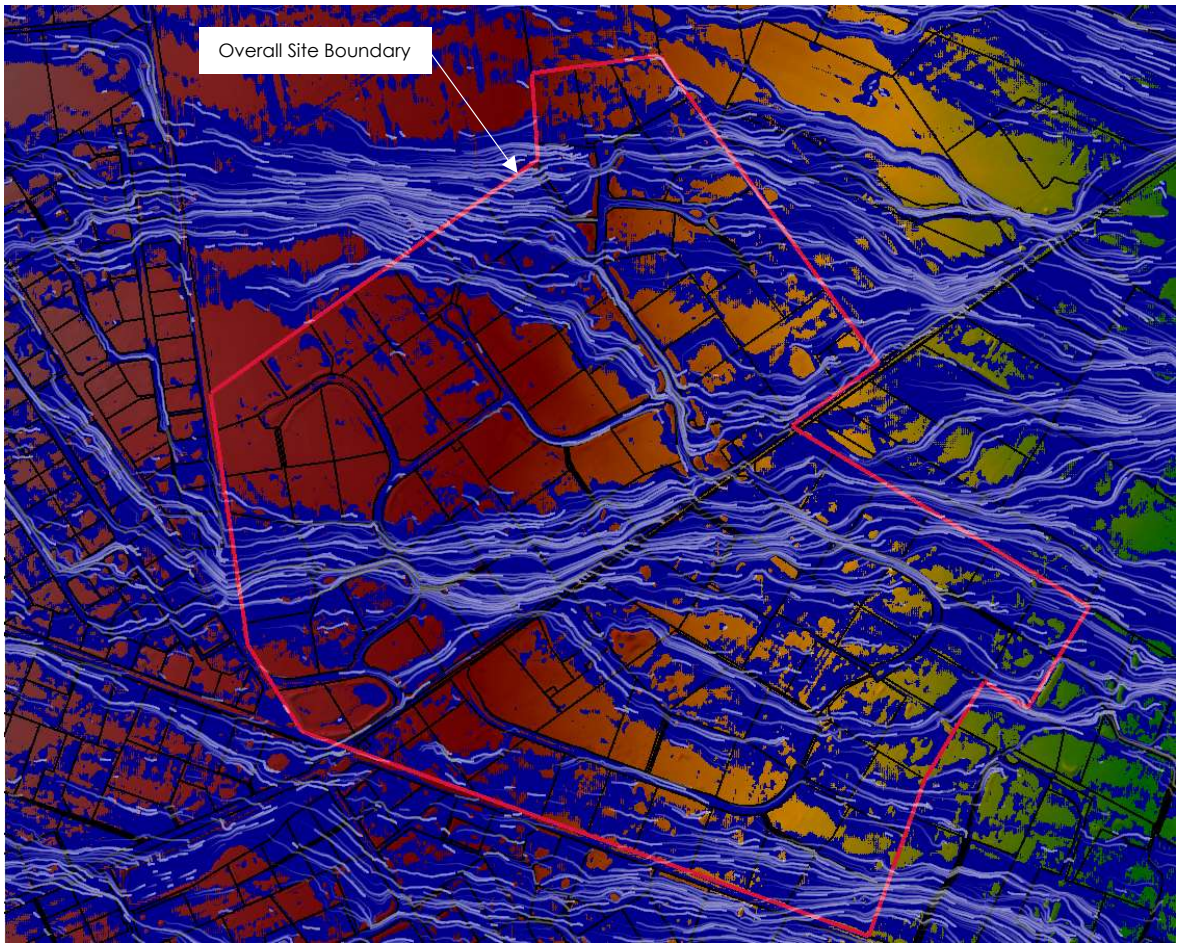

Figure 9. Pre-development Overland Flow Paths

Figure 10 shows the post-development overland flow paths. As indicated, the overland flow paths flowing through the Site are now flowing around the assumed locations of future building platforms.

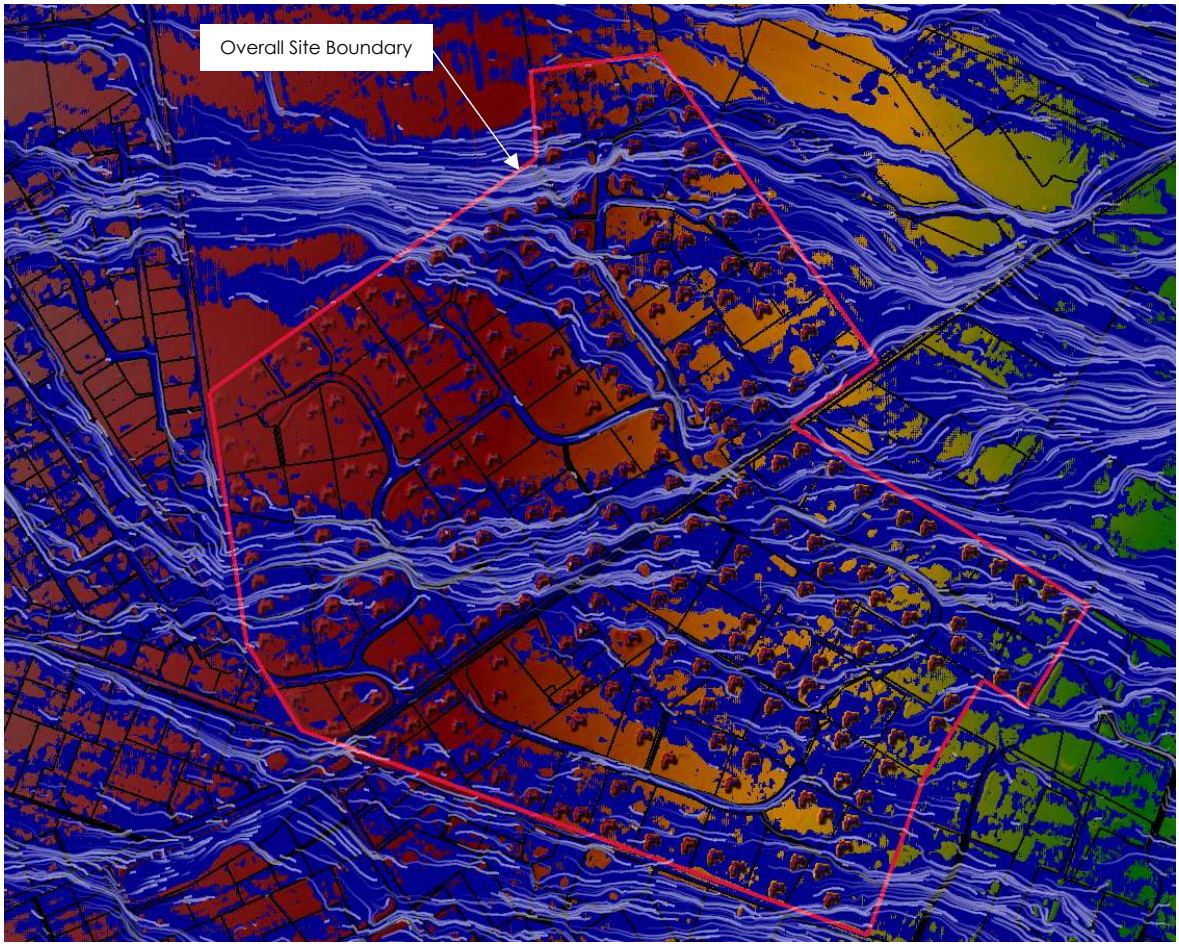

Figure 10. Post-development Overland Flow Paths

However, by visual comparison of the pre and post-development overland flow paths, the overall pre-development and the post-development flow paths are similar and the flow characteristics of pre-development flow paths are generally maintained.

6.2. 200 Year Flood Depths

Figure 11 provides the HEC RAS pre-development flood depths results map. As shown the pre-development flood depths generally match the Waimakariri 200 Year Flood Maps depths shown in Figure 2.

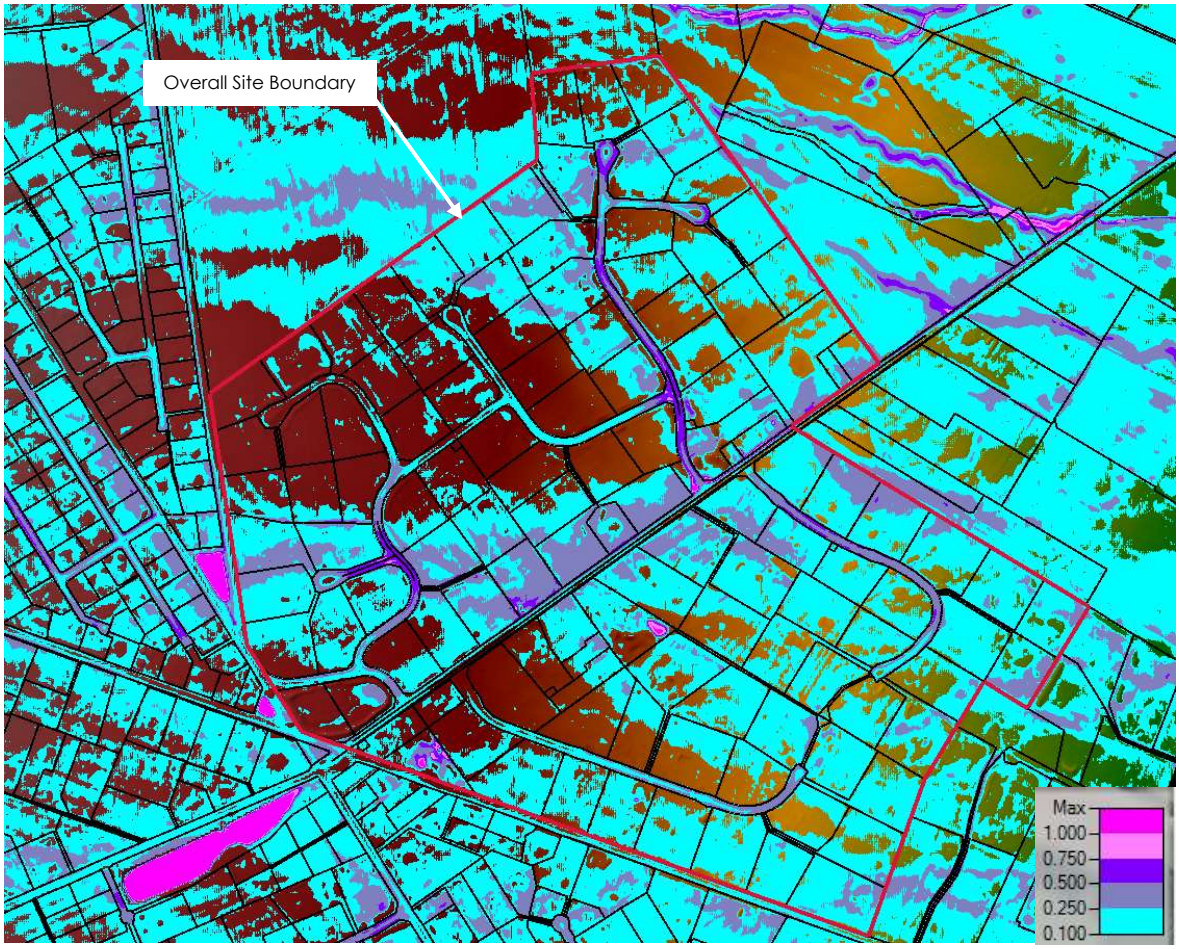

Figure 11. 200 Year Pre-development Flood Depths

It should be noted that the WDC 200 Year Flood Map (Figure 2) does not include the flood depths less than 100 mm, whereas the HEC RAS pre-development model does not include flood depths less than 50 mm.

The HEC RAS post-development flood depths results map is shown in Figure 12 .

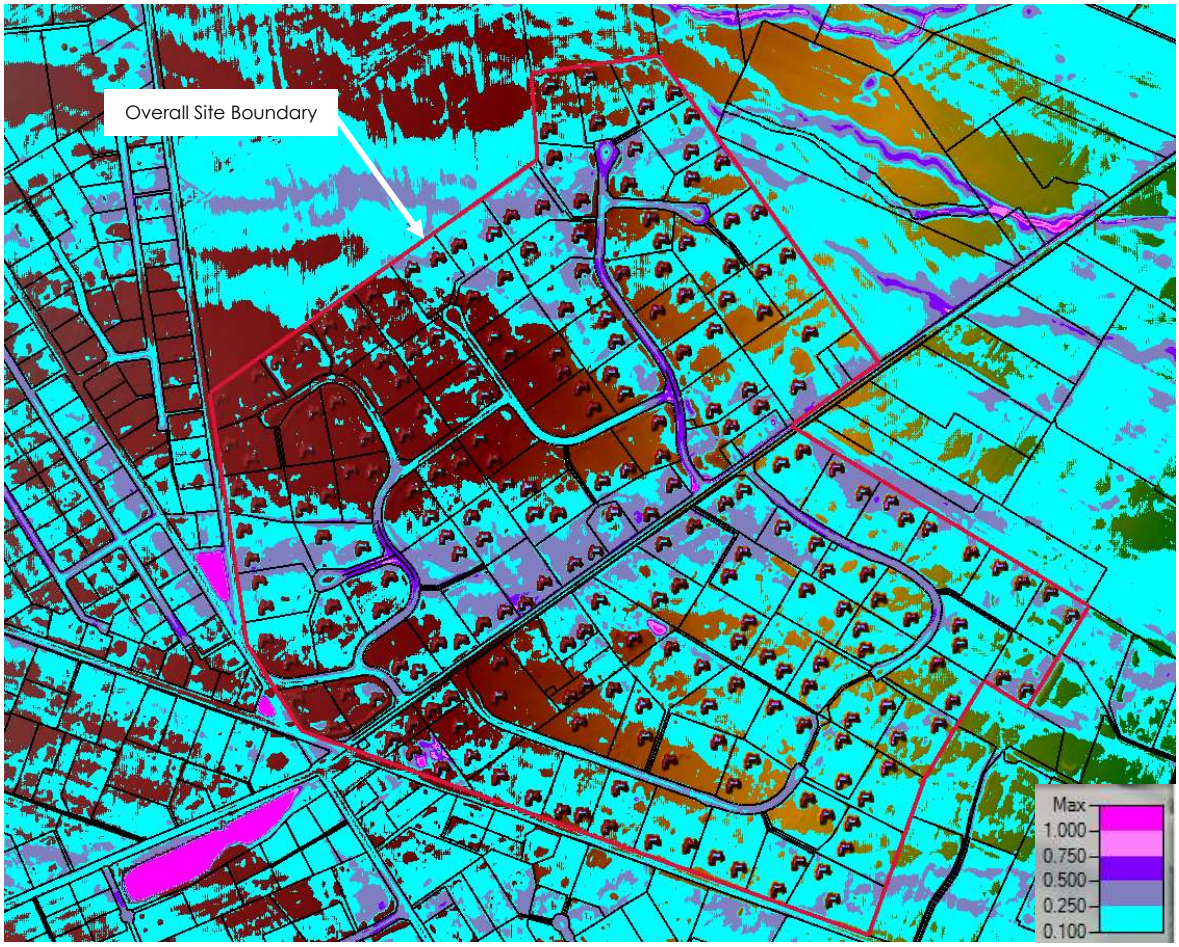

Figure 12. 200 Year Post-development Flood Depths

Figure 13 shows the difference between the pre-development and post-development flood depths and the flood effects associated with the proposed rezoning of land. As shown, there is a flood depth increase around the proposed building platforms, as the overland flows go around each building. This also results in a flood depth increase to some neighbouring properties to the north of the Site, which is further discussed below.

Note: The differences less than 5 mm are not shown on the results map.

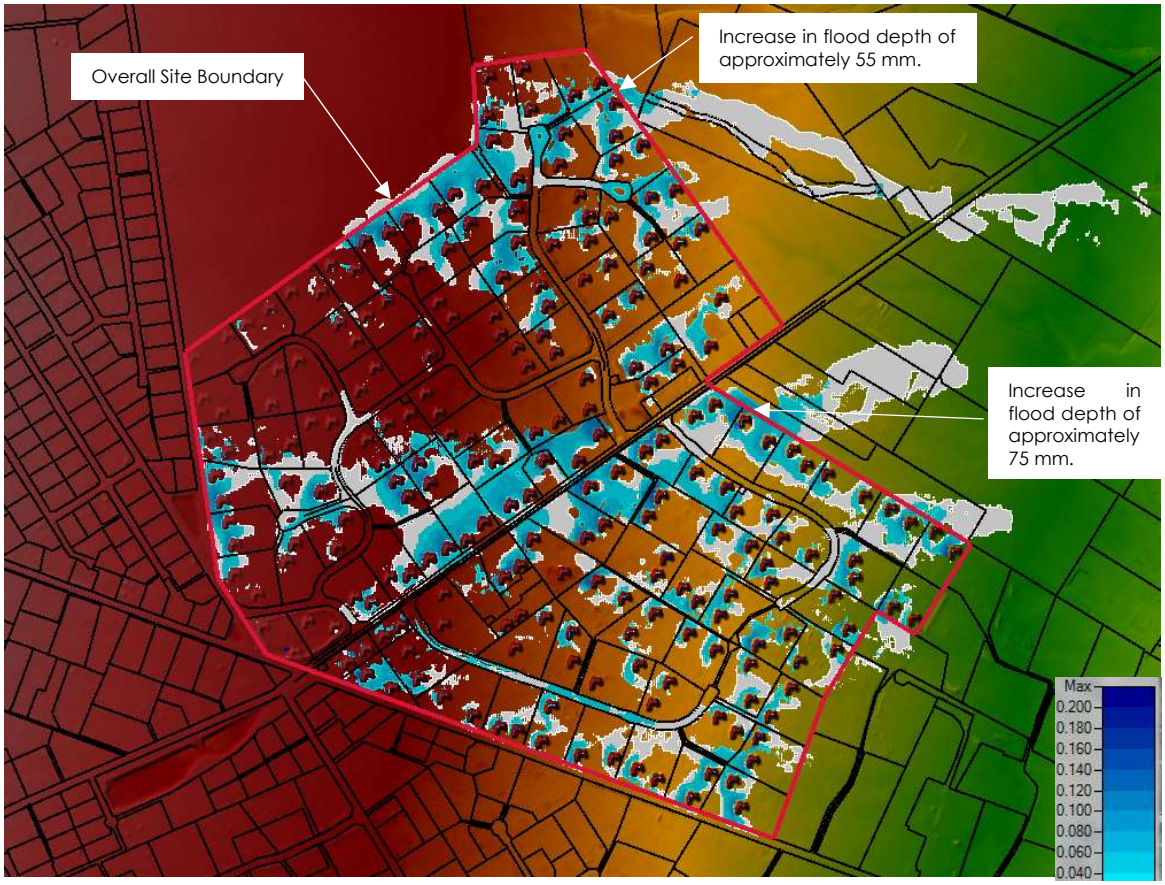

Figure 13. Post-development vs Pre-Development Difference Map

6.2.1. Effects on Existing Lots within the Site

As shown in Figure 13, there is increase in flood depths within the existing lots due to the proposed new buildings. The flood depth increase varies from 10 mm up to 155 mm.

6.2.2. Effects on Existing Roads

The maximum increase in flood depths on existing carriageways due to proposed rezoning is shown in Table 1.

Table 1. Flood Effects on Existing Roads

Road Name	Increase in Flood Depth at Road Centreline (mm)	Increase in Flood Depth at Road-side Drain (mm)
Bradleys Road	50	100
Siena Place	25	25
Velino Place	-	20
Vicenza Drive	15	15
Modena Place	15	20
Wards Road	5	5
Dawsons Road	-	30
Biella Place	35	35

Road Name	Increase in Flood Depth at Road Centreline (mm)	Increase in Flood Depth at Road-side Drain (mm)
Verona Place	25	30
Sillano Place	26	30
Pesaro Lane	10	8

6.2.3. Effects on Neighbouring Properties

Figure 14 shows the surrounding properties (highlighted in blue) that are affected by the post-development flood effects.

Figure 14. Surrounding Properties considered for flood effects (highlighted in blue)

Table 2 provides the flood depths increase at surrounding properties.

Table 2. Flood Depth Effects at Surrounding Properties

Property Address	Increase in Flood Depths (mm)	Comments
Part RS 3591	25	The increase in flood depth has not affected any dwellings and this depth is within the pasture land.
RS 6459	41	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 1 DP 357102	20	The increase in flood depth has not affected any dwellings and this depth is within pasture land.

Property Address	Increase in Flood Depths (mm)	Comments
Lot 4 DP 3755	17	The increase in flood depth is up to 191 mm. The increase in flood depth has not affected anu dwellings and this depth is within pasture land.
Lot 9 DP 314202	55	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 2 DP 8301	8	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 1 DP 83609	8	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 3 DP 83609	7	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 1 DP 400028	18	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 2 DP 400028	25	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 1 DP 63843	34	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 2 DP 63843	70	The increase in flood depth around the existing dwellings is around 15mm. The increase in flood depth up to 70 mm is within pasture land.
Lot 3 DP 69126	10	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 3 DP 74232	65	The increase in flood depth has not affected any dwellings and this depth is within pasture land.
Lot 4 DP 74232	15	The increase in flood depth has not affected any dwellings and this depth is within pasture land.

