Proposed Ōhoka Development Memo

My name is Sarah Barkle. I am a long time resident and current chair of the Oxford-Ohoka Community Board (the Board). I have a BSC majoring in geology, whilst I do not practice in this field, I have some understanding of the geological concerns within the area of the proposal. This memo has been prepared on behalf of and is endorsed by the Board.

The Board has been involved in consideration of the proposed Ōhoka development since its original application as a plan change in 2023 (PC31), through the District Planning process (PDP) and as a party to the Environment Court appeal. The Board's decision to become involved in this process was driven by the strength of opposition expressed by the local community and the wider district to the proposal in this particular location.

The proposal that is now before the Panel remains fundamentally the same in its location, scale and relationship to the surrounding rural environment. This submission is made on behalf of the Waimakariri ratepayers as well as the local community, thus reflecting the observations and concerns of the people who live in the Ōhoka area and also the wider district. The community that lives in this area, along with those situated west and east, will experience the consequences of the development. The Waimakariri ratepayers will ultimately be responsible for the ongoing maintenance of infrastructure and mitigation costs, should the foreseeable issues associated with this development come to fruition.

Since the proposal entered the Fast-track process, the planning context has evolved. At that time, the District Plan review had not been finalised and the full extent of the District's development capacity had not yet been confirmed. Subsequent planning work has provided a clearer picture of the capacity available to accommodate future growth. This work has identified capacity for at least 15,000–17,000 additional houses over the next 30 years in Waimakariri District, excluding this proposal. Neighbouring councils have also identified capacity to accommodate future housing growth.

This raises a fundamental question about the extent to which this development is needed to meet housing demand within the District or the wider region. Where substantial capacity has been identified through established planning processes, the applicant should demonstrate what additional regional or national benefit this particular development would provide, and why that benefit justifies establishing a substantial urban settlement in this rural location. The Panel should consider the proposal against the current evidence of housing demand and development capacity, rather than relying on assumptions that applied when the project entered the Fast-track process.

Before proceeding with the substantive matters addressed in this submission, it is important to acknowledge the extent of community opposition to the proposed development.

Approximately 790 submissions were made in opposition to PC31. The significantly lower level of opposition expressed during the subsequent District Plan Review process should not be interpreted as a change of community views. The difference in submission numbers arose, because many members of the community understood that PC31 had been declined and believed that the matter had therefore

been resolved. They were not aware that the Carter Group had also sought a further opportunity to obtain the same or similar zoning outcome through its submission to the Proposed District Plan (PDP). The level of local opposition remains readily apparent within the community. A drive through the area currently provides a visible indication of the strength of local feeling, with numerous properties displaying signs in opposition to the development, a selection of these can be seen in Appendix H.

In addition, a petition initiated by a local resident opposing the development being within the fast track process attracted more than 3000 signatures. In the context of a village with approximately 350 residents, the level of support of the petition is clearly wider than the village itself and evidence of the depth of community concern regarding the proposal and its consideration through this process.

This history and the continuing level of community opposition to this proposal are important context for the Panel when considering the proposal.

The principal issues are the location and form of the development, the groundwater and flooding characteristics of Ōhoka, the limitations of the flood modelling, the capacity of services, transport networks, the loss of rural and lifestyle land, the loss of the character and amenity of a historical village and the long-term cost to ratepayers.

Location and Form of Development

The proposed development represents a substantial expansion of urban development into an area that is currently rural in character and physically separated from the district's established urban areas.

The closest existing residential development in the Rangiora direction is Southbrook, approximately 7.2 kilometers from the Ohoka Hall. In the Kaiapoi direction, Silverstream is approximately 6 kilometres away. The proposal is therefore not simply an extension of an existing urban area. It would create a significant residential development separated from established urban centers by intervening rural land. Consequentially, this raises questions about the efficiency and cost of providing and maintaining infrastructure and services. Development that is separated from existing urban areas requires additional transport connections and infrastructure and creates ongoing costs for the district.

Waimakariri District Council has undertaken planning processes to identify areas considered appropriate for future development. Those areas have been considered in the context of existing infrastructure, connectivity and the ability to support a well-functioning urban environment. The proposed Ōhoka development was considered in this context and found to be inefficient and uneconomical and not contributing to a well-functioning environment by the Council and then by both independent hearings panels (for PC31 and the District Plan review). The proposal is also consistent with the characteristics commonly associated with urban sprawl or leapfrog development: a substantial residential area separated from established urban development rather than being a connected extension of an existing urban area.

Groundwater and Flood Risk

Flooding risk and groundwater resurgence were considered as part of the District Plan review hearing, and before that as part of PC31. A significant concern for the community is the groundwater environment. Ōhoka has a long history of wet and swamp-like conditions because historically it was a swamp. Local residents have consistently described saturated soils, a distinctive clay layer and springs emerging with high groundwater levels.

Historical accounts provide important context. An interview recorded in 2008 with local resident Harold Stone described farming in the Ōhoka and Wilson's Siding area, including repeated flooding, springs appearing and disappearing, very wet ground and difficulties managing agricultural land. The account also describes flooding associated with the Eyre River and occasions when the drainage system could not remove the water. Appendix A is the entire transcript.

These are not historical conditions. Residents continue to observe sodden soils, high groundwater conditions and associated springs. The land on the eastern side of land proposed to be developed tends to feel the effects of this the most. In fact, this particular piece of land and its surrounds was once referred to as 'Springlands'.

The applicant's updated stormwater assessment acknowledges that Ōhoka has shallow groundwater, spring-fed waterways and existing land drains that collect both stormwater and high groundwater. However, it is important to distinguish between recognising groundwater conditions in the design of stormwater infrastructure and explicitly accounting for groundwater resurgence within the flood modelling itself. The Board considers it important that the Panel be satisfied that the flood assessment adequately addresses the interaction between rainfall, elevated groundwater levels, springs and the existing drainage network, including the potential for groundwater to emerge at the surface during significant rainfall events. The modelling methodology should clearly establish whether these interactions have been incorporated and, if not, how the resulting uncertainty has been assessed. Residents have observed groundwater emerging at the surface as springs over many years, as evident in Mr Stone's recount.

The community's position is therefore that groundwater needs to be considered as an integral part of the flood and storm water assessment. The issue is not whether a technical solution can theoretically be engineered, but whether the assessment of the volume and movement of water is based on a complete understanding of the hydrological system. The uncertainty around how groundwater is represented in the modelling makes local observations particularly important. People who have lived and farmed in Ohoka for many years have direct experience of how quickly water appears, where it travels and how the drainage network responds. The Panel should therefore consider the technical modelling alongside this local knowledge when assessing whether the proposed storm water and flood-management measures are adequate.

The experience of Mandeville provides an important local example of the limitations of relying solely on flood hazard modelling and associated maps. As shown in Appendices B and C, map B identifies flooding from pluvial and alluvial sources expected in a 1-in-200-year event (ARI200), while map C identifies areas subject to development constraints. The area circled in green is the Mandeville development area being

referred to in this example. It is located in a south/south west direction, approximately 2km from the proposed area. On the basis of these maps, the area appeared suitable for development from a flood hazard perspective, with no significant flooding identified even in a ARI200 event.

