



SECOND GENERATION DISTRICT PLAN

Variation 2 – Additional Housing Capacity Part 3 – Sites Proposed for Rezoning

Appendix D Supporting Information

July 2022

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SECOND GENERATION DISTRICT PLAN

Variation 2 – Additional Housing Capacity

Part 3 – Sites Proposed for Rezoning

Appendix D.5

Evidence on 3 Waters

July 2022

BEFORE THE VARIATION 2 HEARING PANEL

IN THE MATTER

of the Resource Management
Act 1991

AND

Variation 2 to the proposed
Second Generation Dunedin City
District Plan (2GP)

STATEMENT OF EVIDENCE OF BRUCE SAUNDERS FOR DUNEDIN CITY COUNCIL

Dated 08 July 2022

QUALIFICATIONS AND EXPERIENCE

1. My name is Bruce Saunders.
2. I am employed by the Dunedin City Council ("the Council") as a Strategic Planning Engineer within the 3 Waters group. In this role I provide high-level strategic optioneering, conceptual and feasibility studies that support investment in 3 Waters infrastructure, through long-term strategy development, capital prioritisation and programming.
3. I hold a Bachelor of Engineering Degree majoring in Mechanical Engineering, from Nottingham Trent University, in the United Kingdom. I am a member of Engineering New Zealand (ENZ). I have over seven years' of experience within the 3 water's industry, working in the United Kingdom and New Zealand, mainly within the private sector. My experience has included the design of water and wastewater treatment systems and pump stations.
4. I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note. This evidence has been prepared in accordance with it and I agree to comply with it. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE AND OVERVIEW

5. My evidence relates to providing 3 Waters assessments of sites. At times I have sought input from other 3 Waters staff
6. A consultant, AR & R Associates has also supported the 3 Waters Group with work on Variation 2 and in particular, Andres Roa, of AR & R Associates in advising on certain aspects.
7. My evidence is contained in a memo dated 06 July 2022

CONCLUSION

8. It is my opinion that the information within this memo is correct.

DATED this 08 day of July 2022

Bruce Saunders

Strategic Planning Engineer

3 Waters Group

Dunedin City Council

BEFORE THE VARIATION 2 HEARING PANEL

IN THE MATTER

of the Resource Management
Act 1991

AND

Variation 2 to the proposed
Second Generation Dunedin City
District Plan (2GP)

STATEMENT OF EVIDENCE OF JARED OLIVER FOR DUNEDIN CITY COUNCIL

Dated 07 July 2022

QUALIFICATIONS AND EXPERIENCE

1. My name is Jared Oliver.
2. I am employed by the Dunedin City Council ("the Council") as the Engineering Services Team Leader with the 3 Waters Group. In my current role I am responsible for leading a team that provides technical support and direction at a long-term strategic level to support investment in 3 Waters infrastructure, through strategic planning, engineering, condition assessments, hydraulic modelling and coastal expertise.
3. I hold a Bachelor of Technology Degree majoring in Chemical Technology and a Masters of Technology majoring in Energy Management, both from Massey University. I am a member of the Engineering New Zealand (ENZ) and have been a Chartered Professional Engineer (CPEng) since 2011. I am a member of the New Zealand Water & Wastes Association (Water NZ) and the Institute of Public Works Engineering Australasia (IPWEA). I have over seventeen years' experience in the 3 Water's industry both within New Zealand and abroad in the public and private sectors. My experience has included the design, operation, maintenance and asset management of water and wastewater treatment systems and 3 Waters reticulation networks.
4. I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note. This evidence has been prepared in accordance with it and I agree to comply with it. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE AND OVERVIEW

5. My evidence relates to submissions related to water, wastewater, and stormwater services, and also providing 3 Waters assessments of sites not previously evaluated. At times I have sought input from other 3 Waters staff.
6. A consultant, AR & R Associates has also supported the 3 Waters Group with work on Variation 2 and in particular, Andres Roa, of AR & R Associates in advising on certain aspects.
7. My evidence is contained in two memos, one dated 29 June 2022 and the other dated 06 July 2022.

CONCLUSION

8. It is my opinion that the information within these memos is correct.

DATED this 07 day of July 2022

Jared Oliver

TO:	Bede Morrissey, Policy Planner, City Development
FROM:	Jared Oliver, Engineering Services Team Leader, DCC 3 Waters Group
DATE:	29 th June 2022
SUBJECT:	VARIATION 2: 3 WATERS RESPONSE TO REQUEST FOR COMMENTS ON DCC-PROPOSED GREENFIELD SITES

INTRODUCTION:

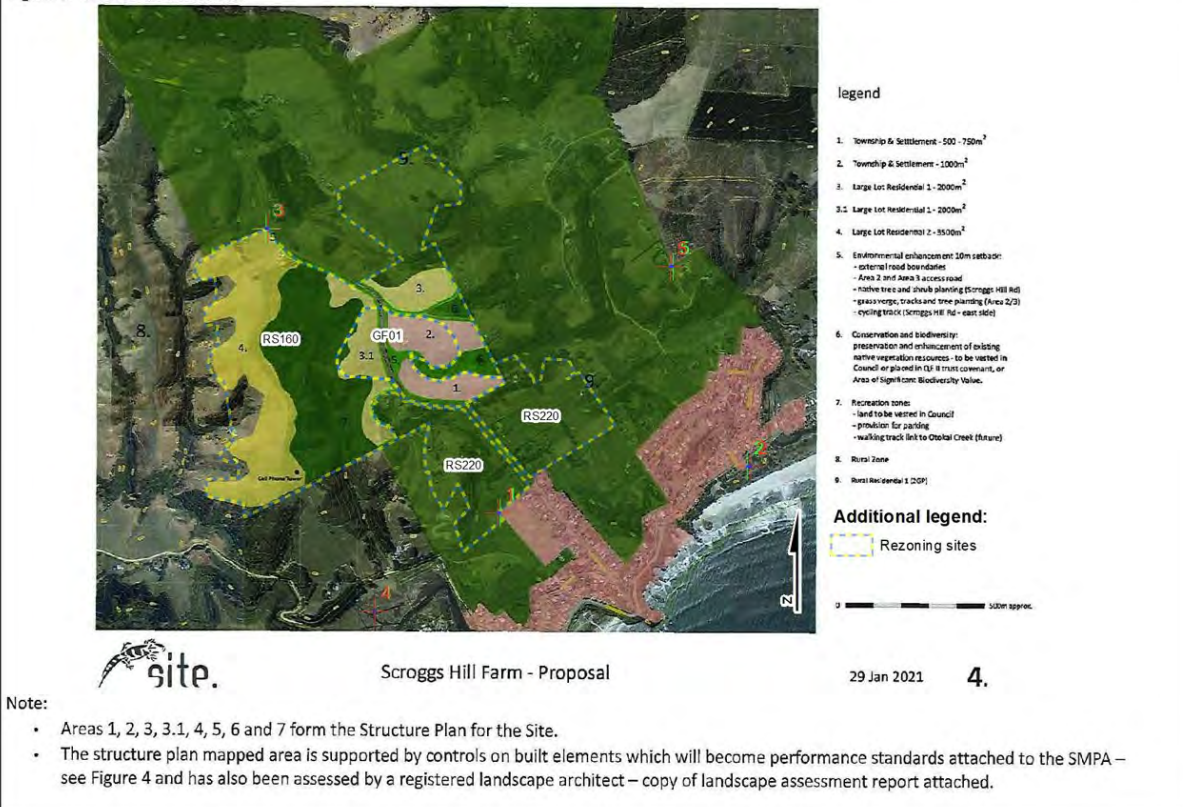
1. The 3 Waters department received a memo from you dated 16 February 2022 requesting comments on Variation 2 in relation to 3 waters and specific questions you have raised as a result of reviewing submissions regarding proposed greenfield sites.
2. I have considered the relevant submissions on the topics/issues you highlighted and your specific questions.
3. Please find below my response on these topics/questions in the grouping that you posed these requests.

COMMENTS – GREENFIELD REZONING (DCC PROPOSED SITES):

GF01 / RS160 / RS220 – Scroggs Hill Road, Brighton

4. As GF01 is adjacent to Rejected Sites RS160 and RS220 and Submission S249 proposes a variety of rezoning as per a submitted structure plan that covers the areas of GF01, RS160. RS220 is adjacent to these areas so I have assessed all three areas together at the zonings proposed in the Structure Plan included in Submission S249 and at Township & Settlement for RS220. Where submissions relate to a specific area, I have grouped these under a heading for that area.

Figure 3: Structure Plan for Site



Proposed Structure Plan plus RS220 at Township & Settlement – 3 Waters infrastructure assessment

- The proposed Structure Plan requests a range of zoning, including:
 - Township and Settlement – at site sizes of 500-750m²
 - Township and Settlement – at site sizes of 1,000m²
 - Large Lot Residential 1 – 2,000m²
 - Large Lot Residential 2 – 3,500m²
- Submitters have requested rezoning of RS220 to either Large Lot Residential 1 or Township & Settlement. For the purposes of this assessment Township & Settlement zoning of RS220 was assumed.
- It is estimated that across the whole assessed area this would result in a yield of up to 200 lots.
- The 3 Waters infrastructure assessment of the proposed structure plan detailed in Submission S249 plus RS220 is summarised in the table below.

3 Waters	Issue Grade (minor/moderate/significant)	Comments
Overall	Significant issues (manageable)	Poor but not impossible site from 3W servicing perspective. Water supply would require significant infrastructure to support the development and requires further investigation. For wastewater there are concerns regarding how much of the site could be serviced without pumping. Stormwater could be managed adequately with NDMA rules for stormwater management as per GF01 however, this may be expensive on a per lot basis. Overall

		development as per the proposed Structure Plan is not currently supported.
Potable Water Supply	Significant issues (manageable)	The site elevation varies from approximately 116m to 6m. The site location is outside the area that is currently serviced by DCC. However, the Brighton Reservoir is within the site location at an elevation of approximately 86m. This is fed by Southern WTP, elevation approximately 114m. The existing infrastructure is adequate to service a portion of the proposed development at lower elevations. The topography of the site suggests that an additional reservoir would be required to service higher elevation areas of the site (to the north of the site) up to an approximate elevation of 84m (therefore the RS220 site but no further). Booster pumps and pressure reducing valves would be required to service any areas at higher elevation than approximately 84m. Dunedin's water supply is fortunate in many areas to not require pumping. 3 Waters prefers gravity to pumping where possible due to lower operating and maintenance costs and supporting DCC's Zero Carbon policy. I do not support servicing water supply for development above 84m elevation. I believe that it may be possible to consider development up to 84m pending further detailed analysis to investigate the feasibility of the proposed reservoir. Some major upstream network upgrades would be required in the future. At this stage the proposal is not supported from a water supply perspective. Further investigation and assessment is required.
Wastewater Supply	Significant issues (manageable)	There is existing infrastructure within Scroggs Hill Road. Small extension required, however many areas of the site are at lower elevation to the adjacent road. For these areas, wastewater pumping may be required. 3 Waters prefers gravity to pumping where possible due to lower operating and maintenance costs and supporting DCC's Zero Carbon policy. While servicing by gravity would be possible for areas of the site with elevation similar to adjacent Scroggs Hill Road, I do not support servicing for wastewater for areas of the site that would require pumping. Significant downstream network upgrades would also be required. At this stage the proposal is not supported from a wastewater servicing without an understanding of the balance of gravity and pumped reticulation. Further investigation and assessment is required.
Stormwater Supply	Some issues (manageable)	The proposed development's stormwater runoff contributes to overland flow path which flows down various valleys and gullies, eventually discharges over McIntosh Rd and finally into the river tributary before heading out to sea. The capacity of the gullies and channels are unknown therefore an attenuation assessment is required for the 100 year storm flows.

		Due to the large site area, onsite attenuation would be required. The campground downstream has had previous flooding issues. Provided the stormwater management rules in GF01 were applied to the whole proposed structure plan area the site may be considered developable, however I have concerns over the affordability of the stormwater infrastructure.
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GF01: Part 155 Scroggs Hill Road, Brighton – Rezoning from Rural Residential 1 (RR1) to Large Lot Residential 1 (LLR1)

9. S271.032, FS184.98 (Otago Regional Council - ORC) - the submitter is concerned about the density of development proposed under the rezoning and the effects of that development on water quality. The following comments are provided. The submitter requested to remove Change GF01 unless:
 - zoning is applied that permits much less density of development, or
 - a significantly higher quality on-site wastewater treatment solution is required under the proposed zoning.
10. GF01 will be subject to Policy 9.2.1.Y and Rule 9.9.X Stormwater management plans. These aim to manage stormwater effects from the development. Through 2GP appeals mediation and Hearing 3 of Variation 2, the ORC has already helped to shape changes to these parts of the 2GP and has agreed to these changes for stormwater management.
11. As the site is not serviced for wastewater by DCC, resource consents for wastewater discharge will be required from ORC. As such, ORC will be responsible for assessing the degree of wastewater treatment required.
12. S56.007 (Saddle Hill Community Board) - The submitter supports retaining Change GF01 providing that developments do not put pressure on the infrastructure of existing residential dwellings and surroundings. The site is to be self-serviced for water and wastewater so there will be no additional pressure on this infrastructure. For stormwater, GF01 will be subject to Policy 9.2.1.Y and Rule 9.9.X Stormwater management plans. These aim to manage stormwater effects from the development.
13. S249.004 & S249.005 (Ross McLeary & COF Ltd & Scroggs Hill Farm Ltd) the submitter has requested amending Change GF01 to remove the new development mapped area and replace it by a proposed structure plan attached to the submission.
14. The proposed structure plan has no details on whether or how the site would be serviced for water or wastewater or how stormwater would be managed for the site. It is essential that the requirement for servicing and means of 3 Waters servicing is documented. Stormwater management needs to be adequately considered, designed, and approved by DCC, and the NDMA is considered an acceptable way to ensure a holistic and appropriate approach is taken to stormwater management for the whole structure plan area.
15. Without the requirements of the NDMA provisions, there would be no requirement for integrated stormwater management for greenfield sites or for development to connect to that system. This could result in piecemeal or individual site approaches to management of stormwater being proposed.

16. The 3 Waters infrastructure assessment for the proposed Structure Plan does not support the proposal. Water supply and wastewater servicing require further investigation and stormwater management, while possible, may not be affordable.
17. The submitter (S249.004 & S249.005) also requested removal of the no DCC reticulated wastewater mapped area.
18. Previous comments in Appendix 6 of the Section 32 report may have been unclear. The comment “Significant downstream network upgrades would be required and are budgeted in draft 10 Year Plan. Self-servicing (Large Lot Residential zoning) is feasible.” may have implied that downstream upgrades to allow capacity for servicing GF01 for wastewater were budgeted in the draft 10 Year Plan. This is not the case. No funding to service the site for wastewater has been budgeted in the 10 Year Plan 2021-31.
19. The submitter proposes that “The extension of the wastewater line from its current terminal point in Scroggs Hill Road to the site will be paid for by the site developer.” DCC would be open to this but it would need to be done through a Private Development Agreement and this would be in addition to Development Contributions (which cover wider network upgrades, not costs for connecting the site to the wastewater network). It would also not address concerns that to service the proposed Structure Plan area for wastewater would require a mix of gravity and pumped systems, the degree of which is unknown at present.
20. FS184.501, FS184.502, FS184.503 & FS184.504 (ORC): The submitter opposed OS249.002, OS249.004, OS249.005 & OS249.006 to amend Change GF01 to zones shown in the submitter's proposed structure plan. I agree with the submitters’ concerns that an increase in development in this area would require significant infrastructure planning. As indicated in my summary comments on the Scroggs Hill Road sites (GF01, RS160, RS220) further investigation, particularly for water supply and wastewater servicing, is required.

RS160: Part 155 and part 252 Scroggs Hill Road– Rezoning from RR1 to LLR1, LLR2 & Township and Settlement Zone (as shown in the submission’s proposed structure plan)

21. S249.001 & S249.003 (Ross McLeary & COF Ltd & Scroggs Hill Farm Ltd): The submitter requested to rezone the site from Rural Residential 1 zone to Township and Settlement Zone with a Structure Plan Mapped Area (inferred not stated). As per the comments in 13 above, the 3 Waters infrastructure assessment for the proposed Structure Plan does not support the proposal. Water supply and wastewater servicing require further investigation and stormwater management, while possible, may not be affordable.
22. FS184.63 & FS184.529 (ORC): The submitter opposes OS249.001, in part seeking to not extend Change GF01, as rezoning would enable higher density of development in a sensitive area, which would require reticulation or significantly higher quality provision for any on-site wastewater treatment solution. As per the comments in 13 above, the 3 Waters infrastructure assessment for the proposed Structure Plan does not support the proposal. Wastewater servicing requires further investigation. On-site servicing for wastewater would require consent from the ORC as such, ORC would be responsible for assessing the degree of on-site wastewater treatment required.
23. FS217.1 & FS217.2 (Scott and Justine Weatherall): The submitter opposes OS249.001 & OS249.003 due to concerns over the actual capacity of the current sewage network to take the extra volume of wastewater. As indicated in my summary comments on the Scroggs Hill Road

sites (GF01, RS160, RS220) significant downstream upgrades to the existing wastewater network would be required to service the site.

RS220: 53, 64, 73, 74, 80, 85, 86, 92, 100, 103, 103A, 123, 127 Scroggs Hill Road – Rezoning from RR1 to LLR1 or Township and Settlement Zone

24. S62.001 (Richard and Rosalind Mains): The submitter requested rezoning the site from Rural Residential 1 zone to Large Lot Residential 1 zone (inferred not stated). As indicated in my summary comments on the Scroggs Hill Road sites (GF01, RS160, RS220), this would not currently be supported if the rezone were to be serviced for water supply and wastewater as further investigation of the infrastructure requirements is required. Rezoning without servicing for wastewater and stormwater would be consistent with GF01 so may be possible, however the concerns raised by other submitters regarding on-site wastewater treatment quality may be exacerbated if both GF01 and RS220 were rezoned to Large Lot Residential 1.
25. FS184.102 & FS184.533 (ORC): The submitter opposes S62.001 & S249.007, supporting the DCC's position for rejecting this site and that there are stormwater management issues raised by the proposal. If RS220 was rezoned to Large Lot Residential 1, it should be made subject to the same rules as GF01 regarding stormwater management and the two areas merged into one NDMA so that integrated stormwater management can be achieved across the two sites. These rules aim to manage stormwater effects from the development. Through 2GP appeals mediation and Hearing 3 of Variation 2, the ORC has already helped to shape changes to these parts of the 2GP and has agreed to these changes for stormwater management.
26. FS75.1 & FS75.2 (Deborah & Kevin MacLeod): The submitter opposes OS249.007 & OS62.001 as the property already has its own water and septic system and there could be concerns over water supply and wastewater (inferred not stated). This property could be excluded from any rezoning for RS220 as it would still be connected to other Rural Residential 1 zoned land. It would seem unfair to include these landowners in a rezoned area if it were subject to water and wastewater servicing and where NDMA rules for integrated stormwater management would apply, as there is a risk that they could be subject to the cost of complying with these rules when they have no wish to be part of the rezoning.