6.2.4. Egress Hazard Assessment

Austroads Guide to Road Design, Part 5: Drainage Design specifies that the maximum pedestrian safety criteria within flood waters is 0.4 m^2/s (also known as angular momentum). Where pedestrian safety is not of concern, the maximum value for vehicle safety is 0.6 m^2/s.

Figure 15 shows the Depth x Velocity Map for pre-development scenario. As shown, the angular momentum in most roads is less than 0,4 m^2/s with the exception of Vicenza Drive where the angular momentum is 0.50 m^2/s, Biella Avenue where the angular momentum is 0.57 m2/s and Siena Place where the angular momentum is 0.345 m^2/s.

Figure 15. Pre-development Map for Depth x Velocity

Figure 16 shows a map of depth x velocity for the post-development scenario. The graphs below show the increase in flood depths along the roads in more detail.

Figure 16. Post-development Map of Depth x Velocity

As shown on Figure 17, the angular momentum along the Vicenza Drive has increased from a maximum of 0.50 m^2/s to 0.56 m^2/s. Since the road does not have a footpath and it is considered that pedestrians are unlikely to be using the road in a flood event, therefore it is considered the road complies with the Austroad Guide maximum angular momentum requirement of 0.6 m^2/s for vehicle safety.

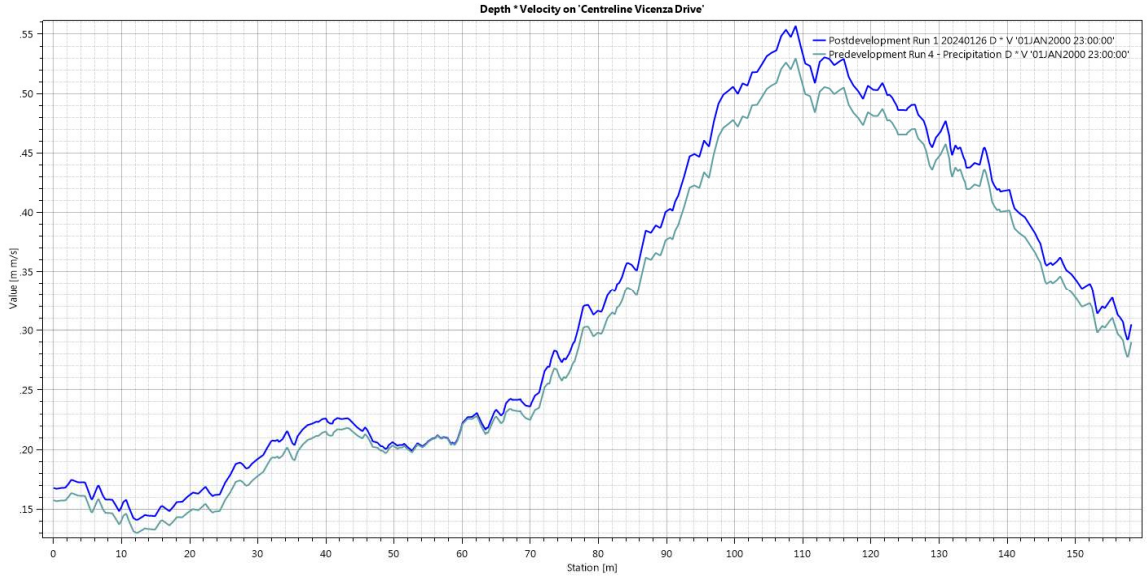

Figure 17. Depth x Velocity on Centreline of Vicenza Drive

As shown on Figure 18, the angular momentum along the Biella Place has increased from a maximum of 0.57 m^2/s to 0.59 m^2/s. As the road does not have a footpath and it is considered that pedestrians are unlikely to be using the road in a flood event, therefore it is considered the road complies with the Austroad Guide maximum angular momentum requirement of 0.6 m^2/s for vehicle safety.

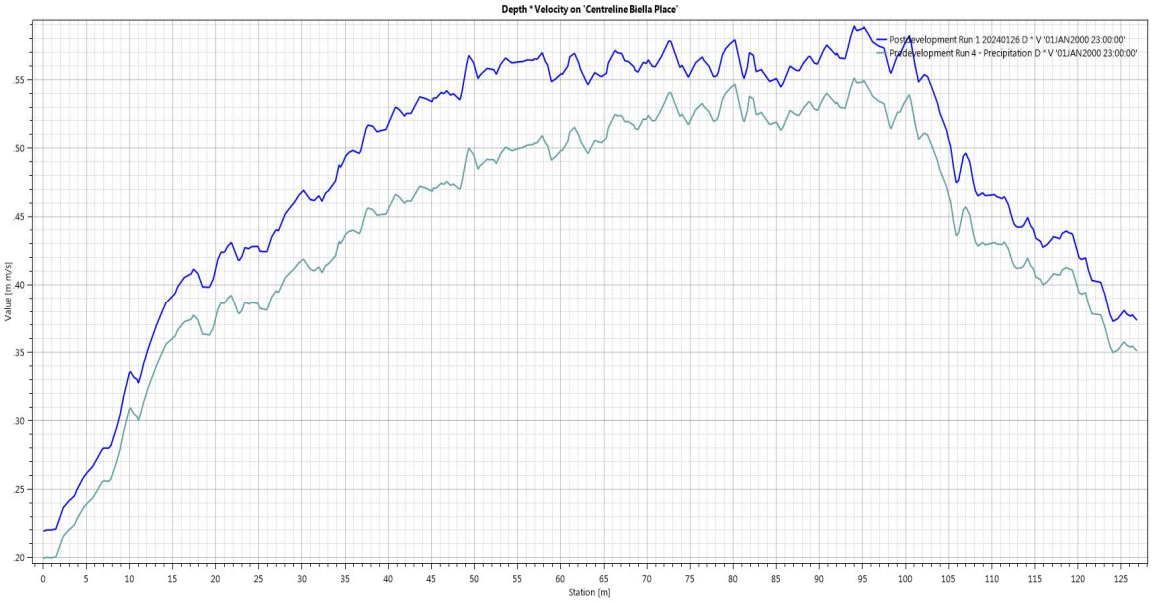

Figure 18. Depth x Velocity on Centreline of Biella Drive

As shown on Figure 19, the angular momentum along the Biella Place has decreased from 0.345 m^2/s to 0.34 m^2/s. As the road does not have a footpath, however the angular momentum is lower than 0.4

m^2/s, which complies with the maximum pedestrian safety criteria of 0.4 m^2/s from Austroad Guide to Road Design, Part 5: Drainage Design.

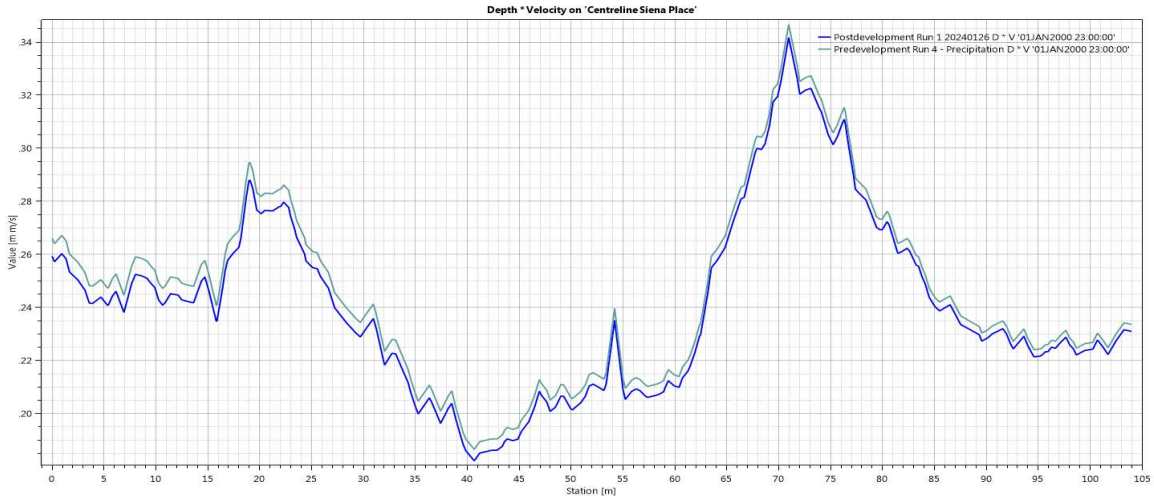

Figure 19. Depth x Velocity on Centreline of Siena Drive

All the other roads have angular momentum less than 0.4 m^2/s, which complies with the maximum angular momentum requirement for pedestrian safety from Austroad Guide to Road Design, Part 5: Drainage Design.

7. Proposed Building Finished Floor Level

The Waimakariri District Council (WDC) requires that the proposed building finished floor level be 500 mm above the 200 Year ARI flood level in a Medium Hazard Flood area and 400 mm above the 200 Year ARI flood level in a Low Hazard Flood area.

In accordance with the Waimakariri District Flood classification, areas with flood depths less than 0.3 m are considered Low Hazard Flood areas and with flood depths between 0.3 - 1m are considered Medium Hazard.

The post-development flood model for the Site (as shown in section 5) indicates that the flood depths within the Site vary from 10 mm to approximately 420 mm, therefore it is considered that parts of the Site are Low Hazard and parts Medium Hazard Flood areas.

Therefore, it is proposed that all the future residential dwellings should be 500 mm above the 200 Year ARI flood level.

The exact proposed building floor levels are not advised in this report and will need to be advised at building consent stage once the exact proposed building locations are known. However, the proposed future building floor levels should consider the increased flood depths indicated in Figure 13 of this flood assessment.

8. Conclusion

HEC RAS flood modelling has been carried out to determine the 200 Year flood effects of the proposed rezoning at San Dona, Mandeville on the surrounding properties and roads.

Pre and post-development scenarios were modelled within the plan change area and the surrounding properties. The pre-development flood depths were calibrated against the Waimakariri

flood model. The post-development model surface has included 2 building platforms at an assumed location in each lot within the Site.

A comparison between pre and post-development 200 Year flood depths, indicate the following flood increase within the Site, existing carriageways and the neighbouring properties:

- Within the Site, there is an increase in flood depths ranging from 10 mm to 200 mm in various locations.
- Within neighbouring properties to the north-east, there are flood depth increases varying between 5mm and 75mm at various locations
- Within existing carriageways, there is a flood depth increase of approximately 50mm at the road centreline and up to 100mm at the road edge.

Accessibility has been considered and although the angular momentum values have increased along existing carriageways, the highest value is 0.59 m2/s which is less than the Austroads safety criteria for vehicles.

9. Disclaimer

This report has been prepared by Eliot Sinclair & Partners Limited ("Eliot Sinclair") only for the intended purpose as a Flood Impact Assessment Report.

The report is based on:

- Lidar data (2020-2022) obtained from LINZ
- Waimakariri Flood Hazard Maps
- Flow Hydrograph and Rainfall Hyetograph obtained from Waimakariri District Council

Where data supplied by San Dona Landowner Group or other external sources, including previous site investigation reports, have been relied upon, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Eliot Sinclair for incomplete or inaccurate data supplied by other parties.

Whilst every care has been taken during our investigation and interpretation of Lidar data and the District flood maps to ensure that the conclusions drawn, and the opinions and recommendations expressed are correct at the time of reporting, the accuracy of the flood model and results is based on the accuracy of the Lidar data and a calibration of that data against the Waimakariri Flood Hazard maps. As such the post development flood modelling may include a margin of error, the extent of which is unknown at the time of writing this report. Eliot Sinclair does not provide any warranty, either express or implied, that all conditions will conform exactly to the assessments contained in this report.

The exposure of conditions or materials that vary from those described in this report, or any update to Lidar data or District flood maps may require a review of our recommendations. Eliot Sinclair should be contacted to confirm the validity of this report should any of these occur.

This report has been prepared for the benefit of San Dona Landowner Group and Waimakariri District Council for the purposes as stated above. No liability is accepted by Eliot Sinclair or any of their employees with respect to the use of this report, in whole or in part, for any other purpose or by any other part.

Appendix F. Natural Hazard Risk Assessment

Desktop Natural Hazards Risk Assessment Report

Version A

eliot sinclair

San Dona Development, Mandeville

Prepared for San Dona Landowners Group

520977

Desktop Natural Hazards Risk Assessment Report

San Dona Development, Mandeville

Prepared for San Dona Landowners Group

520977

Quality Control Certificate

Eliot Sinclair & Partners Limited

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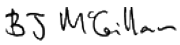
Directed and approved for release by:	Bryan McGillan Resource Management Planner BAppSc, MNZPI & RMLA		13 February 2024
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Version History

Status	Description	Author	Release Date
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Executive Summary

Eliot Sinclair & Partners Ltd was engaged by San Dona Landowners Group to undertake a calibrated desktop assessment to rezone the San Dona development ('the site') from Rural Lifestyle Zone to Large Lot Residential Zone and to provide preliminary geotechnical foundation recommendations.

We have considered the risk associated with natural hazards in relation to the RMA:1991 and concluded that the risk and consequence of potential natural hazards is either acceptable or tolerable. For this site, the most relevant natural hazards are earthquake shaking, earthquake-induced land deformation, and flood inundation.

- **Methodology**

a) Our desktop assessment comprises of a review of available online geotechnical data and records that are relevant to the site and the wider area.

b) Eliot Sinclair has previously shallow soil investigations and is familiar with the local geotechnical conditions.

- **Key Findings**

a) The underlying ground model across the site comprise of topsoil over various layers of gravel to at least 10m depth. Groundwater is expected to range between 1-2.5m below ground level (bgl).

b) The Waimakariri District Natural Hazards Interactive viewer locates the site to be within a green-zoned area recorded as *'Liquefaction damage is unlikely'*. This infers the characteristic performance of the site is consistent with TC1 land performance, defined as *'future land damage from liquefaction is unlikely, and ground settlements are expected to be within normally accepted tolerances'*.

c) The general site is subjected to low to medium flood risk following a 200-year ARI event. Assuming normal good practice design and ensuring development controls are implemented, the risk of flooding following a 200-year ARI storm across the site is deemed tolerable for development.

d) We have concluded that the risk and consequence of potential natural hazards is either acceptable or tolerable.

- **Recommendations**

a) Providing normal good practice investigation, design and development controls are implemented we have found no significant risks from natural hazards that would prevent the granting of a plan change consent.

b) Any new foundations shall be subject to detailed investigation and design. We assess that it is likely that the proposed building structures can be supported on shallow foundations.

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Appendix A. San Dona Development Map

Appendix B. ECan Well Borehole Records

Appendix C. ESP Site Investigation Records

Appendix D. GNS Risk Assessment Method

1. Introduction

Eliot Sinclair & Partners Ltd was engaged by San Dona Landowners Group to undertake a calibrated desktop assessment to rezone the San Dona development ('the site') from Rural Lifestyle Zone to Large Lot Residential Zone and to provide preliminary geotechnical foundation recommendations.

In our preparation of the present report, we have relied exclusively on existing geotechnical desktop information, our shallow soil investigations, and our knowledge of the area.

Our calibrated desktop assessment will comment on the risk of natural hazards relevant to the site, as they relate to the proposed rezoning of the site.

2. Scope of Work

The scope of work for this assessment comprised:

- Review available data from the New Zealand Geotechnical Database[1] (NZGD), Canterbury Maps[2], Waimakariri District Council Natural Hazards Viewer[3] and the Institute of Geological & Nuclear Sciences' (GNS) Active Faults Database[4].
- Undertake shallow spade holes and Dynamic Cone Penetrometer (DCP) tests to investigate the nature and bearing capacity of the shallow soils. This testing will infer preliminary foundation recommendations for any new dwellings.
- Undertake a calibrated desktop assessment (Level B) in accordance with MfE's '*planning and engineering guidance for potentially liquefaction-prone land*'.

Prepare a Desktop Natural Hazards Assessment Report to comment on the hazards relevant to the site, to summarise the general geotechnical conditions inferred across the site and to advise on preliminary geotechnical foundation recommendations.

3. Site Description

3.1. General

The San Dona Development encompasses a number of properties shown in Figure 1.

The allotments within the San Dona Development range in size from around 0.72 hectares to 2.15 hectares that comprise of existing dwelling structures and orchards currently zoned within the Waimakariri District Plan as Rural.

The landform within the San Dona Development is typically flat.

The San Dona Development map is attached in **Error! Reference source not found.**.

[1] New Zealand Geotechnical Database (NZGD) - https://www.nzgd.org.nz/

[2] Canterbury Maps - https://mapviewer.canterburymaps.govt.nz

[3] https://waimakariri.maps.arcgis.com/apps/instant/portfolio/index.html?appid=c6bc05f87d4f47ecae975e5241657913

[4] GNS Active Faults Database - http://maps.gns.cri.nz/website/af/viewer.htm

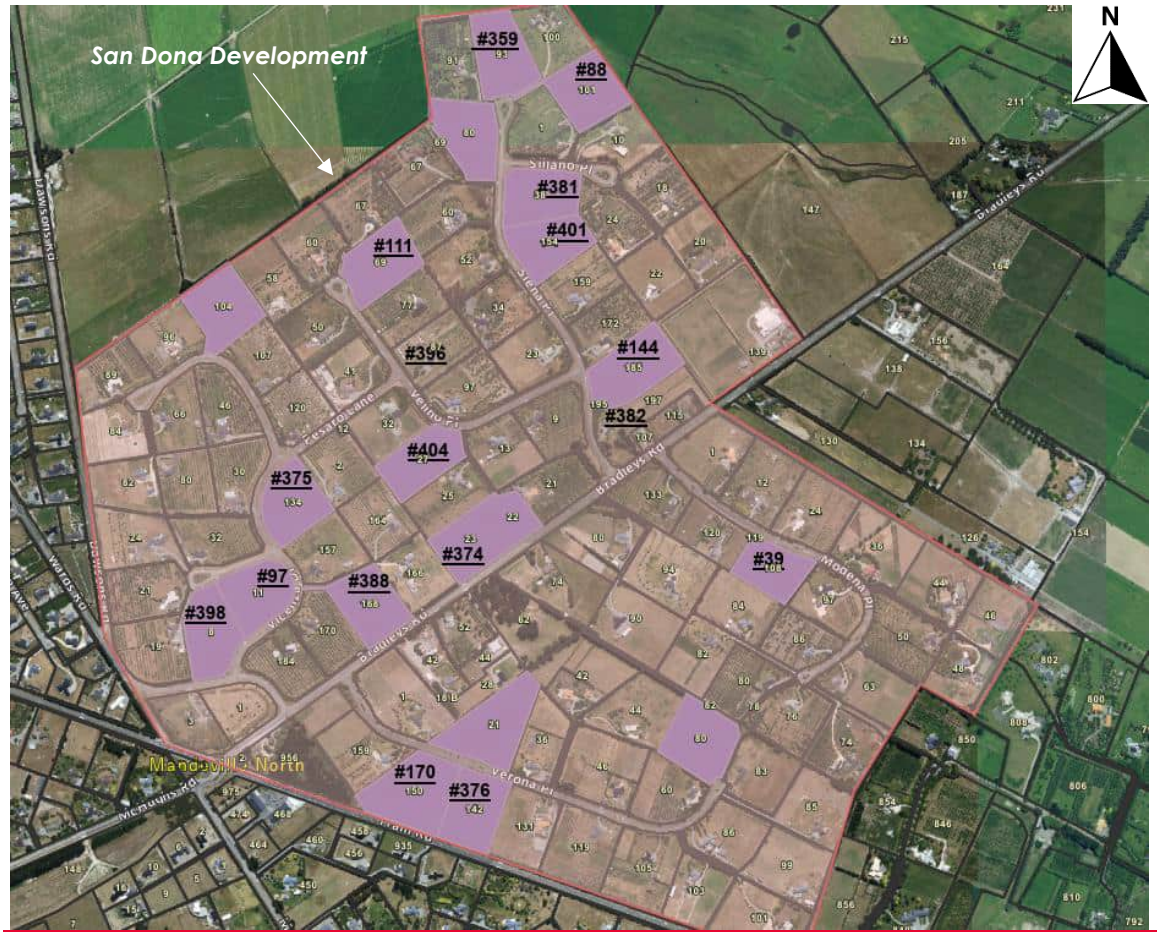


Figure 1. Extract sourced from Appendix A - San Dona Development outlined in red with purple areas indicating San Dona Submitters.

4. Desktop Review

4.1. Engineering Geology

The published geology[5] for the site indicates it is underlain by *'Unweathered, brownish-grey, variable mix of gravel/sand/silt/clay in low river terraces; locally up to 2m silt cap.' (OIS2 Late Pleistocene River deposits)*.