Unfortunately, this was not the experience following development. The area has experienced flooding on a number of occasions, including the events documented in Appendix D-1, which reports flooding between 2014 and 2023. Appendix E includes newspaper articles following the 2014 event. It was then that saw some 50 septic tanks fail due to groundwater inclusion, while the Bradleys Rd sewer pumping station which usually pumps around 100 l/s, was pumping 2300l/s and continued to pump flows 8 times over its operating level at the time of the article demonstrating significant groundwater inclusions and surface flooding. Appendix F contains photographs of the 2022 event. An important detail to note is that the rainfall associated with the 2022 event was not particularly extreme, with annual recurrence intervals (ARI) of approximately 5 years and 10 months; and 3 years and 8 months. These were not events that would ordinarily be expected to produce significant flooding based on the ARI but as you can see, they did. This demonstrates that significant flooding can occur even when rainfall is not exceptionally extreme, and highlight the importance of understanding the contribution of groundwater alongside rainfall.

Groundwater normally moving beneath the surface can rise and emerge as overland flow, particularly when groundwater levels are high. This resurgence typically occurs when groundwater is sitting above 10-metres below ground level. The groundwater level at the time of the 2022 event was approximately 8m below ground level, as can be seen in the ground water monitoring wells graph in appendix D-2. It is therefore important to recognise that significant flooding does not necessarily require an extreme rainfall event. Saturated soils, elevated groundwater levels and modest rainfall can combine to produce substantial surface water, as occurred in 2022.

The Mandeville experience demonstrates why groundwater needs to be considered when assessing flood risk, rather than relying solely on modelled pluvial and alluvial flows. Local residents had previously raised concerns about the suitability of the Mandeville area for development and its susceptibility to resurgence flow. Not such an issue when the land is being used for rural purposes but as soon as houses are introduced a hazard is not only formed but amplified by the change in land use. The subsequent flooding this development encountered highlights the need to listen to locals and those who know the land, look into historical accounts and take groundwater into consideration when evidence deems it necessary, so that problems like these can be avoided.

Waimakariri District ratepayers are now facing costs associated with mitigating the effects of this flooding. Works suggested by Mr Cleary in the newspaper article in appendix E have proven to be a lot more extensive and complex than originally thought, and are still being worked through. Local knowledge has and is proving to be invaluable in this process. Interim works have recently been undertaken to reduce the impact of lower-return-period events by making some channel and culvert upgrades to a small section of drain. So far this has cost the rate payers $352,280. Longer-term mitigation options are expected to be in the vicinity of $20 million. Staff from WDC will be submitting a request to council seeking funding for this in the next long term plan. This represents a significant and

ongoing public cost associated with managing flooding in an area that was not identified through the available flood mapping. The developer went ahead and developed the land, did what they thought they needed to for storm water according to the modelling, with the inevitable fall out landing directly in the ratepayer's lap. Knowledge the Waimakariri District Council have since incorporated into the zoning within their PDP.

The purpose of raising the Mandeville example is not to suggest that technical modelling should be disregarded. Rather, it demonstrates that modelling needs to reflect the actual characteristics of the catchment and that local observations can identify groundwater and drainage conditions that may not be apparent from conventional flood modelling alone. It also demonstrates how not taking this into account ends up costing the ratepayer rather than the developer. This issue is particularly relevant to Ōhoka, where groundwater is an established characteristic of the area and the basin-like nature of the land, together with its soil composition, can result in springs and groundwater seepage. The community therefore asks the Panel to consider the consistency of local observations and the evidence provided by residents through this and previous planning processes. Where local experience and modelling differ, the reasons for that difference should be clearly understood before the Panel relies on the modelled results. The Panel should then also consider the potential for additional costs to fall on the ratepayer to resolve any flooding issues that arise subsequently.

Downstream Impacts

Residents have observed changes in the behavior of the Ohoka Stream over time, as development has occurred in Ōhoka. The Ōhoka Stream runs through the proposed subdivision area. As a member of the Ōhoka-Mandeville Drainage Board, I have often heard accounts from the members about the impact they are feeling downstream from development over time. These members are people who know the land, who have farmed the area over many years and have observed these changes. They report that the stream now responds more rapidly to rainfall, with flows increasing more quickly than they have historically. Once again, these are local observations from people who know the land and should be considered alongside the hydrological evidence. They are relevant to the question of whether the existing receiving environment has sufficient capacity to accommodate additional runoff and altered drainage. The members that are noticing these changes are not within the notifiable area of this proposal so do not have the opportunity to voice their concerns to the Panel in this process.

The potential effects of this subdivision are unlikely to be confined to residents within the bounds of the proposed development. If water is displaced or drainage patterns are altered, downstream properties are very likely to experience the consequences. Appendix G includes photos taken of the Ōhoka Stream around the Butchers Rd culvert, showing flows on an average day compared to that of a 1 in 15 ARI event in 2023. The location of this area is downstream of the proposed development. The photos show what little capacity the stream already has to carry anymore volume of water. There has recently been $50,000 spent on minor channel works to try and open up some pinch points. This has not increased capacity but is trying to alleviate some of the effects that are currently felt.

Another notable example of downstream impacts within this area is that of the Silverstream Development. The Silverstream development is located some 6km East - down stream – of Ōhoka. Significant downstream effects in residential areas of Western Kaiapoi occurred after this development. The frequency and the level of flooding experienced by these residents in Kaiapoi resulted in the need for pump infrastructure to be permanently placed to mitigate effects. The cost of addressing this was part shared by shovel ready projects funding (tax payers) and ratepayers in the tune of $18million ($9million each) with $10 million being spent on 5 pump stations. This is yet another example of development occurring which had a consequential effect after the development had occurred, and was paid for by the ratepayers and tax payers. These additional costs should not be occurring and need to be accounted for when considering the benefits versus the costs of developments in unsuitable locations.

Transport

Transport matters were carefully considered as part of the District Plan review hearing, and before that as part of PC31. The proposed Ōhoka development is separated from established urban centers and would therefore rely heavily on private vehicle travel. There is currently no established public transport network serving the site, nor are there any identified plans for such a service. Residents would need to travel outside the development for employment, secondary schooling, shopping, health services, sport and many other everyday activities.

The surrounding road network is predominantly rural and has developed to serve the existing population and rural land-use pattern. These roads are not equivalent to the connected and higher-capacity urban road networks that serve established towns. A substantial increase in population and traffic will place additional pressure on the wider network, including intersections, connecting rural roads and State Highway infrastructure, and will require upgrades well beyond the roads that the development directly accesses.

This raises an important question about the extent of infrastructure that would be funded by the developer and where responsibility for the wider network would ultimately fall. If improvements are required to accommodate traffic generated by the development extend beyond its immediate access roads, it is important to understand what proportion would be funded by the developer and what costs would ultimately fall to Council/ratepayers or central government/taxpayers. I understand that these costs will be addressed in the Council's evidence.