GF02 and GF02a: 201, 207, 211 Gladstone Road South, East Taieri – Rezoning from Rural (Taieri Plain) to General Residential 1 (GR1)

27. It was not considered necessary to provide further comment responding to submissions regarding insufficient infrastructure as 3W initial site assessments (see Section 32 Report, Appendix 6) indicate that funds for servicing are in the 2021-31 10 Year Plan.
28. S129.002 (Alex King) - Whether the wastewater requires pumping requires further site investigation, however, if pumping is required the energy demand is expected to be low.
29. S271.033 (ORC) / S99.002 (Peter and Jillian Hogan) / S24.001, FS220.1 & FS220.2 (Darrin and Sheree Healy) / S108.001 (June Ross) / S30.003 (Sonia & Karl Thom) / FS115 (James Paulin) - Stormwater management will be achieved through rule changes in Variation 2 that ORC has been part of developing.
30. S24.001, FS220.1 & FS220.2 (Darrin and Sheree Healy) - services for future subdivision of the submitters property will be accessible from existing public roads or those created as a result of development on GF02.

31. S1.002 (Jane McLeod) – The submitter suggests development in greenfield areas should be required to have rainwater collection tanks for potable water use and only rely on connection to DCC reticulated supply during dry periods. The submitter considered this would place less demand for water from reticulated services and address stormwater management. Water connections are normally provided for General Residential zoned land areas and water capacity is generally available to supply these areas. There is no requirement for landowners to supplement this with rainwater collection but they may do so if they wish.
32. The changes proposed through Variation 2 seek to ensure appropriate stormwater management occurs in greenfield areas, and that stormwater management is undertaken through a holistic approach to the whole area rather than individual management of stormwater, such as on-site tanks.
33. Stormwater detention tanks that are specifically required through the resource consent process to address management of stormwater are separate to retention tanks that are used to collect water as a potable water supply. Stormwater detention tanks store water during high rainfall events and release water to the reticulated network or other stormwater system after a rainfall event when there is capacity in the stormwater network. Stormwater storage tanks need to discharge stormwater to ensure they have capacity to take in water during the next rainfall event. Water tanks for storage of potable water do not discharge water unless they are at capacity as their purpose is to store that water for use as required. Although collection of rainwater may assist in reducing the amount of stormwater released from a site, separate systems are required for these two purposes and collection of rainwater for potable purposes cannot be used as a stormwater management system.
34. S223.002 (Edwin Stewardson owner of No 201) & S240.002 (Invermark Investments Ltd) - The submitters suggest that a NDMA should not be placed over areas with a structure plan and that the requirements of the structure plan can be used to adequately manage stormwater.
35. The recent structure plans added to the 2GP contain very little in the way of stormwater requirements. Generally, the only requirement is for stormwater infrastructure to be in place prior to the construction of dwellings, and this requirement is not included in all structure plans as there are other rules in the 2GP requiring this. Very few of the structure plans contain detailed requirements for the preparation of a Stormwater Management Plan, or details of the proposed stormwater infrastructure and management, and these requirements are generally associated with structure plans that have been in the district plan prior to the latest review and were prepared with significantly more detail than recent structure plans.
36. As these recently added structure plans have generally been included in the 2GP without details of the nature of the site, what is proposed for development, or what is necessary for stormwater management, it is essential that the requirement for stormwater management to be adequately considered, designed, and approved by DCC, is included via the NDMA to ensure a holistic and appropriate approach is taken to stormwater management for the whole structure plan area.
37. Without the requirements of the NDMA provisions, there would be no requirement for integrated stormwater management for greenfield sites or for development to connect to

that system. This could result in piecemeal or individual site approaches to management of stormwater being proposed.

38. S30.001 (Sonia & Karl Thom) - no concerns from 3W. Connections can be made to wastewater and water services from extension of services required for GF02. Stormwater management will still be required as per rules governing GF02 and should be integrated stormwater management with GF02.

GF03: 16 Hare Road and 7 Kayforce Road – Rezoning from Rural Residential 1 (RR1) to Township and Settlement (T&S)

39. It was not considered necessary to provide further comment responding to submissions regarding insufficient infrastructure as 3W initial site assessments (see Section 32 Report, Appendix 6) indicate that funds for servicing are in the 2021-31 10 Year Plan.
40. S42.001 (Mike Ind) - NDMA is proposed to be applied to the site. This includes rules for stormwater management.

GF04: Part 127A Main Road, Fairfield – Rezoning from Rural (hill slopes) to General Residential 1 (GR1)

41. It was not considered necessary to provide further comment responding to submissions regarding insufficient infrastructure as 3W initial site assessments (see Section 32 Report, Appendix 6) indicate that funds for servicing are in the 2021-31 10 Year Plan.
42. No further comments.

GF05 and GF05a: Parts 353 Main South Road, Fairfield (part of) – Rezoning from Rural Residential 2 (RR2) to General Residential 1 (GR1)

43. It was not considered necessary to provide further comment responding to submissions regarding insufficient infrastructure / pressure on infrastructure as 3W initial site assessments (see Section 32 Report, Appendix 6) indicate that funds for servicing are in the 2021-31 10 Year Plan.
44. S204.001 (Balchin) - no concerns from 3W. Connections can be made to wastewater and water services from extension of services required for GF05. Stormwater management will still be required as per rules governing GF05 and should be integrated stormwater management with GF05.

GF06: 27 Weir Street and Part 1 Allen Road, Green Island – Rezoning from Rural (coastal) to General Residential 1 (GR1)

45. No further input required for this site.

GF07: 33 Emerson Street, Concord – Rezoning from Rural (coastal) to General Residential 1 (GR1)

46. No further input required for this site.

GF08: Part 19 Main South Road, Concord – Rezoning from Rural (hill slopes) to General Residential 1/General Residential 2 (GR1/GR2)

47. S239.001 (Dunedin City Baptist Church) - no concerns from 3W. Connections can be made to wastewater and water services from any extension of services required for GF08. Stormwater management will still be required as per rules governing GF08. NDMA should remain on the site, especially if the entire site were rezoned to GR2, to ensure that stormwater management is adequate and is integrated into the site. Currently the existing structure plan is silent on stormwater management. If a structure plan was adopted instead of an NDMA all provisions and requirements relevant to stormwater management in the NDMA should be transferred into the Structure Plan.

GF09: 41-49 Three Mile Hill Road, Halfway Bush – Rezoning from Rural Residential 1 (RR1) to Large Lot Residential 1 (LLR1)

48. S311.001 & 197.001 (Alice Wouters) - each of the existing lots is approximately 2,000m² and so cannot be further subdivided based on the proposed zoning. It is not anticipated that these sites will be further developed and GF09 is just aligning the zoning with the nature of the development that has historically taken place. The proposed changes are not anticipated to result in additional stormwater run-off from the sites.

GF10: 32 & 45 Honeystone Street – Rezoning from Rural (hill slope) to Large Lot Residential 1 (LLR1)

49. No further 3 Waters input is required for this site.

GF11 and GF11a: Wakari Road area – Rezoning from Rural Residential 2 (RR2) to General Residential 1 (GR1)

50. It was not considered necessary to provide further comment responding to submissions regarding insufficient infrastructure as 3W initial site assessments (see Section 32 Report, Appendix 6) indicate that funds for servicing are in the 2021-31 10 Year Plan.
51. S272.005 (Murray and Gloria Harris) / S225.001 (Neil and Linda Brown) / S200.001 (Jim and Patsy Laughton) / S222.001 (John Hurley) - Stormwater management will be required as per rules governing GF11 and NDMA. Policy 9.2.1.Y of the 2GP will need to be met. This will require that there is no increase in the pre-development peak stormwater discharge rate from the development area into any public or private stormwater system. Where this is not practicable, any adverse effects from an increase in the discharge on any public or private stormwater system are to be no more than minor.
52. S222.001 (John Hurley) - 3 Waters has no concerns with the submitters proposal to adjust part of the boundary of GF11 within the submitters property.
53. The submitter requested information regarding the timeline of installation of DCC foul sewer network in Wakari Road, if Variation 2 is approved. Currently the provision of foul sewer is programmed within DCC's 2021-31 10 Year Plan. However, timing will be dependent on:
- DCC's priority for providing a foul sewer network connection to GF11 compared to other rezoned sites that need 3 Waters network connections.
 - The capacity of consultants to design the foul sewer network connection and contractors to build it.
 - The developer's timeframes for development of GF11. DCC does not want to prioritise provision of 3 Waters network connections for this site if developers have no plans to develop the site for many years.

54. S241.002 (Grant Motion) / S13.003 (Bill Morrison) – The submitters suggest that a NDMA should not be placed over areas with a structure plan and that the requirements of the structure plan can be used to adequately manage stormwater.
55. The recent structure plans added to the 2GP contain very little in the way of stormwater requirements. Generally, the only requirement is for stormwater infrastructure to be in place prior to the construction of dwellings, and this requirement is not included in all structure plans as there are other rules in the 2GP requiring this. Very few of the structure plans contain detailed requirements for the preparation of a Stormwater Management Plan, or details of the proposed stormwater infrastructure and management, and these requirements are generally associated with structure plans that have been in the district plan prior to the latest review and were prepared with significantly more detail than recent structure plans.
56. As these recently added structure plans have generally been included in the 2GP without details of the nature of the site, what is proposed for development, or what is necessary for stormwater management, it is essential that the requirement for stormwater management to be adequately considered, designed, and approved by DCC, is included via the NDMA to ensure a holistic and appropriate approach is taken to stormwater management for the whole structure plan area.
57. Without the requirements of the NDMA provisions, there would be no requirement for an integrated communal stormwater management for greenfield sites or for development to connect to that system. This could result in piecemeal or individual site approaches to management of stormwater being proposed.
58. S154.001 (Gillian Thomas & Richard Greer) - 3 Waters has no concerns with the submitters proposal to adjust part of the boundary of GF11 within the submitters property.
59. FS123.1 (John Kidston) – No further comments.

GF12: 233 Signal Hill Road (in part) – Rezoning from Rural (hill slopes) to Large Lot Residential 1 (LLR1)

60. S134.001 (Layland) / S175.001 (Youard) / S152.001 (Dempster-Passang) / FS161.2 (Henderson) - Stormwater management will be required as per rules governing GF12 and NDMA. Policy 9.2.1.Y of the 2GP will need to be met. This will require that there is no increase in the pre-development peak stormwater discharge rate from the development area into any public or private stormwater system. Where this is not practicable, any adverse effects from an increase in the discharge on any public or private stormwater system are to be no more than minor. Requiring self-servicing for water reduces the risk of overloading the wastewater disposal system.
61. S175.001 (Youard) – The submitter is concerned about a lack of consideration for how properties that are self-servicing for water supply would provide fire fighting capability. Water supply for fire fighting is assessed as part of the consenting process. Rule 9.3.3 of the 2GP contains fire fighting requirements for subdivision and new residential development activities. Properties that self-service for water supply must maintain a fire fighting water supply in accordance with the New Zealand Fire Service Firefighting Water Supplies Code of Practice (SNZ PAS 4509:2008).

62. FS49.1 (Gale) - GF12 does not include 235 Signal Hill Road and is not adjacent to the submitters property.

GF14: 336 and 336A Portobello Road, The Cove – Rezoning from Rural Residential 2 (RR2) to Township and Settlement (T&S)

63. S46.001 (Watts) / S72.001 (Watts) / S180.001 (Walker) / S165.001 (Davies) / S53.001 (Brady) / S41.001 (Shaw) / FS215.1 (Watts) / FS18.2 (Chan and Harraway) - a new water supply connection would be necessary for the proposed development, existing and informal connections would not be used to service the proposed site. Stormwater management will be required as per rules governing GF14 and NDMA. Policy 9.2.1.Y of the 2GP will need to be met. This will require that there is no increase in the pre-development peak stormwater discharge rate from the development area into any public or private stormwater system. Where this is not practicable, any adverse effects from an increase in the discharge on any public or private stormwater system are to be no more than minor.
64. Photos and video footage of overland flows from submission FS215.1 (Watts) is appreciated and supports DCC's position that stormwater management as per rules governing GF14 and NDMA must remain in place.
65. S182.001 (Wheeler) - Stormwater management will be required as per rules governing GF14 and NDMA. Policy 9.2.1.Y of the 2GP will need to be met. This will require that there is no increase in the pre-development peak stormwater discharge rate from the development area into any public or private stormwater system. Where this is not practicable, any adverse effects from an increase in the discharge on any public or private stormwater system are to be no more than minor.
66. S263.002 (GTJM Property) - Provisions regarding stormwater management need to remain in place, particularly for this site as there are residential dwellings immediately downslope of the proposed site that could be negatively impacted by poor/inadequate stormwater management.
67. Policy 9.2.1.1A needs to remain in place. The alternative is to not rezone the land until DCC complete any wastewater upgrades necessary to service the site.
68. Policy 9.2.1.BB is based on specific assessment by Council in respect of infrastructure requirements rather than an ad hoc and precautionary approach.
69. The submitter expresses concern about how Policy 9.2.1.Z will be interpreted. The submitters alternative interpretation is correct. The policy lists four activities, being multi-unit development, supported living facilities, subdivision, and development that contravenes the impermeable surfaces performance standard. These are separate activities. Multi-unit development, supported living facilities, and subdivision, are restricted discretionary activities to which this policy applies, along with development that becomes a restricted discretionary activity if it contravenes the impermeable surface performance standard.
70. Regarding Policy 9.2.1.Y, I consider that the land in question is a greenfields site and that despite Council not having stormwater modelling for this location, the presence of dwellings downslope from the proposed site makes it unlikely that development of the site can occur without stormwater controls, without leading to unacceptable adverse effects downstream.

Rule 9.9.X provides the submitter with the opportunity to demonstrate that Policy 9.2.1.Y can be met without stormwater controls.

GF15: 23 and 25 Mc Auley Road, Highcliff Road, Portobello – Rezoning from Rural Residential 2 (RR2) to Large Lot Residential 1 (LLR1)

71. S271.034 (ORC) / FS184.100 and FS184.41 (ORC) - Stormwater management, including requirements for managing water quality, will be achieved through rule changes in Variation 2 that ORC has been part of developing.

GF16: Highcliff Road and Hereweka Street, Portobello – Rezoning from Rural Residential 2 (RR2) to Township and Settlement (T&S)

72. S67.001 (Barton) - Stormwater management will be required as per rules governing GF15-17 and NDMA. Policy 9.2.1.Y of the 2GP will need to be met. This will require that there is no increase in the pre-development peak stormwater discharge rate from the development area into any public or private stormwater system. Where this is not practicable, any adverse effects from an increase in the discharge on any public or private stormwater system are to be no more than minor. As a result of submissions on Variation 2 the rules will be amended to make it clear that:
- there is to be no increase in the pre-development peak stormwater discharge rate from proposed sites
 - erosion and sedimentation will be managed effectively within the proposed sites during earthwork and as the sites are developed
 - stormwater quality treatment is in accordance with best practice techniques.
73. S271.035 (ORC) / FS184.64 (ORC) - Stormwater management, including requirements for managing water quality, will be achieved through Rule Changes in Variation 2 that ORC has been part of developing.

GF17: 26 McAuley Road (Recreation) – Rezoning from Rural Residential 2 (RR2) to Recreation

74. S271.036 (ORC) – The submitter is concerned that increased development could have adverse effects on water quality and feels that this has not been adequately considered in the assessment of the rezoning. The submitter requests that further information is provided to clarify how water quality will be managed in the downstream receiving environments. Stormwater management, including requirements for managing water quality, will be achieved through rule changes in Variation 2 that ORC has been part of developing. It may be more beneficial to include GF17 in an NDMA that covers both GF15 and GF17 so that the area of GF17, which already contains stormwater ponding areas and has been planted could be integrated with stormwater management systems for GF15.

RTZ2: 87 Selwyn Street – Rezoning from Rural Residential 2 – Residential Transitional Zone (RR2 (RTZ)) to General Residential 2 (GR2)

75. S171.001 (Heal and Van Hale) / S10.001 (Whiting) / S121.001 (Wright) / S164.001 (Dakin) - Stormwater management will be required as per rules governing RTZ2 and NDMA. Policy 9.2.1.Y of the 2GP will need to be met. This will require that there is no increase in the pre-development peak stormwater discharge rate from the development area into any public or private stormwater system. Where this is not practicable, any adverse effects from an increase in the discharge on any public or private stormwater system are to be no more than

minor. As a result of submissions on Variation 2 the rules will be amended to make it clear that:

- there is to be no increase in the pre-development peak stormwater discharge rate from proposed sites
- stormwater quality treatment is in accordance with best practice techniques.

76. S171.001 (Heal and Van Hale) - Noise from pump stations is typically very low as pump motors are located below ground in chambers that are almost entirely sealed.
77. S121.001 (Wright) - On-site wastewater detention system prevents discharge into the public network during peak flows. When the downstream wastewater network is at full capacity the On-site wastewater detention system holds wastewater generated by the proposed site until such time as there is capacity in the downstream network to receive additional flow. At this time, flows are released from the on-site wastewater detention system into the downstream network.
78. S271.037 (ORC) / FS184.6 / FS184.105 / FS184.535 / FS184.2 / FS184.12 / FS184.534 / FS184.536 / FS184.23 - Stormwater management, will be achieved through rule changes in Variation 2 that ORC has been part of revising following further submissions and earlier hearings.
79. In reviewing the submission points on RTZ2, it appears that the submitters have made a number of good points that raise significant issues with rezoning RTZ2. While the 3 Waters issues appear resolvable, I have reservations about the rezoning of this site and question if it is the most suitable in terms of meeting the objectives of the 2GP.