The GNS Active Fault Database[4] indicates there are no known active faults near the site.

4.2. ECan Boreholes

Nearby ECan boreholes with well logs within and surrounding the site were reviewed from Canterbury Maps in January 2024.

The well logs typically indicate the deeper ground model comprising various layers of gravel below the topsoil which extends from around 15m to 30m bgl.

ECan well log records are attached in Appendix B.

[5]https://data.gns.cri.nz/geology/

Figure 2. Aerial site plan with ECan well bores with logs sourced from Canterbury Maps. San Dona development outlined in red.

4.3. Groundwater

Canterbury Maps recorded depth to groundwater based on piezometric contours to range between 1m to 2.5m below ground level (bgl).

ECan boreholes presented in Section 4.2 recorded water levels ranging from around 1m to 6m below measuring point.

4.4. Liquefaction Hazard

The Waimakariri District Natural Hazards Interactive viewer locates the site to be within a green-zoned area recorded as *'Liquefaction damage is unlikely'*. This infers the characteristic performance of the site is consistent with TC1 land performance, defined as *'future land damage from liquefaction is unlikely, and ground settlements are expected to be within normally accepted tolerances'*.

4.5. Historical Aerial Review

We have reviewed available historical aerial imagery sourced from Canterbury Maps and Google Earth dating back from the 1940s through to 2023.

The site was typically pastural farmland from the 1940s through to the early 2000s where subdivision and building construction across the land was carried out. Planted olive tree orchards were evident within the formed allotments.

We note a watercourse channel evident in 1940 aerial imagery intersects across 134 and 168 Vicenza Drive.

Figure 3. Extract sourced from Canterbury Maps (1940 – 1944). San Dona Development outlined in red.

4.6. Tsunami Hazard Mapping

Tsunami hazard mapping is provided by ECan[6]. The site is located outside (inland) of the three mapped Tsunami Evacuation Zones.

4.7. Flood Hazard Mapping

The WDC flood hazard mapping[3] indicates the general site is subjected to low to medium flood risk following a 200-year Average Recurrence Interval (ARI), as shown in Figure 3.

Eliot Sinclair has undertaken a Flood Impact Assessment report[7] which comments on the risk of flooding (pre/post) development across the site.

The report states that *'the post-development flood model for the Site indicates that the flood depths within the Site vary from 10 mm to approximately 420 mm, therefore it is considered that parts of the Site are Low Hazard and parts Medium Hazard Flood areas. Therefore, it is proposed that all the residential dwellings should be 500 mm above the 200 Year ARI flood level'*.

In conclusion, assuming normal good practice design and ensuring development controls are implemented, the risk of flooding following a 200-year ARI storm across the site is deemed tolerable for development.

[6] https://www.ecan.govt.nz/your-region/your-environment/natural-hazards/tsunamis/tsunami-evacuation-zones-and-warnings/

[7] Flood Impact Assessment at San Dona, Mandeville prepared for San Dona Landowner Group, ref 520977, Version A

Figure 4. Current Level of Flood Hazard at the Site (source: Waimakariri Flood Hazard Map)

5. Shallow Soil Investigations

Our shallow soil investigations carried out on 25 January 2024 consisted of nine shallow spade holes and nine Dynamic Cone Penetrometers (DCP) tests, which indicate the nature and bearing capacity of the shallow soils.

Please refer to the site investigation records attached in Appendix C.

A visual-tactile field classification of the soils encountered during the shallow investigation was carried out in general accordance with 'Guidelines for the Field Classification and Description of Soil and Rock for Engineering Purposes' (NZGS, 2005) and DCP testing was carried out in accordance with NZS 4402:1988, Test 6.5.2, 'Dynamic Cone Penetrometer'.

5.1. Spade Hole Tests

The shallow spade holes recorded topsoil around 0.3m depth over silty gravel to around 0.8m below ground level (bgl) where practical refusal was met on dense gravel.

Groundwater was not encountered within the test pits at time of investigation. Groundwater is expected to range between 1m to 2.5m bgl.

5.2. Dynamic Cone Penetration (DCP) tests

DCP resistances beneath the topsoil, within the dense gravel exceeded 3 blows per 100mm up to around 0.4m to 0.8m bgl where practical refusal was met, indicating an 'index' geotechnical Ultimate Bearing Capacity (q_u) of at least 300kPa.

The assessment of bearing capacity given here is the index geotechnical ultimate bearing capacity (GUBC) using the DCP blow count profile method given in the MBIE Residential Guidance Section 3.4.

6. Site Specific Assessment of Risk from Natural Hazards

Council can refuse plan change consent if there is a significant risk of material damage or injury from one, or a combination of, natural hazards. Decision-makers are guided by the matters set out in RMA Section 106 which requires an assessment of:

- The existing likelihood and consequence of natural hazards, and
- The likelihood that subdivision of the site could increase the likelihood or consequence of the natural hazard.

Refer to Appendix D for GNS risk assessment method.

The RMA defines natural hazards as:

Any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment[8].

Our desktop risk assessment of natural hazards for the proposed development assuming normal good practice investigation, design and development controls are implemented is listed below;

- Earthquake Fault Rupture and shaking hazard (Tolerable).
    - The nearest mapped active fault is located kilometres away to the northwest.
- Tsunami (Acceptable)
    - The site is outside of the three mapped Tsunami Evacuation Zones.
- Erosion & Sedimentation (Acceptable)
    - No erosion or sedimentation was observed following review of available site photographs and aerial imagery.
- Subsidence (Acceptable)
    - The risk of subsidence from liquefaction across the site is unlikely. This infers the characteristic performance of the site is consistent with TC1 land performance, defined as '*future land damage from liquefaction is unlikely, and ground settlements are expected to be within normally accepted tolerances*'.
- Flooding (Acceptable)
    - The general site is subjected to low to medium flood risk following a 200-year ARI event. Assuming normal good practice design and ensuring development controls are implemented, the risk of flooding following a 200-year ARI storm across the site is deemed tolerable for development.

6.1. Conclusions

We have considered the risk associated with natural hazards in relation to the RMA:1991 and concluded that the risk and consequence of potential natural hazards is either acceptable or tolerable. For this site, the most relevant natural hazards are earthquake shaking, earthquake-induced land deformation, and flood inundation.

Providing normal good practice investigation, design and development controls are implemented we have found no significant risks from natural hazards that would prevent the granting of a plan change consent.

[8] https://www.mfe.govt.nz/publications/rma/resource-legislation-amendments-2017-fact-sheet-series

7. Preliminary Geotechnical Foundation Recommendations

Eliot Sinclair's recommendations below are strictly preliminary, and any new foundations shall be subject to detailed investigation and design.

7.1. Shallow foundations

The foundations and floor slab for any new building structures will need to be designed and constructed to comply with the relevant provisions of NZS 3604:2011 'Timber Framed Buildings' and to satisfy the minimum requirements for Technical Category 1 that are set out in Section 5 of MBIE's guidelines.

8. Disclaimer

This report has been prepared by Eliot Sinclair & Partners Limited ("Eliot Sinclair") only for the intended purpose as a Desktop Natural Hazards Risk Assessment.

The report is based on:

- Information from the New Zealand Geotechnical Database (NZGD), Canterbury Maps, Waimakariri District Council Natural Hazards Viewer and the Institute of Geological & Nuclear Sciences' (GNS) Active Faults Database,
- Our shallow soil investigations and site walkover in January 2024.

Where data supplied by San Dona Landowners Group or other external sources, including previous site investigation reports, have been relied upon, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Eliot Sinclair for incomplete or inaccurate data supplied by other parties.

Whilst every care has been taken during our desktop assessment and interpretation of the subsurface conditions to ensure that the conclusions drawn, and the opinions and recommendations expressed are correct at the time of reporting, Eliot Sinclair has not performed an assessment of all possible conditions or circumstances that may exist at the site. Variations in conditions may occur between investigatory locations and there may be conditions such as subsoil strata and features that were not detected by the scope of the investigation that was carried out or have been covered over or obscured over time. Additionally, on-going seismicity in the general area may lead to deterioration or additional ground settlement that could not have been anticipated at the time of writing this report. Eliot Sinclair does not provide any warranty, either express or implied, that all conditions will conform exactly to the assessments contained in this report.

The exposure of conditions that vary from those described in this report, or occurrence of additional strong seismicity, or any future update of MBIE's guidelines may require a review of our assessment. Eliot Sinclair should be contacted to confirm the validity of this report should any of these occur.

This report has been prepared for the benefit of San Dona Landowners Group for the purposes as stated above. This report is specifically prepared for the proposed rezoning of the site. No liability is accepted by Eliot Sinclair or any of their employees with respect to the use of this report, in whole or in part, for any other purpose or by any other party.

Appendix A. San Dona Development Map

Canterbury Maps

canterbury maps

N

San Dona Submitters
San Dona Development
Rating Units

Legend note: if you have a large number of layers on the map, they may not all be visible in the legend.

Disclaimer:

Information has been derived from various organisations, including Environment Canterbury and the Canterbury Maps partners. Boundary information is derived under licence from LINZ Digital Cadastral Database (Crown Copyright Reserved). Environment Canterbury and the Canterbury Maps partners do not give and expressly disclaim any warranty as to the accuracy or completeness of the information or its fitness for any purpose.

Information from this map may not be used for the purposes of any legal disputes. The user should independently verify the accuracy of any information before taking any action in reliance upon it.

0 0.1 0.2 0.3 0.4 Kilometres

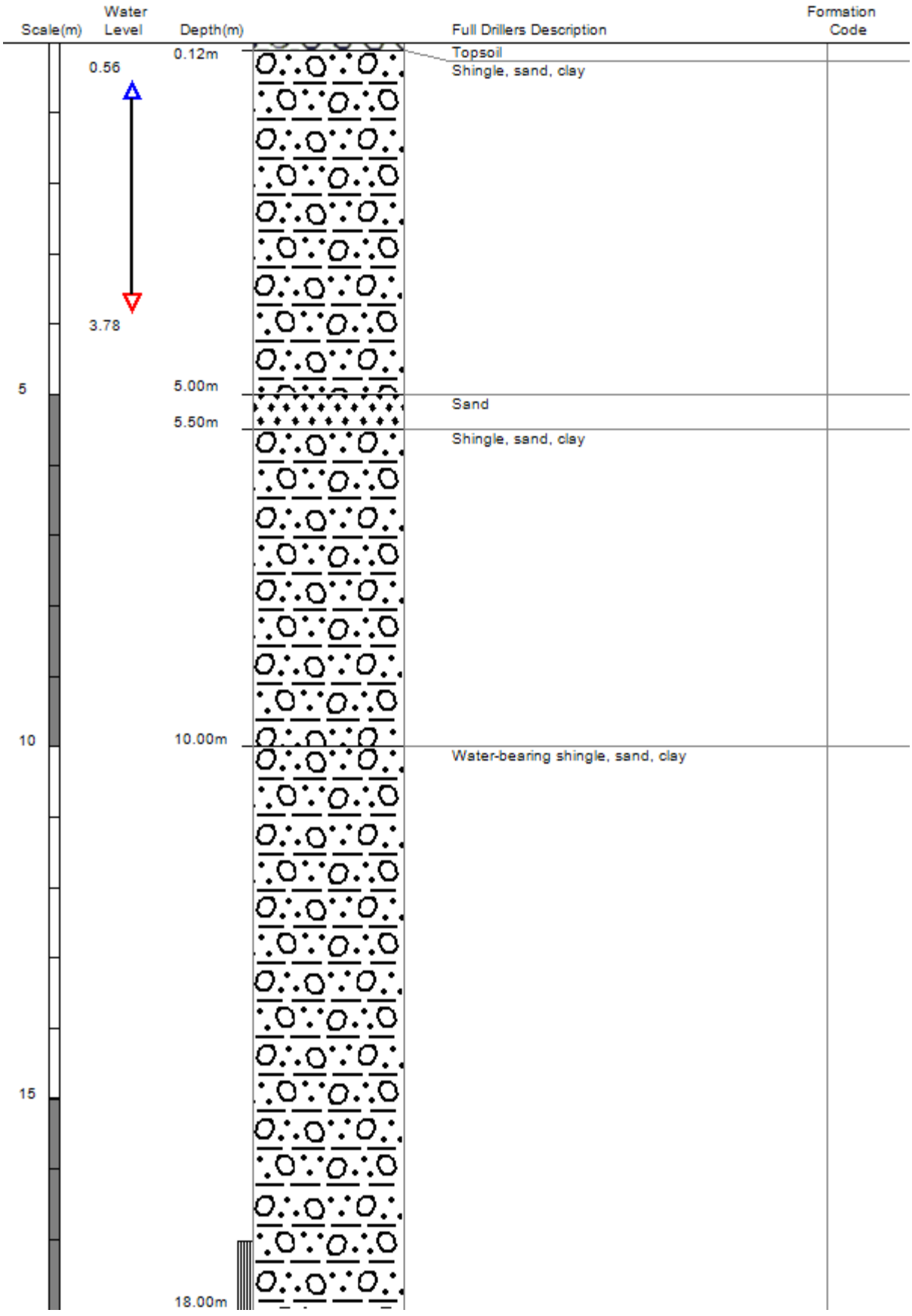
Scale: 1:7,000 @A3

Map Created by Canterbury Maps on 14/12/2023 at 3:38 PM

Appendix B. ECan Well Borehole Records

Borelog for well M35/18231

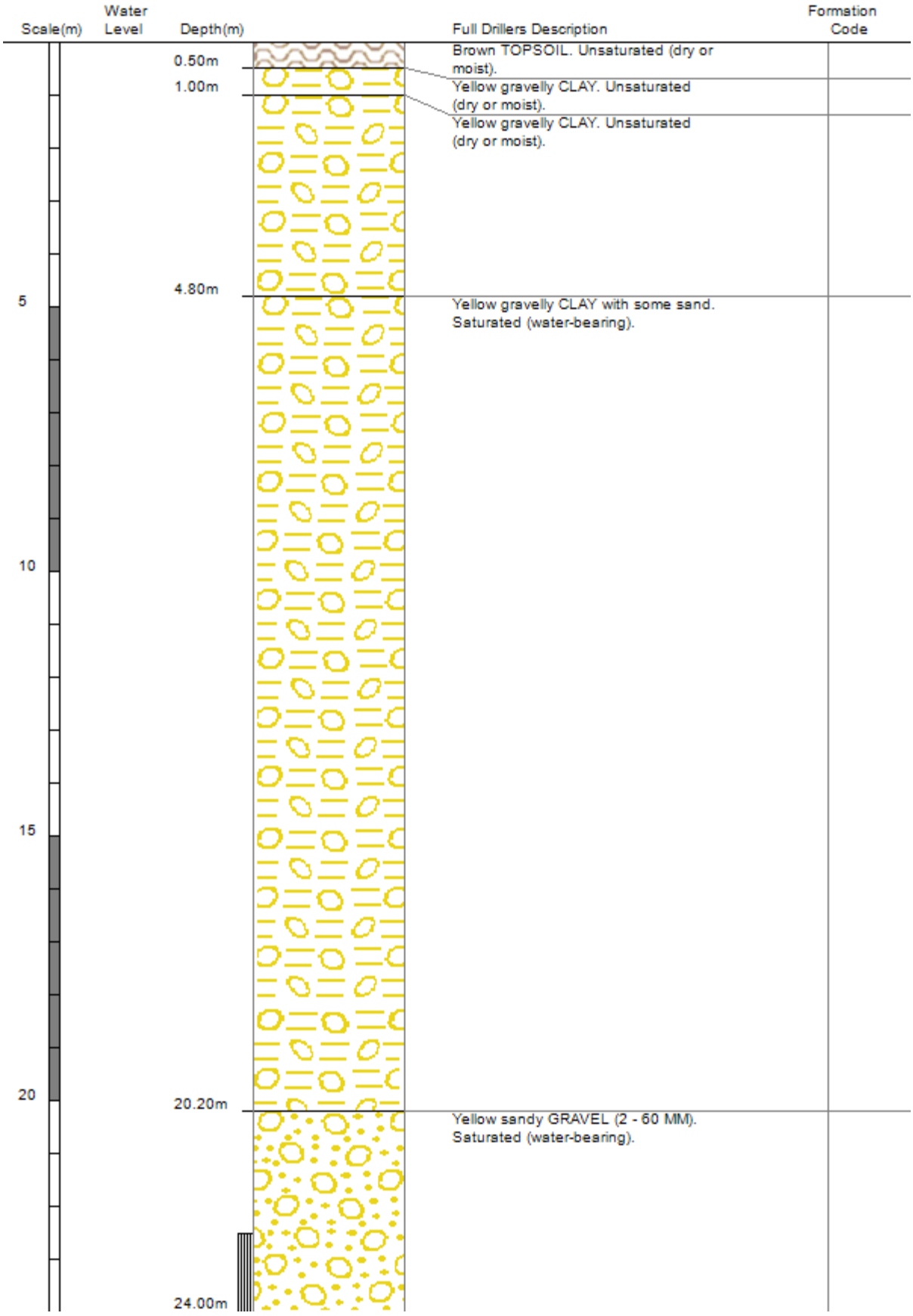
Grid Reference (NZTM): 1562923 mE, 5198093 mN
Location Accuracy: 1 - 2m
Ground Level Altitude: 33.6 m +MSD Accuracy: < 0.1 m
Driller: Well Drilling Direct
Drill Method: Rotary Rig
Borelog Depth: 18.0 m Drill Date: 19-Feb-2010



Borelog for well BW23/0342

Grid Reference (NZTM): 1561900 mE, 5197874 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: m +MSD Accuracy: < 2.5 m
Driller: Hydrill
Drill Method: Rotary Rig
Borelog Depth: 24.0 m Drill Date: 04-Dec-2015

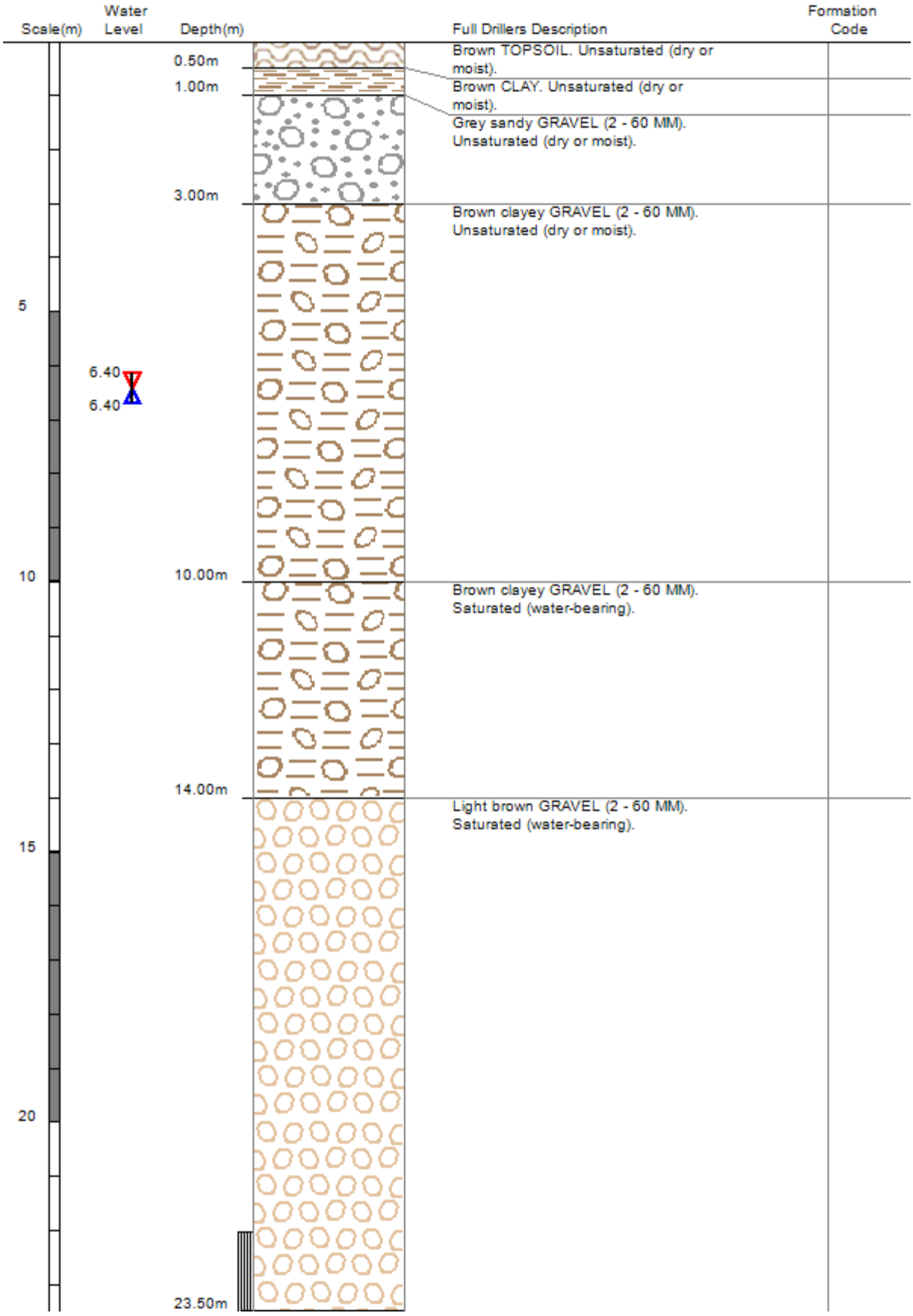
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well BW23/0407