This issue is particularly relevant to the State Highway network and the Tram Road on-ramp serving the area. The on-ramp has a finite capacity for vehicle movements. If traffic generated by the proposed development were to exceed that capacity, significant improvements may be required. The question then is who would fund those works and whether funding would be available when it is needed. Central government has indicated that there will be significant constraints on funding for future road development therefore, it cannot simply be assumed that necessary State Highway upgrades will be approved for funding let alone delivered in time to support this proposal whether staged or not.

The same issue applies to the local road network. Many of the surrounding roads are relatively narrow rural roads that were not designed to accommodate a substantial increase in traffic volumes. Intersections are generally basic and, in places, there are narrow bridges, one lane bridges, limited road markings and other features that reflect their rural function rather than an urban population of the scale proposed.

There are already identified pressures on parts of this network. For example, roundabouts have been proposed at the Tram Road/South Eyre Road and Tram Road/McHughs Road intersections, but central government funding contributions have not been approved therefore they will not be going ahead. Tram Road is an important through-route for traffic travelling between Clarkville, South Eyre Road, Ōhoka, Mandeville, Swannanoa, West Eyreton, Oxford and beyond, it already carries significant traffic volumes with many intersections that need improving. In previous hearings, the applicant was reliant upon these improvements and others, which simply do not have funding now nor in the foreseeable future, therefore the existence of these improvements cannot be assumed.

The amount of extra vehicle movements this development would generate is not insignificant. Even with a conservative estimate of 879 new dwellings, not accounting for the retirement units, it is expected that there would be at the very least, another 5500 extra vehicle movements per day. It should not be assumed that the necessary upgrades to roads connecting the development area to urban areas, will be completed before, or as a consequence of, the proposed development. If the development proceeds before the wider network is upgraded, the additional traffic will nevertheless be placed on the existing roads.

This raises a fundamental infrastructure and funding question: what improvements are necessary to accommodate the development, which of those improvements will be funded by the developer, and which costs will ultimately be carried by existing road users, Waimakariri ratepayers or central government taxpayers? While growth is supposed to pay for growth, much of the costs to upgrade the transport infrastructure cannot be solely attributed to the Ohoka development (for example where there is wider community benefit). Without funding there is no guarantee these upgrades will be completed in a timely manner, if at all.

The community considers that these wider network impacts need to be clearly identified and costed as part of assessing the proposal. The assessment should not be limited to whether the roads immediately connecting to the development can be upgraded. It should consider the cumulative impact of the additional traffic on the wider rural and State Highway network and identify who will be responsible for funding and delivering any necessary improvements.

Character and Amenity of Ohoka and Rural/Lifestyle Living.

While the Fast-track process may limit the extent to which matters of character and amenity can be considered, there is more to a place than its economic or development potential. Ōhoka is not simply an area of undeveloped land awaiting urbanisation. It is a small, historic rural village whose identity has

developed over generations through its farming and milling history, its waterways, surrounding farmland and established community.

What makes Ōhoka distinctive is the way these elements come together to create a genuine rural village environment. The village has a distinctly rural feel, with historic buildings, the Domain, mature trees, open spaces and waterways woven through the settlement. Rural roads with grassed margins, open-style fencing and vegetated boundaries give the village a softer, less formal character than an urban subdivision. Houses sit within a landscape that remains visibly connected to the surrounding farmland, rather than being defined by continuous built development. The result is a strong sense of openness, quietness and separation from the larger urban centers, where people meet, gather and participate in village life.

This character is also reflected in the way Ōhoka developed. It is not a planned urban settlement that has yet to reach its intended scale. It is a rural village that has gradually evolved since the 1850s to form what we see today. Its relatively modest scale and historical context are part of what gives Ōhoka its identity and contributes to the amenity valued by both residents and the wider community.

The proposed development would introduce approximately 879 houses and up to 250 retirement units into this setting. At this scale, it would not simply extend the existing village; it would establish another urban town. The resulting density, road network, infrastructure, traffic and built form would change the relationship between the existing village and its surrounds. The transition from village to countryside would instead become a sharp urban edge.

The significance of this change is that the amenity of Ōhoka comes from the relationship between all of these elements, rather than from any single feature that can be retained or replicated. Landscaping or urban design within a new subdivision may provide attractive spaces, but it cannot recreate the existing village scale or feel. If the area was to be urbanised, the particular village environment and historical nature that currently exists will be fundamentally lost.

Alongside the loss of the village would also be the loss of housing choices within the District. Ōhoka currently provides a form of rural and lifestyle living characterised by larger properties, open space, rural outlook and a low-density environment. This is different from the urban housing available in established areas such as Rangiora, Kaiapoi, Woodend, Pegasus, Ravenswood and Oxford. The District therefore gains something from retaining Ōhoka as a unique rural village, as it helps diversify the housing stock available. The Council has undertaken extensive planning for urban growth and identified more than enough capacity in urban areas better suited to this type of housing, alongside existing infrastructure, services and transport networks

If the rural lifestyle choice provided by Ōhoka is reduced, the demand for that type of living does not disappear. It would either result in a net reduction in this form of housing or place further pressure for lifestyle development within the general rural zones

There is also a concern about the precedent that would be established if this development proceeds. Once a substantial urban development is established in this location, further expansion may become

more difficult to resist, potentially creating an even bigger Ohoka or another satellite settlement separated from the district's established urban centers.

The physical characteristics of the area are also relevant to the type of zoning the Council has given it. Ōhoka has a history of high groundwater, springs and drainage constraints. These characteristics can be better absorbed when the land is maintained in a more rural form. Higher-density housing, such as that proposed in this development, inevitably places greater demands on drainage and storm water systems, as demonstrated by issues experienced in other areas such as Mandeville and Silverstream.

A key consideration in relation to this development is whether its existence is justified when the urban housing it would provide is not needed. District planning both within the Waimakariri and neighbouring districts, have demonstrated that ample urban growth can be accommodated in areas that are better connected and serviced. The choice is not simply between development and no development; it is between accommodating urban growth in locations planned for that purpose, or fundamentally changing a rural village that provides a distinctive sense of place and a particular form of housing choice. In Ōhoka, the consequence would be the loss of an established rural village environment, its associated amenity and the lifestyle housing it provides, in favour of an urban settlement that is not required.

Retirement Village

The proposal includes provision for a retirement village as part of the wider residential development. The concern is not with the provision of retirement living itself, but with the suitability of this rural location for a large-scale residential community, including residents who may have reduced mobility or who are no longer able to drive.

The proposed development is geographically isolated from established urban services and amenities. Residents would need to travel outside the development to access essential services such as medical facilities, shopping that is not established within the proposed commercial area and connect with family and friends. This is of particular concern for older residents who may no longer drive and would therefore be reliant on alternative forms of transport. There is currently no public transport serving the proposed location, nor is there any identified provision for a public transport service. This creates a significant risk that residents who cannot drive would become dependent on private or facility-provided transport and could experience reduced independence and social isolation.

The surrounding road network further compounds these concerns. The development is located within a rural road environment characterised generally by narrow, unmarked roads and speed limits of up to 100 km/h, rather than the lower-speed, pedestrian-oriented street networks typically associated with established urban communities. Such conditions present particular challenges for drivers, pedestrians, cyclists, mobility scooter users and other residents with reduced mobility, and limit the ability of residents to safely access services and amenities independently.

