Waimakariri District Council

Utilities and Roading Committee

Agenda

Tuesday 21 March 2023
9am

Council Chambers
215 High Street
Rangiora

Members:

Cr Niki Mealings (Chairperson)
Cr Robbie Brine
Cr Philip Redmond
Cr Joan Ward
Cr Paul Williams
Mayor Dan Gordon (ex officio)

WAIMAKARIRI
DISTRICT COUNCIL

AGENDA CONTENTS – UTILITIES AND ROADING COMMITTEE MEETING

Item Number	Item Topic	Page numbers
3	**Confirmation of Minutes**	
3.1	Minutes of 21 February 2023	11-20
3.3	Workshop Notes of 21 February 2023	21-22
5	**Staff Reports**	
5.1	Flood Mapping Freeboard and Floor Level Technical Practice Note	23-95
5.2	Ashley Street Stormwater Upgrade	96-278
5.3	July 2022 Flood Response Update	279-287
8	**Matters Referred from the Rangiora-Ashley Community Board**	
8.1	Approval of Scheme Design for Consultation – Transport Choices Project 2 – Railway Road / Torlesse Street / Coronation Street / Country Lane	288-323
8.2	Approval of Design – Transport Choices Project 4 – Rangiora On-Road Cycle Lane	324-364
9	**Matters referred from the Woodend-Sefton Community Board**	
9.1	Approval of Scheme Design for Consultation – Transport Choices Project 3 - Woodend to Pegasus Footpath	365-394
10	**Matters referred from the Woodend-Sefton and Kaiapoi-Tuahiwi Community Boards**	
10.1	Approval of Scheme Design for Consultation – Transport Choices Project 1 - Woodend to Kaiapoi Cycleway	395-457
11	**Matters for Information**	
11.1	Cust Water Main Renewals 2022/23 – Request to Engage Water Unit	458-462

The Chairperson and Members
UTILITIES AND ROADING COMMITTEE

A MEETING OF THE UTILITIES AND ROADING COMMITTEE WILL BE HELD IN THE COUNCIL CHAMBER, RANGIORA SERVICE CENTRE, 215 HIGH STREET, RANGIORA ON TUESDAY 21 MARCH 2023 AT 9AM.

Sarah Nichols
GOVERNANCE MANAGER

Recommendations in reports are not to be construed as Council policy until adopted by the Council

BUSINESS

Page No

1 APOLOGIES

2 CONFLICTS OF INTEREST

Conflicts of interest (if any) to be reported for minuting.

3 CONFIRMATION OF MINUTES

3.1 Minutes of the meeting of the Utilities and Roading Committee held on Tuesday 21 February 2023.

11-20

RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Confirms** the circulated Minutes of the meeting of the Utilities and Roading Committee held on 21 February 2023, as a true and accurate record.

3.2 Matters arising (From Minutes)

3.3 Notes of the workshop of the Utilities and Roading Committee held on Tuesday 21 February 2023

21-22

RECOMMENDATION

THAT the District Planning and Regulation Committee:

(a) **Receives** the circulated notes of the workshop of the Utilities and Roading Committee, held on 21 February 2023.

PUBLIC EXCLUDED MINUTES *(Refer to public excluded agenda)*

3.4 Minutes of the public excluded portion of the Utilities and Roading Committee meeting Tuesday 21 February 2023.

4 DEPUTATION/PRESENTATIONS

Nil.

5 REPORTS

5.1 Flood Mapping Freeboard and Floor Level Technical Practice Note – Gerard Cleary (General Manager Utilities and Roading) and Kelly LaValley (Project Delivery Manager)

23-95

RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Receives** report No. 200108001550.

AND

THAT the Utilities and Roading Committee recommends:

THAT the Council:

(b) **Endorse** the Flood Mapping Freeboard and Floor Level Technical Practice Note and associated process (Record No. 200106000520 and 220323042890).

(c) **Notes** that the processes and requirements in this Technical Practice Note will be used by staff when setting minimum floor levels in relation to building, subdivision and land development in the district.

(d) **Notes** that the Technical Practice Note may need to be revised once the Proposed District Plan is adopted to reflect the proposed changes to the natural hazards chapter.

(e) **Notes** that the Technical Practice Note is a living document and may be amended by the General Manager Utilities and Roading, 3 Waters Manager or Project Delivery Manager with any major changes to be brought to the Council for endorsement.

5.2 Ashley Street Stormwater Upgrade – Teifion Matthews (Project Engineer), Jason Recker (Stormwater and Waterways Manager)

96-278

RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 230308032092.

(b) **Approves** the recommendation to upgrade the existing sumps to back entry double sumps along Kingsbury Avenue.

(c) **Notes** that this is a reduced scope of work from the previously accepted design of stormwater pipe upgrades on Kingsbury Avenue and Ashley Street, and has come about due to the construction estimate for this upgrade being beyond the available budget.

(d) **Notes** that Council staff will monitor any future flooding along Good Street, Kingsbury Avenue and Golding Avenue intersection. When capacity improvements are made in North Drain, Council should consider the stormwater capacity upgrade to further reduce the depth of flooding.

(e) **Notes** that a road reseal is planned for this area in 2024/25, so any future upgrades would require trenching through the new seal.

(f) **Notes** that a water renewal was to be included within the same contract, however this will now likely be done as a standalone project, which is expected to increase its cost.

(g) **Notes** that Council will continue receiving complaints with the time it takes for the water to drain away.

5.3 July 2022 Flood Response Update – Kalley Simpson (Three Waters Manager), Joanne McBride (Roading and Transport Manager) and Rob Kerr (Flood Recovery Programme Manager)

279-287

RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 230306030501.

(b) **Notes** that investigations, funded physical works and maintenance actions arising from the July 2022 floods are well advanced, with the majority expected to be completed prior to winter 2023.

(c) **Notes** that the investigations are identifying a range of potential capital projects which are being managed as follows:

- Three projects with a combined estimated costs of $790,000 are proposed in the FY23/24 draft Annual Plan.
- Nine projects with a combined estimated cost of $6.35 million are included in outer years of the long Term Plan.
- A further ten projects that are currently not included in any forecasts will be investigated and scoped further and offered for consideration in the next Long Term Plan process (2024-2034) or the Three Water Reforms Transition process.

(d) **Circulates** this report to all Community Boards for information.

6 CORRESPONDENCE

Nil.

7 PORTFOLIO UPDATES

7.1 Roading – Councillor Philip Redmond

7.2 Drainage, Stockwater and Three Waters (Drinking Water, Sewer and Stormwater) – Councillor Paul Williams

7.3 Solid Waste– Councillor Robbie Brine

7.4 Transport – Mayor Dan Gordon

8 MATTERS REFERRED FROM THE RANGIORA-ASHLEY COMMUNITY BOARD

8.1 Approval of Scheme Design for Consultation – Transport Choices Project 2 – Railway Road / Torlesse Street / Coronation Street / Country Lane – Kieran Straw (Civil Projects Team Leader), Aaron Kibblewhite (Senior Project Engineer) and Joanne McBride (Roading and Transportation Manager)

288-323

RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Approves** the scheme Design as per Attachment i of this report for the purposes of consultation.