RTZ1: 30 Mercer Street Kenmure – Rezoning from Rural (RTZ) to General Residential 2 (GR2)

80. S40.002 (Hall) - On-site wastewater detention system prevents discharge into the public network during peak flows. When the downstream wastewater network is at full capacity the On-site wastewater detention system holds wastewater generated by the proposed site until such time as there is capacity in the downstream network to receive additional flow. At this time, flows are released from the on-site wastewater detention system into the downstream network.

RTZ3: 13 Wattie Fox Lane – Rezoning from General Residential 1 (GR1) and Rural (RTZ) to General Residential 1 (GR1)

81. S40.001 (Hall) - as part of rezoning RTZ3 to GR1 the site would be granted access to connect to the DCC foul sewer network.

COMMENTS – GREENFIELD REZONING (BROAD SUBMISSIONS):

Greenfield Group of Changes

82. The submissions can be grouped into four topics. These topics are discussed below:
- Adequacy of infrastructure to support proposed increased density
 - Allowance for network connections or alternate “off grid” solutions
 - Removal of stormwater management provisions
 - Shared drain requirements for duplexes and split dwellings

Adequacy of infrastructure to support proposed increased density

83. S59.012 (Post) requested amendment to proposals to increase housing density and availability of sites to build on to ensure that there is adequate 3 waters infrastructure provided. FS184.478 (ORC) support this submission in part as the relief sought for adequate 3 waters infrastructure is consistent with ORC's original submission.
84. S60.005 (Grindlay) sought retention of all changes in Variation 2 subject to the required 3 waters infrastructure being adequately funded, so it is capable of handling the existing and new development. The submitter considers there is a cost to the community of inadequate infrastructure leading to stormwater flooding and sewage overflow, in terms of money, stress, distress, lost productivity, and environmental pollution and erosion. FS184.101 (ORC) oppose this submission as the relief sought conflicts with ORC's submission on the stormwater provisions of Variation 2.
85. S187.008 (DCC) suggests that as an alternative to rejecting any changes that provide for intensification or new residential zoning in response to submissions opposing them, consideration should be given to the need for plan provisions to better manage adverse effects. FS184.480 (ORC) support this submission in part and request amendment to provisions which increase housing density and availability of sites to build on to ensure there is adequate 3 waters infrastructure provided.
86. The changes proposed through Variation 2 seek to ensure on-site management of stormwater to minimise downstream impacts on other properties, waterways and private and public infrastructure. This is required in addition to any extensions or upgrades to the public stormwater network proposed to support growth.
87. Over \$77 million of capital funding has been approved through the 10-year plan for new capital and renewals that support growth. Work is currently in the planning phase to identify, design and carry out the 3 Waters capital works necessary to facilitate this additional growth. This work includes identifying and confirming where there is a need for additional capacity and where this should be constructed. The timing of specific projects within this growth capital program is yet to be confirmed. Any upgrades can only address issues in the public networks and cannot address any issues with private infrastructure or watercourses with limited capacity.
88. In response to submissions considered in other hearings, DCC is proposing amendments to enhance the provision to manage potential stormwater effects while allowing for development to occur.

Allowance for network connections or alternate "off grid" solutions

89. S176.001 (Angelo) sought retention of rezoning to residential on greenfield sites provided that connections to public infrastructure and consideration of alternative solutions for "off the grid" is achieved. The submitter considers basic essentials such as water, sewerage, power supply and rubbish disposal, should be first-class and self-sustaining (solar, wind power, water power, composts onsite, public gardens and roof gardens). FS226.12 (Southern Heritage) support this submission.
90. The district plan zoning of residential areas generally gives an indication of whether areas are serviced by all or some of the 3 waters reticulated networks, or whether residents are expected to self-service due to a lack of reticulated network, as is the case in some Township and Settlement or Large Lot Residential zones. Where reticulated networks are available,

any new development is generally required to connect to those services. Most rural and rural residential zones require a level of self-servicing depending on what services are available, and connection to services is not generally required.

91. Self-servicing for water and wastewater in residential areas where there is a reticulated network available is generally undesirable. Self-servicing, rather than connecting to available reticulated services:
 - results in an inconsistent level of servicing of properties
 - can have implications on the anticipated demand for services and the water or wastewater rates recovered to cover the costs of servicing as there would be less properties connecting than planned when the network was designed
 - could have environmental issues.
92. There is also a general expectation by people living in most urban environments that the property will be serviced by reticulated networks. Future property owners may not be happy being self-serviced when services are available and surrounding properties are serviced. Subsequent connection to services, if desired by the landowner, is likely to be more difficult and costly for the landowner than if the properties were connected at the time of subdivision or development.
93. Rural, Rural Residential, and some Township and Settlement or Large Lot Residential zones are not serviced with all or some reticulated networks. These zones provide opportunities for self-sufficiency for people not wanting to live in serviced areas.

Removal of stormwater management provisions

94. S230.018 (BA Building Ltd), S300.026 (Bowen,) S282.030 (Survey & Spatial New Zealand,) S260.013 (Lloyd Morshuis), S76.027 (Connor & Prendergast) , S79.023 (Glenelg Street Trust Board), S291.007 (Charles and Lazar), S150.024 (Wynn-Williams), S203.019 (Richardson), S296.013 (Hewlett), S264.020 (D N Innovations), S286.020 (Knudson and Brown), S206.032 (Paterson Pitts Group), S295.018 (HWH Properties), S290.011 (Jane and Eden), S270.025 (Hall) requested removal of the infrastructure controls from all new greenfields land regions, until the stormwater management plan provisions can be amended into a workable arrangement.
95. The submitters' considered there is inadequate research and stormwater modelling therefore resulting in a knowledge gap. They consider the proposed provisions will have a detrimental effect on feasibility and rate of residential development as the provisions are complex and problematic to implement. They consider the National Environmental Standard – Urban Development requires DCC to provide adequate infrastructure to enable residential capacity and that DCC collects development contributions and rates which provide income sources for infrastructure and developers should not be expected to be responsible for providing infrastructure or addressing stormwater issues.
96. The following further submissions from ORC - FS184.483, FS184.484, FS184.485, FS184.486, FS184.487, FS184.488, FS184.489, FS184.490, FS184.491, FS184.492, FS184.493, FS184.494, FS184.495, FS184.496, FS184.497, FS184.498, FS184.499 oppose OS76.027, OS79.023, OS150.024, OS203.019, OS206.032, OS230.018, OS260.13, OS264.020, OS270.025, OS282.030, OS283.013, OS286,020, OS290.011, OS291.007, OS295.018, OS296.013, OS300.026 as the relief sought by the submitters' conflicts with ORC's submission on the stormwater provisions of Variation 2.

Stormwater modelling

97. DCC has Catchment Management Plans for some areas of the city but has not yet prepared these for the entire city. As DCC does not have catchment management information for all areas targeted rules for each catchment cannot be developed within the Variation 2 timeframes. While DCC does have work in progress to address this, the time constraints of the housing situation in Dunedin, and the requirements of the National Policy Statement on Urban Development, are such that DCC is having to propose rezoning of areas for development without having done more detailed studies for stormwater management.
98. The situation of not having areas for development fully modelled is not inconsistent with many other local authorities in New Zealand, where all catchments are not yet modelled. Stormwater management rules within district plans are applied and the onus is on the developer to demonstrate that development will not result in adverse effects.
99. It is recognised that there is a need to continue to undertake modelling and assessment to assist with setting more targeted stormwater management rules in the 2GP. The issue is not that the work is not feasible to be done, but that it takes a lot of time and money to do it. To undertake modelling of the whole stormwater network, DCC must not only look at the public network but also private watercourses and infrastructure. DCC is working on completing modelling, but significant time is needed to undertake this project.
100. Steps involved to assess the entire stormwater network include:
 - a) Rapid flood hazard assessment – high level modelling over all urban areas to identify problem areas (that aren't currently modelled) for prioritisation
 - b) Prioritisation of areas for more detailed model development
 - c) Initial model development using existing data
 - d) Flow monitoring and calibration of models – there are limited flow monitoring contractors nationally
 - e) Hydraulic performance assessment and identification of options for catchment management
 - f) Assessment and selection of preferred catchment management options
101. It is expected to be approximately 3 years before the catchment assessment process is worked through. Over \$4 million of funding has been allocated over this timeframe. It is possible, once initial catchment assessment work is complete, that lower priority areas will not warrant full model development.
102. Legislation at a national and regional level is changing the requirements for management of stormwater discharges to natural waterways from both a quality and quantity perspective. Greater emphasis is being placed on protection of the environment and management of contaminants (including sediment) that may enter waterways in stormwater discharges. DCC is required to make changes to the 2GP and approaches to management of stormwater to implement the requirements of national and regional legislation. To implement the changes to national and regional legislation and to address issues that have been identified in Dunedin, DCC needs to set rules in the 2GP to ensure that stormwater discharges are managed and impacts on the environment and other properties are minimised. If rules are not included there is the risk that stormwater discharges will have effects on the environment or other properties.

103. The Resource Management Act 1991 (s88 and Schedule 4) requires an application to include an assessment of actual or potential effects on the environment and that this information must be provided in sufficient detail to satisfy the purpose for which it is required. Information needs to be provided by applicants with resource consent applications (in the form of a Storm Water Management Plan) so 3 Waters can consider the actual and potential effects from a proposed development/subdivision/activity on stormwater networks, including effects on neighbouring or downstream private landowners that may be impacted by the stormwater from that development/subdivision/activity, and ensure effects are appropriately managed.
104. When considering an application for a resource consent, Section 104(1)(b) of the RMA requires the consent authority to have regard to any actual and potential effects of the activity, as well as various planning documents, including National Policy Statements. The fundamental concept of the National Policy Statement for Freshwater Management 2020 (NPSFM) is 'Te Mana o te Wai', a concept that refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment. The NPSFM applies to all freshwater and therefore stormwater management is important as it often discharges to freshwater.
105. DCC has a role to implement and give effect to the NPSFM - local authorities must –
- *manage freshwater, and land use and development, in catchments in an integrated and sustainable way to avoid, remedy, or mitigate adverse effects, including cumulative effects, on the health and well-being of water bodies, freshwater ecosystems, and receiving environments.*
106. Consideration and implementation of national and regional planning documents is essential when DCC is considering consent applications and how stormwater should be managed.
107. DCC will continue to do stormwater modelling and catchment assessment work and make this data available to developers to assist them with their evaluation of potential effects which is required when lodging resource consents. The evaluation of potential effects needs to include the potential downstream impacts of stormwater on the environment, other properties, and infrastructure. The requirements for stormwater management plans to be provided in certain circumstances, that have been proposed through Variation 2, will require developers to undertake this assessment to determine the stormwater management that will be required to minimise downstream impacts. These assessments will be important for greenfield sites as the impermeable surface levels will significantly increase with development of these areas and post-development flows and volumes are likely to be significantly higher than pre-development levels.

Not all projects are covered by development contributions

108. Submitters have queried why developers should have to do on-site management of stormwater when they are paying development contributions toward stormwater projects and why infrastructure has not been, or can't be, upgraded or developed to provide new infrastructure or capacity for all new areas zoned residential through the 2GP, Variation 2 or appeals.
109. Development in greenfield areas increases the impermeable surfaces in the area, potentially resulting in significantly more run-off than was occurring pre-development. Stormwater discharges not only rely on capacity being available in the public stormwater system but in

the private infrastructure and watercourses that exists throughout the city as well. DCC has no responsibilities for private infrastructure or watercourses and therefore has no control over ongoing required maintenance or clearing of watercourses or the size of pipes that are installed on private property. New development increases the volume of stormwater flowing through the network and this could result in the capacity of public or private infrastructure or watercourses being exceeded and possibly contribute to increased stormwater flood risks or exacerbate any existing flooding issues. Downstream landowners have little say in what areas are being developed that may result in additional flows through their properties.

110. Good management of stormwater to minimise potential effects is generally required throughout the urban area but is more important in greenfield areas due to the significant change in flow and volume of stormwater between pre and post development. It is important that potential effects on the environment and other properties or infrastructure are minimised through appropriate management of stormwater.
111. 3 Waters endeavors to minimise impacts of development on private properties, watercourses, and infrastructure by trying to ensure stormwater from development is managed appropriately. This is difficult to do if there is no requirement for on-site management of stormwater to regulate flows from a site, especially during high rainfall events. If comprehensive provisions are not included in the 2GP for managing stormwater discharges in greenfield areas, there is the potential for downstream effects to occur.
112. Of the \$77 million budgeted in the 10-year plan 2021-2031 to provide for 3 Waters infrastructure to support growth, over \$27 million is for stormwater infrastructure, of which over \$9 million is for stormwater infrastructure in greenfield areas.
113. Development contributions are collected to contribute toward stormwater infrastructure upgrades or extensions planned to provide for growth and included in the Annual Plan. While large upgrade projects can be planned and constructed by DCC, upgrades to extend the network or provide extra capacity for a small number of developments or in a particular development area, are less likely to be programmed and budgeted for in the Annual Plan and included in the Development Contributions Policy.
114. Even if works on public infrastructure are programmed in the Annual Plan and growth costs collected through the Development Contributions Policy, these works would not address capacity issues in private infrastructure or watercourses. This means that developers need to manage the effects of their development, as required by the RMA, and manage stormwater on-site so they don't have adverse effects beyond their site.
115. Delaying development in newly rezoned areas or areas proposed for rezoning, until infrastructure is extended or upgraded to allow for growth would create unacceptable delays for developers and significantly increase the cost of development contributions required to be paid.

Proposed rules potentially problematic to implement and detrimental to development

116. Submitters have suggested that the proposed stormwater provisions will have a detrimental effect on feasibility and rate of development because they are complex and will be problematic to implement.

117. As discussed above, there is a need for on-site stormwater management to address potential effects from development and avoid or minimise downstream impacts on other properties, waterways, and infrastructure. As with other effects of development, the RMA requires that effects from stormwater be managed.
118. In response to submissions considered through previous Variation 2 hearings, changes are likely to occur that will improve the implementation of some of the proposed rules. The approach proposed through Variation 2 and the proposed changes in response to submission, is not significantly different to the approach taken by some other councils.

Shared drain requirements for duplexes and split dwellings

119. S283.003 (Max Hope Trust) requested amendment to Change A2 (Duplexes and two units in a single building) to include a requirement that subdivision of duplex developments can only be completed once the new units have been constructed and a suitable planning provision to share foul and stormwater drains (e.g. a drain in common). The submitter considers that without the ability to construct shared drains it may be difficult to obtain a building consent for the duplex unit construction (in a duplex pair) while the site is still a single site (i.e. prior to the subdivision being completed). The submitter suggests a drain in common between two duplex units is consistent with certain types of subdivision (e.g. Unit Title) and has the benefit of reducing house construction costs.
120. Private drains in common have been created in the past to service sites without close or easy access to DCC wastewater infrastructure. Issues can occur with ownership and maintenance responsibilities. There are also health and environmental implications if spills occur due to drain damage or lack of maintenance.
121. Although the duplexes would sit initially on one title, subdivision could occur in the future. DCC generally require property owners to have unique connections from each lot to DCC infrastructure. This avoids future issues occurring with shared drains that may not have adequate easements, records on titles, or clear records of maintenance and cost sharing responsibilities by drain owners. Where confusion over ownership responsibilities occur, DCC can sometimes be pulled into emergency situations with private infrastructure, especially where environmental or health issues occur, such as sewage spills or stormwater flooding. This often results in costs to DCC and as such all ratepayers to resolve issues caused by shared drains.
122. 3 Waters Group have responsibility for approving infrastructure that will be vested in DCC. Building Services are responsible for issuing building consents and would determine the appropriateness of private drainage proposed through the building consent process. Shared drains are generally not DCC's preferred approach.
123. Specifications for connection layout of private infrastructure or infrastructure to be vested in DCC is managed through legislation, bylaws, and the Code of Subdivision and Development 2010. The 2GP is not the appropriate place for specification of connection layout as requested by the submitters.

TO: Bede Morrissey, Policy Planner, City Development

FROM: Bruce Saunders, Strategic Planning Engineer, 3 Waters
Jared Oliver, Engineering Services Team Leader, 3 Waters

DATE: 6th July 2022

SUBJECT: **VARIATION 2: 3 WATERS RESPONSE TO REQUEST FOR COMMENTS ON GREENFIELD REZONING SITES – REJECTED SITES**

• **INTRODUCTION**

1. The 3 Waters department received a memo from you dated 2 March 2022 requesting comments on Variation 2 in relation to 3 waters and specific questions you have raised as a result of reviewing submissions regarding rejected greenfield sites.
2. We have considered the relevant submissions on the topics/issues you highlighted and your specific questions.
3. Please find below our response on these topics/questions in the grouping that you posed these requests.

COMMENTS ON THE PREVIOUSLY REJECTED SITES

RS170: 103, 105, 107 Hall Road, Sawyers Bay – Rezoning from Rural Residential 1 to some form of Residential zoning

4.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Risky site from 3 Waters perspective, mostly due to wastewater and somewhat due to water supply. Preference would be to exclude or make long term. Downstream of the site are a number of wastewater pump stations, and importantly wastewater overflows that occur at Sawyers Bay, in wet weather, this negatively impacts the environment and local shellfish business.
Potable Water Supply	Significant issues (manageable)	Minor local network upgrade required to service the site. Water pressure at the higher elevations is estimated to be approximately at DCC's target minimum water pressure (30m head). Significant upstream upgrades required. The supply is fed from Port Chalmers water supply which is constrained during peak hot summer periods. This is also exacerbated when it is cruise ship season. Medium term to resolve (5-8 years).

3 Waters	Issue Grade (minor / moderate / major)	Comments
Wastewater Supply	Significant issues (manageable)	There is a 150mm wastewater main running down Hall Road. The start point of the main is in road reserve outside of 103 Hall Road. However, downstream of the site are a number of wastewater pump stations, and importantly wastewater overflows that occur at Sawyers Bay in wet weather, negatively impacting the environment and local shellfish business. Significant downstream wastewater upgrades may be required. This will take a long time to resolve (10+ years).
Stormwater Supply	Some issues (manageable)	Existing stormwater infrastructure is greater than 50m away. Downstream of the site is a naturally formed gully/channel, the capacity is unknown. An attenuation assessment has been carried out for the 100-year storm flows. Provided the new stormwater management rules in Variation 2 are applied to the whole proposed area the site may be considered developable.