These matters should be considered in the context of the scale and nature of the proposal. The development would introduce approximately 879 additional homes and up to 250 retirement units, into a rural location without the existing transport infrastructure, services or connectivity to urban areas. The

inclusion of a retirement village reinforces the importance of considering whether the location can provide a genuinely connected and accessible living environment for residents at all stages of life, rather than creating a community that is inherently dependent on private vehicles for access to services.

Concluding Comments

The Board's opposition to this proposal is based on a fundamental concern: this is the wrong location for urban development of this scale. Waimakariri District Council has undertaken extensive planning to identify where future urban growth should occur, with capacity available within or connected to established urban centres. The proposed development would depart from that planned approach, introducing approximately 879 homes and up to 250 retirement units into a rural area physically separated from existing urban centres and services.

The proposal would not simply extend an existing urban area. It would create a substantial new urban settlement requiring additional infrastructure, transport connections and services. This raises a clear question of whether the development represents an efficient use of the District's resources when growth can be accommodated in locations more closely connected to existing communities and infrastructure. The Board is also concerned that the proposal would reduce the availability of rural and lifestyle housing while permanently changing the character and function of Ōhoka.

There are significant practical and financial considerations that must be weighed alongside the proposed development's benefits. The area's groundwater conditions, drainage constraints and potential downstream flooding effects require careful consideration, particularly given concerns about the effects of existing development in the surrounding area and whether groundwater is adequately considered in modelling. The additional traffic generated by a development of this scale would also place further demands on the rural road network and raise questions about the practicality of public and active transport connections.

These concerns extend beyond the initial cost of developing the site. Infrastructure must be operated, maintained and eventually renewed or replaced. Where infrastructure or services require additional investment, or where unforeseen drainage and stormwater problems arise, the wider community will ultimately bear costs through Council expenditure and rates. The Panel should therefore consider not only whether the development can be serviced, but whether its location creates additional costs and risks that could be avoided by directing growth to more appropriately planned urban areas.

The Board acknowledges the need to provide for future housing and recognises that development can bring economic benefits. However, the scale of this proposal does not, in itself, establish that it is necessary, appropriately located or in the wider public interest. When the proposal entered the Fast-track process, the District Plan review and the full assessment of development capacity had not been finalised. The subsequent planning work has provided a clearer picture of the capacity available to accommodate future growth in more appropriately planned locations. The Panel should therefore consider what additional regional or national benefit this particular development offers in light of the current evidence, and whether that benefit justifies the associated infrastructure, environmental, transport and financial risks. In the Board's view, the proposal has not adequately demonstrated that case.

The Board does not consider that the proposal has demonstrated that it would contribute to a well-functioning urban environment under the NPS-UD or deliver the significant regional or national benefits contemplated by the FTAA 2024. The Board therefore opposes the proposal and asks the Panel to consider the long-term interests of the District as a whole, rather than the development's capacity to proceed on this particular site. The benefits of accommodating growth in this location must be weighed against the costs, risks and permanent changes imposed on the wider community, and the Board considers that the proposal has not made a sufficient case to justify those consequences.

Thank you for reading this memo and taking the communities voice into consideration.

On Behalf of the Oxford Ohoka Community Board



Sarah Barkle
Chairperson.

Appendix A

Harold Stone Transcript – historical community research recorded in 2008 By Tim Fulton.

Harold Stone grew up in swamp country, on a farm near Ohoka that would normally flood every two or three years. Eighty acres was a big farm "and you survived on what you could do".

"We were on very heavy ground, swamp ground and there was still a lot of black pine stumps, driftwood and God knows what. That railway line was built up above that but I can remember my brother Lawrence and I rode in a tin bath from our door, over to the Main Drain, over the top of the railway line and all the fences and never touched them. When we got home we got a hiding because the old man said, what would have happened if the plug had come out?"

One night a Mr Izard came down to our place and said to my father, the flood's coming, you'd better do something. So, father went out a cut a very small hole through the railway line - it washed out the railway line but it saved us. Those floods were terrible.

It's pretty low lying around here. On our farm at Wilson's Siding the springs would come and go every day with the tide.

In the early days along the Mill Stream there was four flour mills, a flax mill and a wool scour - all out of the one little stream. But with the underground water in those days there were springs everywhere and those mills just kept going...all with waterwheels.

There was very little crop grown in our area, it was just too wet. Although I have heard the story about my two brothers who put in wheat and Wilson's Siding and they hand hoed it, to keep the willow weed and stuff down. Fancy hand hoeing a paddock of wheat. So about the only other thing we used to grow was mangles and chowmolia for the cattle - whatever grew really - a few spuds for ourselves perhaps. But a lot of time we'd lose them too with the wet; in Ireland they're nicknamed bog oranges aren't they?

The Eyre River used to bust its banks and come straight through down Ohoka and into us at Wilson's Siding- and we were a pond... it couldn't get out into the Main Drain. They had floodgates onto the Main Drain and they just used to shut off, you couldn't get the water out."

"If you think of a house the Williams family built near here, it's got seven inch concrete walls and they've seen seven floods in one February when the water came out through the windows.

"When the last of the Williams boys left there it sold to the judge, Edward Somers, and the first year he was there I had to take his wife out of the house on the tractor one morning at 2am because a flood had come down and he was away in Wellington. So it was very floodable - but it was built in concrete because the Williams' knew it would flood."

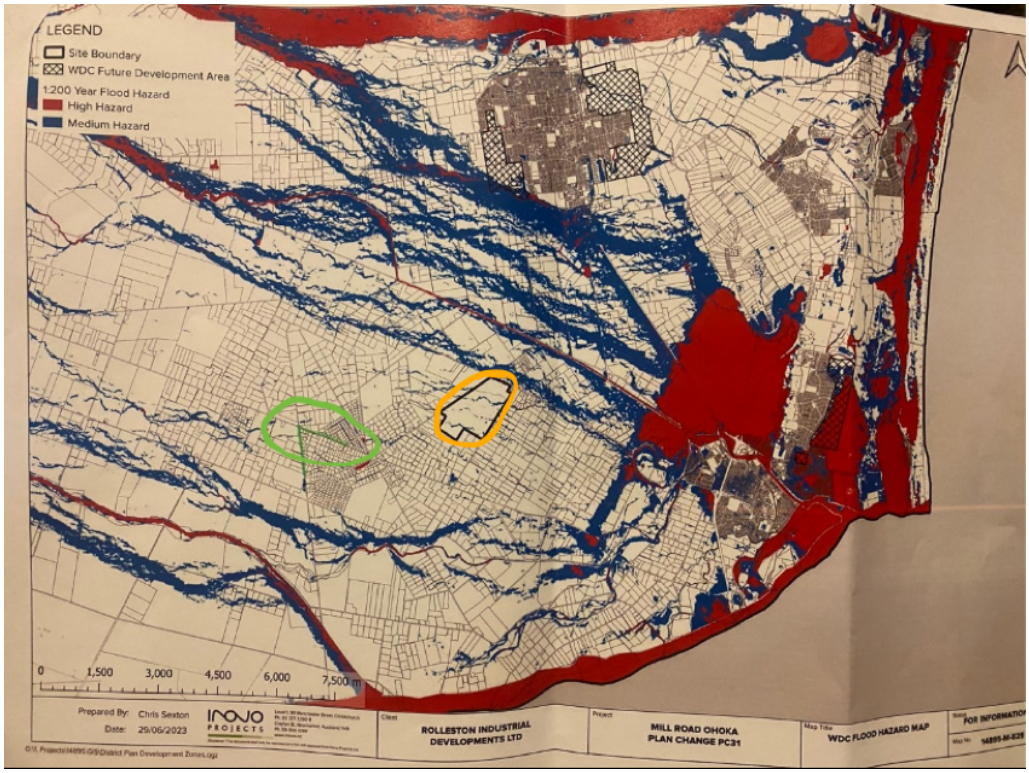
People are going to build on houses on that sort of land around here now, and I personally think they're mad. It'll flood again one day so someone's going to get a shock one morning when they walk