(b) **Notes** that staff will present the approved Scheme Concept to directly impacted residents and stakeholders for feedback**.**

(c) **Notes** that feedback from the consultation will be fed into the Detailed Concept, and that the Detailed Concept will be reported back to the Board in May 2023.

(d) **Notes** the scheme design requires the removal of 7 on street car parking spaces at the locations detailed within the draft No Stopping Schedule included as attachment iii of this report, and that the final approval of any parking spaces to be removed will be included within the detailed design report in May 2023.

(e) **Notes** that any parking to be removed as result of the Scheme Concept will be communicated directly with the immediate adjacent residents.

(f) **Notes** that the scheme concept required the removal of 12 existing street trees, which are required to be replaced in alternative locations as noted in attachment iv of this report, and that final approval of the removal of any street trees will be included within the detailed design report in May 2023.

(g) **Notes** that the removal of street trees has been discussed with Greenspaces, who are represented on the Project Control Group. Greenspace are supportive of the removal of the identified trees provided that they are replaced elsewhere along the length of the route.

(h) **Notes** that this project is funded through the "Transport Choices" funding stream (which is still subject to final signing and confirmation), and this requires that all works is complete by June 2024.

(i) **Notes** that the funding agreement between Waka Kotahi and the Waimakariri District Council is dependent on the site having been though an independent Road Safety Audit process, which will proceed upon acceptance of this report, and that the safety audit may result in further minor design changes.

8.2 Approval of Design – Transport Choices Project 4 – Rangiora On-Road Cycle Lane – Kieran Straw (Civil Projects Team Leader), Allie Mace-Cochrane (Project Engineer) and Joanne McBride (Roading and Transportation Manager)

324-364

RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Approves** the Design as per Attachment i of this report, noting that the staff will then implement the works.

(b) **Approves** the No Stopping Schedule as per Attachment iii of this report;

(c) **Notes** that staff will inform impacted residents and stakeholders prior to works being implemented.

(d) **Notes** that the works as designed will result in the loss of 40 on-street car park spaces, though out the length of the project, at the locations specified within Attachment iii of this report.

(e) **Notes** that this project is funded through the "Transport Choices" funding stream (which is still subject to final signing and confirmation), and this requires that all works are completed by June 2024.

(f) **Notes** that the funding agreement between Waka Kotahi and the Waimakariri District Council is dependent on the site having been through an independent Road Safety Audit process, which will proceed upon acceptance of this report, and that the safety audit may result in further minor design changes.

9 MATTERS REFFERED FROM THE WOODEND-SEFTON COMMUNITY BOARD

9.1 Approval of Scheme Design for Consultation – Transport Choices Project 3 - Woodend to Pegasus Footpath – Kieran Straw (Civil Projects Team Leader), Allie Mace-Cochrane (Project Engineer) and Joanne McBride (Roading and Transportation Manager)

365-394

RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Approves** the Scheme Design as per Attachment i of this report for the purposes of consultation

(b) **Notes** that staff will present the approved Scheme Design to directly impacted residents and stakeholders for feedback.

(c) **Notes** that feedback from the consultation will be fed into the Detailed Design and that the Detailed Design will be reported back to the Community Boards and the Utilities and Roading Committee in May 2023 for their approval before procurement begins.

(d) **Notes** that the Scheme Design will be distributed to Greenspace's Landscape Architect for comment around amenity options, which will be fed into the Detailed Design and reported back to the Community Board, and Utilities and Roading Committee.

(e) **Notes** that the Scheme Design requires the removal of 40 on-street car parking spaces at the locations detailed within the draft parking removal schedule included as attachment iii. of this report, and that the final approval of any parking spaces to be removed will be included within the detailed design report in May 2023.

(f) **Notes** that any parking to be removed as a result of the Scheme Design will be communicated directly with the immediately adjacent residents.

(g) **Notes** that staff have designed two links; one as a connection to Pegasus and one as a connection to Ravenswood. Both of these are on the approved Network Plan, however the Transport Choices Funding application only allowed for the Ravenswood connection.

(h) **Notes** that the Pegasus footpath connection will only proceed if there is adequate budget to do so.

(i) **Notes** that staff are working closely with Waka Kotahi to co-ordinate this cycleway project with the planned Woodend Safety Improvement project that is currently being designed.

(j) **Notes** that this project is funded through the "Transport Choices" funding stream (which is still subject to final signing and confirmation), and this requires that all works is complete by June 2024.

(k) **Notes** that the funding agreement between Waka Kotahi and the Waimakariri District Council is dependent on the site having been though an independent Road Safety Audit process, which will proceed upon acceptance of this report, and that the safety audit may result in further minor design changes.

(l) **Notes** a small corner snipe of land may be required for the purposes of constructing the cycleway, and that staff upon approval of this report will enter negotiations with the relevant land owners to purchase the required land, noting that a report approving purchase will be brought back to Council.

10 MATTERS REFFERED FROM THE WOODEND-SEFTON AND KAIAPOI-TUAHIWI COMMUNITY BOARDS.

10.1 Approval of Scheme Design for Consultation – Transport Choices Project 1 - Woodend to Kaiapoi Cycleway – Kieran Straw (Civil Projects Team Leader), Glenn Kempton (Senior Project Engineer) and Joanne McBride (Roading and Transportation Manager)

395-457

RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Approves** the Scheme Design as per Attachment i of this report for the purposes of consultation.

(b) **Approves** the amendment of the Walking and Cycling Network Plan to include Ranfurly Street (between Walker Street and Smith Street) in lieu of Walker Street and Bridge Street.

(c) **Approves** the change in priority at the Ranfurly Street / Dale Street intersection, with Dale Street being required to “STOP” for traffic on Ranfurly Street and Old North Road.

(d) **Approves** the implementation of a “Give Way” priority control at the Sandhills Road / Fullers Road intersection, giving the Sandhills Road traffic priority.

(e) **Notes** that the Scheme Design is based on an Off-Road shared Path for the full length of Old North Road.

(f) **Notes** that staff will present the approved Scheme Design to directly impacted residents and stakeholders for feedback.

(g) **Notes** that district wide consultation completed mid 2022 included two options to get this cycleway from Smith Street to Pineacres, and that “Option B” is the option preferred by staff and recommended within this report.

(h) **Notes** that feedback from the consultation will be fed into the Detailed Design, and that the Detailed Design will be reported back to the Community Boards and the Utilities and Roading Committee in May 2023 for their approval before procurement begins.