Grid Reference (NZTM): 1561992 mE, 5197568 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 39.0 m +MSD Accuracy: < 2.5 m
Driller: East Coast Drilling
Drill Method: Air Rotary
Borelog Depth: 23.5 m Drill Date: 15-Sep-2016

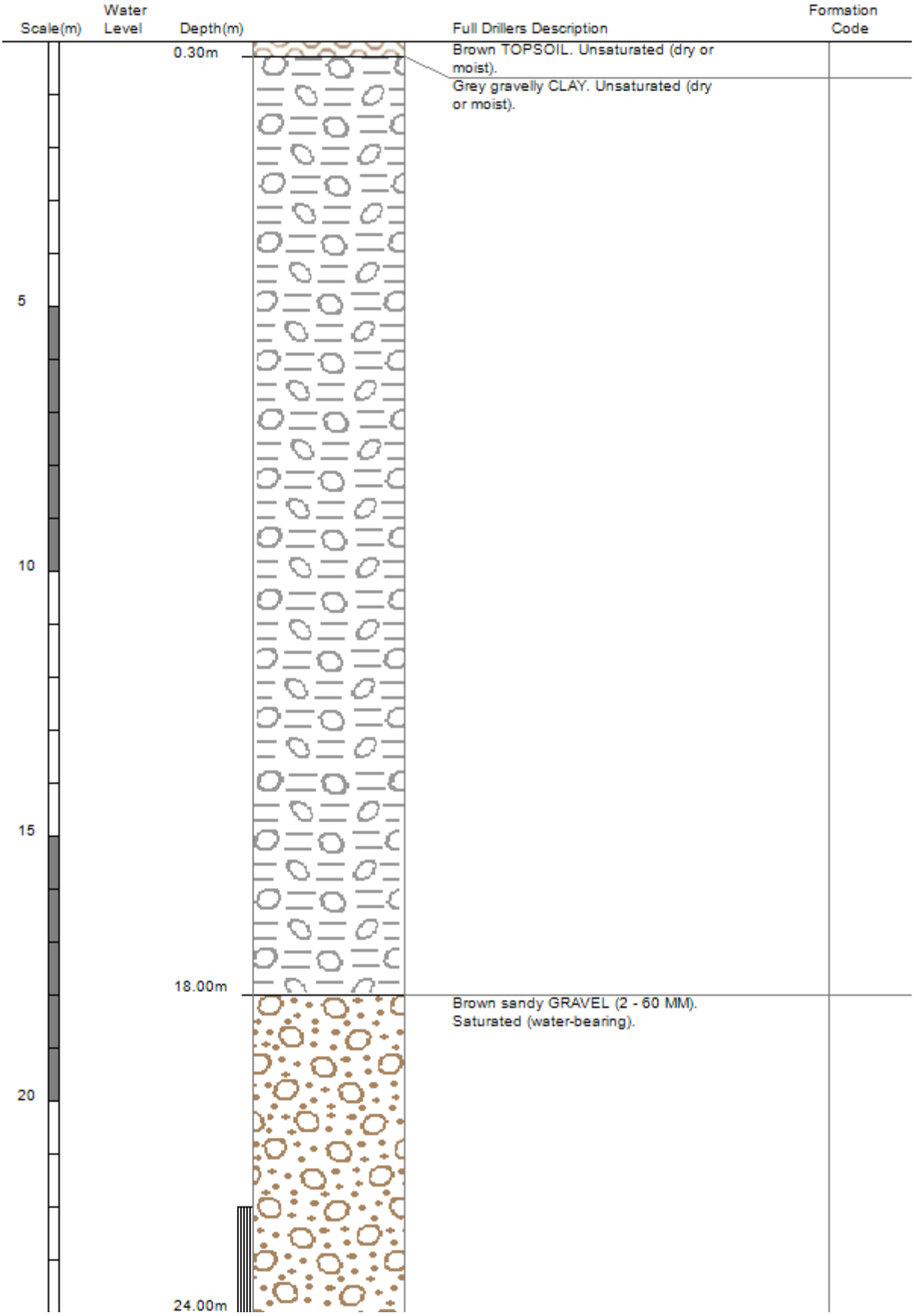
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well BW23/0591

Grid Reference (NZTM): 1562694 mE, 5196796 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: m +MSD Accuracy: < 2.5 m
Driller: Daly Water Wells Ltd
Drill Method: Rotary Rig
Borelog Depth: 24.0 m Drill Date: 06-Mar-2020

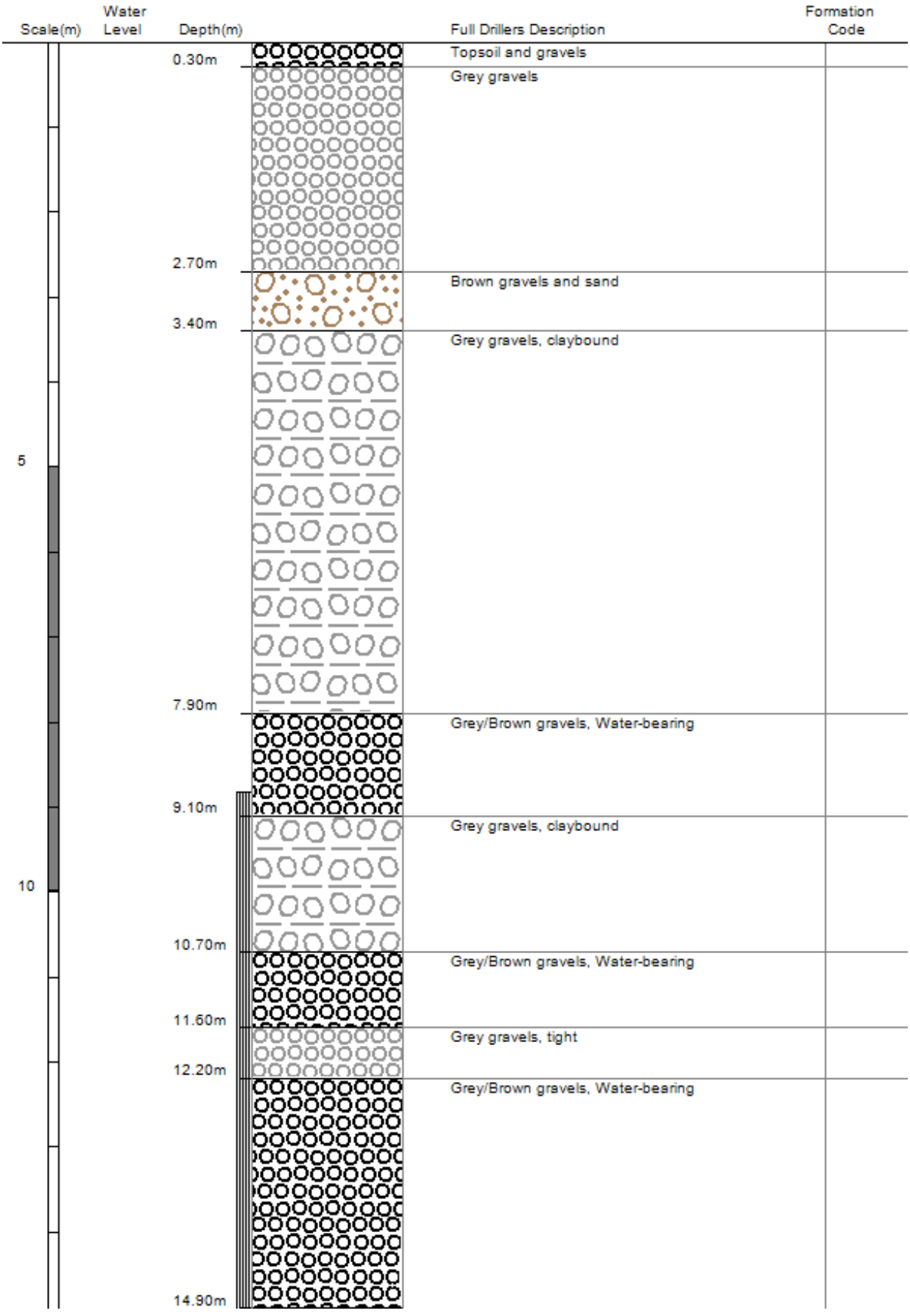
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/0612

Grid Reference (NZTM): 1563502 mE, 5197282 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 30.7 m +MSD Accuracy: < 2.5 m
Driller: A M Bisley & Co
Drill Method: Cable Tool
Borelog Depth: 14.9 m Drill Date: 23-Nov-1967

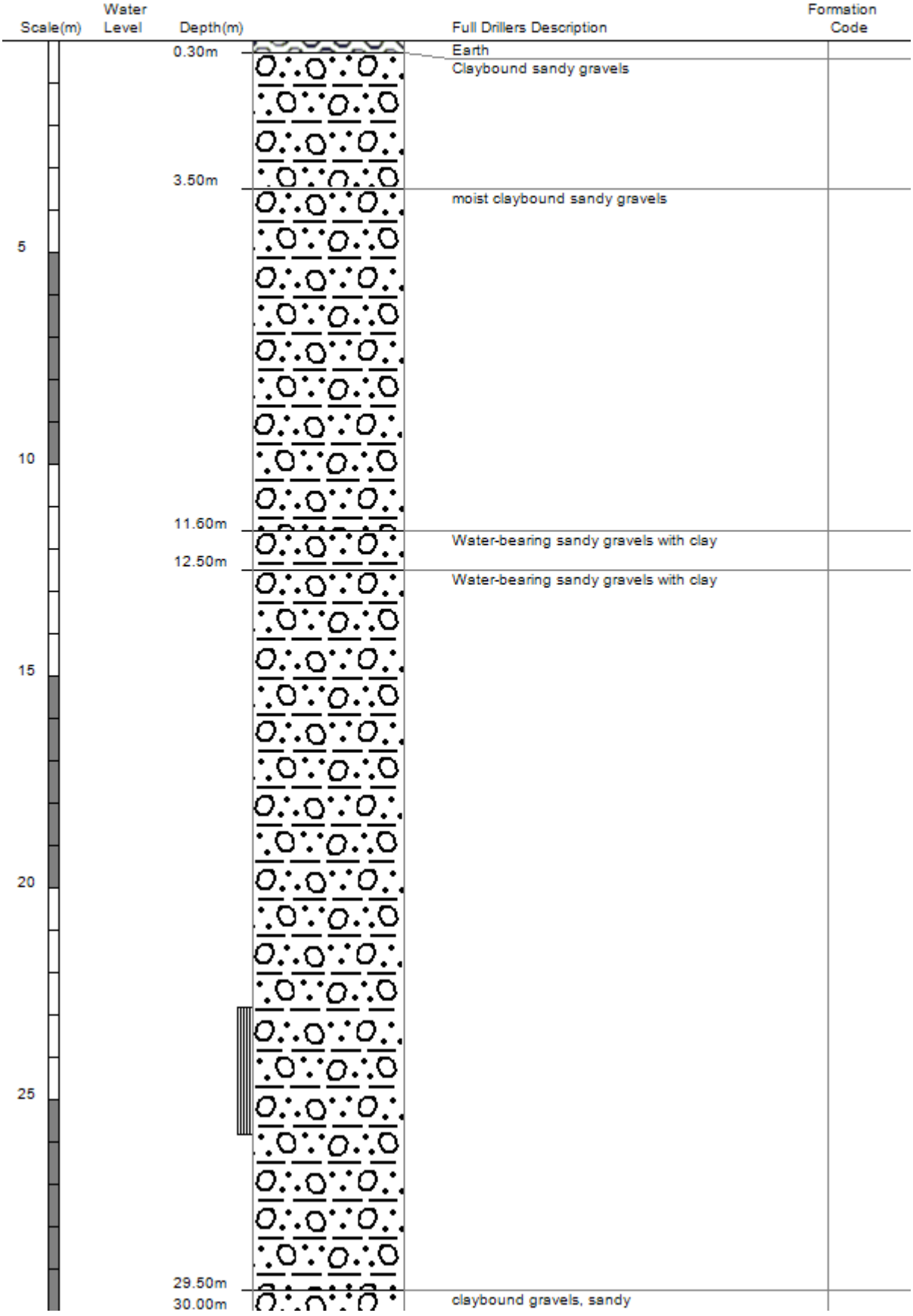
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/7618

Grid Reference (NZTM): 1562762 mE, 5197110 mN
Location Accuracy: 2 - 15m
Ground Level Altitude: 34.6 m +MSD Accuracy: < 0.5 m
Driller: McMillan Drilling Ltd
Drill Method: Rotary Rig
Borelog Depth: 30.0 m Drill Date: 27-Jan-1998

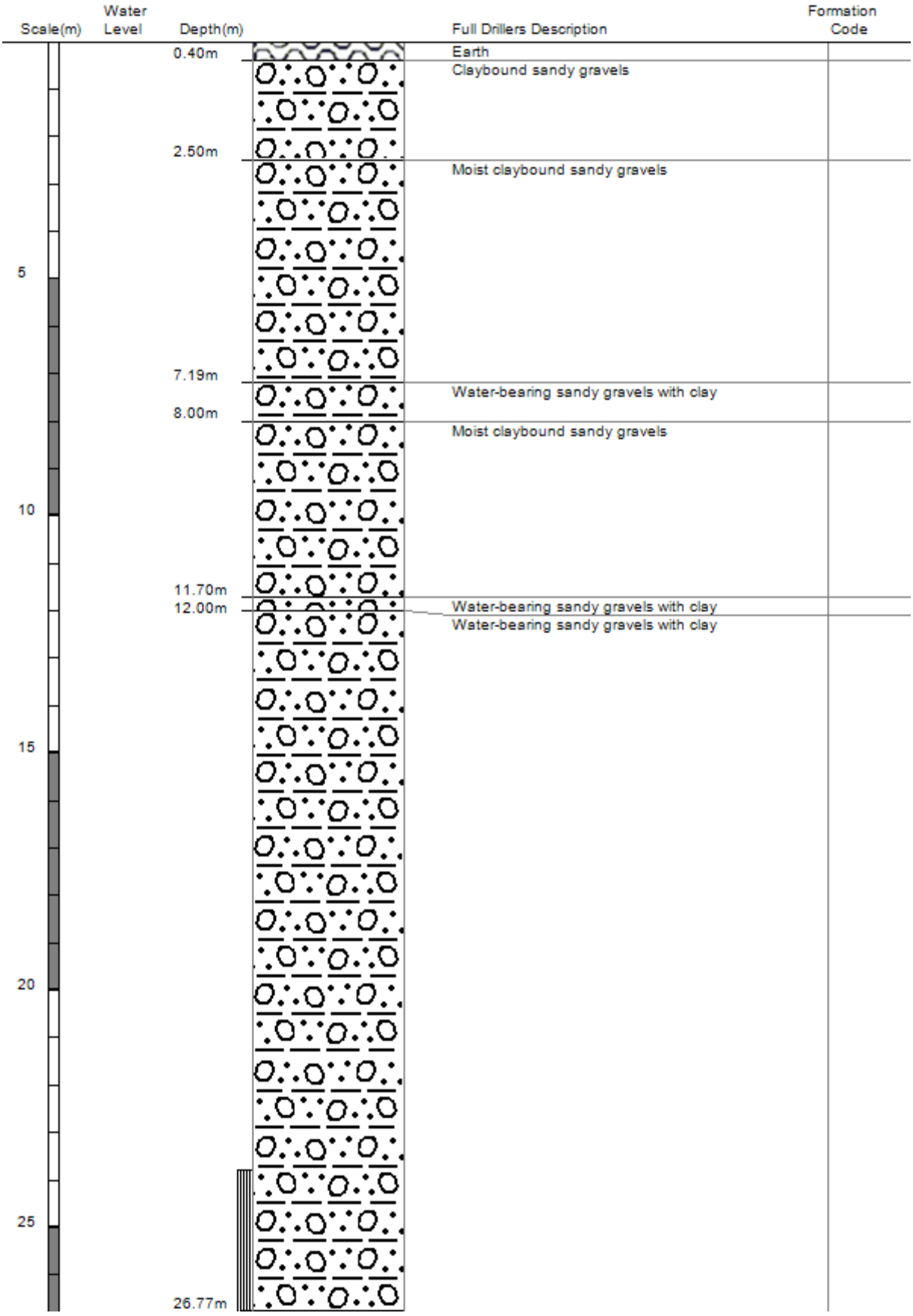
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/7619

Grid Reference (NZTM): 1563422 mE, 5197442 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 30.9 m +MSD Accuracy: < 2.5 m
Driller: McMillan Drilling Ltd
Drill Method: Rotary Rig
Borelog Depth: 26.8 m Drill Date: 11-Sep-1997

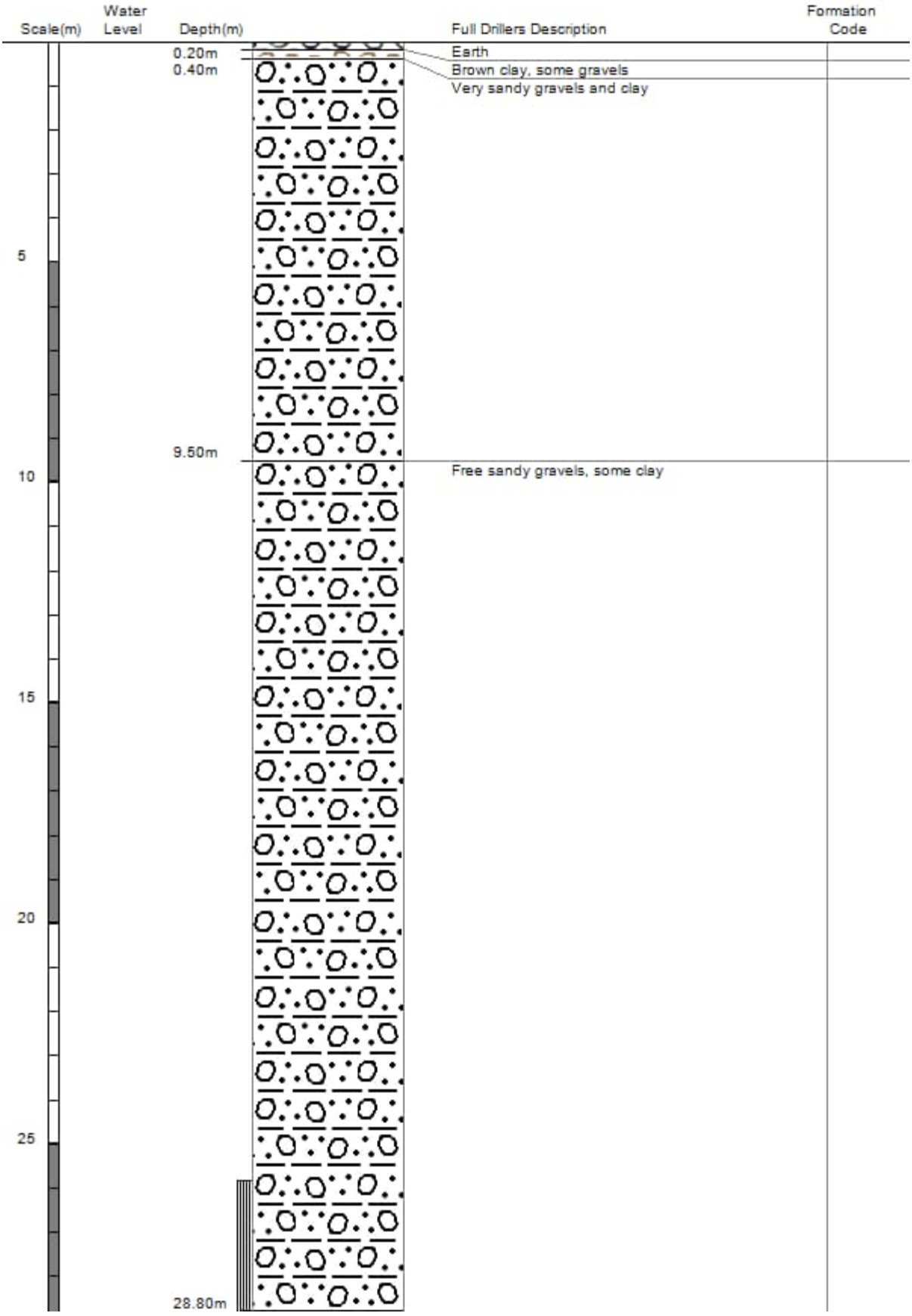
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/8160