out the door. But people won't listen to you; I've tried to change two houses now where the undercurrent is, but they just wouldn't go a bit further up the paddock.

There's a woman living on Mill Rd now where we once put a header in and it took us five days to get it out. It just went down a driftwood hole; well she built a house there right on top of it because she wanted to be beside the river. Well, it will sink or fall one of these days but you couldn't shift people. No, they're building in some queer places."

Appendix B

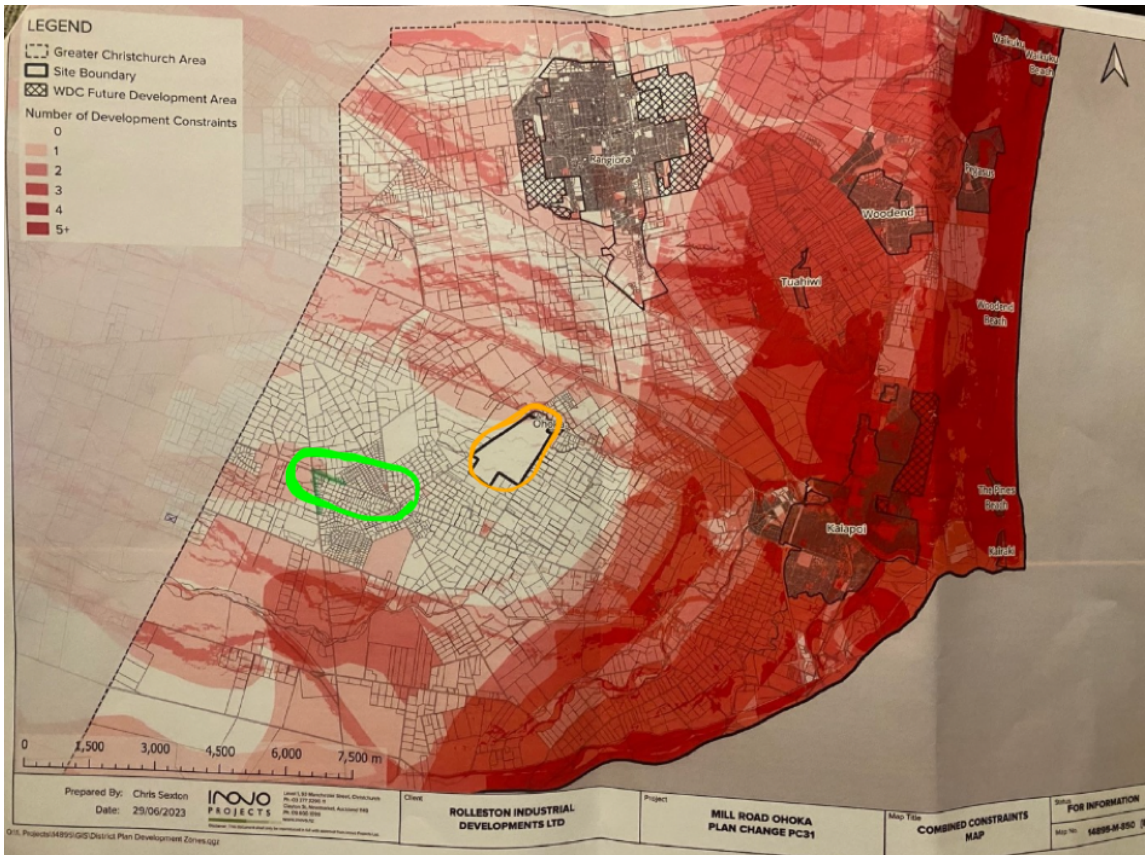
Map of 1:200 year Flood Hazards



This map indicates that there is no level of flooding expected in this area in a 1:200 return period flood.

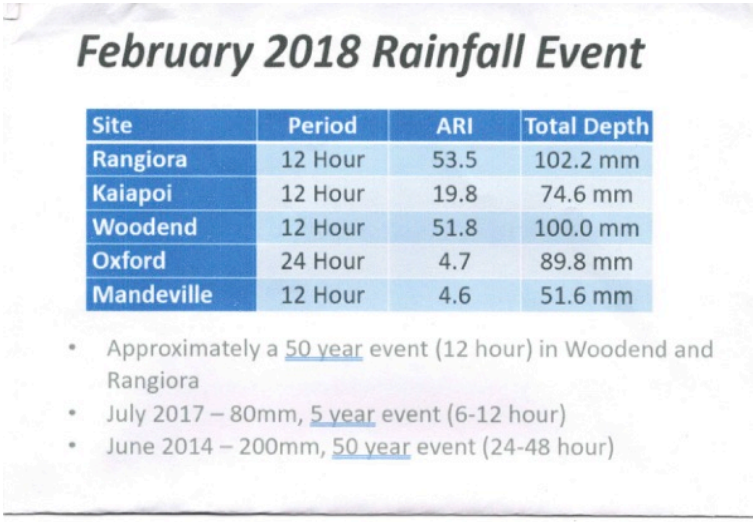
Appendix C

Map of Development Constraints.



This map indicates that there are no development constraints for the development east of the green lines.

Appendix D-1
Return periods for significant flooding events.