(i) **Notes** that the scheme design requires the removal of five on-street car parking spaces on Ranfurly Street at Sidey Quay and that the final approval of any parking spaces to be removed will be included within the detailed design report in May 2023.

(j) **Notes** that any parking removal as result of the Scheme Design will be communicated with the immediate adjacent residents.

(k) **Notes** that upon acceptance of this report, the Council’s Property Team will commence work with various stakeholders to create new easements as required to allow the route to progress, and that the relevant stakeholders are willing to support the project.

(l) **Notes** that the recommendations within this report will require the reclamation of road reserve currently occupied by private residencies along Old North Road, and that this has been discussed with the relevant property owners.

(m) **Notes** that staff are working closely with Waka Kotahi to co-ordinate this cycleway project with the planned Woodend Safety Improvement project that is currently being designed.

(n) **Notes** that this project is funded through the "Transport Choices" funding stream (which is still subject to final signing and confirmation), and this requires that all works is complete by June 2024.

(o) **Notes** that the funding agreement between Waka Kotahi and the Waimakariri District Council is dependent on the site having been though an independent Road Safety Audit process, which will proceed upon acceptance of this report, and that the safety audit may result in further minor design changes.

(p) **Notes** a small piece of land will be required for the purposes of constructing the cycleway, and that staff upon approval of this report will enter negotiations with the relevant land owners to purchase the required land, noting that a report approving purchase will be brought back to Council.

11 MATTERS FOR INFORMATION

11.1 Cust Water Main Renewals 2022/23 – Request to Engage Water Unit – Jaskaran Singh (Civil Design / CAD Technician) and Shaun Fauth (Utilities Projects Team Leader) (Report No. 230214019258 to the Management Team meeting of 20 February 2023)

458-462

RECOMMENDATION

THAT the Utilities and Roading Committee

(a) **Receives** the information in Item 11.1.

12 QUESTIONS UNDER STANDING ORDERS

13 URGENT GENERAL BUSINESS

14 MATTERS TO BE CONSIDERED WITH THE PUBLIC EXCLUDED

In accordance with section 48(1) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by section 6 or section 7 of that Act (or sections 6, 7 or 9 of the Official Information Act 1982, as the case may be), it is moved:

1. That the public is excluded from:
   - The following parts of the proceedings of this meeting

The general subject of each matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter, and the specific grounds under section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution are as follows:

Meeting Item No. and subject	Reason for excluding the public	Grounds for excluding the public.
14.1 Minutes of public excluded portion of Community and Recreation Committee meeting of 21 February 2023	Good reason to withhold exists under section 7	To protect the privacy of natural persons, including that of deceased natural persons (s 7(2)(a)).
14.2 Report from Management Team meeting of 6 March 2023	Good reason to withhold exists under section 7	To carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations) (s 7(2)(i)).
14.3 Report from Management Team meeting of 6 March 2023	Good reason to withhold exists under section 7	To carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations) (s 7(2)(i)).
14.4 Report from Management Team meeting 13 March 2023	Good reason to withhold exists under section 7	To carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations) (s 7(2)(i)).

CLOSED MEETING

See Public Excluded Agenda (separate document)

OPEN MEETING

NEXT MEETING

The next meeting of the Utilities and Roading Committee will be held on Tuesday 18 April 2023 at 9am.

Workshop

- *Southbrook RRP Layout Plans – Kitty Waghorn (Solid Waste Asset Manager) 30mins*
- Waste Assessment and Waste Management and Minimisation Plan Review – *Kitty Waghorn (Solid Waste Asset Manager) 40mins*
- Overview of River Road Upgrade, Shared Path, Kerb and Parking Options and Proposed Engagement with residents - Glen Kempton (Senior Projects Engineer), Joanne McBride (Roading and Transport Manager) and Kieran Straw (Civil Projects Team Leader).

WAIMAKARIRI DISTRICT COUNCIL

MINUTES OF THE MEETING OF THE UTILITIES AND ROADING COMMITTEE HELD IN THE COUNCIL CHAMBER, RANGIORA SERVICE CENTRE, 215 HIGH STREET, RANGIORA, ON TUESDAY, 21 FEBRUARY 2023, AT 9.00AM.

PRESENT

Councillor N Mealings (Chairperson), Councillors R Brine, P Redmond, J Ward, P Williams and Mayor D Gordon (left the meeting at 10.10am).

IN ATTENDANCE

Councillors N Atkinson, B Cairns and T Fulton.

G Cleary (General Manager Utilities and Roading), J McBride (Roading and Transport Manager), K Simpson (Three Waters Manager), D Young (Senior Engineering Advisor), R Kerr (Flood Recovery Programme Manager), C Grabowski (Roading Operations Team Leader) and K Rabe (Governance Advisor).

1 APOLOGIES

There were no apologies.

2 CONFLICTS OF INTEREST

No conflicts of interest were declared.

3 CONFIRMATION OF MINUTES

3.1 Minutes of a meeting of the Utilities and Roading Committee held on Tuesday, 29 November 2022

Moved: Councillor Williams Seconded: Mayor Gordon

THAT the Utilities and Roading Committee:

(a) **Confirms** the circulated Minutes of the meeting of the Utilities and Roading Committee held on 29 November 2022 as a true and accurate record.

CARRIED

3.2 Matters arising (From minutes)

There were no matters arising from the Minutes.

PUBLIC EXCLUDED MINUTES

(These Minutes were considered in the public excluded portion of the meeting)

3.3 Minutes of the public excluded portion of the Utilities and Roading Committee Meeting Tuesday, 29 November 2022

4 DEPUTATION/PRESENTATIONS

4.1 Traffic on Taaffes Glens Road, Loburn – K Stewart and G Lancaster

K Stewart and G Lancaster were in attendance to request that the Council consider extending its metalled road maintenance programme on Taaffe Glen Road by 0.4 kilometres. K Stewart spoke to her previously circulated submission (Trim: 230221023476), which noted that prior to 2021, the Council had contracted CORDE to maintain Taaffe Glen Road up to Fox Creek, regularly graded to 289 Taaffe Glen Road. This request would take the maintenance a further 0.4 kilometres to the Roundhill Farm entrance and provide a well-maintained road to the access and parking area utilised by tampers, cyclists, hunters, campers and those who regularly used the waterhole for swimming. This access was advertised on both the Council and the Department of Conservation's websites for these activities. In addition to recreational users, the road was also used by Environment Canterbury (ECan) officers, farm workers and neighbours to access their paddocks.

In addition to assisting with maintaining the road, Mr Lancaster had worked to control the gorse along the road edge.

Councillor Williams asked if this section of road was a paper road or on private property and was informed that it was on Crown land and was there when Ms Stewart and Mr Lancaster bought the property.

Mayor Gordon commended the work done by Ms Stewart and Mr Lancaster to maintain the road and requested that a report on the matter be brought to the Council with some urgency.