Grid Reference (NZTM): 1563380 mE, 5197398 mN
Location Accuracy: 2 - 15m
Ground Level Altitude: 31.4 m +MSD Accuracy: < 0.5 m
Driller: McMillan Drilling Ltd
Drill Method: Rotary/Percussion
Borelog Depth: 28.8 m Drill Date: 09-Aug-2000

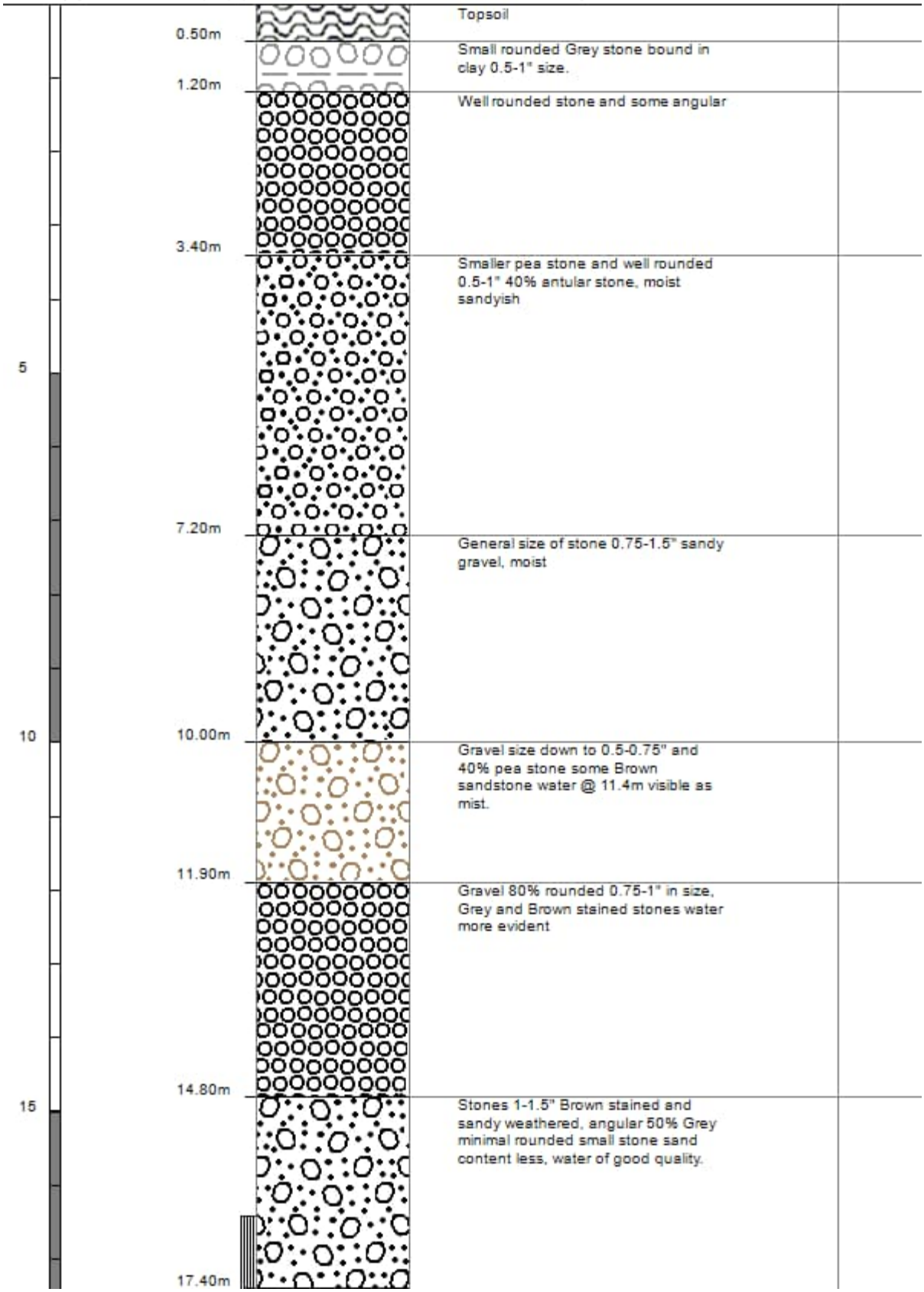
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/8414

Grid Reference (NZTM): 1563202 mE, 5197672 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 32.0 m +MSD Accuracy: < 2.5 m
Driller: Texco Drilling Ltd
Drill Method: Rotary Rig
Borelog Depth: 17.4 m Drill Date: 18-Mar-1999

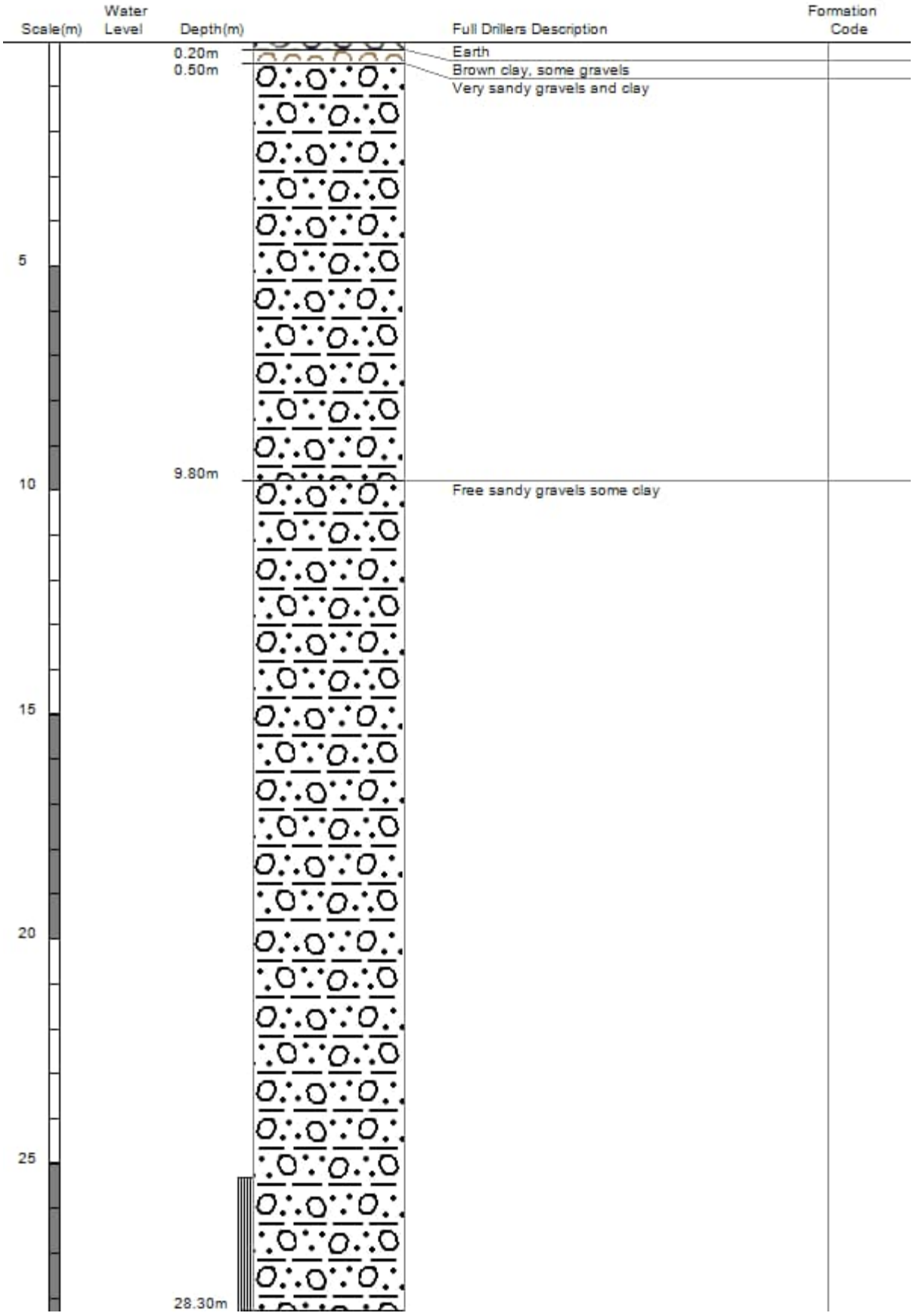
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/8594

Grid Reference (NZTM): 1562532 mE, 5197642 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 36.1 m +MSD Accuracy: < 2.5 m
Driller: McMillan Drilling Ltd
Drill Method: Rotary Rig
Borelog Depth: 28.3 m Drill Date: 09-Aug-2000

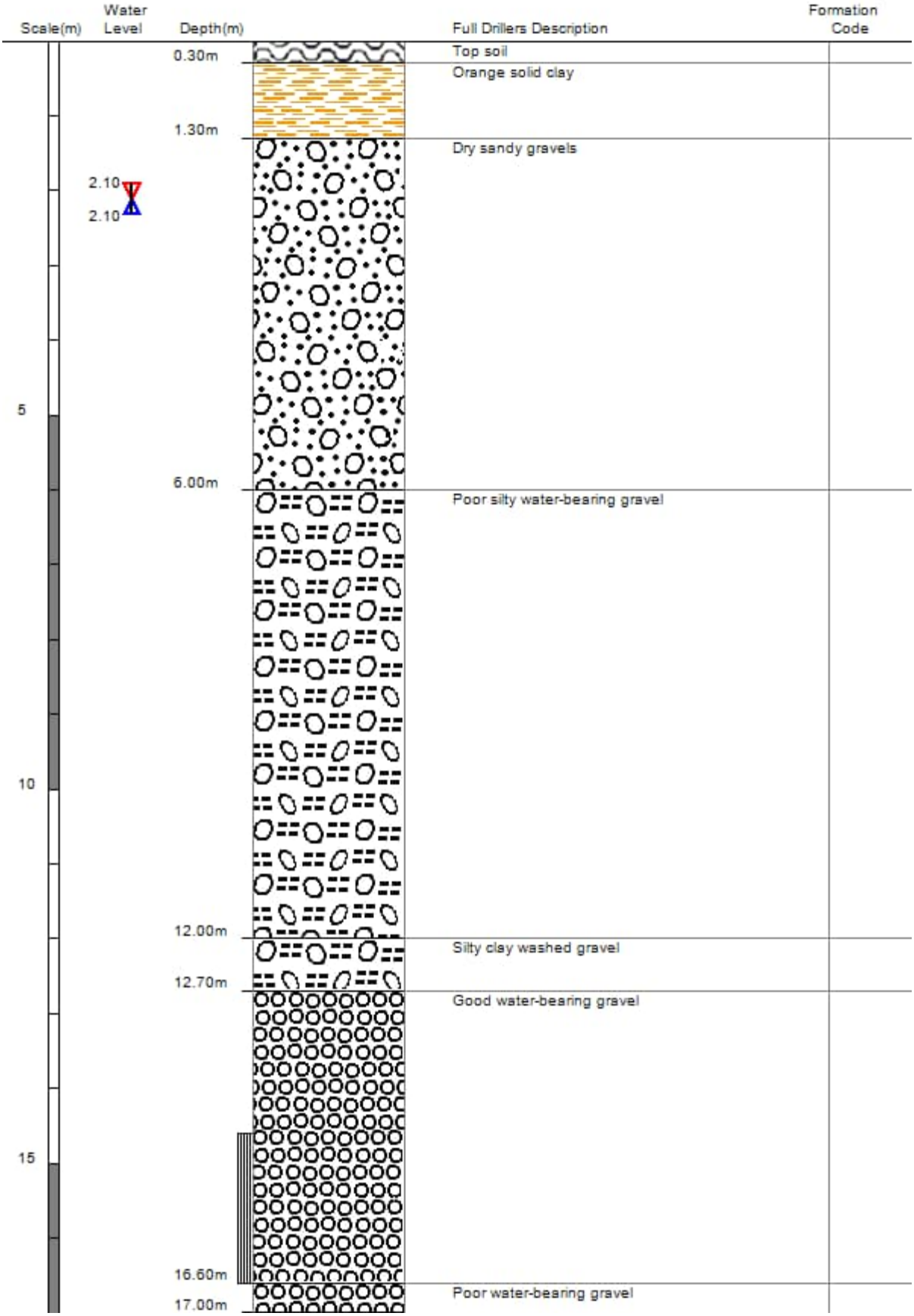
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/9630

Grid Reference (NZTM): 1562849 mE, 5198014 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 34.5 m +MSD Accuracy: < 2.5 m
Driller: Clemence Drilling Contractors
Drill Method: Rotary/Percussion
Borelog Depth: 17.0 m Drill Date: 02-Jul-2003

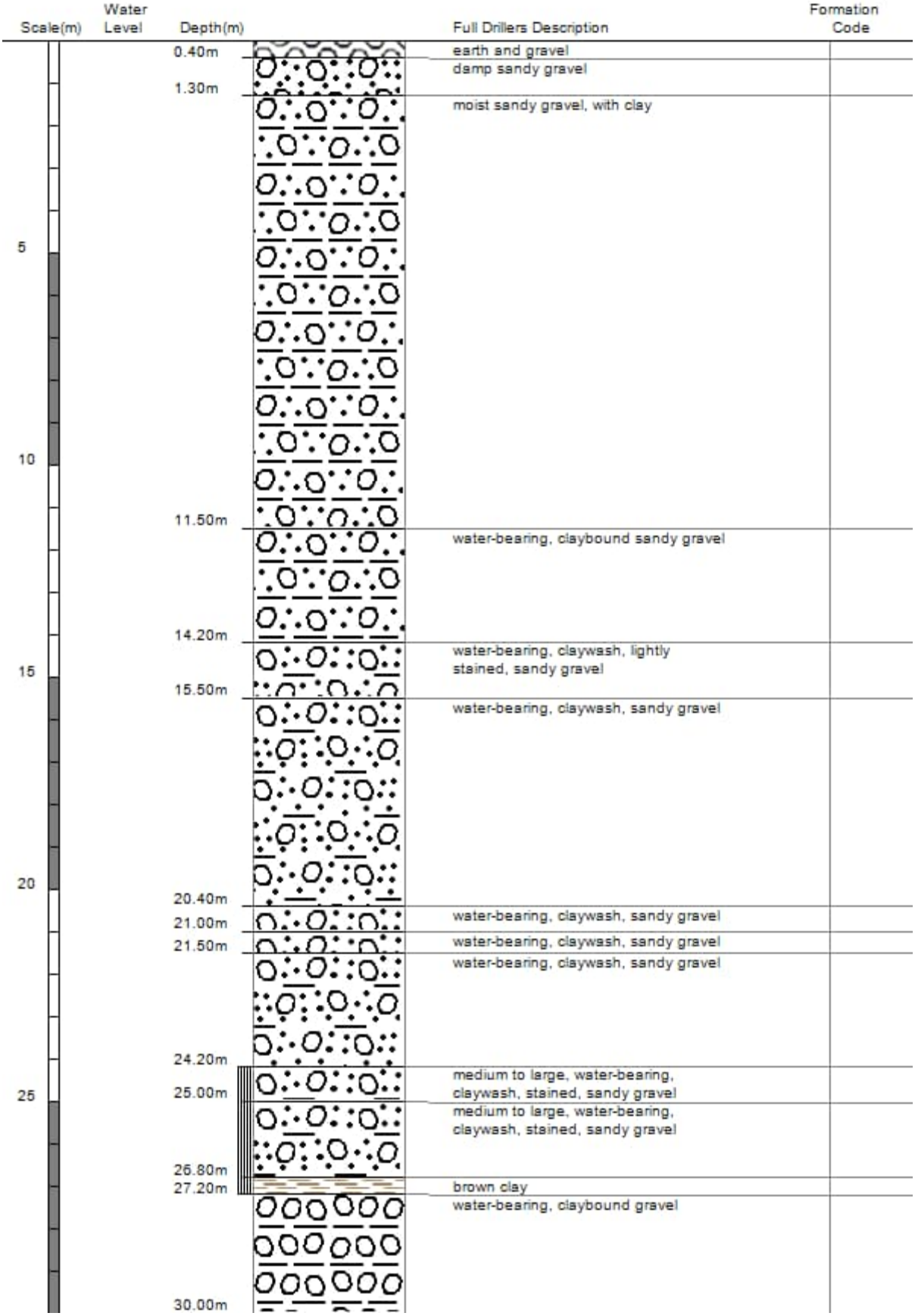
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/9698

Grid Reference (NZTM): 1562202 mE, 5197092 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 38.3 m +MSD Accuracy: < 2.5 m
Driller: McMillan Drilling Ltd
Drill Method: Rotary/Percussion
Borelog Depth: 30.0 m Drill Date: 25-Sep-2003

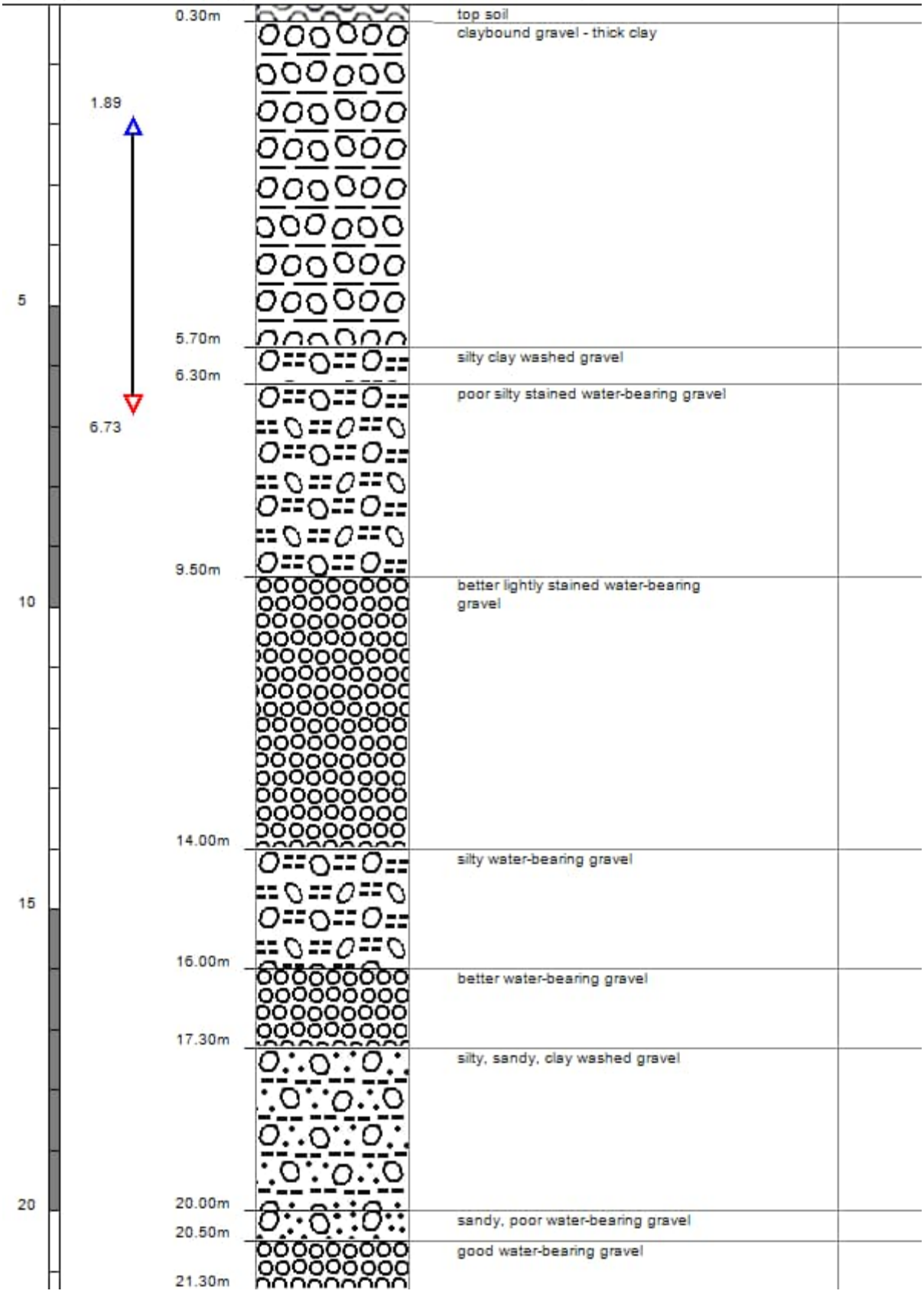
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/10179

Grid Reference (NZTM): 1562632 mE, 5197653 mN
Location Accuracy: 1 - 2m
Ground Level Altitude: 35.7 m +MSD Accuracy: < 0.1 m
Driller: Clemence Drilling Contractors
Drill Method: Rotary/Percussion
Borelog Depth: 21.3 m Drill Date: 17-Mar-2004