RS193: 177 Tomahawk Road – Rezoning from Rural to General Residential 1

5.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Not supported from a 3 Waters perspective for stormwater reasons, preference is to exclude. Tomahawk Lagoon is classed as a regionally significant wetland, consent required for stormwater discharge and is expected to be very difficult to obtain.
Potable Water Supply	Some issues (manageable)	Existing infrastructure appears to be adequate based on a high-level assessment. Connection points would be Gloucester Street and Tomahawk Road. Upgrade to the main in Gloucester Street may be required. High water pressure at low elevations on the site may be an issue and pressure reduction may be necessary. Further detailed modelling of the water supply infrastructure would be required to confirm. Some upstream upgrades required.
Wastewater Supply	Some issues (manageable)	Existing infrastructure provides enough capacity for additional flow but does not achieve the grade for self-cleaning. Connection would be to the existing network across Tomahawk Road. The existing wastewater infrastructure in this part of Dunedin connects into a pumped system downstream. The capacity of the pump station to accept additional flows would need further assessment.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Stormwater Supply	Significant issues (not considered manageable)	The site is located adjacent to and discharges to Tomahawk lagoon and other tidal-influenced coastal areas, all downstream of the site. It is assumed that an overland flow path can be established/designed to be directed to safely discharge to these tidal areas from the site, without the need for onsite attenuation. Erosion protection and stormwater quality treatment would be required to protect water quality. Tomahawk Lagoon is classed as a regionally significant wetland. Discharge would require resource consent from ORC. Experience with existing consents for stormwater discharges to Tomahawk Lagoon indicate that obtaining consent would be extremely difficult. Strong community and manawhenua opposition to a consent would be expected. Development of the site gives no natural buffer zone to the lagoon. We would suggest that it is better to rezone this to a recreation zoning or at least incorporate a lagoon buffer to natural/biodiversity zone. Meeting the new stormwater management rules in Variation 2 is not expected to be sufficient to address stormwater issues due to the consenting requirement and Tomahawk Lagoon's status as a regionally significant wetland.

RS204: 21, 43, 55, 65, 75, 79, and 111 Chain Hills Road – Rezoning from Rural Residential 1 to a mix of zones (GR1, LLR1) as shown on submitters structure plan

6.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Not supported from a 3 Waters perspective, for all three waters but primarily for water supply reasons. There are also concerns regarding stormwater, which may also be expensive. Further investigation, particularly for water supply is considered necessary and water supply issues aren't going to be resolved in the near term. Strong preference is to exclude or make long term.
Potable Water Supply	Significant issues (manageable)	The existing infrastructure is inadequate to service the proposed development due to current supply constraints to Mosgiel in peak summer demand periods and low pressures for the higher elevation parts of the site, above 100m. Booster pumps would be required to service the higher elevation parts of the site as well as additional reservoir storage. 3 Waters prefers

3 Waters	Issue Grade (minor / moderate / major)	Comments
		gravity to pumping where possible due to lower operating and maintenance costs and supporting DCC's Zero Carbon policy. Significant upstream network upgrades required and will be medium term timeframe to resolve.
Wastewater Supply	Significant issues (manageable)	The site's northern location has an adequate connection to wastewater pipes, flow from some of these goes to Mosgiel Wastewater Treatment Plant (WWTP), while some goes to Green Island WWTP. However, the southern end of the proposed site is far from a connection point and unless easements through neighbouring property were obtained, would require pumping. 3 Waters prefers gravity to pumping where possible due to lower operating and maintenance costs and supporting DCC's Zero Carbon policy. Significant downstream network upgrades required as the network and treatment plants have issues in wet weather events. Medium to long term to resolve.
Stormwater Supply	Significant issues (manageable)	There is no stormwater infrastructure close to the subject site, flow is by open watercourse eventually connecting to ORC Schedule Drains (O5 to the west, also known as Quarry Creek, and O11 to the north). Both of these then connect to the Owhiro Stream. The Owhiro Stream has capacity issues in rainfall events when the Taieri River level is up and the Owhiro can not discharge into it, this results in flood issues in Mosgiel. There are known and significant flooding issues downstream of the proposed site and concerns from residents at Woodland Avenue, business in the Gladstone Road South Industrial area and East Taieri School. Some of the other developments adjacent to the proposed site have implemented stormwater management poorly, resulting in issues for residents and DCC. The fragmented nature of the stormwater management approach has exacerbated this. The capacity of the overland flowpaths is unknown, therefore onsite attenuation is required for 100-year storm event. Provided the new stormwater management rules in Variation 2 are applied to the whole proposed area the site may be considered developable, however we have concerns over the affordability of the stormwater infrastructure and the risks to downstream areas if stormwater management is not properly implemented.

7. S219.008 (Gladstone Family Trust): The submitter has requested that if 21, 43, 55, 65, 75, 79, and 111 Chain Hills Road are rezoned, add a structure plan mapped area rather than a new development mapped area.
8. The proposed structure plan has insufficient details on how the site would be serviced for water and wastewater or how stormwater would be managed for the site. It is essential that the requirement for servicing and means of 3 Waters servicing is documented. Stormwater management needs to be adequately considered, designed, and approved by DCC, and the NDMA is considered an acceptable way to ensure a holistic and appropriate approach is taken to stormwater management for the whole structure plan area.
9. Without the requirements of the NDMA provisions, there would be no requirement for integrated stormwater management for the site. This could result in piecemeal or individual site approaches to management of stormwater being proposed.

RS161: 210 Signal Hill Road – Rezoning from Rural to Large Lot Residential or Rural Residential

10.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Unfavourable site for servicing from a 3 Waters perspective mostly due to wastewater, although we also have concerns about the affordability of stormwater management.
Potable Water Supply	Some issues (manageable)	A minor local network extension would be required to connect the site to the existing network. Significant upstream upgrades required. Note that water supply would not be provided if the site were to be zoned to Rural Residential. Self-servicing for water supply would be necessary under this zoning. This has been assessed and is considered to be constrained, self-servicing may be possible in this zoning.
Wastewater Supply	Significant issues (not considered manageable)	A minor local network extension would be required to connect the site to the existing network. The existing local infrastructure provides enough capacity for additional flow and achieves the grade for self-cleaning. Downstream of the site wastewater flows enter an infrastructure constrained mapped area (ICMA) which eventually flows into a trunk main down North Road. There are existing wastewater overflows occurring in wet weather in North Road with discharge to the environment (Lindsay Creek). Additional flows would exacerbate this. The site should not be rezoned until wastewater upgrades are completed. Medium to long timeframe for these. Note that wastewater servicing would not be provided if the site were to be zoned to Rural Residential. Self-servicing for wastewater would be necessary under Rural Residential zoning. Self-

3 Waters	Issue Grade (minor / moderate / major)	Comments
		servicing for wastewater is feasible, however, would not be supported if serviced for water supply as this would risk overloading of on-site wastewater disposal systems.
Stormwater Supply	Some issues (manageable)	The existing receiving stormwater's open channel (located downstream of the site location) capacity is unknown. It is assumed that the infrastructure is not easily upgradeable. Due to the unknown capacity of the open channel on-site attenuation to meet the 100-year ARI conditions has been assessed to ensure that post-development flows do not exceed existing conditions. Provided the new stormwater management rules in Variation 2 are applied to the whole proposed area the site may be considered developable, however we have concerns over the affordability of the stormwater infrastructure.

RS110: 23 Sretlaw Place – Rezoning from Rural to General Residential 1

11.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Not supported from a 3 Waters perspective for wastewater and stormwater reasons, preference is to exclude.
Potable Water Supply	No issues	Minor network extensions required to connect the site. There is a water connection within Sretlaw Place. Possibly some minor network upgrades required.
Wastewater Supply	Significant issues (not considered manageable)	Minor network extension required to connect the site. The existing local infrastructure provides enough capacity for additional flow and achieves grade for self-cleaning. The site will require a pump system to be installed to connect to the existing infrastructure. 3 Waters prefers gravity to pumping where possible due to lower operating and maintenance costs and supporting DCC's Zero Carbon policy. Flow goes to Kaikorai Valley then South Dunedin in wet weather to reach Tahuna Wastewater Treatment Plant. Wastewater overflows occur into Kaikorai Stream and South Dunedin (entering Dunedin Harbour) including Surrey St affecting the environment and creating a public health risk. Significant downstream upgrades required to address this. Long term timeframe to resolve these.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Stormwater Supply	Significant issues (not considered manageable)	Downstream of the site is Frasers Creek. Water flows from Fraser Creek into Kaikorai Stream. There are known flooding issues downstream at Glenelg St that affect Stone St roundabout and downstream areas. The capacity of Frasers Creek is unknown. Therefore on-site attenuation for the 100-year ARI storm flows has been assessed. The area of land required for stormwater management is over 20% of the total area of the site and is not considered feasible. ORC has flood hazard mapping of the Kaikorai Stream (<i>Flood hazard of Dunedin's urban streams, ORC, 2014</i>). Frasers Gully also has high ecological value. Potential degradation of Frasers Creek is counter to the principles of Te Mana o te Wai.

RS176: 234/290 Malvern Street, Leith Valley – Rezoning from Rural Residential 2 to either Large Lot Residential (LLR1 or LLR2) or Rural Residential 1

12.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Risky site from 3 Waters perspective, mostly due to stormwater and somewhat due to wastewater concerns. Preference would be to exclude or make long term.
Potable Water Supply	Some issues (manageable)	Existing infrastructure is adequate to service the proposed site through a 150mm pipe. Some upstream network upgrades required.
Wastewater Supply	Some issues (manageable)	Existing local infrastructure is already at the site boundary within Malvern Street and achieves grade for self-cleaning. There are known wastewater overflows immediately downstream in significant wet weather (corner of Patmos Ave and Malvern St). Some downstream upgrades required.
Stormwater Supply	Some issues (manageable)	Downstream of the site is the Water of Leith. Any increase in peak flows could potentially have a negative impact on ORC's level of service for flood protection associated with the Water of Leith. It is assumed that the infrastructure is not easily upgradeable. It is therefore proposed to assess on-site attenuation to meet the 100-year ARI conditions. We have concerns over the affordability of stormwater infrastructure.

3 Waters	Issue Grade (minor / moderate / major)	Comments
		There is flood hazard to downstream properties identified by ORC flood hazard report (<i>Flood hazard of Dunedin's urban streams, ORC, 2014</i>). Potential degradation of Water of Leith is counter to principles of Te Mana o te Wai.

RS206, RS206a, RS77: Part 35 and 43 Watts Road, Part 109 North Road – Rezoning from Rural/Rural Residential 2 to General Residential 2/General Residential 1

13.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Risky site from 3 Waters perspective, mostly due to wastewater and stormwater concerns. Preference would be to exclude.
Potable Water Supply	Some issues (manageable)	Minor local network extension would be required to connect the site to the existing network and some local upgrades to existing pipes (from 100mm diameter to 150mm diameter). Significant upstream upgrades required.
Wastewater Supply	Significant issues (manageable)	A minor local network extension would be required to connect parts of the site to the existing network. Immediately downstream of the site wastewater flows enter an infrastructure constraint mapped area (ICMA). Flows enter the trunk main on North Road. There are existing wastewater overflows occurring in wet weather in North Road with discharge to the environment (Lindsay Creek). Additional flows would exacerbate this. Medium to long timeframe for resolving these. Wastewater detention may be a possibility given the number of lots proposed however, the site is split across at least two sub-catchments making this difficult so further investigation would be required to consider this.
Stormwater Supply	Significant issues (manageable)	Downstream of the site is Lindsay Creek. Any increase in peak flows could potentially have a negative impact on ORC's level of service for flood protection associated with the Water of Leith. It is assumed that the infrastructure is not easily upgradeable. It is therefore proposed to assess on-site attenuation to meet the 100-year ARI conditions. We have concerns over the affordability of stormwater infrastructure.

3 Waters	Issue Grade (minor / moderate / major)	Comments
		There is flood hazard to downstream properties identified by ORC flood hazard report (<i>Flood hazard of Dunedin's urban streams, ORC, 2014</i>). Potential degradation of Lindsay Creek is counter to principles of Te Mana o te Wai.

RS171: 3 Brick Hill Road and 18 Noyna Road, Sawyers Bay – Rural to Township and Settlement

14.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Risky site from 3 Waters perspective, mostly due to wastewater and somewhat due to water supply. Preference would be to exclude or make long term. Downstream of the site are a number of wastewater pump stations. Wastewater overflows occur at Sawyers Bay in wet weather, this negatively impacts the environment and local shellfish business.
Potable Water Supply	Significant issues (manageable)	Existing local infrastructure is adequate to service the proposed site. The water supply zoning and pressure requirements are within specification. The location of connection would be on Sir John Thorn Drive. Significant upstream upgrades required. Fed from Port Chalmers supply which is constrained during peak hot summer periods. Medium term to resolve (5-8 years).
Wastewater Supply	Significant issues (manageable)	Existing local infrastructure (located on Sir John Thorn Drive) provides enough capacity for additional flow. Downstream of the site are a number of wastewater pumping stations, including the most immediate downstream pump station at Sawyers Bay. Wastewater overflows occur at Sawyers Bay in wet weather, negatively impacting the environment and local shellfish business. Significant downstream wastewater upgrades may be required. Long term to resolve. Could be a candidate for communal wastewater detention alternative if sufficient scale and developed as one development.
Stormwater Supply	Some issues (manageable)	Downstream of the site there is an open channel. The existing capacity of the receiving open channel is unknown. No DCC stormwater infrastructure is present nearby. Flows would have to pass through Waka Kotahi or Kiwirail culverts to reach Otago harbour. Erosion protection and stormwater treatment would be required. It is assumed that the infrastructure is not easily upgradable. Due to this and the unknown capacity

3 Waters	Issue Grade (minor / moderate / major)	Comments
		of the open channel on-site attenuation to meet the 100-year ARI conditions has been assessed to ensure that post-development flows do not exceed existing conditions. Provided the new stormwater management rules in Variation 2 are applied to the whole proposed area the site may be considered developable, however we have concerns over the affordability of the stormwater infrastructure.

RS200: 489 East Taieri-Allanton Road – Rezoning from Rural to Township and Settlement/Large Lot Residential 1

15.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Risky site from 3 Waters perspective, for all 3 Waters. Stormwater management may be expensive. Further investigation is considered necessary. Preference would be to exclude or make long term.
Potable Water Supply	Significant issues (manageable)	The site is outside of the area serviced for water supply by DCC. Adjacent Allanton is self-serviced for water. Therefore, an on-site self-servicing assessment has been completed. The portion of site that is proposed to be zoned as Township and Settlement is not considered feasible for self-servicing based on our assessment, however it is acknowledged that existing adjacent sites in Allanton at the same zoning are already self-serviced for water supply. The adequacy of the existing self-servicing in Allanton and how much tankered water top-up is required by existing residents is unknown. The portion of the site that is proposed to be zoned Large Lot Residential 1 is considered to be constrained, self-servicing may be possible in this zoning.
Wastewater Supply	Some issues (manageable)	West of the site location is Allanton and a potential service connection to the wastewater scheme. The Allanton wastewater scheme is a pressure sewer scheme with individual pump stations for each lot discharging to a rising main to the Mosgiel wastewater treatment plant. A high-level assessment suggests connecting to this is feasible. However, a detailed analysis is recommended for confirmation.
Stormwater Supply	Significant issues (manageable)	There is no existing stormwater infrastructure close to the subject site.

3 Waters	Issue Grade (minor / moderate / major)	Comments
		Downstream of the site is a naturally contoured field leading to a small pond. This is connected to ORC Schedule Drain 01A which flows into the Owhiro Stream, eventually discharging into the Taieri River. Capacity of the watercourses prior to the Owhiro Stream cannot be determined therefore attenuation has been assessed for the 100-year storm event. The Owhiro Stream has capacity issues in rainfall events when the Taieri River level is up and the Owhiro can not discharge into it, this results in flood issues in Mosgiel. Provided the new stormwater management rules in Variation 2 are applied to the whole proposed area the site may be considered developable, however we have concerns over the affordability of the stormwater infrastructure.

RS205: 761 Aramoana Road – Rezoning from Rural to Township and Settlement

16.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Although DCC 3 Waters would not service this site with 3 Waters infrastructure we still consider it a risky site due to constrained water supply, unknowns regarding wastewater disposal and coastal hazard risks associated with climate change. Preference would be to exclude or make long term.
Potable Water Supply	Significant issues (manageable)	The site is located outside of DCC's water zone boundaries and would need to self-serviced for water. An on-site servicing assessment has been carried out and indicates that self-servicing for water is not feasible. However, existing adjacent sites already self-service for water supply. It is unclear whether adjacent properties are permanently occupied or are holiday homes, which changes water demand.
Wastewater Supply	Some issues (manageable)	The site is outside the DCC reticulated wastewater area and is not serviced for wastewater. An on-site servicing assessment has been carried out. Shallow groundwater investigations are required to confirm the feasibility of wastewater self-servicing due to location (next to harbour). If groundwater depth is greater than 0.6m then self-servicing for wastewater is considered feasible. Sea level rise is likely to reduce the depth to groundwater over time, increasing the risk of any wastewater disposal system failing in future.

3 Waters	Issue Grade (minor / moderate / major)	Comments
		Consent to discharge treated wastewater would be required from the Otago Regional Council.
Stormwater Supply	Significant issues (unsure whether manageable long term)	The site is located adjacent to the harbour. There is an existing 300mm diameter culvert from the site to the harbour. Due to the proximity to the coast stormwater attenuation will not be required however, erosion protection and stormwater treatment would be required. The elevation of the site is no more than 6 metres with the majority of the site below 4 metres. Risks of coastal flooding, inundation, storm surge and tsunami risk should be considered. Climate change and associated sea level rise is expected to increase the frequency and severity of some of these risks. This may have an impact on the insurability of any improvements to the site. DCC should consider this in light of potential future liabilities if it were to rezone the site.

RS153: 77 and 121 Chain Hills Road and 100 Irwin Logan Drive, Mosgiel – Rezoning from Rural to a range of Residential and Rural Residential zones. Note – requested additional sites are included: 2-20 Jocelyn Way, 38 and 40-43 Irwin Logan Drive, and 25-27 Pinfold Place.