Councillor Ward also acknowledged the work done to control the gorse along the road and requested an investigation to establish whose responsibility it was to control it. J McBride confirmed that neither the Council nor ECan was responsible as it was the property owner's responsibility.

The Chairperson thanked K Stewart and G Lancaster for bringing this matter to the Committee's attention and for a clear and concise presentation.

5 REPORTS

5.1 July 2022 Flood Response Update – K Simpson (Three Waters Manager), J McBride (Roading and Transport Manager) and R Kerr (Flood Recovery Programme Manager)

K Simpson and R Kerr provided a short overview, including information on completed investigations and progress on physical and maintenance works.

Councillor Williams noted that of the 321 maintenance works identified, only 92 would be completed by the end of February 2023, and enquired what could be done differently to achieve a better completion rate. G Cleary replied that the figures were deceptive as this did not imply that no maintenance had been carried out, noting that the maintenance works resulted from the recent weather events.

Councillor Williams questioned that if all the maintenance had been completed, would it have impacted on the amount of additional work required after the flooding. K Simpson explained that 908 drain service requests were received after the weather event, which staff had assessed to ascertain if there was a history of issues with this area, and if so an investigation would be triggered. However, if there was no history of flooding or pipe failure, then staff would investigate the possibility of silt build-up, overgrown vegetation or other blockages which would be logged as a maintenance request. Once an investigation

had been completed, a further assessment was done to determine whether the work could be funded from existing budgets or if additional funding needed to be requested, which would result in a report to the Council.

Moved: Councillor Williams Seconded: Councillor Redmond

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 230207015365.

(b) **Notes** that investigations, funded physical works and maintenance actions arising from the July 2022 floods were well advanced, with the majority expected to be completed prior to winter 2023.

(c) **Notes** that the investigations were identifying a range of potential capital projects, of which some were included in the current draft Annual Plan, while others would be offered for consideration in the next Long Term Plan.

(d) **Circulates** this report to all Community Boards for information.

CARRIED

6 CORRESPONDENCE

Nil.

7 PORTFOLIO UPDATES

7.1 Roading – Councillor Philip Redmond

- Southbrook Road / Torlesse Street / Coronation Street Intersection

  Work was progressing well with the improvements around Southbrook and New Life Schools, having largely been completed. Installation of services was continuing and the intersection woks were well underway on the eastern side of the road, including the installation of foundations for the traffic signal poles. The contractor was currently ahead of programme.

- Kerb and Channel Renewals

  OnGrade had commenced with the kerb and channel contract, which included four kerb and channel sites. Ohoka Road (motorway end near the Dairy) had been completed and work was starting on Good Street. Work on Geddis and Keir Streets were to follow.

- Mulcocks Road Right Turn Bay

  Work had begun on the installation of the Right-turn-bay on Skewbridge Road at Mulcocks Road. This would provide space for a dedicated right turn bay for traffic wanting to turn into Mulcocks Road.

- Pavement Rehabilitation

  The pavement rehabilitation work on Oxford Road was progressing. Chip sealing of the final section was due to be completed next week, sweeping, road marking, shoulder works and driveway tie ins were also being carried out with the road likely to open between the 1st and 3rd of March 2023. If the work was completed earlier then the road would be reopened. South Eyre Road Pavement Rehabilitation was the next site to be undertaken (starting early to mid-March 2023) and pavement repairs were also required on Smarts Road.

- Resealing

  The Resealing Programme had been continued with approximately 60% of the programme now complete. Pre-reseal repairs including stabilisation, edge break and minor levelling were continuing.

- Lees Valley

  Vegetation trimming was being undertaken through the valley later this week.

- Stringers Road Seal Extension

  This work was due to start this week and was being done under the Private Funding of Seal Extension Policy and was approved by the Utilities and Roading Committee last year.

- Cyclic works

  The work included pothole repairs, signage repairs and vegetation trimming was continuing.

- Ashley Gorge Road

  There were a number of planned works which needed to be undertaken in the short term, including vegetation cutting, pavement repairs, drainage maintenance and resealing of two sections of road. Staff were working with the contractor to ascertain if the work could be combined and undertaken during one closure to minimise disruption.

7.2 **Drainage, Stockwater and Three Waters (Drinking Water, Sewer and Stormwater) – Councillor Paul Williams**

Water

- Temporary Chlorination Update

  There was a Council briefing after the Utilities and Roading Committee meeting regarding the temporary chlorination of the Woodend and Kaiapoi water supplies, as well as to give an update about the Cust exemption application.

- Mandeville New Tank

  After a long wait construction was progressing for the stainless steel storage tank at the Mandeville water headworks. The foundation had been poured and the tank welding machinery was due on site soon to install the first steel tank for the Council.

- Reservoir Sealing

  In March 2023 the contractor who won the reservoir sealing contract was going to begin work sealing reservoirs throughout the district, including in Oxford, Kaiapoi, Rangiora and Pegasus.

- Hot Weather Caused High Demand

  The district had seen an increased demand on the water supplies with the hot weather in recent weeks, however, so far all supplies had coped well and there had not been any major operational issues.

Wastewater

- Treatment Plants

  There had been no notable outbreak of avian botulism this year. However, there had been some issues with midges, but this had been less than other years due to the weather and also the proactive measures employed to manage midges.

- Kairaki Sewer

  Works were still progressing to repair the manholes and laterals in Featherstone Avenue to reduce infiltration and inflow into the sewer system.

Stormwater

- Flood Response Work

  The concerted effort was continuing to wrap up investigations and maintenance work by the end of June 2023.

7.3 **Solid Waste– Councillor Robbie Brine**

Canterbury Joint Committees:

The Chair for

- CRLJC was Christchurch City Councillor Mark Peters.
- CWJC was Christchurch City Councillor Kelly Barber
- Deputy chair for both joint committees was Councillor Robbie Brine

The Transwaste Directors were:

- Councillor James to represent CCC
- Councillor Grant Miller to represent the rural Councils

Southbrook RRP

- The rubbish pit floor was repaired overnight last Thursday, with a skim coating over the concrete floor and modifications to the steel plate at the compactor hopper – there was no impact on services.
- Asbestos-containing materials were removed from the cleanfill stockpile; concrete was washed cleaned and taken to the Council's cleanfill pit. The remaining soils had been tested for asbestos, metals etc., and owing to above, acceptable concentrations in arsenic, copper, lead and zinc, would be taken to a Frews' managed fill site, a lower-cost option than sending it to Kate Valley.

Kerbside Collections

- Bin Audits:
  - Three audit rounds had been completed in the targeted kerbside areas (six weeks of audits).
  - In the first three weeks of audits: 2,145 bins were audited; 1,477 properties received 'educations'; 548 were tagged contaminated and not collected; and 120 received gold stars.
  - 105 letters had been sent out regarding double-contaminations.
  - Twenty eight properties had been identified for bin removals as they had had three or more contaminations, (one in Pegasus, nine in Rangiora, eighteen in Kaiapoi and of the Kaiapoi ones, three have Health and Safety risks associated with them owing to adverse interactions at kerbside).
  - Rangiora High School had agreed with Council that their 30-odd 'free' recycling bins should be removed as they could not manage to keep these clean using their current systems.