February 2018 Rainfall Event

Site	Period	ARI	Total Depth
Rangiora	12 Hour	53.5	102.2 mm
Kaiapoi	12 Hour	19.8	74.6 mm
Woodend	12 Hour	51.8	100.0 mm
Oxford	24 Hour	4.7	89.8 mm
Mandeville	12 Hour	4.6	51.6 mm

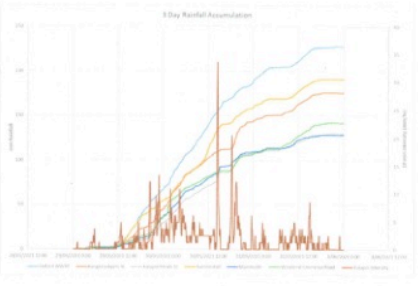
- Approximately a 50 year event (12 hour) in Woodend and Rangiora
- July 2017 – 80mm, 5 year event (6-12 hour)
- June 2014 – 200mm, 50 year event (24-48 hour)

May 2021 RAINFALL RETURN PERIOD

Rainfall Totals				
	29-May	30-May	31-May	Total
Oxford	67mm	122.8mm	37.8mm	227.6mm
Rangiora	44.8mm	99.8mm	31.4mm	176mm
Mandeville	37mm	72.4mm	19.4mm	128.8mm
Kaiapoi	29.8mm	78.2mm	22.6mm	130.6mm
Woodend	36mm	71.2mm	34.8mm	142mm
Summerhill	54.6mm	105.2mm	30.8mm	190.6mm

Indicative Return Periods

- Oxford – 127 year event over 48 hours
- Rangiora – 46 year event over 48 hours
- Mandeville – 17 year event over 48 hours
- Kaiapoi – 17 year event over 24 hours
- Woodend – 20 year event over 48 hours
- Summerhill – 46 year event over 48 hours



June 2019 Event - Rainfall

Site	Period	ARI	Depth	Period	ARI	Depth	Total Depth
Rangiora	0.5 hour	13.2	14.0 mm	24 hour	15.8	98.2 mm	102.8 mm
Kaiapoi	0.5 hour	488.9	36.6 mm	24 hour	38.0	109.8 mm	114.4 mm
Woodend	0.5 hour	110.0	21.6 mm	Comms Failure			
Oxford	0.5 hour	2.0	8.6 mm	24 hour	16.2	105.4 mm	109 mm
Mandeville	0.5 hour	3.0	8.2 mm	24 hour	7.0	75.4 mm	79.4 mm

- February 2018 – 100mm, 50 year event (12 hour)
- July 2017 – 80mm, 5 year event (6-12 hour)
- June 2014 – 200mm, 50 year event (12-24 hour)

3 / 4

July 2023 Rainfall Event

Site	Total Rainfall	Return Period	Critical Duration	Rainfall For Critical Duration
Kaiapoi	118.4mm	27 years, 4 months	24 hours	102.6mm
Woodend	151.8mm	72 years, 6 months	6 hours	70.2mm
Rangiora	122.4mm	18 years, 11 months	24 hours	103.2mm
Mandeville	105mm	15 years	24 hours	91.4mm
Summerhill	110mm	8 years 1 month	24 hours	89.2mm
Oxford	103.8mm	7 years, 4 months	24 hours	85.8mm

- Woodend experienced the most amount of rainfall > 50 year event over 6 hours
- More rainfall than each of the July 2022 events individually but not cumulatively
- Inland rainfall totals were less than coastal areas

Monthly Total		
Site	**July 2022**	**July 2023**
Oxford	204.8 mm	146.8 mm
Rangiora	234.2 mm	167.2 mm
Kaiapoi	258 mm	168.8 mm

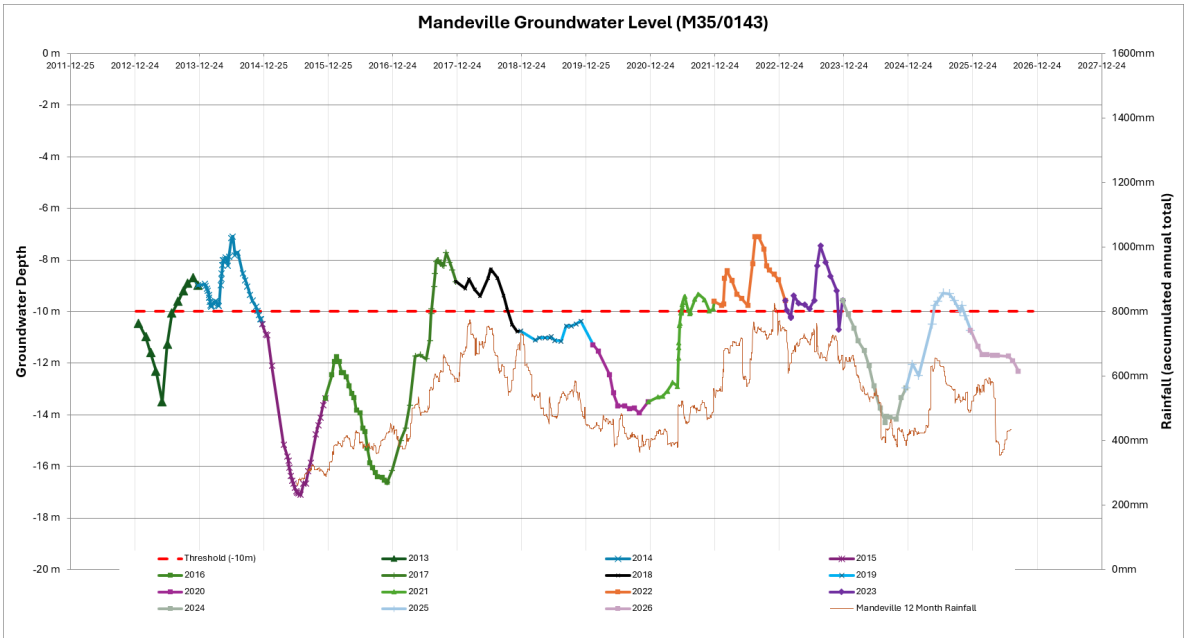
July 2022 Rainfall Events

- 12 July – 65-75mm
- 20 July – 25-35mm
- 26 July – 50-120mm
- 30 July – 25-35mm

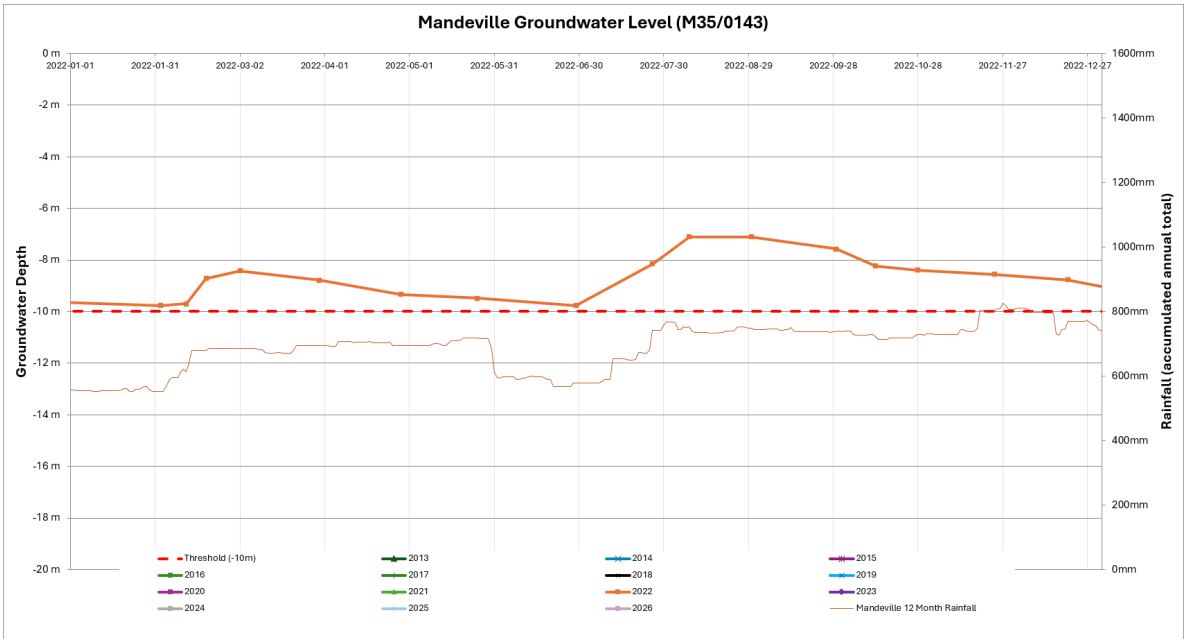
Site	Total Rainfall	Return Period	Critical Duration	Rainfall For Critical Duration
Kaiapoi	74.4mm	12 years, 2 months	12 Hours	62.2 mm
Woodend	74.8mm	10 years, 4 months	12 Hours	62.4 mm
Rangiora	76.6mm	8 years, 10 months	12 Hours	63.0 mm
Mandeville	68.6mm	5 years, 10 months	12 Hours	53.4 mm
Summerhill	69.2mm	4 years, 2 months	12 Hours	53.6 mm
Oxford	66.8mm	4 years, 8 months	12 Hours	57.2 mm