17. See RS204 (No.6)

RS169: 41 Emerson Street – Rezoning from Rural to General Residential 1

18.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Reasonable site from a 3 Waters infrastructure perspective. Adjacent area already proposed to be rezoned to General Residential 1 in Variation 2 (33 Emerson Street, GF07).
Potable Water Supply	Some issues (manageable)	A minor network extension is required. Moderate upstream network upgrades are required.
Wastewater Supply	Some issues (manageable)	A minor network extension required. Moderate downstream network upgrades required.
Stormwater Supply	Some issues (manageable)	The site currently discharges via an overland flowpath, through a 225mm pipeline along Emerson Street, and then to an open watercourse. The pipe is under capacity for the expected 10-year annual recurrence interval (ARI) and the capacity of the open watercourse is unknown. Therefore, attenuation is required. Provided the new stormwater management rules in Variation 2 are applied to the whole proposed area the site may be considered developable.

RS14: Freeman Cl and Lambert St, Abbotsford – Rezoning from Rural to General Residential 1

19.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Risky site from 3 Waters perspective, for all 3 Waters. There are a number of risks and issues for water supply, wastewater needs further investigation and while stormwater management is possible it is somewhat reliant on the proper functioning of the downstream sections of watercourse. The site location has an additional risk due to being situated within the Mt Grand Reservoir Dam Break Hazard Zone. Preference would be to exclude or make long term, otherwise consider reducing the proposed site by eliminating high and low elevation areas that would require additional water and wastewater pumping respectively.
Potable Water Supply	Significant issues (manageable)	There is a connection point close to the site boundary. A minor local network upgrade is required to service the site. Within the site are a 750mm diameter raw water trunk main, and a 200mm diameter treated water trunk main. The raw water trunk main is the primary source water feed to the Southern Water Treatment Plant as so is a critical water supply main for Dunedin. An access corridor and buffer easement would be required to ensure that DCC can access and maintain the raw water trunk main. The 200mm treated water main does not have adequate capacity for the proposed development and would need to be upgraded. Higher elevation areas of the site would require pumping. 3 Waters prefers gravity to pumping where possible due to lower operating and maintenance costs and supporting DCC's Zero Carbon policy. Significant upstream network upgrades required. Medium to long term to resolve. Eastern and south western sides of site are within the Mt Grand Raw Water Reservoir Dam Break Hazard Zone. Any development would need to either avoid development in this zone or be designed to mitigate property and life safety risks.
Wastewater Supply	Some issues (manageable)	The existing wastewater infrastructure in this area gravitates to a pump station. Pump station capacity would likely need to be increased but verification of capacity is required through modelling. From a high-level desktop study it

3 Waters	Issue Grade (minor / moderate / major)	Comments
		appears the local network has the capacity for the proposed development density and future development in the existing zoned catchment. Additional pumping would be required to service the lower lying western block of land but this may be undevelopable due to flood risks. 3 Waters prefers gravity to pumping where possible due to lower operating and maintenance costs and supporting DCC's Zero Carbon policy. Some downstream network upgrades required.
Stormwater Supply	Significant issues (manageable)	The proposed site discharges to a stream which passes under the railway line downstream and is an upper tributary of Abbots Creek. No stormwater infrastructure is present downstream of the area to be developed. As the channel capacities are unable to be determined and the risk exists for flooding to neighbouring properties, it is advised to attenuate the 100yr ARI storm event to predevelopment levels to ensure post development flows are kept to predevelopment levels to ensure the stream integrity is maintained. Neighbouring properties have contacted DCC repeatedly about concerns over flooding, particularly as it relates to increasing development in the catchment. There is evidence that downstream watercourses are not properly maintained, increasing flood risks. Provided the new stormwater management rules in Variation 2 are applied to the whole proposed area the site may be considered developable, however despite this there is still significant risk to downstream landowners if watercourses are not being properly maintained.

20. S228.003 (Wendy Campbell) – The submitter has requested rezoning in accordance with the submitter's proposed structure plan and to not apply a New Development Mapped Area (NDMA).
21. The proposed structure plan has no details on how the site would be serviced for water and wastewater or how stormwater would be managed for the site. It is essential that the requirement for servicing and means of 3 Waters servicing is documented. Stormwater management needs to be adequately considered, designed, and approved by DCC, and the NDMA is considered an acceptable way to ensure a holistic and appropriate approach is taken to stormwater management for the whole structure plan area.

22. Without the requirements of the NDMA provisions, there would be no requirement for integrated stormwater management for the site. This could result in piecemeal or individual site approaches to management of stormwater being proposed.

RS154: 91 and 103 Formby Street – Rezoning from Rural to Township and Settlement

23.

3 Waters	Issue Grade (minor / moderate / major)	Comments
Overall		Not supported from a 3 Waters perspective primarily for stormwater reasons but there are also concerns regarding water supply, preference is to exclude. It is also noted that the site sits within a high class soil and Hazard 2 (flood) overlay.
Potable Water Supply	Significant issues (manageable)	There are services at existing boundaries to the site but these would need to be upgraded. Water supply capacity is constrained during peak summer demand periods with no spare capacity available at these times. Medium to long term timeframe to address this.
Wastewater Supply	Some issues (manageable)	Outram is not serviced for wastewater by the DCC, the site is outside the DCC reticulated wastewater area. An on-site self-servicing assessment has been carried out. Self-servicing for wastewater is considered feasible, pending soil investigations. Consent to discharge treated wastewater would be required from the Otago Regional Council.
Stormwater Supply	Significant issues (not considered manageable)	The site is flat and there is no obvious natural flow path other than the channel to the north of the site which is an old “ox-bow” of the Taieri River. Stormwater drainage in Outram is complex and constrained. Due to the position of the Taieri flood protection bank there is no natural outlet for stormwater drainage in Outram. Instead, Outram’s stormwater drains to an “ox-bow” lake, at the southern end of Outram and just to the east of the proposed site. From here the stormwater is disposed of through infiltration into the ground. The infiltration capacity of the “ox-bow” lake is unknown and there have been past rainfall events in which the “ox-bow” lake has flooded. As the capacity of the open channel and “ox-bow” lake is unknown, an on-site attenuation assessment has been carried out. The area of land required for stormwater management is over 30% of the total area of the site and is not considered feasible. Even if stormwater management were feasible at the site, the additional stormwater volumes

3 Waters	Issue Grade (minor / moderate / major)	Comments
		generated are a risk due to the unknown disposal capacity of the “ox-bow” lake.

24. Three submissions (S308.001, S305.002, S307.003) - requested rezoning and application of a structure plan mapped area instead of a New Development Mapped Area (NDMA).
25. Most structure plans added to the 2GP contain very little in the way of 3 Waters servicing requirements. For stormwater management in particular it is essential that requirement for stormwater management are adequately considered, designed, and approved by DCC and are included via the NDMA to ensure a holistic and appropriate approach is taken to stormwater management for the whole structure plan area.
26. Without the requirements of the NDMA provisions, there would be no requirement for integrated stormwater management. This could result in piecemeal or individual site approaches to management of stormwater being proposed.

RS175: 85 Formby Street – Rezoning from Rural to Township and Settlement

27. See RS154 (No.23)
28. Three submissions (S308.002, S305.001, S307.001) - requested rezoning and application of a structure plan mapped area instead of a New Development Mapped Area (NDMA).
29. Most structure plans added to the 2GP contain very little in the way of 3 Waters servicing requirements. For stormwater management in particular it is essential that requirement for stormwater management are adequately considered, designed, and approved by DCC and are included via the NDMA to ensure a holistic and appropriate approach is taken to stormwater management for the whole structure plan area.
30. Without the requirements of the NDMA provisions, there would be no requirement for integrated stormwater management. This could result in piecemeal or individual site approaches to management of stormwater being proposed.



SECOND GENERATION DISTRICT PLAN

Variation 2 – Additional Housing Capacity

Part 3 – Sites Proposed for Rezoning

Appendix D.6

Evidence on Parks & Recreation

July 2022

BEFORE THE VARIATION 2 HEARING PANEL

IN THE MATTER

of the Resource Management
Act 1991

AND

Variation 2 to the proposed
Second Generation Dunedin City
District Plan (2GP)

STATEMENT OF EVIDENCE OF JOHN BRENKLEY FOR DUNEDIN CITY COUNCIL

Dated 04 July 2022

QUALIFICATIONS AND EXPERIENCE

1. My name is John Brenkley.
2. I am employed by the Dunedin City Council ("the Council") as the Planning and Partnerships Manager with the Parks and Recreation Services Business Unit. In my current role I lead the recreation planning function for parks and recreation and oversee implementation of the Parks and Recreation Strategy. The purpose of the recreation planning team is to provide professional and technical advice to Council, the community and development industry on spatial matters to facilitate planned, sustainable city parks, cemeteries and open space growth. The team is also responsible for supporting the Group's planning processes such as Resource Consent applications, Bylaw development, input into policy and plan development including Reserve Management Plans.
3. I hold a Bachelor of Horticultural Science from Massey University and a Master of Landscape Architecture from the University of Edinburgh, Scotland. I have been a Registered member of the New Zealand Institute of Landscape Architects Tuia Pito Ora since 1995. I have over 20 years' experience in landscape architecture and in the parks and recreation sector both in New Zealand and overseas. My experience includes landscape design, contract management, contract administration and landscape planning as a local authority landscape architect with Palmerston North City Council from 1994 to 2006. I was then employed as Parks and Property Manager for 12 years at Palmerston North City Council before moving to Dunedin in 2018 to take up my current position as Planning and Partnerships Manager within Parks and Recreation Services.
4. I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note. This evidence has been prepared in accordance with it and I agree to comply with it. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE AND OVERVIEW

5. My evidence responds to submissions that relate to parks and recreation facilities and has been prepared by myself and Claire Swift, Senior Parks and Recreation Planner. My evidence also relates to conducting assessments of sites in relation to parks and recreation facilities.

6. My evidence is contained in two memos, one dated 07 March 2022, the other dated 10 March 2022.

CONCLUSION

7. It is my opinion that the information within these memos is correct.

DATED this 04 day of July 2022

John Brenkley

Planning and Partnerships Manager
Parks and Recreation Services
Dunedin City Council

TO:	Bede Morrissey, Policy Planner, City Development
FROM:	John Brenkley, Manager, Planning and Partnerships, Parks and Recreation
DATE:	7 March 2022
SUBJECT:	VARIATION 2: PARKS AND RECREATION RESPONSE TO REQUEST FOR COMMENTS ON DCC-PROPOSED GREENFIELD SITES

INTRODUCTION:

1. Parks and Recreation Services have received a memo from you dated 16 February 2022, requesting consideration of the Variation 2 – Additional Housing Capacity Section 32 Report, and subsequent submissions, in relation to parks and recreation matters.
2. Parks and Recreation Services have considered the relevant information in the Section 32 Report, and have provided a response to specific DCC proposed greenfield sites. Please find the response below.

COMMENTS – GREENFIELD REZONING (DCC PROPOSED SITES):

GF02 and GF02a: 201, 207, 211 Gladstone Road South, East Taieri – Rezoning from Rural (Taieri Plain) to General Residential 1 (GR1)

3. PARS comments are as follows:
 - 3.1 This location falls into the community profile Mosgiel which has a poor supply of public open space. It has the smallest number of hectares (ha) of open space per 1,000 residents (only 4 hectares) when compared to the other 10 community profiles, and is significantly lower than the Dunedin average of 33ha per 1,000 residents.
 - 3.2 In addition, the average site size for outdoor public amenities is also the smallest, when compared to the other 10 community profiles. This provision, and the size of outdoor community amenities, reflects the large amount of growth in recent years, and the number of smaller outdoor public amenities that PARS have received as part of the subdivision process. This current provision is not sustainable long term, and larger open spaces are required.
 - 3.3 This site has very poor access to outdoor community amenities, with no provision within 400m walking distance from this location. The closest outdoor public amenity is approx. 2,500m (Kinmont Park). This is a 5-minute drive via the state highway. There is also the East Taieri Dog Park and Cemetery approx. 2,300m away from this site.
 - 3.4 There are presently 280 existing dwellings at this location that are not within 400m walking distance of an outdoor public amenity. There is potential for a further 36 dwellings by rezoning this site. This means over 300 dwellings will not be adequately serviced by an outdoor public amenity.
 - 3.5 Additionally, because of the minimum lot size, the community will be reliant on a large open space to allow for informal sports play, and another modest sized outdoor public amenity to allow neighbours to meet and supervise children's play.
4. For PARS to support rezoning of GF02/GF02a, the provision of an outdoor public amenity is required, with a minimum size of 5,000m². To do this, the following options would need to be adopted by the developer:

- 4.1 A minimum of 5,000m² is provided for an outdoor public amenity within this site to meet the broader community needs. A smaller sized recreational area would not be supported. This is because multiple subdivisions can lead to multiple smaller outdoor public amenities being created (i.e. one per subdivision). This restricts the types of amenity that can be provided due to their size, they cannot be used for multiple purposes, and they generally don't meet the needs of the community. Site specific requirements include:
 - 4.1.1 A squarer shape to enable the land to be used much more efficiently, and allow the space to support a full range of neighbourhood park functions.
 - 4.1.2 Street frontage along two or three sides to provide passive surveillance and increase prominence of the open space.
- 4.2 Consideration should also be given to street vegetation and landscaping as set out in the native planting guide for Dunedin Hillslopes Forest.
- 4.3 PARS do not have any budget in the current 10YP to provide new outdoor public amenities for this community.
- 4.4 If a minimum size 5,000m² open space is not provided, then rezoning this site would not be supported from a PARS perspective.
5. PARS did investigate alternative options to support this rezoning. This included an upgrade within the existing open space provision. Unfortunately, the nearest suitably sized open space is Kinmont Park, and as previously mentioned, this is not within walking distance of this proposed rezoning and is separated by the State Highway. The additional of toilets would also need to be considered because of the length of stay, and this community would have to drive there. For these reasons, it makes an upgrade to Kinmont Park and unsuitable alternative.

GF08: Part 19 Main South Road, Concord– Rezoning from Rural (hill slopes) to General Residential 1/General Residential 2 (GR1/GR2)

6. PARS comments are as follows:
 - 6.1 This location falls into the community profile Green Island. A community that are quite well serviced for outdoor public amenities and have a slightly higher hectare of open space (36ha) per 1,000 residents than the Dunedin average which is 33ha per 1,000 residents. This current provision is satisfactory. However, because of the minimum lot size, the 32 new dwellings will be reliant on a large open space for informal sports play, and another modest sized outdoor public amenity to allow neighbours to meet and supervise children's play.
 - 6.2 This site has good access to outdoor community amenities. There are two outdoor public amenities less than 400m walking distance from the proposed rezoning. These are, Pladda Street Playground, and Emerson Park. However, Pladda Street is situated uphill from the site, and there is no safe direct pedestrian route because the lot is separated by the state highway on two sides. This leaves Emerson Park as the most accessible outdoor public amenity near the proposed site.
 - 6.3 Emerson Park is classified Recreation Reserve under the Reserves Act 1977, and any changes are subject to the General Policies. Emerson Park is approximately 25,000m². Its primary purpose is to support organized sport, although it does have a small play area (equivalent to provision you would find in a local playground). This outdoor public amenity is currently servicing around 300 dwellings, excluding visitors to the sports ground. The play space is insufficient for the current number of dwellings. Any increase in dwellings will exacerbate this issue.
7. For PARS to support rezoning of GF08, the following would need to be adopted by the developer:
 - 7.1 An upgrade of the existing playground at Emerson Park to a community facility, this will include some landscaping, new play equipment, and additional amenities such as seating.
 - 7.2 The provision of a safe recreational walk and cycle route to the pedestrian crossing on Main Road South to encourage sustainable transport to Emerson Park.
 - 7.3 Consideration should also be given to street vegetation and landscaping as set out in the native planting guide for Dunedin Hillslopes Forest.

- 7.4 Consideration should also be given to opportunities for restoration planting of indigenous vegetation, or enhancement of existing vegetation to encourage native biodiversity linkages. This may help to complement the native riparian revegetation plantings along the creek that has been partially funded by the DCC Biodiversity Fund grant.
- 7.5 Access for recreation purposes along the small watercourse should also be provided.

GF11 and GF11a: Wakari Road area – Rezoning from Rural Residential 2 (RR2) to General Residential 1 (GR1)

8. PARS comments are as follows:
 - 8.1 This location falls into the community profile Roslyn. This community are adequately serviced for outdoor public amenities owing to the number of open spaces, but they are disadvantaged because most of them are smaller in size. The 9 hectares of open space per 1,000 residents is significantly lower than the Dunedin average which is 33ha per 1,000 residents. This current provision is unsatisfactory.
 - 8.2 Owing to the proposed density, this community will require an outdoor public open space for informal sports play, and a modest sized (5,000m²) outdoor public amenity to allow neighbours to meet and supervise children's play because of the minimum lot size.
 - 8.3 This site has adequate access to outdoor community amenities with some provision within 400m walking distance from this location. It benefits from outdoor informal sports in Redwood, and Ross Creek. Although activities are limited to riding and walking, and there is no safe pedestrian route to get to Ross Creek. There is also a small neighbourhood park, referred to as Bain Neighbourhood Park.
 - 8.4 Bain Neighbourhood Park is within 400m walking distance of this site. It is classified a Recreation Reserve under the Reserves Act 1977, and any changes are subject to the General Policies. It is approximately 1,200m² in size, and currently services at least 350 dwellings. It is already too small to adequately service the current community. A further 240 dwellings planned with the rezoning will exacerbate this issue.
9. For PARS to support rezoning of GF11/GF11a, one of the following options would need to be adopted by the developer:
 - 9.1 Option 1: Bain Neighbourhood Park is increased to 5,000m² in size, and additional seating, landscaping, and playground equipment is included in this larger space. A new smaller sized outdoor public amenity between 700m² - 1,000m² is also required for more passive and quiet recreation activities. This space will allow neighbours to meet and socialise. This should be located in the top section of 245 Wakari Road. This space needs to have street frontage along two sides to provide passive surveillance.
 - 9.2 Option 2: Bain Neighbourhood Park is left the same size and another outdoor public amenity space is provided that is a minimum 5,000m². This needs to be centrally located within the site. Other site-specific requirements include:
 - 9.2.1 A squarer shape to enable the land to be used much more efficiently, and allow the space to support a full range of neighbourhood park functions.
 - 9.2.2 Street frontage along two or three sides to provide passive surveillance and increase prominence of the open space.
 - 9.3 PARS preference is Option 2. This is because it will provide more reserve area and the possibility of a large reserve centrally located within the site. Option 2 will provide the community with a greater choice for recreation.
 - 9.4 With either option chosen, protection of scheduled trees (T1171 and T1172) along the south eastern boundary of 312 Wakari Road is required, along with access points into Redwood Mountain Bike Park and the provision of a recreational walk and cycle route to encourage sustainable transport towards Ross Creek. If a pavement is not developed along Wakari Rd, then provision of a recreational walk and cycle route to encourage sustainable transport towards Ross Creek should be given.
 - 9.5 Consideration should also be given to street vegetation and landscaping as set out in the native planting guide for Dunedin Hillslopes Forest.