Bin supply:

- 140 litre bins were now in stock (these were ordered in October 2023, and were received a month after their due delivery date). Waste Management had caught up with new bin deliveries and also bin swaps for 140L bins.

Cust Rural Recycling Facility

- The road crossing had been sealed, in compliance with the land use consent conditions.
- Staff and hotel proprietors had agreed for the Council to install a surveillance system in the back car-park, to ensure the Council could identify users that do not comply with the site usage requirements. The Council would be using their internet for this system.
- The Council had arranged for a pre-easter skip empty, and a second empty on Tuesday after Easter to ensure there was plenty of capacity for recycling over the holiday period.

Councillor Williams questioned the discrepancy between a recent report which stated that contamination had decreased significantly and the abovementioned feedback stating that the bin audits had revealed concerning contamination of bins. He also noted that he had received criticism regarding the behaviour of the auditors. Councillor Brine commended the staff on their professional behaviour when confronted by aggressive residents during bin audits.

Councillor Redmond queried if rates were adjusted due to the removal of recycling bins. G Cleary replied that no adjustments to rates were made, however, residents would have their bins returned after a stand down period.

Councillor Ward enquired if it would be possible to include the costs relating to contaminated bins in the education information circulated to the public, so people could understand the consequences of contaminating a load of recycled material.

Mayor Gordon requested that recycling information be circulated to ratepayers with their rates bill.

7.4 **Transport – Mayor Dan Gordon**

- Mass Rapid Transport – Interest from Government, which indicated how important it was to keep all parties briefed.
- Noted that Woodend Safety improvements drop in session run by Waka Kotahi. Unaware that this was the final plan and there were plenty of residents in attendance to provide feedback.
- Waka Kotahi was keen to implement safety barriers down Lineside Road which the Council was opposed to at this time.

Councillor Atkinson raised concern that little to no information had been shared with residents, business and the Council about the impact of the Woodend Safety Improvements, specifically the impact of work to be done at the Pineacres intersection.

Mayor Gordon assured members that he would be taking the matter up with Waka Kotahi's Director of Regional Relationships, J Caygill, and further conversations needed to be initiated.

Councillor Cairns noted he had attended the drop in session and asked if he could forward the feedback/queries he had taken at the session to Mayor Gordon to forward onto Waka Kotahi.

Councillor Atkinson requested clarification on Waka Kotahi's intentions with one lane approaches to the Pegasus roundabout.

Councillor Redmond queried the point of a drop in session if the decision on the improvements had already been made, and was advised that it was for information sharing.

Councillor Mealings acknowledged how important the information sharing during Portfolio Updates was to keep other Councillors informed.

8 MATTERS REFFERED FROM RANGIORA-ASHLEY COMMUNITY BOARD

8.1 Request approval of No-Stopping Restrictions – Durham Street and South Belt – Shane Binder (Transportation Engineer)

There were no questions to this report.

Moved: Councillor Ward Seconded: Councillor Williams

THAT the Utilities and Roading Committee:

(a) **Approves** installation of the following no-stopping restrictions:

i. For 1.5meters on either side of the primary pedestrian access to 78 Durham Street, Rangiora .

ii. 5.0meter east of the driveway to 64 South Belt, Rangiora.

CARRIED

9 MATTERS FOR INFORMATION

9.1 Request approval for Stop Controls on Seddon Street at King Street; Station Road at Railway Road; and MacPhail Avenue / Spark Lane at Northbrook Road – Shane Binder (Senior Transport Engineer) (Report No. 221121201887 to the Rangiora-Ashley Community Board meeting of 15 February 2023)

9.2 Approval of MainPower quote to relocate power transformer – Joanne McBride (Roading and Transportation Manager) and Kieran Straw (Civil Projects team Leader) **–** (Report No. 221221220186 to the Management Team meeting of 16 January 2023)

9.3 Approval of Treetech Quote to Remove Hedge on Cones Road – Dominic Mansbridge (Project Engineer) and Kieran Straw (Civil Projects Team Leader) **–** (Report No. 221221220186 to the Management Team meeting of 16 January 2023)

9.4 Cenotaph Corner Improvement Project – Price Request Method – Heike Downie (Senior Advisor – Strategy and Programme) **–** (Report No. 230110001928 to the Management Team meeting of 16 January 2023)

9.5 July Flood Recovery programme – Direct appointment of consultants – Rob Kerr (Flood Recovery Programme Manager) and Kalley Simpson (Three Waters Manager) – (Report No. 221121201664 to the Management Team meeting of 21 November 2022)

9.6 Cycle Skills Education Programme "Cycle Sense" Update – Peter Daly (Road Safety Co-Ordinator/Journey Planner) and Joanne McBride (Roading and Transport Manager) - (Report No. 221118200998 to the Management Team meeting of 28 November 2022)

Councillor Ward queried if the work at Cones Road would include safety improvements as there had been several incidents at that intersection. D Young explained that this was primarily a drainage project and the hedge removal, while assisting with sight lines, would not ultimately achieve any further safety improvements at the intersection. J McBride further noted that there would be further investigation on what could be done to improve safety at the intersection.

Mayor Gordon left the meeting at 10.10am.

Councillor Williams commented that several of the reports indicated that only one quote had been considered and questioned why that was. G Cleary replied that there were thresholds within the Council's Procurement Policy which allowed for the Management Team to opt for one quote, however, there were instances where only one vendor had tendered or there was only one vendor who offered that services.

Councillor Redmond noted that there had been a discussion regarding bringing the funding for the drainage project at Cones Road forward, and that a public meeting would be held to update residents on the status of this matter. D Young responded that he was in favour of a meeting with residents, however, it was unlikely that funding would be able to be brought forward.

In response to a query regarding whether residents had been informed of the possible stop controls at Seddon Street, King Street and Station Road at Railway Road D Young replied that further conversation would be required with Pak n Save representatives.

Moved: Councillor Ward Seconded: Councillor Redmond

THAT the Utilities and Roading Committee:

(a) **Receives** the information in Items 9.1 to 9.6.

CARRIED

10 QUESTIONS UNDER STANDING ORDERS

Nil.

11 URGENT GENERAL BUSINESS

Nil.

12 MATTERS TO BE CONSIDERED WITH THE PUBLIC EXCLUDED

Section 48, Local Government Official Information and Meetings Act 1987

Moved: Councillor Ward Seconded: Councillor Brine

THAT the public be excluded from the following parts of the proceedings of this meeting.