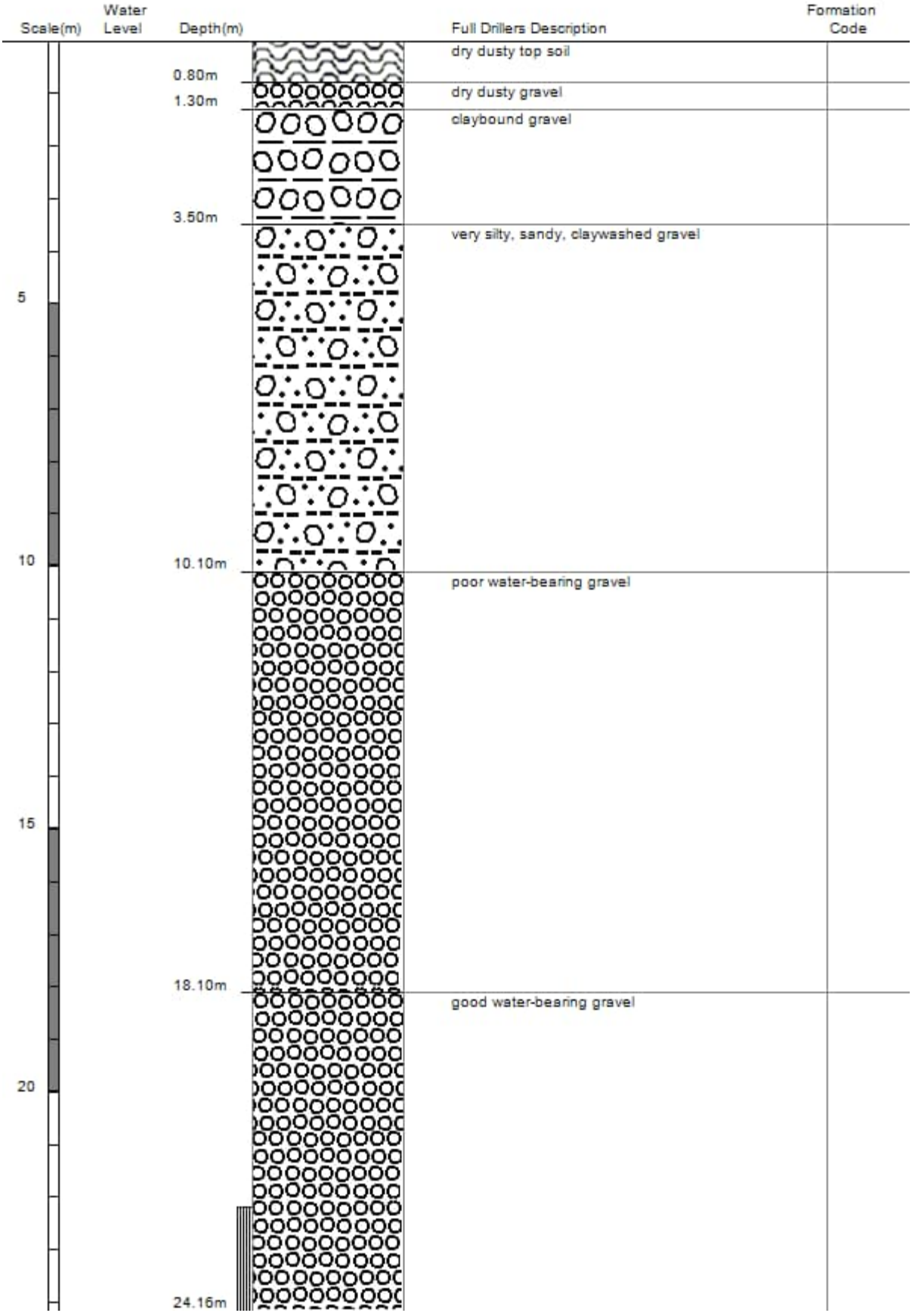
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/10507

Grid Reference (NZTM): 1562762 mE, 5198081 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 34.8 m +MSD Accuracy: < 2.5 m
Driller: Clemence Drilling Contractors
Drill Method: Rotary/Percussion
Borelog Depth: 24.2 m Drill Date: 03-Dec-2004

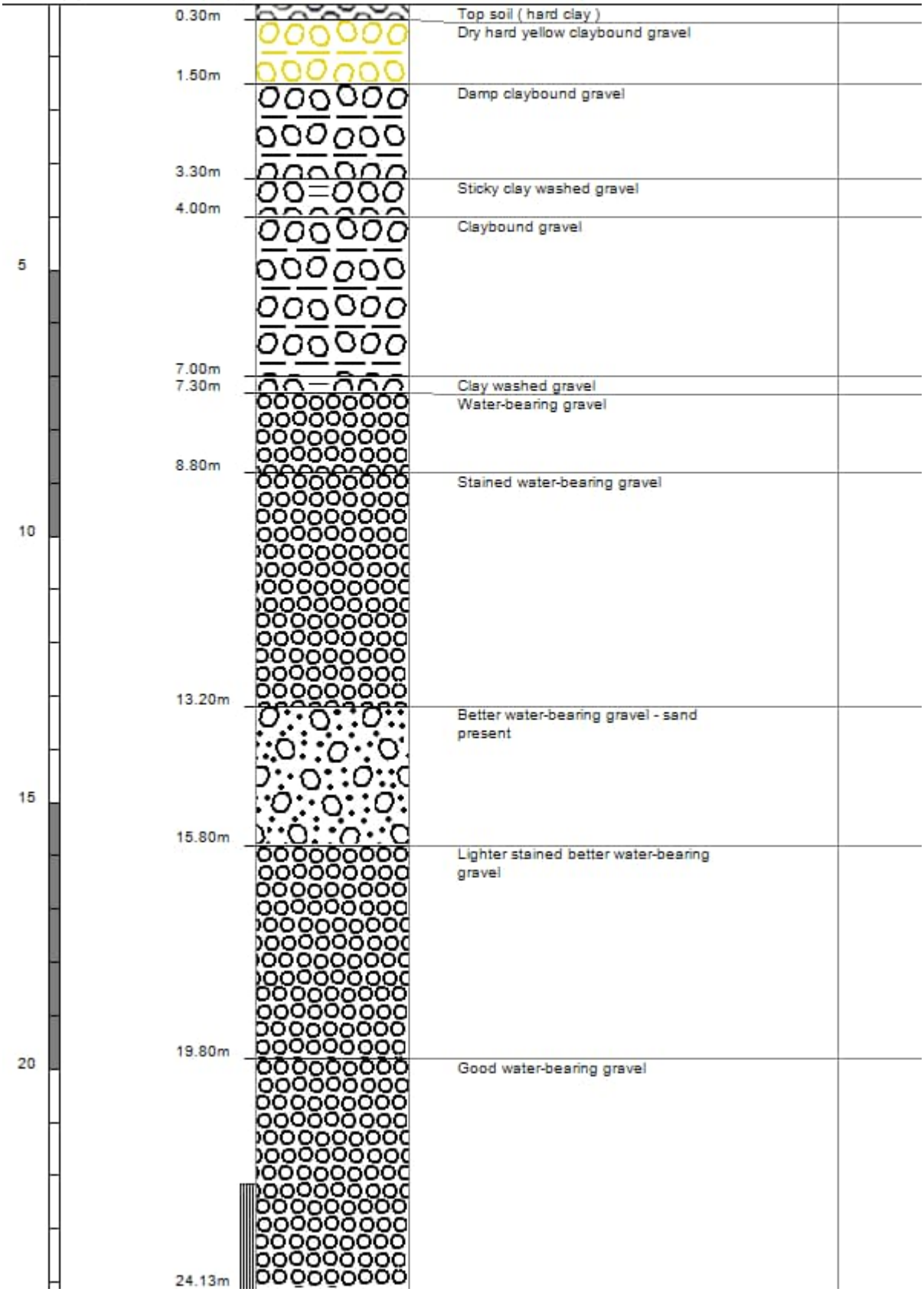
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/10530

Grid Reference (NZTM): 1562402 mE, 5197872 mN
Location Accuracy: 50 - 300m
Ground Level Altitude: 37.1 m +MSD Accuracy: < 2.5 m
Driller: Clemence Drilling Contractors
Drill Method: Rotary/Percussion
Borelog Depth: 24.1 m Drill Date: 06-Dec-2004

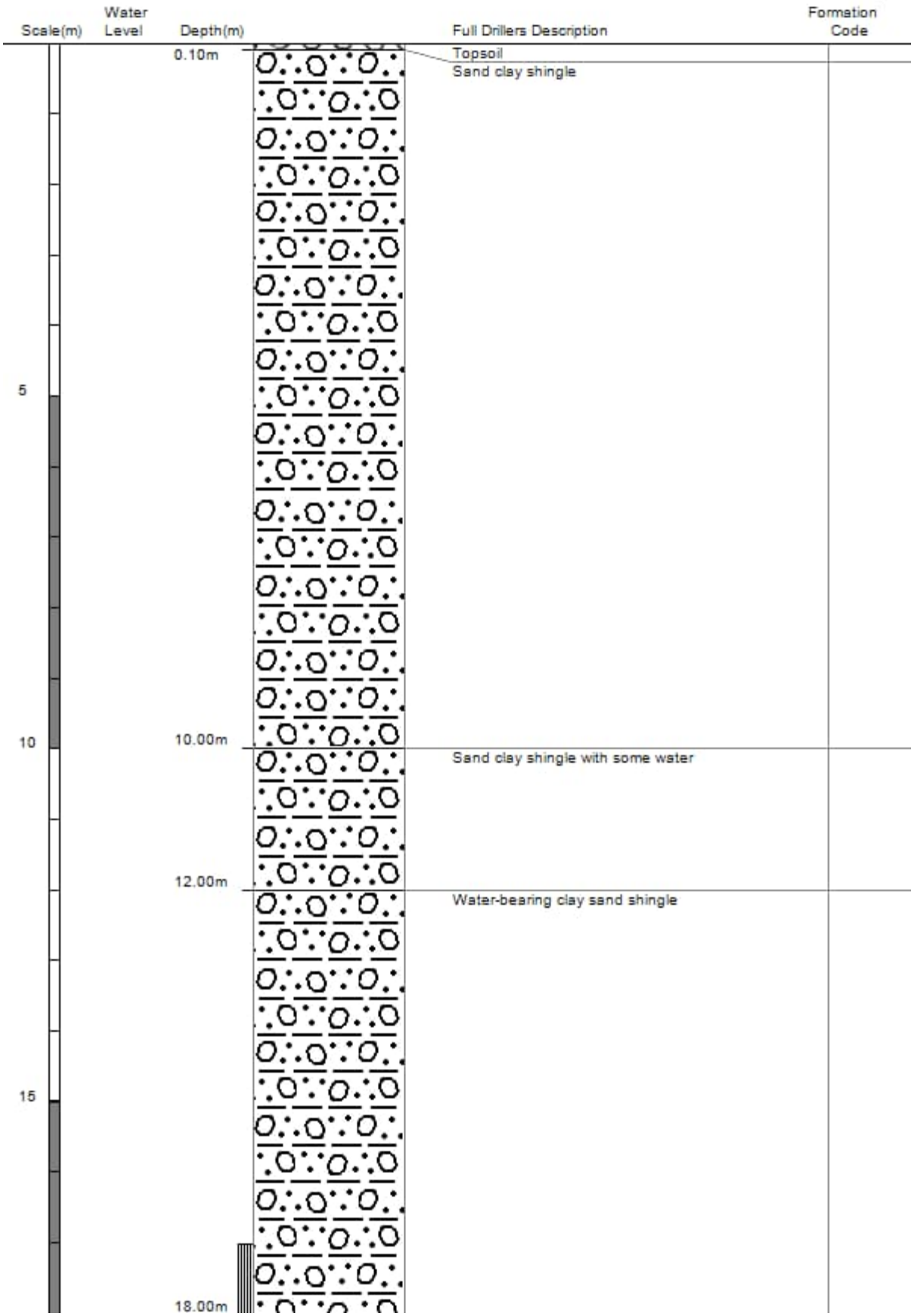
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/10634

Grid Reference (NZTM): 1562916 mE, 5198383 mN
Location Accuracy: 2 - 15m
Ground Level Altitude: 34.0 m +MSD Accuracy: < 0.5 m
Driller: Well Drilling Direct
Drill Method: Rotary Rig
Borelog Depth: 18.0 m Drill Date: 14-Mar-2005

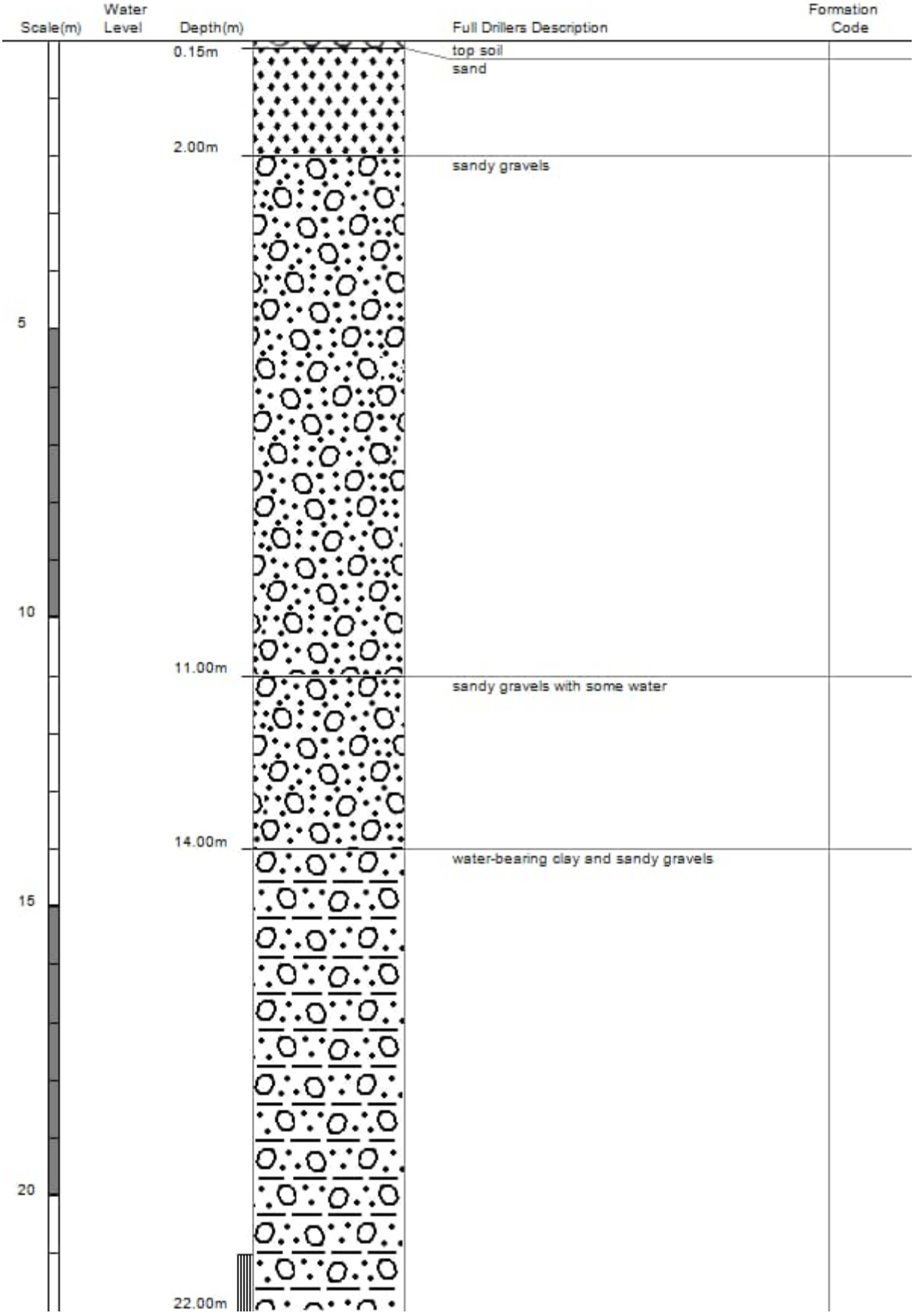
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/10731

Grid Reference (NZTM): 1562782 mE, 5198241 mN
Location Accuracy: 10 - 50m
Ground Level Altitude: 34.8 m +MSD Accuracy: < 2.5 m
Driller: Well Drilling Direct
Drill Method: Rotary/Percussion
Borelog Depth: 22.0 m Drill Date: 14-Apr-2005

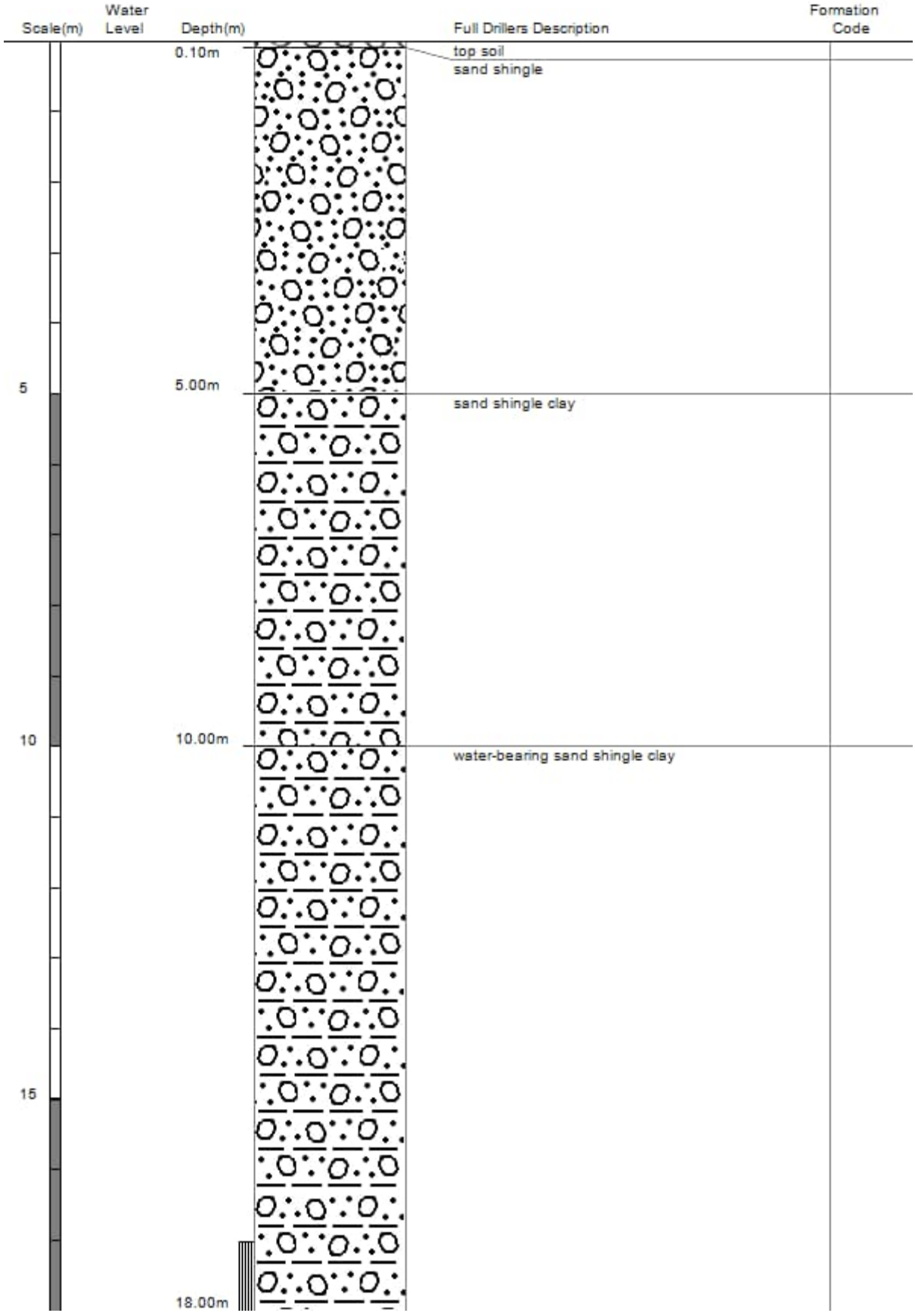
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/11103

Grid Reference (NZTM): 1562794 mE, 5198360 mN
Location Accuracy: 2 - 15m
Ground Level Altitude: 34.7 m +MSD Accuracy: < 0.5 m
Driller:
Drill Method: Rotary/Percussion
Borelog Depth: 18.0 m Drill Date: 21-Jan-2006