RTZ2: 87 Selwyn Street – Rezoning from Rural Residential 2 – Residential Transitional Zone (RR2 (RTZ)) to General Residential 2 (GR2)

10. PARS comments are as follows:

- 10.1 This location falls into the community profile North Dunedin. This community are adequately serviced for outdoor public amenities with around 23ha per 1,000 residents, but this is still lower than the Dunedin average which is 33ha per 1,000 residents. This current provision is satisfactory, but consideration must also be given to access, connections, and distribution of outdoor public amenities within this community.
- 10.2 The small lot size for a dwelling means that the additional 50 dwellings will be heavily reliant on a large open space to allow for informal sports play, along with outdoor public amenities for neighbours to meet and supervise children's play, and varied spaces that connect places and provide for recreational walks.
- 10.3 Another important aspect of this site, that should be protected, and has already been noted in the Section 32 Report, is the areas of native planting that protect the habitat contributing to native birds.
- 10.4 The topography of this site is very steep, ranging from 128m at the top of the site to 40m at the bottom of the site. If the location could have connected through to Truby King Street or Wilkinson Street at the top of this site, then this location would have benefited from several different types of outdoor public amenities. Alternatively, provision of a pedestrian access route to Forrester Avenue would achieve a similar connectivity outcome. However, these options do not appear possible due to private property constraints. Because of this, the site has very poor access to outdoor community amenities. There is no outdoor public amenity 400m walking distance from this location.
- 10.5 Pentland Street Playground is the closest outdoor public amenity to this site. Its primary purpose is to provide informal recreation with the provision of playground equipment. It is small (300m²), irregular shaped, and sits at the bottom of the hill so it is damp and cold most of the time. It currently services around 300 dwellings. Given the constraints with Pentland Street Playground, it is unsatisfactory provision, and cannot be considered as adequate provision of a public amenity to support this rezoning.
- 10.6 Under the Resource Management Act 1991 (RMA), when land is subdivided the Council is required to create esplanade reserves on water bodies whose bed has an average width of 3 metres or more where the water body flows through or adjoins the allotment. The Dunedin City District Plan has identified the Lindsay Creek as a waterway which requires the creation of an esplanade reserve (rule 10.3.1).
11. For PARS to support rezoning of RTZ2, the provision of an outdoor public amenity is required with a minimum size of 5,000m². To do this, the following would need to be adopted by the developer:
 - 11.1 A new outdoor public amenity space is provided that is a minimum of 5,000m². This needs to be either centrally located, or located within a flat section of the site, and is not shaded and damp. Other site-specific requirements include:
 - 11.1.1 A squarer shape to enable the land to be used much more efficiently, and allow the space to support a full range of neighbourhood park functions.
 - 11.1.2 Provision of play equipment, seating, and landscaping to support the local native birds.
 - 11.1.3 Street frontage along two or three sides to provide passive surveillance and increase prominence of the open space.
 - 11.2 A minimum width of 20m esplanade reserve must be provided along the Lindsay Creek.
 - 11.3 In accordance with the DCC Biodiversity Advisors recommended approach, a structure plan is developed to protect the areas of vegetation as identified.
 - 11.4 Consideration should also be given to street vegetation and landscaping as set out in the native planting guide for Dunedin Hillslopes Forest, and broader consideration for planting to support the local network of native birds that are being encouraged at Dalmore Reserve.

12. For PARS to support rezoning of all these sites (GF02 and GF02a, GF11 and GF11a, GF08 and RTZ2), and where new open space is created, PARS would expect the developer to classify these open spaces as Recreation Reserves under the Reserves Act 1977, before vesting in DCC.

COMMENTS – GREENFIELD REZONING (BROAD SUBMISSIONS):

Greenfield Group of Changes

13. PARS comments are as follows:

S59.012

- 13.1 PARS annually assess open space requirements against provision metrics provided by New Zealand Recreation Aotearoa (NZRA). Based on these metrics, and a desk top study that looks at proximity, distribution, and a number of other drivers e.g. housing density. The average baseline for Dunedin, for current provision is 5 playgrounds per 1,000 children under 14, 2.3 hectares of sports land per 1,000 residents, and 33 hectares of open space per 1,000 residents. Dunedin achieves this baseline. However, this provision metric varies widely between each community with some communities having more or less than the Dunedin average. PARS use these provision metrics as a tool to ensure that as the city dwellings increase, so too will the outdoor public amenities, so that PARS can continue maintaining these provision levels. Provision of communal, outdoor children's play areas for each 4 or more unit dwelling is not considered realistic given that this level of provision far exceeds the recommended provision metrics outlined above and would be impractical and unrealistic to implement at the scale suggested by the submitter.

S176.001

- 13.2 The provision of green space and provision of public amenities is considered through policy 2.6.2.1, and that, when assessing land to be rezoned we use the guidelines and provision metrics provided by NZRA in the annual benchmarking activities.

FS226

- 13.3 Refer to comments for S176.001.

TO: Bede Morrissey, Policy Planner, City Development

FROM: John Brenkley, Manager Planning and Partnership, Parks and Recreation

DATE: 10/3/2022

SUBJECT: **VARIATION 2: PARKS AND RECREATION RESPONSE TO REQUEST FOR COMMENTS ON GREENFIELD REZONING SITES – REJECTED SITES**

BACKGROUND

1. Parks and Recreation Services have received a memo from you dated 3 March 2022, requesting consideration the previously rejected sites. Please find the response below.

COMMENTS ON THE PREVIOUSLY REJECTED SITES

RS170: 103, 105, 107 Hall Road, Sawyers Bay – Rezoning from Rural Residential 1 to some form of Residential zoning

2. PARS would support rezoning site RS170 on the condition that the developer provides an open space to support a variety of recreation activities. The size of the open space will be subject to the number of lots. Large Lot Res 1 & 2 would require no provision of open space. For Township and Settlement, the minimum open space requirements would be, regular square size, located centrally, street frontage on at least two sides and a minimum of 2,000m². Other conditions to be considered include landscaping, amenities, and sustainable transport connections.

RS193: 177 Tomahawk Road – Rezoning from Rural to General Residential 1

3. PARS would not support rezoning site RS193. This proposal is directly adjacent to Tomahawk Lagoon. Tomahawk Lagoon is classified as a Government Purpose Reserve for Wildlife Management. Much of the area is managed by the Department of Conservation, it is a habitat for rare and threatened plant species, and it is a regionally significant wetland habitat for waterfowl and waders. PARS do not want to encourage any residential development, including stormwater and wastewater management, or recreation activities that would have a negative effect on the natural features or wildlife species that are present in this lagoon. This is a protected area of importance for flora and fauna. In addition, PARS do not want adjacent coastal reserves being proposed to receive stormwater runoff as is the case for the recent Centre Road subdivision.

RS204: 21, 43, 55, 65, 75, 79, and 111 Chain Hills Road – Rezoning from Rural Residential 1 to a mix of zones (GR1, LLR1) as shown on submitters structure plan

4. PARS would support rezoning site RS204 based on the draft structure plan for the combined site (RS204 and RS153). The structure plan shows open spaces from RS153 connecting into RS204 in the lower Chain Hills Road section (E,F,K in the structure plan), these open space areas are native bush areas and important for biodiversity reasons. The proposed walking track is

supported, with the addition of well formed, obvious connections to adjacent streets into the subdivision.

RS153: 77 and 121 Chain Hills Road and 100 Irwin Logan Drive, Mosgiel – Rezoning from Rural to a range of Residential and Rural Residential zones. Note – requested additional sites are included: 2-20 Jocelyn Way, 38 and 40-43 Irwin Logan Drive, and 25-27 Pinfold Place.

5. PARS would support rezoning site RS153 based on the draft structure plan for the combined site (RS204 and RS153). In addition to the propose draft structure plan, the developer should also adopt the following:
 - a. The minimum requirements for provision of formal open space would be, regular square size, located centrally, street frontage on at least two sides.
 - b. Connection to Woodland Drive/Heathfield Avenue would also be essential to access other open spaces within this community.
 - c. Other conditions to be considered include landscaping, amenities, including natural play equipment and sustainable transport connections.

RS161: 210 Signal Hill Road – Rezoning from Rural to Large Lot Residential or Rural Residential

6. The slopes of Signal Hill are clearly visible from much of Dunedin and provide the city's scenic backdrop. Because of this PARS would not support the development of 23 or 13 lots on this site RS161. PARS would support the structure plan proposal resulting in an additional 7 lots. PARS would support rezoning the site to a combination of Large Lot Residential 2 and Rural Residential 1 to achieve this because this would provide the greatest flexibility for the developer to meet the following conditions:
 - a. Subdivision activities along the Opoho River requires the develop to provide an esplanade strips with a minimum of 20mts. This is to be classified under the Reserves Act 1977 prior to vesting in DCC.
 - b. 20m wide native bush strip along the boundary line of Signal Hill to preserve the native species and mitigate edge effects.
 - c. Recreational track 2m wide built to a Short Stop Traveller standard to connect Signal Hill via Northfield Avenue and/or Grandview Crescent.

RS110: 23 Sretlaw Place / 118 Brockville Road – Rezoning from Rural to General Residential 1

7. PARS would not support rezoning site RS110 to accommodate 17-32 lots because this is adjacent an urban biodiversity mapped zone. Frasers Gully area provides an important area of vegetation in the suburbs surrounding Dunedin city, and some native species within this area are chronically threatened. Nature Parks (like Frasers Gully) can be affected by edge effects. Changes in population or community structures such as intensification of housing and further fragmentation, and/or loss of open space that occur along the boundary of nature parks could negatively impact on the surrounding native species.
8. PARS would only consider rezoning to accommodate lower density housing (12 lots), if the developer met the following conditions:
 - a. 20m wide native bush strip along the boundary line of the Frasers Gully Reserve
 - b. An adjoining recreational track 2m wide built to a Short Stop Traveller standard to connect to Frasers Gully track, this may include a bridge over the creek.

RS176: 234/290 Malvern Street, Leith Valley – Rezoning from Rural Residential 2 to either Large Lot Residential (LLR1 or LLR2) or Rural Residential 1

9. PARS would not support rezoning site RS176 because the site includes an urban biodiversity mapped area and this area is also adjacent to an important green corridor connecting the urban environment to Ross Creek and the Town Belt.

RS206, RS206a, RS77: Part 35 and 43 Watts Road, Part 109 North Road – Rezoning from Rural/Rural Residential 2 to General Residential 2/General Residential 1

10. PARS would not support rezoning RS206/a/RS77 Part 35 and 43 Watts Road, Part 109 North Road to General Residential 1 or 2 to accommodate 173 lots because this is an important green corridor connecting the urban environment, the Dunedin Town Belt and Chingford Park.
11. If there was to be any rezoning of the site, PARS would recommend that RS77 be vested as reserve due to the steepness of the site and biodiversity value.

RS171: 3 Brick Hill Road and 18 Noyna Road, Sawyers Bay – Rural to Township and Settlement

12. PARS would support rezoning site RS171, provided there was a connection from Noyna Road through to Brick Hill Road. Ideally, this connection would be passable by vehicles and would also services pedestrians and cyclists. If so, there would be no further conditions for the developer.

RS200: 489 East Taieri-Allanton Road – Rezoning from Rural to Township and Settlement/Large Lot Residential 1

13. PARS would support rezoning site RS200: 489 East Taieri-Allanton Road provided there was a reserve included in the proposed structure plan. There are reserves in the Allanton township, however they are on the opposite side of a busy road. There will be approximately 41 – 61 Township and Settlement lots ranging in size from 500 – 700 m² in this development and having an area of open space within walking distance will be important for the residents.
14. The minimum open space requirements would be, regular square size, located centrally, street frontage on at least two sides and a minimum size of 2,000m². Other conditions to be considered include landscaping and amenities.
15. This open space would need to be classified Recreation Reserve under the reserves Act 1977 before vesting in DCC.

RS205: 761 Aramoana Road – Rezoning from Rural to Township and Settlement

16. PARS would support rezoning lots 1,2, and 3 within site RS205 with no conditions for the developer

RS169: 41 Emerson Street – Rezoning from Rural to General Residential 1

17. PARS would support rezoning site RS169 on the condition that Emerson Park is upgraded to a community facility. This would include the addition of play equipment and supporting amenities.

RS14: Freeman Cl and Lambert St, Abbotsford – Rezoning from Rural to General Residential 1

18. This is a significant size that could accommodate nearly 1000 dwellings. The nearest recreational facility is 400m away but would not be big enough to accommodate a development of this size. A further minimum 5,000m² regular shaped flat and centrally located open space with public amenities would need to be provided by the developer for PARS to support rezoning RS14 to general residential 1. This open space would need to be classified Recreation Reserve under the reserves Act 1977 before vesting in DCC.

RS154: 91 and 103 Formby Street – Rezoning from Rural to Township and Settlement

19. PARS would support rezoning RS154 with no conditions for the developer.

RS175: 85 Formby Street – Rezoning from Rural to Township and Settlement

20. PARS would support rezoning RS175 with no conditions for the developer.

RS160: Part 155 and part 252 Scroggs Hill Road – Rezoning from RR1 to LLR1, LLR2 & Township and Settlement Zone (as shown in the submission's proposed structure plan)

21. PARS would support rezoning RS160: Part 155 and part 252 Scroggs Hill Road with no conditions for the developer.

RS220: 53, 64, 73, 74, 80, 85, 86, 92, 100, 103, 103A, 123, 127 Scroggs Hill Road – Rezoning from RR1 to LLR1 or Township and Settlement Zone

22. PARS would support rezoning RS220: 53, 64, 73, 74, 80, 85, 86, 92, 100, 103, 103A, 123, 127 Scroggs Hill Road with no conditions for the developer.



SECOND GENERATION DISTRICT PLAN

Variation 2 – Additional Housing Capacity

Part 3 – Sites Proposed for Rezoning

Appendix D.7

Evidence on Research and Monitoring

July 2022

BEFORE THE VARIATION 2 HEARING PANEL

IN THE MATTER

of the Resource Management
Act 1991

AND

Variation 2 to the proposed
Second Generation Dunedin City
District Plan (2GP)

STATEMENT OF EVIDENCE OF NATHAN STOCKER FOR DUNEDIN CITY COUNCIL

Dated 4 July 2022

QUALIFICATIONS AND EXPERIENCE

1. My name is Nathan Stocker.
2. I am employed by the Dunedin City Council ("the Council") as the Research and Monitoring Team Leader within the City Development team. In this role I am responsible for leading a team that provides data and evidence to support the development, implementation, monitoring, and review of the Second Generation District Plan (2GP) and other City Development activities.
3. I hold a Bachelor of Arts (Majoring in Geography) and a Master of Planning, both from the University of Otago. I have approximately 10 years of planning experience in a variety of roles with the Dunedin City Council, Otago Regional Council, Wellington City Council, and Sinclair Knight Merz. I am an Intermediate member of the New Zealand Planning Institute.
4. I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note. This evidence has been prepared in accordance with it and I agree to comply with it. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE AND OVERVIEW

5. My evidence relates to development capacity, carbon emissions, data relating to the various greenfield sites, and submissions relating to these issues.
6. My evidence is contained in the following:
 - Research and Monitoring comments on submissions on the DCC-proposed greenfield sites dated 24 March 2022;
 - Updated Residential Development Capacity memo dated 20 June 2022;
 - Estimated commute-related carbon emissions from potential Variation 2 rezonings memo dated 22 June 2022; and
 - Greenfield site data integrated directly into the section 42A report.

CONCLUSION

7. It is my opinion that the information within the above is correct.

DATED this 4th day of July 2022

Nathan Stocker

Team Leader Research and Monitoring

City Development

Dunedin City Council

TO:	Bede Morrissey, Policy Planner, City Development
FROM:	Research and Monitoring Team
DATE:	24 March 2022
SUBJECT:	VARIATION 2: RESEARCH AND MONITORING RESPONSE TO REQUEST FOR COMMENTS ON DCC-PROPOSED GREENFIELD SITES

INTRODUCTION:

1. The following comments only deal with submission points that are related to the assessments carried out by the Research and Monitoring team. Concerns from submitters regarding issues such as decreases in property value, crime, disrupted views, or being hemmed in by more development are not discussed below.

COMMENTS – GREENFIELD REZONING (DCC PROPOSED SITES):

GF01: Part 155 Scroggs Hill Road, Brighton – Rezoning from Rural Residential 1 (RR1) to Large Lot Residential 1 (LLR1)

2. No submissions received, no further analysis undertaken.

RS160: Part 155 and part 252 Scroggs Hill Road– Rezoning from RR1 to LLR1, LLR2 & Township and Settlement Zone (as shown in the submission’s proposed structure plan)

3. Detailed assessment carried out by Jonathan Barnsley, site excluded from this assessment.

RS220: 53, 64, 73, 74, 80, 85, 86, 92, 100, 103, 103A, 123, 127 Scroggs Hill Road – Rezoning from RR1 to LLR1 or Township and Settlement Zone

4. Detailed assessment carried out by Jonathan Barnsley, site excluded from this assessment.

GF02 and GF02a: 201, 207, 211 Gladstone Road South, East Taieri – Rezoning from Rural (Taieri Plain) to General Residential 1 (GR1)

5. Most of the objections to rezoning these sites that were raised by the submitters were documented in the original assessment. These were deemed to be manageable or not of sufficient concern to reject the site.
6. A point raised in submission S24.001 that was not covered in the original site assessment was that East Taieri Primary school, the nearest school, is at capacity and has no physical space for further expansion.
7. The roll has been steadily increasing over the past decade and in 2021 was at 327. Examination of an aerial photograph from 2019 suggests the school has very large grounds including a significant area (ca. 7900m²) of empty, seemingly unused, land to the south of the main buildings. It appears that East Taieri Primary has plenty of room for expansion. The Ministry of Education would be best placed to provide comment on any school capacity issues.