The general subject of each matter to be considered while the public was excluded, the reason for passing this resolution in relation to each matter and the specific grounds under section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution, were as follows:

Item No	Report of:	General subject of each matter to be considered	Reason for passing this resolution in relation to each matter	Ground(s) under section 48(1) for the passing of this resolution
MINUTES				
12.1	Minutes of the Public Excluded portion of the Utilities and Roading Committee Meeting Tuesday 29 November 2022.	Confirmation of Minutes	Good reason to withhold exists under Section 7	Section 48(1)(a)

REPORTS				
12.2	Report from Management Team meeting	Report for Information	Good reason to withhold exists under Section 7	Section 48(1)(a)
12.3	Report from Management Team meeting	Report for Information	Good reason to withhold exists under Section 7	Section 48(1)(a)
12.4	Report from Management Team meeting	Report for Information	Good reason to withhold exists under Section 7	Section 48(1)(a)
12.5	Report from Management Team meeting	Report for Information	Good reason to withhold exists under Section 7	Section 48(1)(a)
12.6	Report from Management Team meeting	Report for Information	Good reason to withhold exists under Section 7	Section 48(1)(a)
12.7	Report from Management Team meeting	Report for Information	Good reason to withhold exists under Section 7	Section 48(1)(a)
12.8	Report from Management Team meeting	Report for Information	Good reason to withhold exists under Section 7	Section 48(1)(a)
12.9	Report from Management Team meeting	Report for Information	Good reason to withhold exists under Section 7	Section 48(1)(a)

CARRIED

CLOSED MEETING

The Public Excluded section of the meeting occurred from 10.24am to 10.38am.

OPEN MEETING

Moved: Councillor Williams Seconded: Councillor Redmond

THAT open meeting resumes and that the business discussed with the public excluded remains public excluded.

CARRIED

NEXT MEETING

The next meeting of the Utilities and Roading Committee will be held on Tuesday 21 March 2023 at 9am.

THERE BEING NO FURTHER BUSINESS THE MEETING CONCLUDED AT 10.38AM.

CONFIRMED

_____
Chairperson

_____
Date

NOTES OF A WORKSHOP OF THE UTILITIES AND ROADING COMMITTEE HELD IN THE COUNCIL CHAMBERS, 215 HIGH STREET, RANGIORA ON TUESDAY, 21 FEBRUARY 2023, AT 10.45AM.

PRESENT:

Councillor N Mealings (Chairperson), Councillors R Brine, P Redmond, J Ward and P Williams.

IN ATTENDANCE

Councillors N Atkinson, B Cairns, and T Fulton.

G Cleary (General Manager Utilities and Roading), D Young (Senior Engineering Advisor), K Waghorn (Solid Waste Asset Manager) and K Rabe (Governance Advisor).

Consultant Lisa Eve

APOLOGIES

There were no apologies.

1. **WASTE ASSESSMENT AND WASTE MANAGEMENT MINIMISATION PLAN** - Lisa Eve (Consultant - Eunomia)

Key points:

- There was a requirement Under the Waste Management Act 2008 to complete a Waste Assessment and review the Waste Management Minimisation Plan (WMMP) at least every six years.
- The WMMP must provide objectives, policies, and methods for 'achieving effective and efficient waste management and minimisation'.
- Methods to be considered would be reduction, reuse, recycle, recovery and disposal.
- Draft New Zealand Waste Strategy – circular economy focusses was to be achieved by 2050 and conservation resources, environmental connection and the aim that nothing was wasted to ensure that waste did not create a nuisance for the future.
- A further workshop on this topic would be held in March 2023.

Questions:

- Review of Bylaw – The Council had little to no ability to enforce the Bylaw so what was the point?

  Acknowledged that prosecution was a lengthy and costly process, however, the Council did have the ability to fine people for littering or illegal dumping, as well as the ability to fine regarding dog control breaches.

- When would the current WMMP expire?

  In early 2024, however, starting now would ensure that the new plan would be in place for the 2024-34 Long Term Plan.

- Currently methane was captured and turned into electricity, which was a benefit, so why could this not be continued?

  During the lifetime of the landfill only 50% of the methane was captured, leaving methane trapped in a closed landfill whereas organic waste could be used in its entirety to create a useful by-product. Although there was a small amount of carbon dioxide released it was not harmful as it was biogenic and would be absorbed back into the cycle whereas fossil carbon had no further use and was harmful to the atmosphere.

- Kate Valley was known for its efficiency which seemed to contradict your findings.

  Staff was aware of Kate Valley and its viability; however, it had a finite capacity and lifespan and then would generate methane within the closed site. Kate Valley's carbon analysis showed it was better to keep organics out of landfill and climate change required a reduction in emissions. New regulations would be released soon regarding kerbside services and councils would be require to deal with waste consistently throughout the country.

- Methane was a potent short-lived gas which could be used to generate electricity.

  With new landfill modelling it was evident that methane was far more potent (up to 42%) than originally thought.

- Composting generated carbon dioxide, heat and contaminated water which were all undesirable whereas methane could be used to generate electricity and reduce the mining and use of coal. This was considered a win/win situation.

  There was scientific proof and figures which supported that composting, as a natural function, was the better option.

- Query if the Council was not putting the cart before the horse by doing this work now when the Government had yet to release its document.

  Risk in proceeding however a bigger risk by delaying.

- Compost was a challenging option in built up areas due, in part, by odour and vermin, whereas Kate Valley was clean and smell free. Where would compost areas be sited?

  The process for making commercial compost would be different from the management followed by waste disposal. Planning would be required for any possible locations for waste infrastructure in the future.

Actions Required:

Task	**Officer**
Collation of scientific figures and facts for March workshop	Lisa Eve
Key Point for discussion for March workshop should concentrate on composting vs Kate Valley	K Waghorn, D Young and L Eve.

THERE BEING NO FURTHER BUSINESS THE WORKSHOP CONCLUDED AT 11.40AM.

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO:	TSU-22 / 200108001550
REPORT TO:	UTILITIES AND ROADING COMMITTEE
DATE OF MEETING:	21 March 2023
FROM:	Gerard Cleary, General Manager Utilities and Roading Kelly LaValley, Project Delivery Manager
SUBJECT:	Flood Mapping Freeboard and Floor Level Technical Practice Note
ENDORSED BY: (for Reports to Council, Committees or Boards)	General Manager / Acting Chief Executive

1. SUMMARY

1.1 This report is to update the Utilities and Roading Committee and Council on work staff have been doing to ensure that a consistent and robust process is followed when assessing the risk of flooding and setting minimum floor levels for new dwelling houses in the district.

1.2 Minimum floor levels work in conjunction with Council infrastructure to provide a level of flood protection to dwelling houses. Minimum floor levels provide protection in large flood events that exceed the level of service provided by Council infrastructure.

1.3 The report requests that the Utilities and Roading Committee recommends that the Council adopt the Flood Mapping Freeboard and Floor Level Technical Practice Note (provided as attachment i).