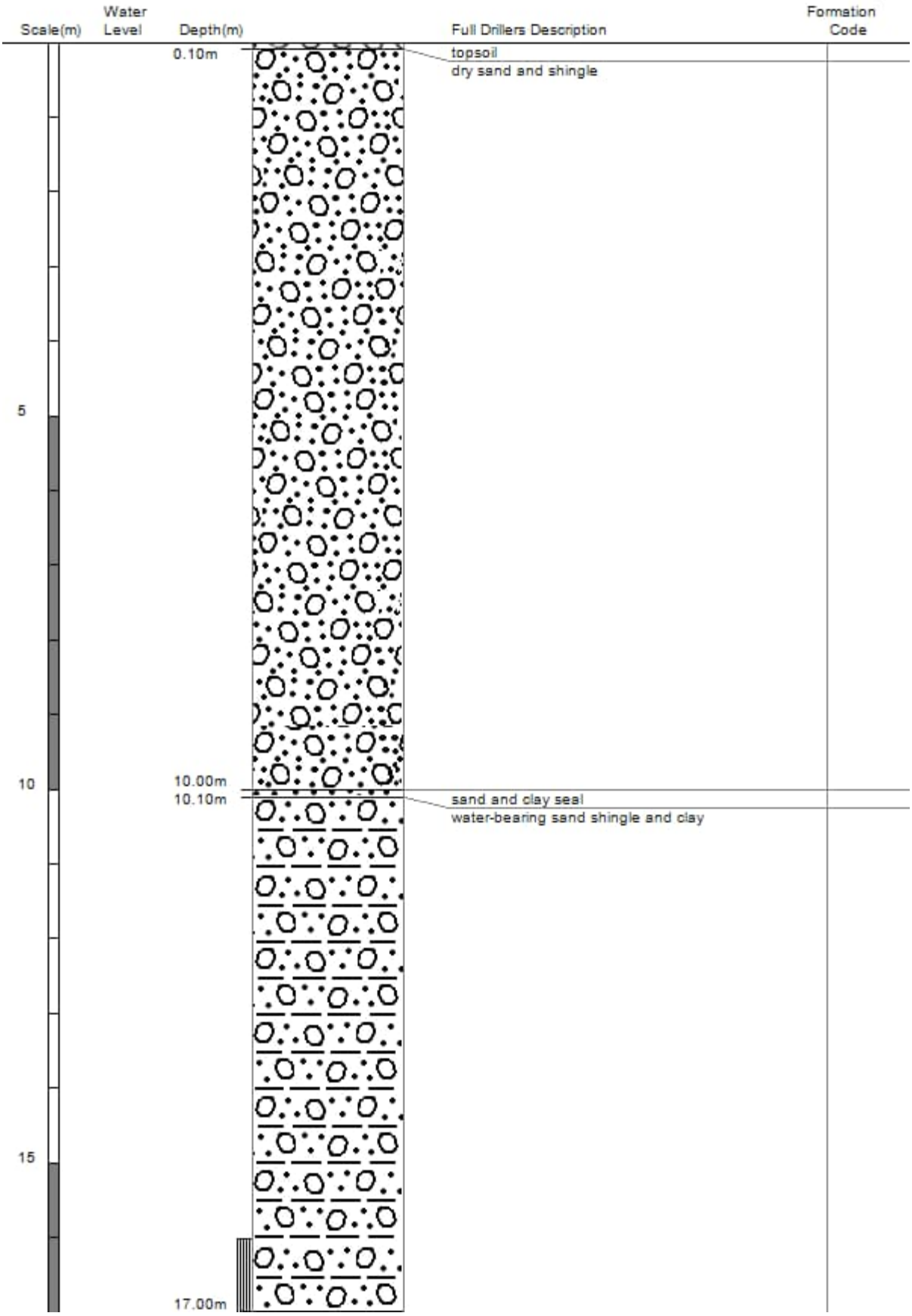
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/11106

Grid Reference (NZTM): 1562971 mE, 5198209 mN
Location Accuracy: 10 - 50m
Ground Level Altitude: 33.5 m +MSD Accuracy: < 2.5 m
Driller: Well Drilling Direct
Drill Method: Rotary/Percussion
Borelog Depth: 17.0 m Drill Date: 08-Mar-2008

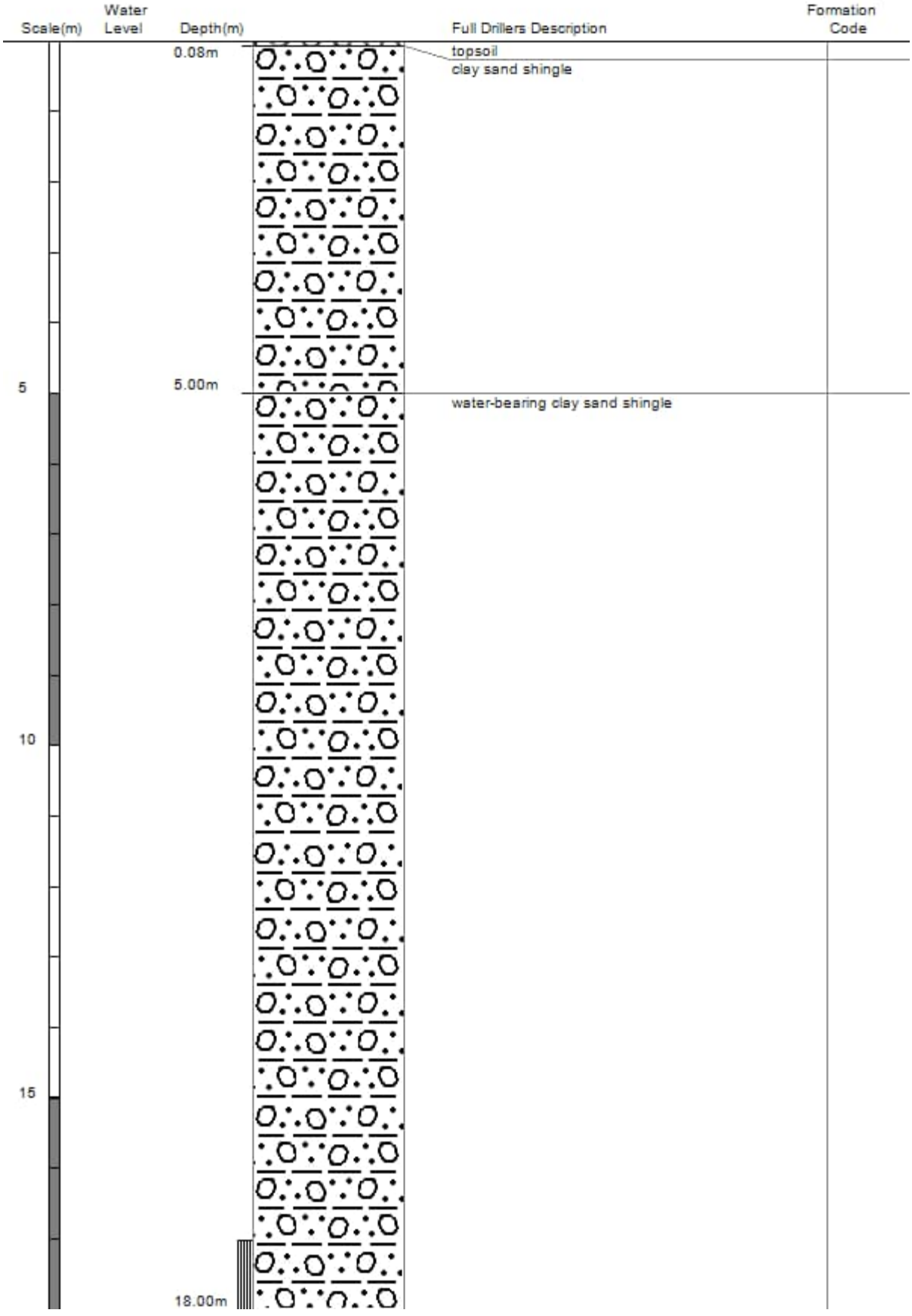
Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Borelog for well M35/11227

Grid Reference (NZTM): 1563102 mE, 5197981 mN
Location Accuracy: 10 - 50m
Ground Level Altitude: 32.8 m +MSD Accuracy: < 2.5 m
Driller: Well Drilling Direct
Drill Method: Rotary/Percussion
Borelog Depth: 18.0 m Drill Date: 16-Nov-2006

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha



Appendix C. ESP Site Investigation Records

Site Investigation Record

Client: San Dona Project

Site: 104 Vicenza Place, Ohoka

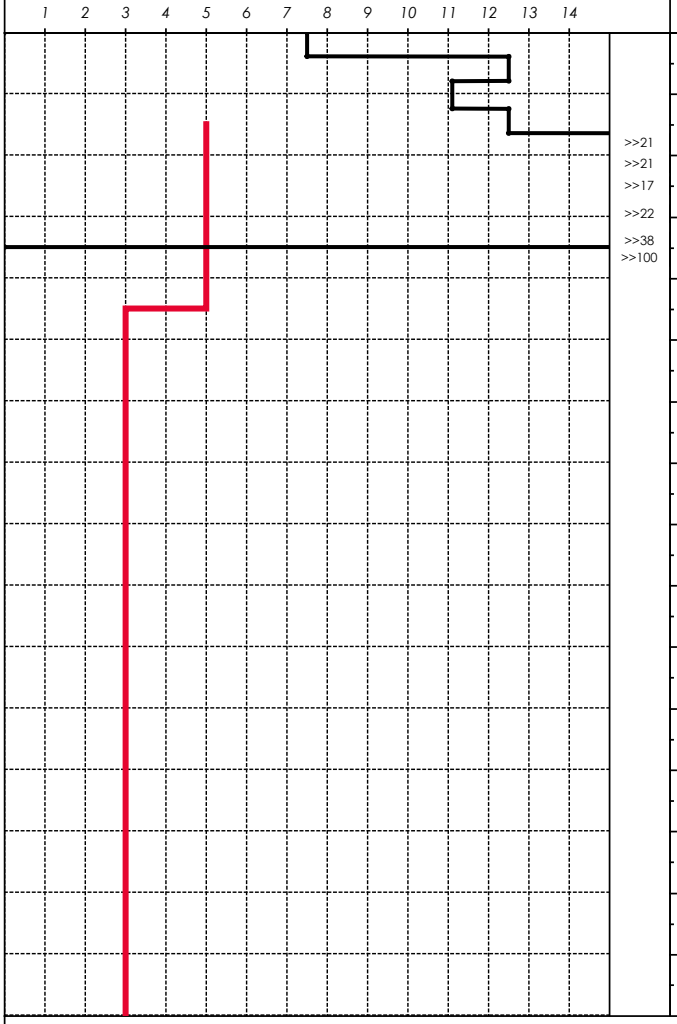
Technical Category: N/A - Rural & Unmapped

Lot: 3 **D.P.:** 300695

Date Tested: 31-Jan-2024

Log Sheet No.: 1 of 1 **Project No.:** 520977

Dynamic Cone Penetrometer (DCP) Test Results



104 Vicenza

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 104 Vicenza

	Water
Silty TOPSOIL; dark greyish brown. Dry.	Groundwater Not Encountered
SILT; yellowish grey. Hard; dry.	
EOH: 0.7m - Test terminated on firm gravels, not practical to continue with hand equipment.	

Comments:

Site Plan: (Not to Scale)

Field Staff:	Prepared By:	Soil Profile From:
QJF	QJF	☐ Hand Auger
Job Manager:	**Approved By:**	☑ Spade Hole
AC	AC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: San Dona Project

Site: 108 Modena Place, Ohoka

Technical Category: N/A - Rural & Unmapped

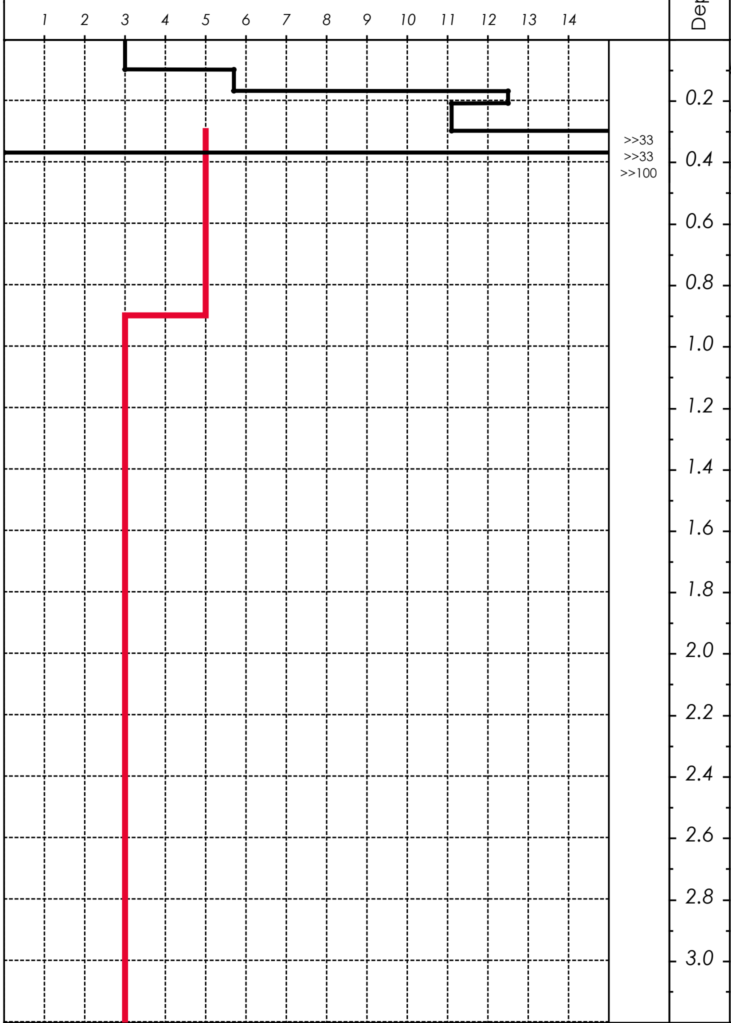
Lot: 39 **D.P.:** 78405

Date Tested: 25-Jan-2024

Log Sheet No.: 1 of 1 **Project No.:** 520977

Dynamic Cone Penetrometer (DCP) Test Results

Number of Blows per 100mm



108 Modena

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 108 Modena

Water: Groundwater Not Encountered

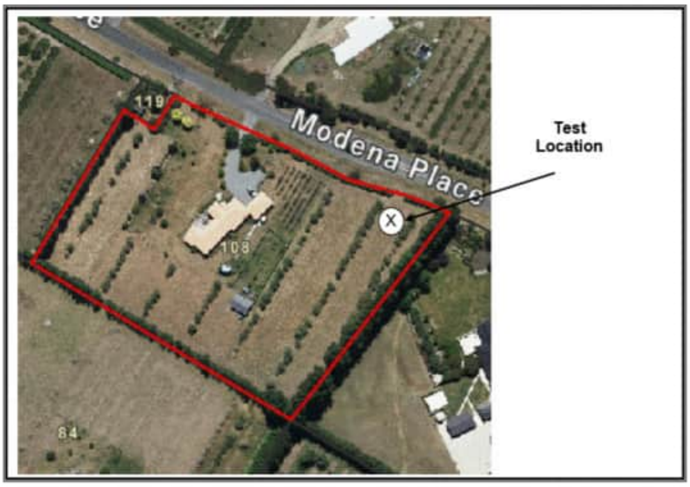
Silty TOPSOIL; dark brown.

SILT, with some sand and gravel; light yellowish grey. Dry; gravel, fine to medium.

Silty medium to coarse GRAVEL, with some sand; yellowish grey. Dry; gravel, round to subround.

EOH: 0.5m - Test terminated in dense gravels, not practical to continue with hand test equipment.

Site Plan: (Not to Scale)



Comments:

Field Staff:	Prepared By:	Soil Profile From:
QJF	QJF	☐ Hand Auger
Job Manager:	**Approved By:**	☑ Spade Hole
AC	**AC**	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: San Dona Project

Site: **142 Verona Place**, Ohoka

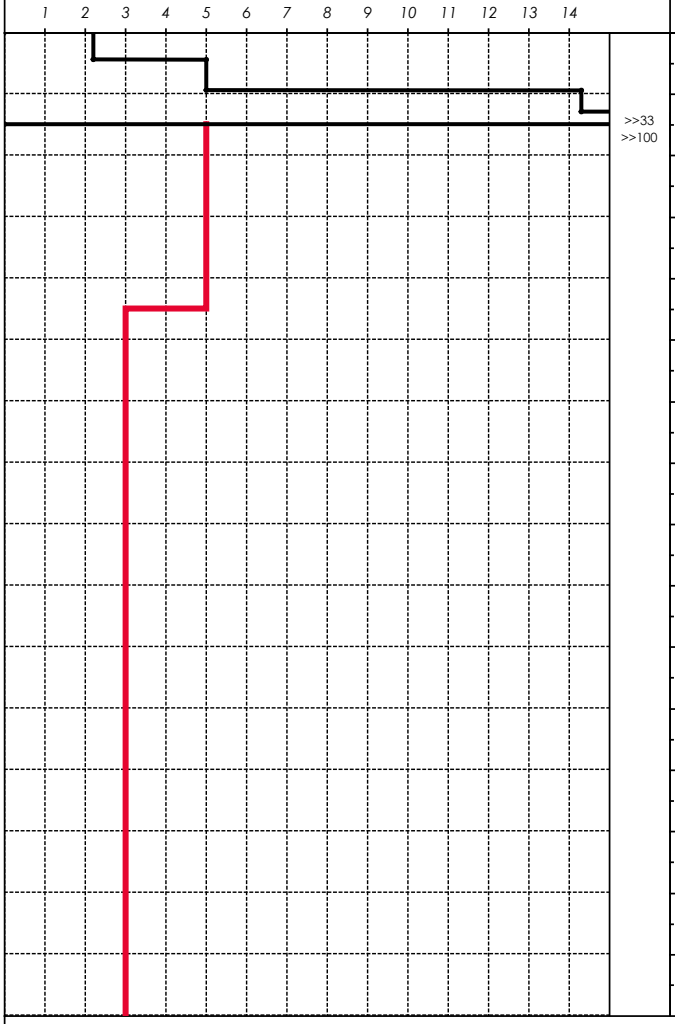
Technical Category: N/A - Rural & Unmapped

Lot: 20 **D.P.:** 77567

Date Tested: 31-Jan-2024

Log Sheet No.: 1 of 1 **Project No.:** 520977

Dynamic Cone Penetrometer (DCP) Test Results



142 Verona

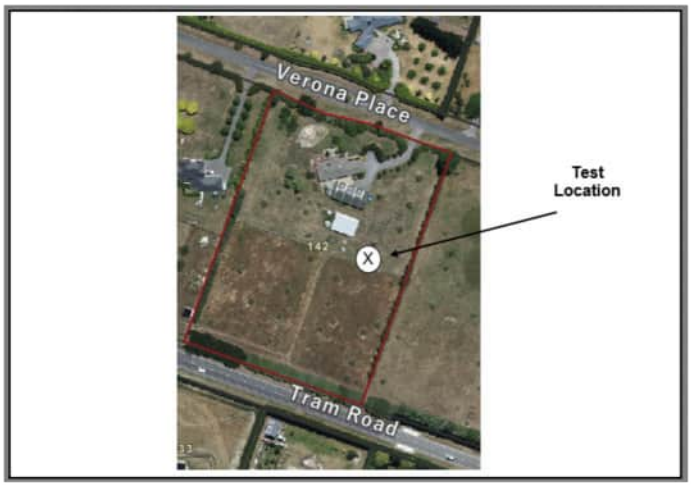
Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 142 Verona

	Water
TS Silty TOPSOIL; dark grey. Dry.	Groundwater Not Encountered
Silty coarse GRAVEL; yellowish grey. Dry; gravel, round.	
EOH: 0.4m - Test terminated in firm gravels, not practical to continue with hand equipment.	