GF03: 16 Hare Road and 7 Kayforce Road – Rezoning from Rural Residential 1 (RR1) to Township and Settlement (T&S)

8. No submissions received, no further analysis undertaken.

GF04: Part 127A Main Road, Fairfield – Rezoning from Rural (hill slopes) to General Residential 1 (GR1)

9. No submissions received, no further analysis undertaken.

GF05 and GF05a: Parts 353 Main South Road, Fairfield (part of) – Rezoning from Rural Residential 2 (RR2) to General Residential 1 (GR1)

10. Submitters were concerned that the local infrastructure would be unable to deal with the population increase associated with any new development. It was felt that the local schools are at capacity and that the roading, in particular the roundabouts at Green Island and Abbotsford, and the motorway on-ramps, would become too congested.
11. The site is within zone for Abbotsford Primary School, which had a roll of 290 in 2022, but has been reasonably stable over the past 10 years. Green Island Primary School is 1.5km away and has no zone restriction. The remaining concerns raised by submitters were already documented in the original assessment and were viewed as manageable.
12. Submission 204 requested that a building platform be enabled on site GF05a. One further dwelling would not be expected to place any significant strain on the infrastructure and services in the area. However, the eastern part of GF05, which is immediately adjacent to GF05a, has been identified as having a high landslide risk. Therefore, any building platform established on GF05a should be the subject of a geotechnical assessment and any subsequent dwelling should mitigate against the potential impacts of land instability.

GF06: 27 Weir Street and Part 1 Allen Road, Green Island – Rezoning from Rural (coastal) to General Residential 1 (GR1)

13. No submissions received, no further analysis undertaken.

GF07: 33 Emerson Street, Concord – Rezoning from Rural (coastal) to General Residential 1 (GR1)

14. No submissions received, no further analysis undertaken.

GF08: Part 19 Main South Road, Concord– Rezoning from Rural (hill slopes) to General Residential 1/General Residential 2 (GR1/GR2)

15. Submitter 239, who owns site GF08, predicts that the site could yield 50-60 dwellings if it was entirely rezoned to General Residential 2. This is a significant increase on the previous prediction of 32, which was supplied by the same submitter. The original assessment noted some potential limitations with the stormwater and wastewater system that would service the site. The impact of this larger number of dwellings on the wastewater and stormwater network should be considered.

GF09: 41-49 Three Mile Hill Road, Halfway Bush – Rezoning from Rural Residential 1 (RR1) to Large Lot Residential 1 (LLR1)

16. No submissions received, no further analysis undertaken.

GF10: 32 & 45 Honeystone Street – Rezoning from Rural (hill slope) to Large Lot Residential 1 (LLR1)

17. No submissions received, no further analysis undertaken.

GF11 and GF11a: Wakari Road area – Rezoning from Rural Residential 2 (RR2) to General Residential 1 (GR1)

18. As this site is relatively long, there is variation around the distance to the nearest bus stop. There is potential for a significant increase in households in this area as a result of the rezoning, which could potentially justify a closer bus stop being added when the population of the area increases.
19. The proposed extension GF11a, which is approximately 3500m², would be a nominal addition to the overall 23.3ha and would likely have little further impact on the capacity of the services or infrastructure in the area.

GF12: 233 Signal Hill Road (in part) – Rezoning from Rural (hill slopes) to Large Lot Residential 1 (LLR1)

20. Submitter 175 raised several points of concern regarding the rezoning of this site from Rural Hill Slopes to Large Lot Residential 1. Those relevant to the original assessment by the Research and Monitoring team include:
 - poor access to public transport - access from North Road via Birchfield Ave and Pleasant Pl, which is not guaranteed.
 - impact on productive land. The submitter disputes that only 3% of the site is covered by high class soils. It is not obvious where the submitter got this information from.
 - there have been significant issues with land instability and ground water for other properties in the immediate area.
 - the lack of reticulated water is a concern, especially for firefighting.
 - there have been significant issues with stormwater in the area, particularly during construction of new dwellings along Pleasant Place.
 - the lack of any apparent satisfactory means of accessing this site from North Road.
 - Uncertainty about how the site would be supplied with electricity.
21. The previous assessment of the site being approximately 400m from the closest bus stop was based on desktop a measurement from the edge of GF12 adjacent to Birchfield Ave. The distance from the furthest point in the site to the same bus stop is approximately 650m. However, these measurements represent a theoretical value that was calculated prior to any knowledge of the problems associated with site access from North Road. If access is not possible from North Road, then the closest bus stop would be on Opoho Road, 1370m from the middle of GF12.
22. The other factors listed above do raise concerns regarding the viability of GF12. In particular, the poor vehicle access from North Road may be a hurdle to developing the site and should be assessed by the Transport team.

GF14: 336 and 336A Portobello Road, The Cove – Rezoning from Rural Residential 2 (RR2) to Township and Settlement (T&S)

23. No submissions received, no further analysis undertaken.

GF15: 23 and 25 Mc Auley Road, Highcliff Road, Portobello – Rezoning from Rural Residential 2 (RR2) to Large Lot Residential 1 (LLR1)

24. No submissions received, no further analysis undertaken.

GF16: Highcliff Road and Hereweka Street, Portobello – Rezoning from Rural Residential 2 (RR2) to Township and Settlement (T&S)

25. No submissions received, no further analysis undertaken.

GF17: 26 McAuley Road (Recreation) – Rezoning from Rural Residential 2 (RR2) to Recreation

26. No submissions received, no further analysis undertaken.

RTZ2: 87 Selwyn Street – Rezoning from Rural Residential 2 – Residential Transitional Zone (RR2 (RTZ)) to General Residential 2 (GR2)

27. No submissions received, no further analysis undertaken.

RTZ1: 30 Mercer Street Kenmure – Rezoning from Rural (RTZ) to General Residential 2 (GR2)

28. No submissions received, no further analysis undertaken.

RTZ3: 13 Wattie Fox Lane – Rezoning from General Residential 1 (GR1) and Rural (RTZ) to General Residential 1 (GR1)

29. Assessment of RTZ3 – 13 Wattie Fox Lane

Slope	Varies from moderate (15-20 degrees) to low (less than 12 degrees). Average slope across the site is 17.38 degrees. This site is a shallow gully and it is likely that the floor of the gully and the sides will distort the average value.
Aspect – Solar access	West to Southwest.
Accessibility – Public transportation	350m to nearest bus stop from furthest point in the site.
Accessibility – Centres	2,050m to middle of Mornington suburban centre.
Accessibility – Primary Schools	The site is immediately adjacent to Balaclava Primary School, but access via roading network is approximately 600m.
Accessibility - Intermediate and Secondary School	780m from Kaikorai College, a co-ed intermediate and secondary school.
Any Significant Trees, heritage items	None.
Compact city – proximity to existing residential areas	Immediately adjacent to large and established residential areas.
Compact city – ability to develop land effectively	Based on the existing density rules, the capacity of this site would be 4 sites.
Effects on Manawhenua values	None related to the 2GP layers.
Any other constraints on development (encumbrances, owner aspirations, appeals)	There does not appear to be any easements or infrastructure crossing the site.

COMMENTS – GREENFIELD REZONING (BROAD SUBMISSIONS):

Greenfield Group of Changes

30. Access to public transport was assessed using an automated process in ArcGIS. It used the existing road network, represented by a series of interconnected lines, to identify the shortest distance between each of the sites and the nearest bus stop. The model that was used required that each of the sites and the bus stops were represented by a single point, and that all these

points were on the roading network -they could not be placed within the sites themselves. To ensure consistency across the sites, each representative point was placed halfway along the road frontage of the site regardless of how large it was. In some instances, this may have over-estimated the distance from the site to the nearest bus stop, in others it may have underestimated the distance. The subsequent categorization of the sites was a relative decision rather than an absolute one.

TO: Bede Morrissey

FROM: Nathan Stocker

DATE: 20 June 2022

SUBJECT: UPDATED RESIDENTIAL DEVELOPMENT CAPACITY

BACKGROUND

This memo outlines the current level of projected demand for residential development and the sufficiency of the development capacity enabled through the Second Generation District Plan (2GP).

This memo should be read alongside the Dunedin City Housing Capacity Assessment (July 2021). It is not a full assessment and is instead intended to provide an update based on recent changes to key inputs.

TERMINOLOGY

By way of introduction to the terminology used:

Plan-enabled capacity – this is defined in clause 3.4 of the National Policy Statement on Urban Development. Plan-enabled capacity effectively equates to the total number of additional homes that could be built under planning instruments without regard for financial feasibility or likelihood of take-up. For instance, this may presume demolition of all existing buildings and full redevelopment of all residential zoned properties in an area.

Feasible capacity - this is a subset of plan-enabled capacity that would deliver a satisfactory return on investment. The Dunedin residential capacity model calculates feasible capacity on residential zoned properties by estimating development costs and potential revenue and assessing whether developments would meet a specified profit margin. If more than one development option for a site would meet the profit margin tests, the most profitable option is deemed to be the feasible one. It is noted that this figure will change based on market conditions (which influence land costs as well as sale prices) and construction costs (which are influenced by supply chains and demand on the construction industry). The rates of growth for construction costs and land costs can fluctuate considerably depending on local, national, and international factors.

Capacity that is 'reasonably expected to be realised' – this is a subset of plan-enabled and feasible capacity that can reasonably be expected to be developed over a certain timeframe. The Dunedin residential capacity model calculates this by applying an annual probability of development (based on recent trends) to each feasible development, as well as ensuring that total city-wide capacity is not unrealistically concentrated in certain areas or housing types. It is noted that this figure can be difficult to calculate where there is a shortage of trend data with relatively constant underlying factors (as is the currently the case with the 2GP being relatively new and new development capacity having had little time to be taken up).

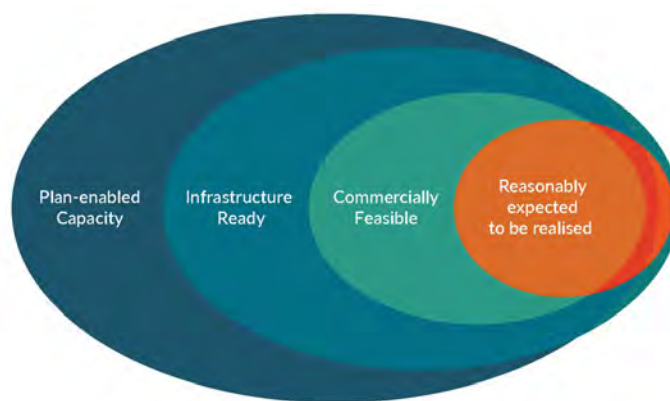


Figure 1: Relationship between capacity concepts¹

CALCULATIONS OF EXPECTED DEMAND

Estimated population growth in Dunedin peaked at 1,800 new residents (a 1.36% growth rate) over the year to June 2016 and has been declining since, reinforced by the altered migration patterns resulting from the Covid-19 pandemic. Growth for the year to 30 June 2021 was 500 residents, or 0.38%. While there is a significant degree of uncertainty in future population trends, the population projections included in Dunedin's 2021-31 10 year plan (and Housing Capacity Assessment 2021) are still considered to be the most reasonable dataset currently available. However, it is noted that there is the possibility that growth will be slower or faster than these projections and different scenarios should be considered in decision-making processes.

The updated figures in this memo use a 2022 base year, as opposed to the 2020 base year used in the Housing Capacity Assessment 2021. This has resulted in a decrease in estimated demand for new dwellings, as growth projections were expected to decline over time. The demand figures are also impacted by an update to the dwelling/household ratios used, which now match the significant forecasting assumptions in the 2021-31 10 year plan.

The estimated recent housing development shortfall has also been adjusted. Between July 2013 and June 2021 (inclusive), there was an estimated growth of 3,177 households² and an estimated net addition of 2,600 new dwellings³, creating a shortfall of 577 homes. A base year of 2013 was used since it corresponds to a census year and provides a more reliable household estimate. The shortfall of 577 homes is a reduction from the shortfall of 1,060 used in the Housing Capacity Assessment 2021. This reduction is the result of population growth revisions made by Statistics New Zealand and the construction of homes continuing at a relatively high rate despite population growth declining to a low rate, leading to a net surplus of new homes over the last three years.

Table 1: Projected demand for new dwellings

	2022-25	2022-32	2022-52
Additional demand	1,557	4,184	6,345
Additional demand + existing shortfall	1,615	4,376	6,922
Additional demand + existing shortfall + competitiveness margin	1,938	5,252	8,180

¹ Diagram taken from Guidance on Housing and Business Development Capacity Assessments (HBAs) under the National Policy Statement on Urban Development (Ministry for the Environment, 2020)

² Based on census household data and Statistics New Zealand annual estimated resident population data.

³ Based on DCC data on building consents, code compliance certificates, and rating information. This incorporates the loss of demolished homes resulting from property development.

CALCULATIONS OF EXPECTED YIELD

Changes in the capacity modelling methodology and inputs incorporated in this update include:

- Use of a newer property dataset (incorporating developments completed since the Housing Capacity Assessment 2021).
- Updated property values (based on property sales data) and construction costs (based on building consent data).
- Updated zoning to reflect appeals resolved since the Housing Capacity Assessment 2021.
- Updated development density assumptions for sites zoned Central Business District, Inner City Residential, or General Residential 2 (based on data from recent developments).

A rough outline of the capacity modelling methodology is provided in Appendix 1.

Results of the modelling are presented in Table 2 below. A comparison of the enabled capacity (by planning status) with the capacity that would be required under different growth scenarios is presented in Figure 2.

Table 2: Sufficiency of housing development capacity⁴

Timeframe	Short-term (2022-25)	Medium-term (2022-32)	Long-term (2022-52)
Capacity required ⁵	1,940	5,250	8,180
Development capacity based on operative provisions and zoning ⁶ (surplus/deficit)	2,020 (+80)	3,780 (-1,470)	9,280 (+1,100)
Development capacity based on provisions and zoning with legal effect ⁷ (surplus/deficit)	2,290 (+350)	4,680 (-570)	12,040 (+3,860)
Development capacity based on notified Variation 2 zoning ⁸ (surplus/deficit)	3,220 (+1,280)	5,600 (+350)	12,860 (+4,680)

⁴ All capacity figures in this section are based on capacity that is plan-enabled, infrastructure-ready, feasible, and reasonably expected to be realised.

⁵ Incorporating 20% competitiveness margin over 2018-28 and 15% over 2028-2048, as required by the NPS-UD.

⁶ These figures are based on the operative pre-Variation 2 zoning and provisions.

⁷ These figures incorporate the Variation 2 changes that have legal effect, i.e. those that were subject to decisions released through hearings 1-3.

⁸ These figures incorporate the Variation 2 changes that have legal effect (those that have had decisions released through hearings 1-3) as well as the additional rezonings notified through Variation 2 but yet to be considered through hearing 4. It is recognised that these may differ from the rezonings approved through Variation 2 decisions.

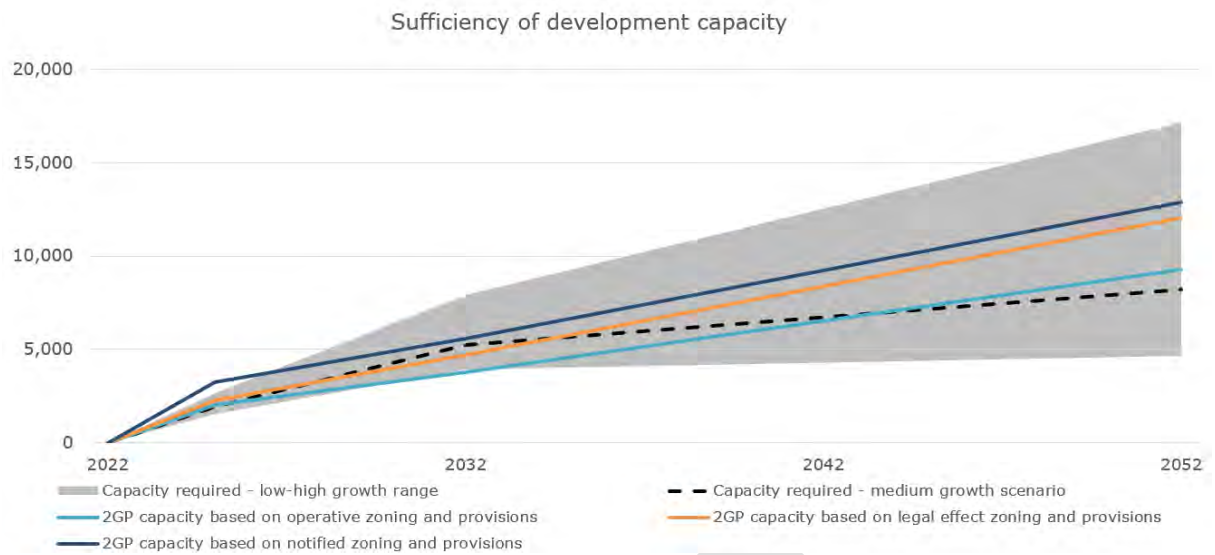


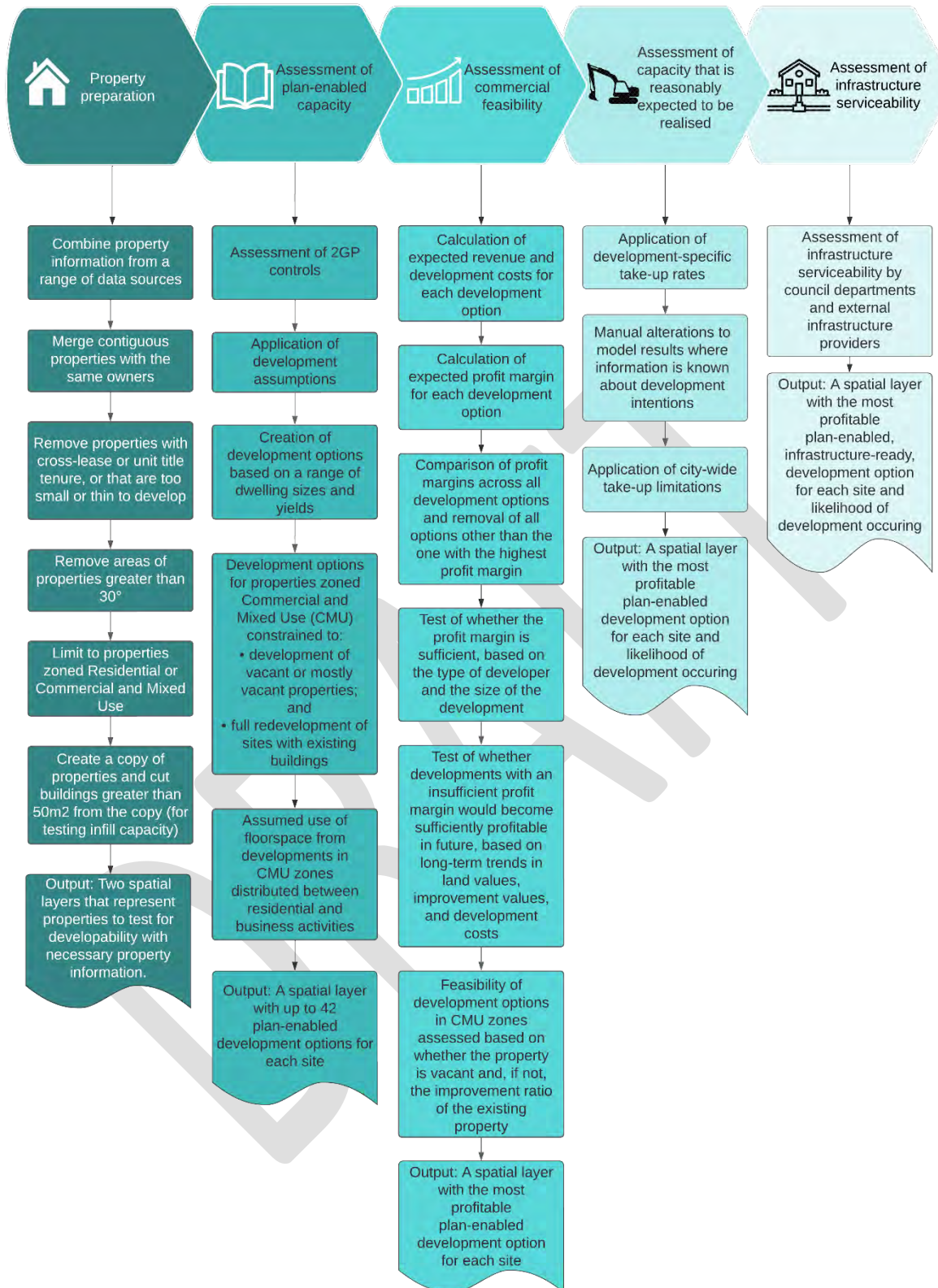
Figure 2: Sufficiency of housing development capacity