Site	Total Rainfall	Return Period	Critical Duration	Rainfall For Critical Duration
Kaiapoi	109.6 mm	20 years, 2 months	24 Hours	96.2mm
Woodend	119.6mm	30 years, 4 months	24 Hours	108.2mm
Rangiora	78.6mm	4 years, 0 months	24 Hours	67.2mm
Mandeville	72.2mm	3 years, 8 months	24 Hours	62.0mm
Summerhill	61.8mm	1 years, 5 months	24 Hours	51.4mm
Oxford	47.2mm	0 years, 7 months	48 Hours	47.2mm

Appendix D-2
Mandeville Bore Groundwater Levels 2012 - 2024



Mandeville Bore Groundwater Levels 2022



Appendix E

Newspaper article following the 2014 flooding event.



Shifting sand: Dawe Contracting is shifting 27,000 cubic metres of fill at Kairaki camp to create 25 new higher ground camp sites.

Sandra Stewart

The long-awaited $1.236 million rebuild of the earthquake-damaged Kairaki Beach camping ground is underway with 25 new serviced sites being created on higher ground.

Waimakariri councillors this month accepted the $679,340 tender from Dawe Contracting for earthworks, sewer, water and drainage reticulation, roading and trenchwork for underground power.

The new sites for existing permanent campers are expected to be ready by September.The long-stay campers would shift up the hill with further work on levelling and grassing the lower land underway after Christmas, the council's property manager Gary Saunders said.

The rebuild was set for completion next March. A $535,000 insurance sum was part-funding the work with the $702,000 balance from equity reserves and loan monies, council chief executive Jim Palmer said. The loan would be recovered over the years from the lease of the camp ground.

TO PAGE 2

Angry Mandeville slams council over flooding

Sandra Stewart

An emergency unbudgeted $1.5 million spend to immediately divert rogue 'under-runner' streams flooding Mandeville properties is being proposed by the Waimakariri District Council.

Mayor David Ayers and council staff weathered an often fractious and loudly critical meeting of more than 350 Mandeville and Ohoka residents who packed out the local sports centre on Tuesday night spilling out doors into the carpark.

Water was still flooding some properties two weeks after the June 9-10 deluge which dumped 200mm of rain over 36 hours on an already sodden countryside experiencing its highest groundwater levels since records began almost 40 years ago.

Burnt-out pumps and broken septic tanks awash with floodwaters added to residents' woes – some new arrivals in homes just weeks old in still developing subdivisions.

The council came under the gun for its poor communication over the meeting, lack of drain maintenance, failure of sewerage treatment infrastructure, too small culvert pipe sizes and its approval of more subdivision in an already problematic area.

The effect of irrigating the west of the district could also be contributing to the higher static groundwater levels in the Mandeville area since 2000 when the Waimakariri Irrigation Scheme started, the meeting was told.

Waimakariri was a pro-development council which did not listen to farmers years back who had warned of the perils of developing land which was subject to flooding, said one resident, who claimed a stream of 12 cubic metres a second was flowing through his property.

The council was not debating past drainage or land-use decisions, Waimakariri utilities and roading manager Gerard Cleary said.

"There will be things which could have been done better in the past – our immediate concern is finding solutions."

The council engineers' plan was to divert some of the resurgent groundwater streams before they flowed through the Mandeville village into a new three-kilometre long open drain along No 10 Road into the Eyre River bed.

This would "turn the tap off at the top end."

While there would still be groundwater coming into Mandeville the diversion drain would make a significant difference, Cleary said.

"It is not a magic solution to all problems but it should give significant benefits."

A report on this and other quick fixes costing some $1.5m in addition to a further $500,000 already being spent on new Ohoka bridges on Jacksons and Whites roads, roading, traffic and emergency drainage works would go to the council for approval on July 1.

"We are trying to move quickly and in the next few days engage contractors and start," Cleary said.

The drain could be in place "within weeks," he told the crowd.

The fact that the high groundwater was very likely to persist all winter made the Mandeville area vulnerable to repeat flooding in any significant rain.

"We need to talk to the council on how this is funded and consult with property owners along No 10 Road," Cleary said.

"This is a real emergency situation and Mandeville is one of the top priority areas for the council.

"The diversion channel is a quick win which will bring significant benefits."

Cleary estimated the diversion channel would take out half the resurgent groundwater flow flooding Mandeville but would amount to less than one per cent of the flow into the Eyre River.

Two [illegible] subdivisions were being planned for Mandeville, long-standing local resident Bill Cockram said.

He wanted an assurance no further subdivision would occur until the flooding and groundwater issues were resolved.

The council had "ring-fenced" San Dona and Mandeville to prevent further subdivision, Mayor David Ayers said. However this had been appealed to the Environment Court by one property owner.

The No. 10 Road diversion channel would not solve the problems with the resurgent groundwater streams flowing through the Millfield subdivision, Cleary said.

The subdivision developer had been waiting since last year for the groundwater to recede to allow work to occur.

The work would now start immediately irrespective of the high water level.

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Groundwater 'highest on record'

Sandra Stewart

Wells in Waimakariri's south-west around Mandeville and Swannanoa are at record high levels – remaining static when traditionally over summer their levels would drop.

Waimakariri council staff outlined the natural phenomenon of groundwater 'resurgence' to a packed public meeting at the Mandeville Sports Centre on Tuesday night as angry residents wanted to know why many of their newly built homes in new subdivisions were flooded, their septic tanks had failed and the drains around the area overwhelmed.

Groundwater levels across Millfield, Ohoka Meadows, San Dona and Ohoka Park subdivisions were the highest on record, utilities and roading manager Gerard Cleary told the crowd.

The drainage network in the area was also at capacity.