Site Plan: (Not to Scale)



Comments:

Field Staff:	Prepared By:	Soil Profile From:
QJF	QJF	☐ Hand Auger
Job Manager:	**Approved By:**	☑ Spade Hole
AC	AC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: San Dona Project

Site: 23 Velino Place, Ohoka

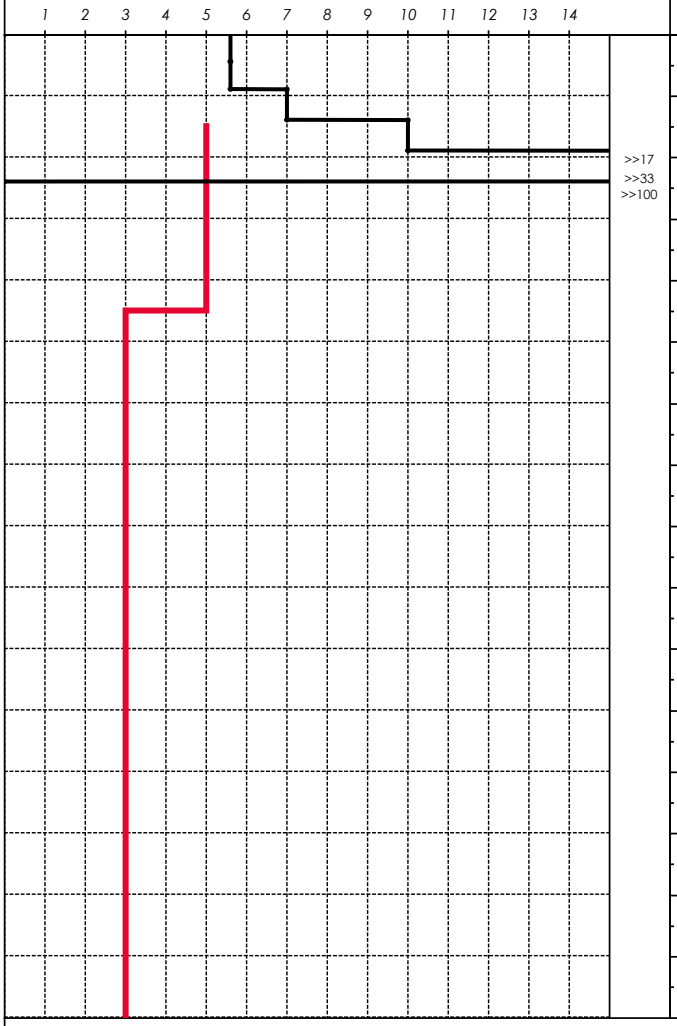
Technical Category: N/A - Rural & Unmapped

Lot: 6 **D.P.:** 80701

Date Tested: 31-Jan-2024

Log Sheet No.: 1 of 1 **Project No.:** 520977

Dynamic Cone Penetrometer (DCP) Test Results



23 Velino

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 23 Velino

		Water
TS / T	Silty TOPSOIL; dark brown. Damp.	Groundwater Not Encountered
	SILT; yellowish grey. Very stiff; damp.	
	EOH: 0.5m - Test terminated on firm gravels, not practical to continue with hand equipment.	

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
QJF	QJF	☐ Hand Auger
Job Manager:	**Approved By:**	☑ Spade Hole
AC	AC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: San Dona Project

Site: 38 Sillano Place, Ohoka

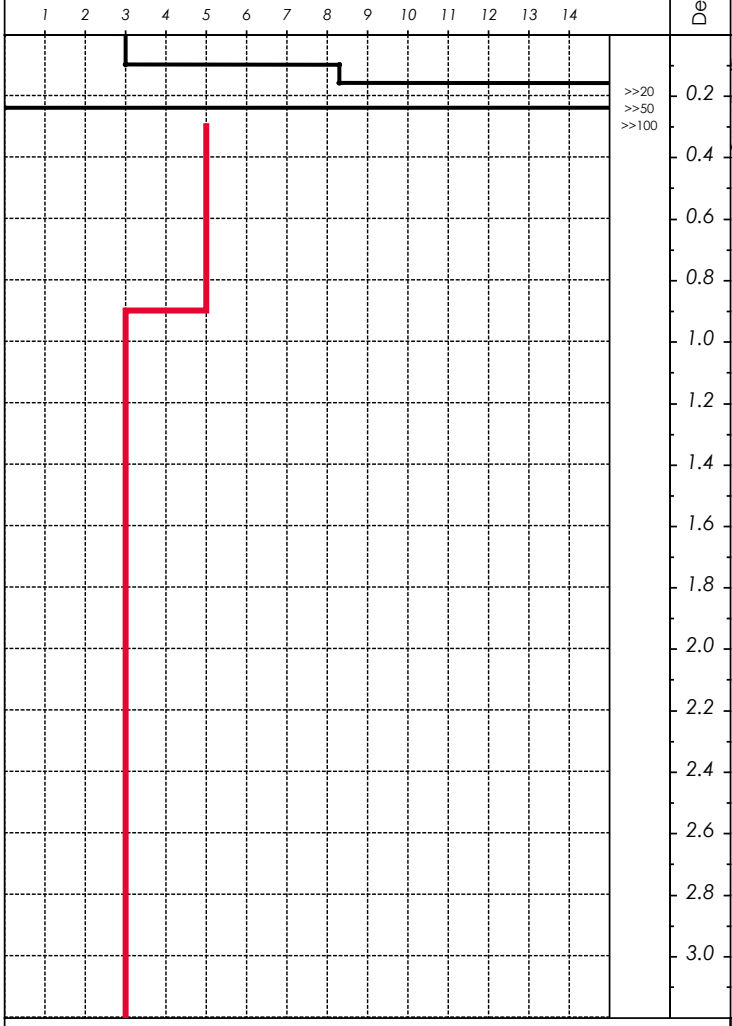
Technical Category: N/A - Rural & Unmapped

Lot: 24 **D.P.:** 81791

Date Tested: 25-Jan-2024

Log Sheet No.: 1 of 1 **Project No.:** 520977

Dynamic Cone Penetrometer (DCP) Test Results



38 Sillano

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 38 Sillano

	Water
TS Silty TOPSOIL; brownish. Dry.	Groundwater Not Encountered
Silty medium to coarse GRAVEL, with some sand; greyish brown. Dry.	
EOH: 0.4m - Test terminated in dense gravels, not practical to continue with hand equipment .	

Comments:

Site Plan: (Not to Scale)

Field Staff:	Prepared By:	Soil Profile From:
QJF	QJF	☐ Hand Auger
Job Manager:	**Approved By:**	☑ Spade Hole
AC	AC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: San Dona Project

Site: 69 Velino Place, Ohoka

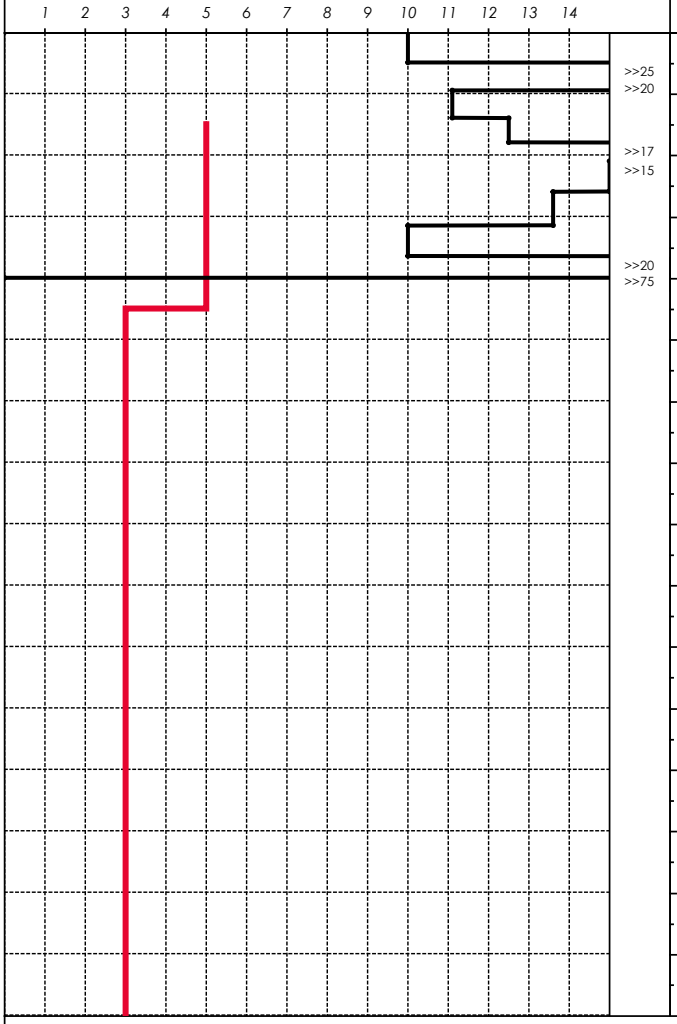
Technical Category: N/A - Rural & Unmapped

Lot: 16 **D.P.:** 80701

Date Tested: 31-Jan-2024

Log Sheet No.: 1 of 1 **Project No.:** 520977

Dynamic Cone Penetrometer (DCP) Test Results



69 Velino

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 69 Velino

		Water
TS T	Silty TOPSOIL; dark greyish brown. Dry.	Groundwater Not Encountered
	SILT; yellowish grey. Hard; dry.	
	EOH: 0.8m - Refusal met on firm gravels.	

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
QJF	QJF	☐ Hand Auger
Job Manager:	**Approved By:**	☑ Spade Hole
AC	AC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: San Dona Project

Site: 8 Vicenza Drive, Ohoka

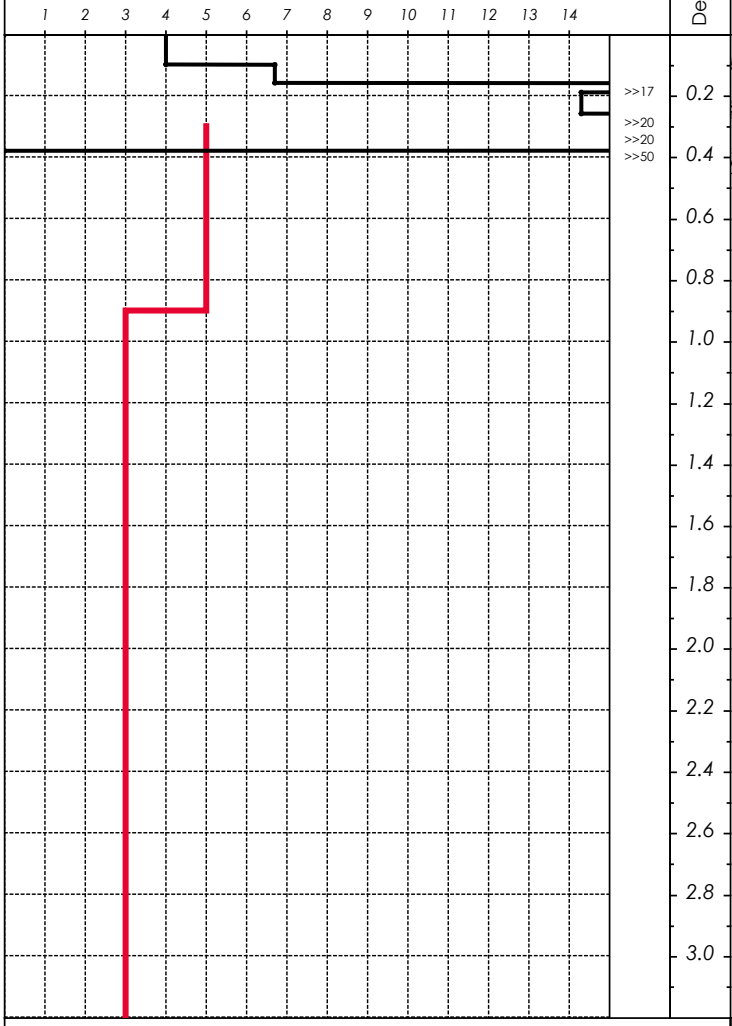
Technical Category: N/A - Rural & Unmapped

Lot: 26 **D.P.:** 300695

Date Tested: 25-Jan-2024

Log Sheet No.: 1 of 1 **Project No.:** 520977

Dynamic Cone Penetrometer (DCP) Test Results



8 Vicenza

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 8 Vicenza	Water
TS / T — FILL: silty TOPSOIL, with some gravel; dark brown. Dry; gravel, coarse.	Groundwater Not Encountered
Silty medium to coarse GRAVEL; yellowish grey. Dry; gravel, round to subround.	
EOH: 0.45m - Test terminated in dense gravels, not practical to continue with hand equipment.	

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
QJF	QJF	☐ Hand Auger
Job Manager:	**Approved By:**	☑ Spade Hole
AC	AC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: San Dona Project

Site: **8 Vicenza Drive, Ohoka**

Technical Category: N/A - Rural & Unmapped

Lot: 10 **D.P.:** 77567

Date Tested: 31-Jan-2024

Log Sheet No.: 1 of 1 **Project No.:** 520977

Dynamic Cone Penetrometer (DCP) Test Results

Number of Blows per 100mm

1 2 3 4 5 6 7 8 9 10 11 12 13 14

>>25

Depth (m)

0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0

80 Verona

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 80 Verona

Water

(FILL?) silty TOPSOIL, with some gravel; dark greyish brown. Dry.

Silty coarse GRAVEL; greyish. Dry.

EOH: 0.5m - Test terminated in firm gravels, not practical to continue with hand equipment..

Groundwater Not Encountered

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
QJF	QJF	☐ Hand Auger
Job Manager:	**Approved By:**	☑ Spade Hole
AC	AC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: San Dona Project

Site: 93 Siena Place, Ohoka

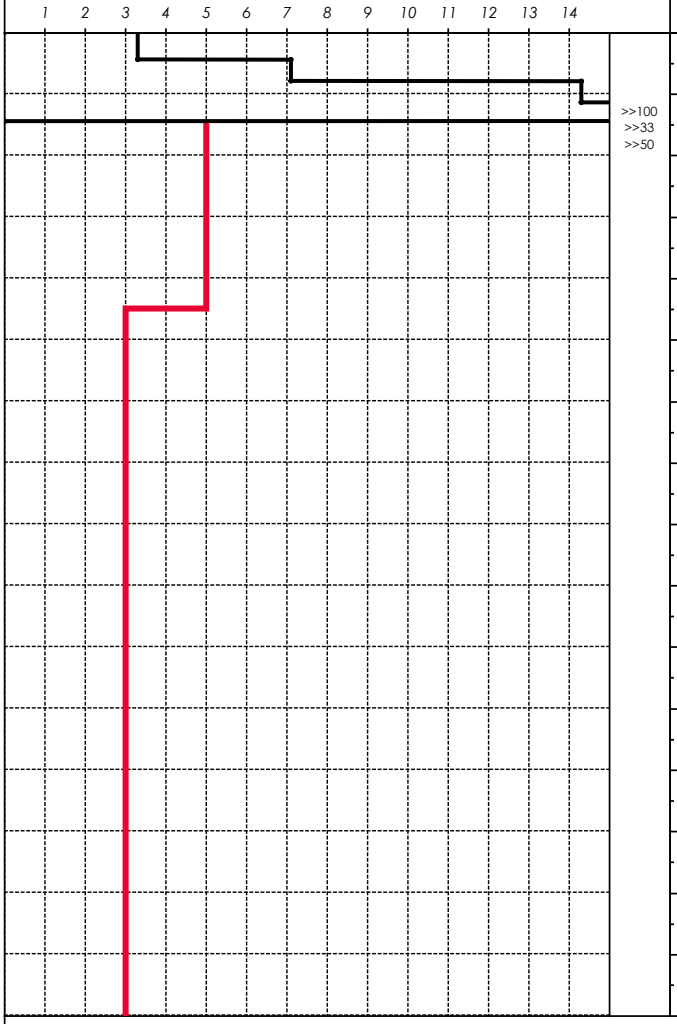
Technical Category: N/A - Rural & Unmapped

Lot: 37 **D.P.:** 81791

Date Tested: 25-Jan-2024

Log Sheet No.: 1 of 1 **Project No.:** 520977

Dynamic Cone Penetrometer (DCP) Test Results



93 Siena

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 93 Siena

TS / T	Silty TOPSOIL; dark brown. Dry.
	Silty medium to coarse GRAVEL, with some sand; greyish brown. Dry; gravel, round to subround.
	EOH: 0.45m - Test terminated in firm gravels, not practical to continue with hand equipment.

Water

Groundwater Not Encountered

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
QJF	QJF	☐ Hand Auger
Job Manager:	**Approved By:**	☑ Spade Hole
AC	AC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Appendix D. GNS Risk Assessment Method

Risk Assessment Method

Principles

The natural hazards risk assessment is based on GNS's risk-based land use planning toolbox[9]. We have adapted the toolbox for the scale of the proposed residential subdivision and for the purposes of the RMA s106 reporting requirements. We have also considered Section 71 of the Building Act (2004), which includes a consent 'test' of whether land is likely to be subject to damage from a natural hazard.

The approach taken for this risk assessment considers whether land is likely to be subject to material damage from a natural hazard, where "likely" has been determined to be a 1 in 100-year return period event, rather than an extreme event with a low probability of occurrence. There are inevitable inconsistencies in the definitions used by different agencies and in this instance, we note that GNS refers to a 1 in 100-year return period event as a "possible" event.

The GNS toolbox report notes that many land use planning objectives, policies, rules, and decisions are based around a likelihood assessment of a natural hazard, such as the 1 in 100-year return period event. Where information exists that enables us to consider other relevant levels of likelihood, we have included additional commentary e.g., for different design earthquake scenarios.

Risk Calculation

In accordance with GNS's approach the risk is calculated as the product of the consequence and the likelihood, with the two inputs drawn from the Consequence Table (GNS Figure 3.4) and the Likelihood Scale (GNS Figure 3.5), as presented below.

Table 1. GNS Consequence Table

	Built					
Severity of Impact	**Social / Cultural**	**Buildings**	**Critical Buildings**	**Lifelines**	**Economic**	**Health & Safety**
Catastrophic (V)	≥25% of buildings of social/cultural significance within hazard zone have functionality compromised	≥50% of affected buildings within hazard zone have functionality compromised	≥25% of critical facilities within hazards zone have functionality compromised	Out of service for >1 month (affecting ≥20% of the town/city population) OR suburbs out of service for >6 months (affecting <20% of the town/city population)	>10% of regional GDP	>101 dead and/or >1001 injured
Major (IV)	11-24% of buildings of social/cultural significance within hazard zone have functionality compromised	21-49% of buildings within hazard have functionality compromised	11-24% of buildings within hazard zone have functionality compromised	Out of service for 1 week – 1 month (affecting ≥20% of the town/city population) OR suburbs out of service for 6 weeks to 6 months (affecting <20% of the town/city population)	1-9.99% of regional GDP	11 – 100 dead and/or 101-1001 injured

[9] https://www.gns.cri.nz/Home/RBP/Risk-based-planning/A-toolbox

Severity of Impact	Built				Economic	Health & Safety
	Social / Cultural	Buildings	Critical Buildings	Lifelines		
Moderate (III)	6-10% of buildings of social/cultural significance within hazard zone have functionality compromised	11-20% of buildings within hazard zone have functionality compromised	6-10% of buildings within hazard zone have functionality compromised	Out of service for 1 day to 1 week (affecting ≥20% of the town/city population people) OR suburbs out of service for 1week to 6 weeks (affecting <20% of the town/city population)	0.1-0.99% of regional GDP	2 – 10 dead and/or 11 – 100 injured
Minor (II)	1-5% of buildings of social/cultural significance within hazard zone have functionality compromised	2-10% of buildings within hazard zone have functionality compromised	1-5% of buildings within hazard zone have functionality compromised	Out of service for 2 hours to 1 day (affecting ≥20% of the town/city population) OR suburbs out of service for 1 day to 1 week (affecting <20% of the town/city population)	0.01-0.09% of regional GDP	<=1 dead and/or 1 – 10 injured
Insignificant (I)	No buildings of social/cultural significance within hazard zone have functionality compromised	<1% of affected buildings within hazard zone have functionality compromised	No damage within hazard zone, fully functional	Out of service for up to 2 hours (affecting ≥20% of the town/city population) OR suburbs out of service for up to 1 day (affecting <20% of the town/city population)	0.01% of regional GDP	No dead No injured

We have applied judgement and interpretation in the application of GNS's table to the scale and nature of the proposed subdivision.

For this assessment there are no social/cultural buildings to consider and the economic impacts are deemed not applicable. We use the '*Buildings*' column as the basis to assess effects on the integrity of buildings (i.e., their amenity and life-safety function), and the '*Lifelines*' column as the basis to assess the effects on utilities servicing the building/s.

Table 2. GNS Likelihood Scale

Level	Descriptor	Description	Indicative Frequency
5	Likely	The event has occurred several times in your lifetime	Up to once every 50 years
4	Possible	The event might occur in your lifetime	Once every 51 – 100 years
3	Unlikely	The event does occur somewhere from time to time	Once every 101 – 1000 years
2	Rare	Possible but not expected to occur except in exceptional circumstances	Once every 1001 – 2,500 years
1	Very rare	Possible but not expected to occur except in exceptional circumstances	2,501 years plus

To take a risk-based approach, the consequences and likelihood need to be quantified to provide a level of risk. To achieve this, a matrix is used that incorporates the relevant risk level, expressed as the consequences multiplied by likelihood (GNS Figure 3.8). The risk then ranges from 1 (extremely low) to 25 (extremely high).

Table 3. Color-coding the matrix based on level of risk

	Consequences				
Likelihood	**1**	**2**	**3**	**4**	**5**
5	5	10	15	20	25
4	4	8	12	16	20
3	3	6	9	12	15
2	2	4	6	8	10
1	1	2	3	4	5

GNS then suggests the consent status (treatment) of the activity can be presented as follows (GNS Figure 3.9):

Table 4. Level of risk and associated consent status

Level of risk	Consent
Acceptable	Permitted
Acceptable	Controlled
Tolerable	Restricted Discretionary
Tolerable	Discretionary
Intolerable	Non-complying, prohibited

GNS recommends that when assessing consequences, the final level of impact is assessed on the 'first past the post' principle, in that the consequence with the highest severity of impact applies.