Nathan Stocker

TEAM LEADER – RESEARCH AND MONITORING

APPENDIX 1

RESIDENTIAL CAPACITY MODEL METHODOLOGY DIAGRAM



TO: Bede Morrissey

FROM: Nathan Stocker

DATE: 22 June 2022

SUBJECT: ESTIMATED COMMUTE-RELATED CARBON EMISSIONS FROM
POTENTIAL VARIATION 2 REZONINGS

BACKGROUND

This memo outlines the estimated impact that rezoning potential growth areas would have on commute-related carbon emissions.

METHODOLOGY

The methodology used in the analysis is outlined below and shown diagrammatically in Appendix 1.

1. Calculate travel distances between growth areas and each Statistical Area 2 (SA2).

This was undertaken using GIS network analysis. The output includes the travel distance between each growth area and the centre point of each SA2 (a suburb-scale geography used by Statistics New Zealand to release census and other data).

2. Combine travel distances with carbon emission factors to calculate carbon emissions by travel mode, home area, and location of work/study.

Carbon emission factors (shown in Appendix 2) were derived from Waka Kotahi data and are specific to Dunedin. For the categories involving 'cars, trucks, or vans', they use an average emissions factor of light vehicles registered as of April 2022 and therefore incorporate a portion of electric and hybrid vehicles. The carbon emission factors are a snapshot in time and may change as travel modes and electric/hybrid vehicle ownership rates evolve.

3. Extract 2018 census data for each growth area, based on the SA2 that it is either in or adjacent to (for those on the urban/rural fringe).

Census data was used to determine the proportion of the population in each area that is in employment, the proportion that is in study (at any level), and the average number of people per household. While the 2018 census had challenges (particularly around data collection), these datasets all had either a moderate data quality rating (for household composition and study participation) or high data quality rating (for work and labour force status)¹.

4. Import data on travel modes and work/education destinations from 2018 census data.

The key dataset used was 2018 census data on home location, work/education destination, and travel modes. The usual residence address data has a high data quality score and the main means of travel and workplace/education intuition address data have moderate data quality scores.

¹ More information on the data quality ratings is available on the Statistics New Zealand website (<https://www.stats.govt.nz/methods/data-quality-ratings-for-2018-census-variables>)

For each area, this data was converted into the proportion of the workforce living in that area who work in each SA2 and get there through each travel mode. For example, 10.4% of workers who live in Opoho work in the Campus South SA2 and usually drive to work. An equivalent analysis was undertaken for people who are enrolled in education.

5. Combine growth area information with demographic data to assess the expected change in the numbers of people commuting to work/education by mode and destination.

The expected yield of each growth area was multiplied by the average number of people per household to derive an expected increase in population. The expected increase in workers and students in each area were derived by multiplying the expected population increase by the proportion of people in that area who work or study.

6. Combine data on the estimated additional people commuting to work/education by mode and destination with carbon emission calculations to determine expected commute-related carbon emissions that would result from development of each growth area.

The expected number of additional workers in each growth area was multiplied by the proportion of current workers who work in each SA2 and usually take each transport mode. This result was then multiplied by the calculated carbon emissions of each trip (based on origin, destination, and travel mode) and doubled (to reflect two trips per day). Results are presented as total additional carbon emissions per person per day and additional carbon emissions per households per day.

ASSUMPTIONS/LIMITATIONS

There are various assumptions and limitations to the data and methodology. These include that:

- Input data is accurate. The census data generally has good data quality scores but is never 100% accurate. The yields of each growth area are based on assumptions about development density and type, however this is mitigated by presenting results as carbon emissions per person and per household.
- Return trips are between the same locations and use the same transport mode as the trip to work/study.
- All trips follow the route that would have the shortest drive duration.
- Household types and sizes resulting from development are similar to the existing population in the surrounding area. It is also assumed that travel modes and destinations are similar.

RESULTS

Results are shown in Appendix 3 and Appendix 4. At a high level, these show that areas further from the CBD generally have higher average carbon emissions. However, other factors are also influencing the results. These may include:

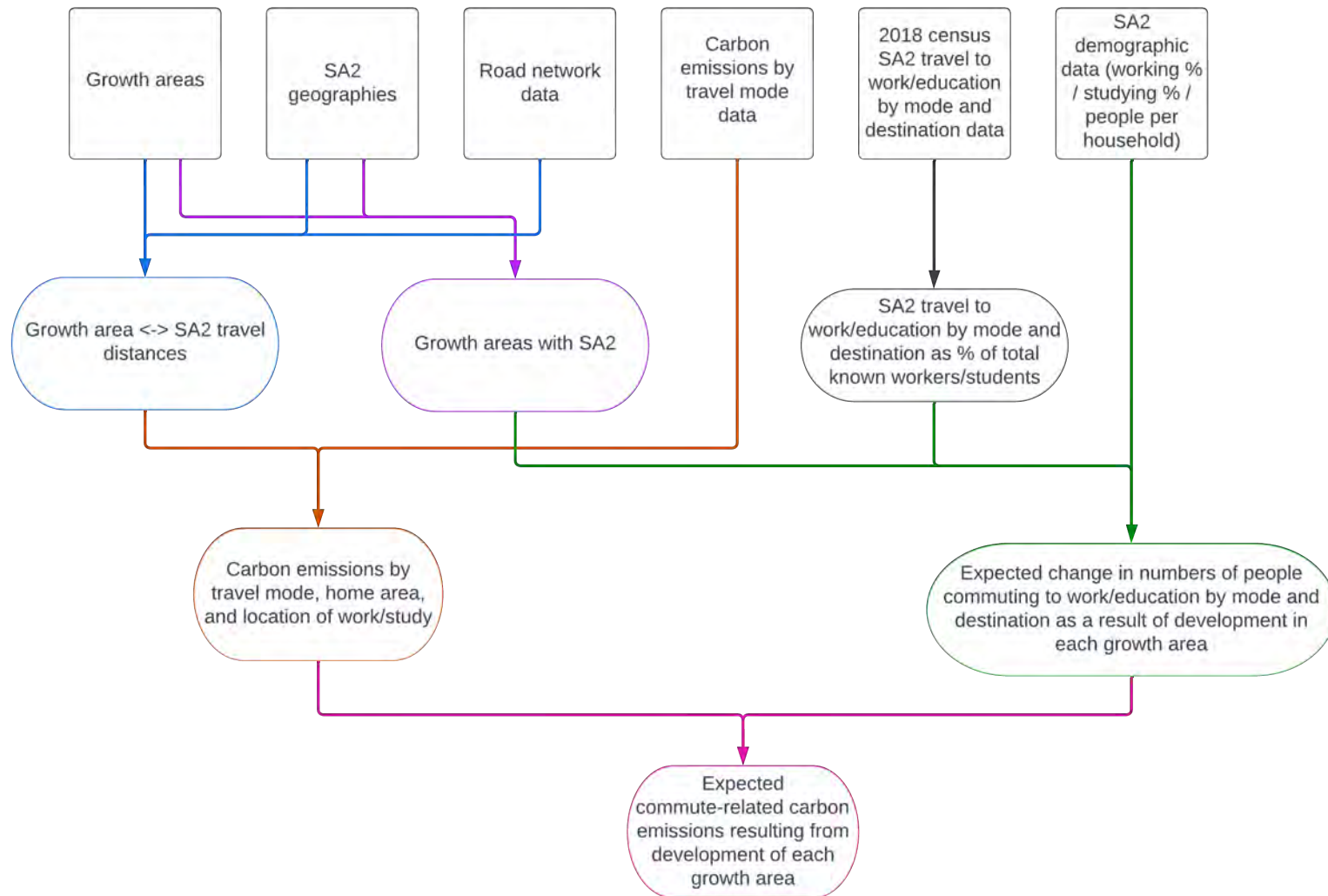
- Availability (and quality) of public transport services
- Proximity to different work/education facilities
- Spatial differences in transport mode composition
- Spatial demographic differences (e.g. differences in average people per household or the proportion of people who work/study)

Further work could be undertaken in future to ascertain the impact of these factors through sensitivity testing and testing statistical significance.

Nathan Stocker

TEAM LEADER – RESEARCH AND MONITORING

APPENDIX 1 CARBON EMISSION ASSESSMENT METHODOLOGY DIAGRAM

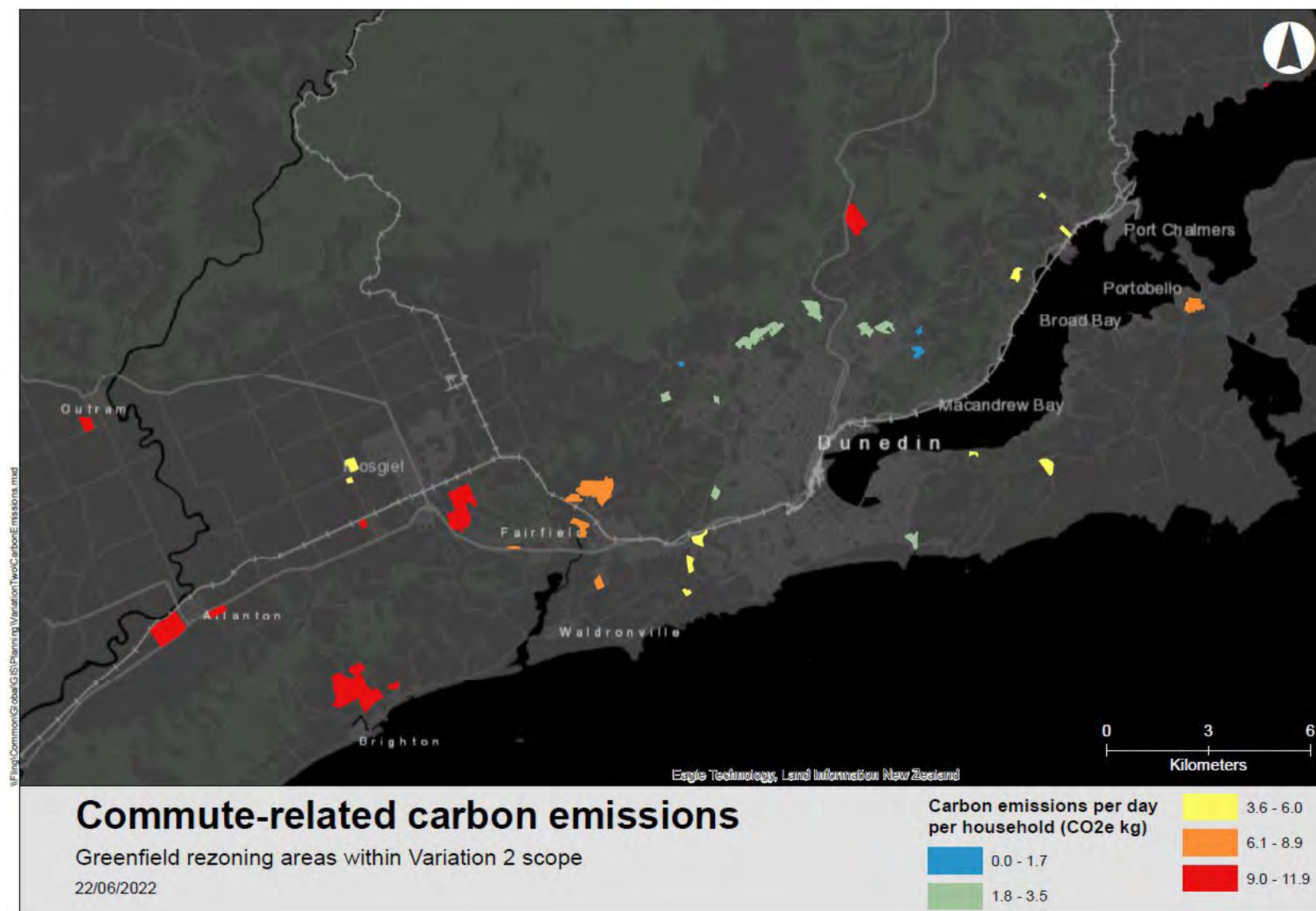


APPENDIX 2 CARBON EMISSION FACTORS BY TRANSPORT MODE

Mode	Dunedin specific emissions factor (kg CO ₂ e/km travelled)
Working/studying at home	0
Bicycle	0
Drive a company car truck or van	0.260187683
Drive a private car truck or van	0.260187683
Ferry	N/A
Passenger in a car truck van or company bus	0
Public bus	0.155
Train	0.046
Walk or jog	0
Drive a car truck or van	0.260187683
Passenger in a car truck or van	0
School bus	0.155

APPENDIX 3

COMMUTE-RELATED CARBON EMISSIONS MAP



APPENDIX 4 COMMUTE-RELATED CARBON EMISSIONS TABLE

Change number	Location	Additional carbon emissions per person per day (CO2e kg)	Additional carbon emissions per household per day (CO2e kg)
GF01	155 Scroggs Hill Road	5.0	11.9
GF02	201, 207, and 211 Gladstone Road South	3.7	10.2
GF03	16 Hare Road and 7 Kayforce Road	5.0	11.9
GF04	127a Main Road Fairfield	2.8	7.5
GF05	353 Main South Road, Fairfield	2.8	7.5
GF06	Weir Road (Green Island)	2.3	6.7
GF07	33 Emerson Street, Concord	2.0	4.9
GF08	19 Main South Rd. Concord	1.6	4.3
GF09	41-49 Three Mile Hill Road	0.0	0.0
GF10	32/45 Honeystone Street	1.4	3.5
GF11	Polwarth Rd & Wakari Rd	1.4	3.5
GF12	233 Signal Hill Rd	0.7	1.7
GF14	336 and 336A Portobello Road	1.9	4.9
GF15	Area surrounding Highcliff Road	3.7	8.9
GF16	Area surrounding Highcliff Road	3.7	8.9
RS014	Freeman Cl, Lambert St, Abbotsford	2.6	6.6
RS077	309 North Road, 43 Watts Road	1.0	2.6
RS109	119 Riccarton Road West	2.4	5.4
RS110	23 Sretlaw Place	1.0	2.8
RS151	147 St Leonards Drive	2.0	4.9
RS153/204	RS153: 77, 121 Chain Hills Road, part 100 Irwin Logan Drive, 3-20 Jocelyn Way, 38 and 40-43 Irwin Logan Drive, 25-27 Pinfold Place RS204: 21, 43, 55, 65, 75, 79 and 111 Chain Hills Road	3.7	10.2
RS154	91 and 103 Formby Street, Outram	4.3	11.0
RS157	90 Blackhead Road (and surrounds)	2.0	4.9
RS160	155 Scroggs Hill Road	5.0	11.9
RS161	210 Signal Hill Road	0.7	1.7
RS165	750 Highcliff Road, Peninsula	2.4	6.0
RS167	50-60 Brinsdon Road	1.0	2.8
RS168	300-304 Leith Valley Road	4.5	11.3
RS169	41 Emerson St	2.0	4.9

Change number	Location	Additional carbon emissions per person per day (CO2e kg)	Additional carbon emissions per household per day (CO2e kg)
RS170	103, 105, 107 Hall Road, Sawyers Bay (part)	2.0	4.9
RS171	3 Brick Hill Road and 18 Noyna Road, Sawyers Bay	2.0	4.9
RS175	85 Formby Street, Outram	4.3	11.0
RS176	234/290 Malvern Street, Leith Valley	1.0	2.7
RS193	177 Tomahawk Road	1.3	3.4
RS195	774 Allanton-Waihola Road	4.3	11.0
RS200	489 East Taieri-Allanton Road, Allanton	4.1	11.4
RS205	761 Aramoana Road	4.5	11.3
RS206	43 Watts Rd	1.0	2.6
RS206a	309 North Road, 35 Watts Road, 37 Watts Road	1.0	2.6
RS212	170 Riccarton Road West	2.4	5.4
RS220	53 - 127 Scroggs Hill Road	5.0	11.9
RTZ1	30 Mercer Street	1.1	2.7
RTZ2	Selwyn Street RTZ	1.0	2.6
RTZ3	13 Wattie Fox Lane	1.1	2.7