Coupled with the heavy dump of rain over June 9-10 in a year experiencing the highest rainfalls in a decade, the result was inevitable flooding.

A Swannanoa monitor bore, which correlated well with groundwater resurgence in the area, had been measured at its highest level on record, he said.

Previously high levels in the well were recorded in 1978 with water about 8 metres below the surface over winter. Over summer these levels traditionally dropped down to 15 metres below the ground.

However in the past few years, particularly from around 2000, the spring-summer drop had not occurred to anything like the levels recorded before 2000.

Since January the groundwater level had remained high – between nine to 10 metres below the surface - and had risen over April-May boosted by high rainfall to be just seven metres underground.

According to a Waimakariri policy and strategy paper just released, there were "wide fluctuations in the static water level in this well until 2000, which approximately matched the variation in annual rainfall.

"After 2000 the level in this well has been relatively stable, which coincides with the commencement of the Waimakariri Irrigation Scheme," the paper stated.

It was when high groundwater levels occurred, some underground streams rose to the surface and this was the natural phenomenon of groundwater resurgence, Cleary said.

It was a rare occurrence and the last time it had occurred in the Mandeville-Ohoka area was back in 1974 and further back in the 1950s. This was also a period of record high rainfall.

With more rain expected over winter, the groundwater levels were not expected to drop 'in a hurry,' he said.

He did not know whether the irrigation of the area above Mandeville was a contributing factor to the rise in groundwater but the correlation had been raised before.

Since June 2013 1100mm of rain had fallen in the area – the highest annual rainfall in a decade.

A total of 200mm had fallen in the two days over June 10-11 and to date this year 625mm had fallen in the area. This was more than the entire annual rainfall in just six months, Cleary said.

He estimated septic tanks had failed in around 50 households in the Mandeville area during the storm – the combination of groundwater and floodwaters flooding into them.

This was a major problem for the Mandeville sewerage treatment plant. For the wastewater treatment system to function as designed individual septic tanks had to be sealed to prevent ground and floodwater getting into them.

The Bradleys Road sewer pumping station usually pumped at around 100 litres a second, Cleary said. On June 10 it was pumping 2300 litres a second. At present it was still pumping flows eight times over its operating level.

Dealing to the sources of infiltration into tanks was a priority, although maintenance of tanks was a responsibility of the property owner not the council, he said.

Sucker trucks were being used to lessen the load on the plant and portaloos distributed to households with residents advised to turn their septic tank pumps off if they continued to pump with no reduction in levels in the tank.

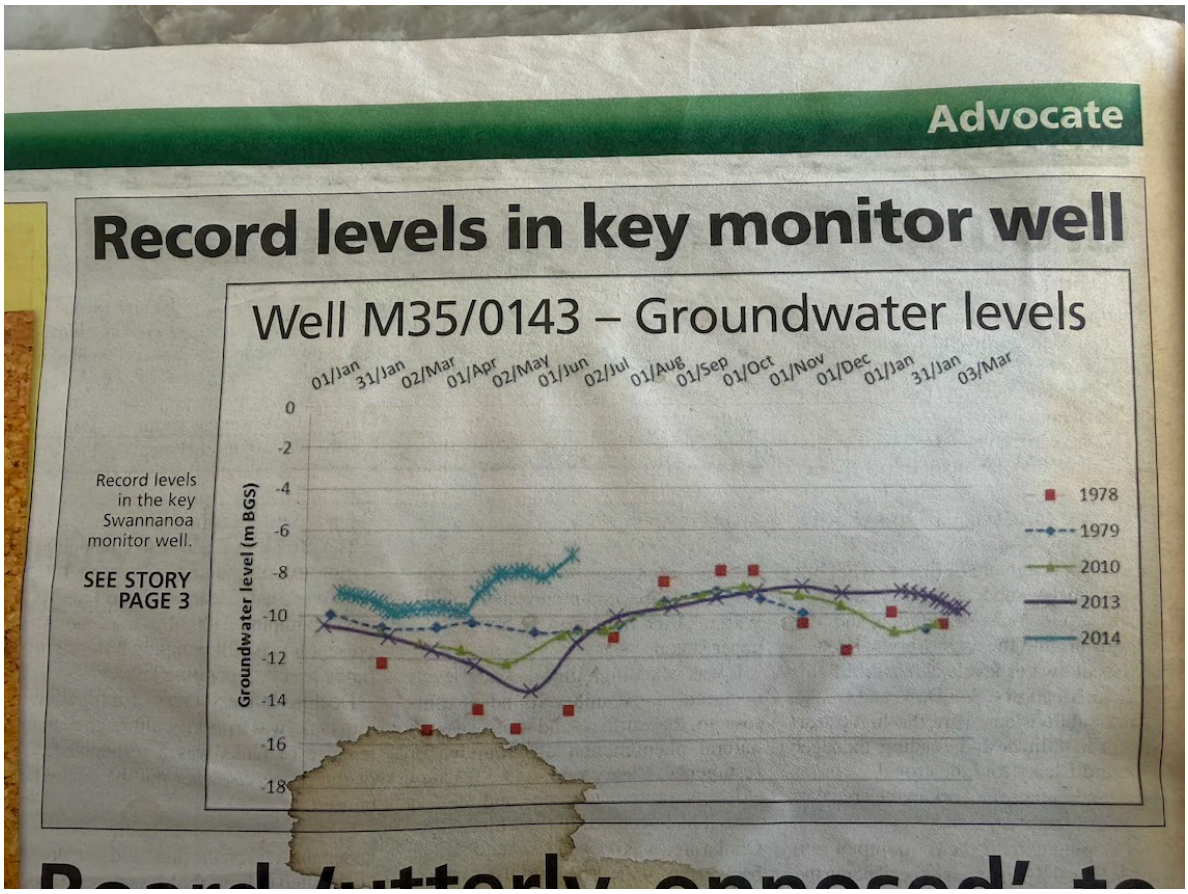
Education on looking after septic tanks and property owners' responsibilities was a clear need following the barrage of questions at the meeting, Gerard acknowledged.

Residents at the meeting believed cracks in the epoxy seals of their septic tanks may be as a result of ground movement from the earthquakes.

However other issues including landscaping over tanks which should be above ground were also flagged and tank installation by unregistered drainlayers.

SEE WELL LOG, PAGE 2

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Advocate
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01/Nov
01/Dec
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31/Jan
03/Mar
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
Groundwater level (m BGS)
1978
1979
2010
2013
2014
Record levels in the key Swannanoa monitor well.
SEE STORY PAGE 3

Appendix F
A series of photos taken in the 2022 flooding event at Mandeville (ARI 5.10 and 3.8)








129








168
SLOW
DOWN









Appendix G
Ohoka Stream Average Day Flows compared to 2023 Flood Event (1 in 15yr ARI)

Mill Rd average flow.



Mill Rd 2023 flood event



Butchers Rd Culvert average day.



Butchers Rd Culvert 2023 flood event.



Ohoka Stream upstream Butchers Rd average day.



Butchers Rd culvert upstream 2023 flood event.



Appendix H

A sample of the signs that are around the Ohoka Village.