1.4 This practice note has been written by the Utilities & Roading Department with on-going advice from Planning, Building Unit and Policy over approximately 2 years. Collaboration has predominately been through the Flood and Floor Level Working Group.

1.5 The key points of the practice note where workshopped with the Council with a good line of questions. Overall the principals of the practice note were positively received by the Council.

1.6 The practice note provides a process for determining finished floor level recommendations for very low, low, and medium hazard areas but advises that no building should occur in high flood hazard areas. This aligns with the requirements in the Proposed District Plan and the direction of the Canterbury Regional Policy Statement, which the Proposed District Plan must give effect to.

1.7 The practice note aligns with the approach taken with the Housing Amendment Act variation whereby flooding is proposed to be a qualifying matter that limits further housing intensification in areas of Kaiapoi.

Attachments:

i. Draft - Flood Mapping Freeboard and Floor Level Technical Practice Note (Record No. 200106000520)

ii. Memo to Flood and Floor Level Working Group, Minimum Floor Levels in Kaiapoi (Record No. 200106000237)
iii. Kaiapoi Minimum Finished Floor Level Technical Memorandum (Record No. 200114003406)
iv. Practice Note Process Flow Chart (Record No. 220323042890)
v. Provide Minimum Finished Floor Level Advice Promapp process (Record No. 220323042876)

2. RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Receives** report No. 200108001550.

AND

THAT the Utilities and Roading Committee recommends:

THAT the Council:

(b) **Endorse** the Flood Mapping Freeboard and Floor Level Technical Practice Note and associated process (Record No. 200106000520 and 220323042890).

(c) **Notes** that the processes and requirements in this Technical Practice Note will be used by staff when setting minimum floor levels in relation to building, subdivision and land development in the district.

(d) **Notes** that the Technical Practice Note may need to be revised once the Proposed District Plan is adopted to reflect the proposed changes to the natural hazards chapter.

(e) **Notes** that the Technical Practice Note is a living document and may be amended by the General Manager Utilities & Roading, 3 Waters Manager or Project Delivery Manager with any major changes to be brought to the Council for endorsement.

3. BACKGROUND

3.1 The risk of flooding is a significant natural hazard in the district. Given the nature of our topography it requires careful consideration whenever houses are being planned for or constructed.

3.2 Council staff have robust systems and processes to manage this risk including, LIDAR survey, flood mapping and historical flood records. In recent years these processes have been strengthened considerably. If houses are constructed in a way that does not provide an adequate level of flood protection the cost and consequences can be significant for the property owner, builder, developer, insurers and the Council. The risk can never be completely eliminated, however, having clear requirements and good systems will help to minimise this risk.

3.3 Despite having good technical information there is, at times, a lack of consistency in its application. The Flood Mapping Freeboard and Floor Level Technical Practice Note will provide staff throughout the entire council with clear guidance when dealing with these matters. In addition to this builders, developers and property owners will have clearer information available to help them understand their obligations and the expectations of the Waimakariri District Council.

3.4 Due to cost pressures, there is an approach taken by some property owners, builders and developers to build to the standards of the Building Code which are a minimum. There is sometimes a reluctance to pay the cost of building floor levels up to an appropriate height and Council staff are therefore put under pressure to defend the Council's chosen position

on a floor level. This Technical Practice Note will be very helpful for all parties by clarifying requirements.

3.5 Minimum floor levels are set to protect dwelling houses from larger storm events that exceed the level of service of Council infrastructure. Other constructed flood protection systems, such as pumped systems or stop banks, can fail in large storm events; minimum flood levels will provide protection if potential failures occur.

3.6 The recent stormwater and flood protection works included in the Shovel Ready programme of works will improve outcomes for existing properties in Kaiapoi, however, the capacity of the pump systems installed is fixed. In order to ensure that no future dwellings are at risk in up to a 0.2% AEP (Annual Exceedance Probability) event, minimum floor levels are required.

4. ISSUES AND OPTIONS

4.1. Flood Mapping

4.2. The Waimakariri District Council has in-house modelling capability and has produced a series of flood hazard maps based on flood models that show areas of flood risk with predicted water level and velocity for a range of storm events. These models are regularly updated, improved, and more recently include Ashley River breakout modelling.

4.3. Additionally, Council has commissioned coastal inundation modelling undertaken by an external consultant that shows areas of flood risk from coastal hazards. This information has also been incorporated into the flood hazard maps.

4.4. For large scale developments it is still necessary to carry out specific modelling to determine the impact the development has on the surrounding area and to determine minimum floor levels.

4.5. For individual houses and small developments the Waimakariri District Council flood hazard maps are appropriate for setting minimum floor levels provided the requirements of the Technical Practice Note are complied with.

4.6. Flood Annual Exceedance Probability

4.7. For rural areas 0.5% AEP flood maps are used to predict flood levels. There are a number of reasons for using this probability of flood event.

4.8. Firstly the 0.5% AEP flood event is aligned with the requirements of the Canterbury Regional Policy Statement (CRPS).

4.9. Secondly, particularly in rural areas, the flood maps should be considered an indication of where flooding is likely to occur. They also categorise the flood hazard as low, medium or high rather than being an exact predictor of flood level. This is because they are broad scale and based on a relatively large grid scale when compared to actual house sites. Using the 0.5% AEP storm, coupled with the freeboard requirements gives an adequate level of conservatism for staff to be comfortable that the risk is being managed adequately. This allows the flood maps to be used to help locate individual houses and build to appropriate floor levels with confidence.

4.10. In urban areas such as Kaiapoi and Rangiora there has been modelling completed to a finer level of detail. These models use smaller grids and represent actual ground levels more accurately. The models also include the primary stormwater network (including pipes and pumps). Because of this higher level of confidence, 1% flood maps have been

produced as well as 2% flood maps. This allows a much better understanding of flood behaviour. As a result these 1% AEP models can be used, with the required freeboard, to set building consent floor levels in towns such as Rangiora and Kaiapoi.

4.11. Along with the requirements of the District Plan, the Canterbury Regional Policy statement requires Council to 'have regard' to the effects of a 0.5% AEP flood breakout event when assessing subdivision or land use consents. It is acknowledged that in some circumstances the specific site context will require consideration of the existing developed environment. The Technical Practice note addresses this matter by setting a starting point for assessment based on a 1% AEP flood event for individual dwellings, with any requirement for a higher finished floor level considered from this starting point.

4.12. **Climate Change**

4.13. Climate change has been allowed for in the flood modelling based on current recommendations from the Ministry for the Environment (MfE). This includes an allowance for sea level rise and an allowance for increased rainfall intensity as predicted by NIWA for future rainfall events.

4.14. One of three new pieces of legislation proposed by central government to replace the Resource Management Act is the Climate Change Adaptation Act. This legislation is expected to be introduced into the house as the third proposed Bill behind the Natural and Built Environments Act and the Strategic Planning Act. Staff understand that this Bill is likely to be introduced sometime in mid-late in 2023. Outcomes of the Climate Change Adaptation Act will be incorporated into future updates of the practice note.

4.15. **Freeboard**

4.16. There has been, in general, a requirement for a 300mm freeboard within the Waimakariri District. Freeboard is the height that the buildings floor level is constructed above the flood level. For example if the flood level is 1.0m above the ground at a house site and a 300mm freeboard is applied, then the building's floor level would need to be 1.3m above the ground.

4.17. There is a variation in the freeboard allowance that is used throughout New Zealand, this is generally between 300mm to 500mm. Table 1 below is a summary of freeboard allowances for a number of New Zealand territorial authorities.

Table 1: Comparison of New Zealand Freeboard Requirements

Location	Freeboard requirement
Waimakariri	300mm
Auckland	500mm, Residential 300mm, Commercial
Wellington	500mm, Habitable 200mm, Non Habitable
Christchurch	400mm
NZS4404, Code of Practice for Urban Subdivision	500mm
Dunedin	500mm 400mm in areas flooded in 2015
Building Act	500mm, if surface water depth is 100mm or more and adjacent to road or areas subject to vehicle wash, 150mm for all other cases.

4.18. The 300mm freeboard that is used in the Waimakariri District has its merits. However, it can be seen from the comparison in Table 1 that it is relatively low compared to the general requirement in other jurisdictions.

4.19. One justification for having a freeboard lower than some others is that Waimakariri District is located within a large and predominantly flat floodplain. Generally speaking, water flow is laminar at relatively low velocity. It also requires a lot of additional water to significantly increase the height of a flood as there is generally a large surface area to spread the water over. These characteristics make the water level more predictable and support a freeboard of 300mm.

4.20. However, there are a number of factors that would favour a higher freeboard of 500mm. These include; vehicle wash, survey error and inaccuracy, fences impeding flow, less public and insurance industry acceptance of flooding, modelling error and uncertainty, minor earthworks (bunding and channels) not represented in the model, ongoing ground movement due to seismic activity, unpredictability of climate change and, catchment changes upstream of development.

4.21. This Technical Practice Note takes an approach of varying the freeboard between 300mm and 500mm depending on the circumstances associated with flood risk. This issue is explained below and in the Technical Practice Note itself (attachment i).

4.22. *New Greenfield Development*

4.23. In new greenfield development areas the Technical Practice Note requires a 500mm freeboard above the 0.5% AEP flood level. This matches the freeboard requirement of 500mm in the New Zealand Standard, Land Development and Subdivision Infrastructure, NZS 4404:2010.

4.24. Where the land has a low risk of flooding, there is little or nothing that needs to be done by the Developer to achieve the freeboard requirement. In areas of medium or higher risk there may need to be additional filling or careful design considerations given to achieve the desired level of protection.

4.25. The Technical Practice Note is guidance for Council Staff in this situation, it also helps the Developer understand what Council engineers consider to be an acceptable level of protection. A Plan Change or Resource Consent for subdivision provide the formal process for assessing the effects of a development under the Resource Management Act (RMA). A Developer may choose to seek to gain approval for a lower level of flood protection than the

Technical Practice Note, which would require the preparation and approval of a site specific flood risk assessment. The formal RMA process allows for this and will take precedence over the requirements of the Technical Practice Note.

4.26. *Existing Greenfield subdivisions*

4.27. Many subdivisions that have been approved since 2000 have minimum floor level requirements. These include subdivisions such as Pegasus and Ravenswood. In these areas the floor level requirements are clearly spelled out and used without any need to utilise the Waimakariri District Council's flood maps to carry out further engineering assessment.

4.28. *Existing Urban Areas (Brownfield) and Rural Areas*

4.29. The Technical Practice Note adopts a variable freeboard between 300mm and 500mm. A staff working group consisting of experienced engineers workshopped this issue in developing the outlined approach. A 300mm freeboard is required for shallow flood water, increasing up to 400mm in medium hazard areas and 500mm in high hazard areas.

4.30. Where flood water is predicted to be less than 100mm in depth, then 300mm freeboard is required. This is because there is a lower flood risk and it is unlikely that significant waves can be sustained in such shallow water.

4.31. For flood water up to 300mm in depth, a 400mm freeboard is required. Where water exceeds 300mm, then a 500mm freeboard is required.

4.32. *Rural Areas and Res 4A.*

4.33. In areas where flood water is predicted to be below 100mm (very low hazard) the technical practice note requires a floor level to be 400mm above the surrounding ground. This allows for a 300mm freeboard.

4.34. 300mm is considered adequate as it is unlikely significant waves can be generated in less than 100mm of water. It is still necessary to allow for some freeboard as there is still a risk of error. Also, particularly in rural areas there is a risk that flooding will be deeper than predicted in localised areas due to minor earthworks, fences, shelterbelts, driveways and other land use changes. Our experience during flood events has shown this to be an issue, depending on the location of the building on the site.

4.35. For low hazard areas, where water can be up to 300mm deep, a freeboard of 400mm is required by the practice note. In medium hazard areas where water is greater than 300mm deep, a 500mm freeboard is required by the practice note.

4.36. In high hazard areas building is not anticipated by the practice note. If a property owner wishes to construct a house in a high hazard area then they will need to apply for a resource consent, supported with a flood risk assessment from a Chartered Professional Engineer. This assessment will need to take into consideration the Regional Policy Statement which seeks to avoid adverse environmental effects resulting from construction of houses in high hazard areas.

4.37. There is an allowance for exceptions such as on hillsides or ridges where there is not a risk of flooding.

4.38. *Existing Urban Areas (Brownfield)*

4.39. In urban areas (excluding Kaiapoi and coastal urban area of Kairaki, The Pines Beach, Woodend Beach and Waikuku Beach) the 1% AEP flood maps are used. In very low hazard

areas the Building Act minimum requirements need to be complied with, with no need for any further specific consideration. In low hazard areas a 400mm freeboard is required over the 1% AEP flood level. For medium and high hazard areas 500mm freeboard is required over the 1% AEP flood level.

4.40. *Kaiapoi and Coastal Urban Areas*

4.41. Kaiapoi and coastal urban area of Kairaki, The Pines Beach, Woodend Beach and Waikuku Beach has been considered separately as much of these areas are located within basins that rely on a functioning stormwater system and pump stations. A separate memo has been prepared to discuss floor levels including freeboard requirements in Kaiapoi. This memo is appended to this report (see attachment ii).

4.42. A minimum floor level map has been prepared for Kaiapoi and coastal urban areas. This makes it simple for the public and Council staff to work off. It allows for the 1% AEP flood level and a suitable freeboard depending on the area. The freeboard requirements are based on the hazard category and are consistent with the other towns and rural areas.

4.43. *Existing Dwellings*

4.44. The requirements of this practice note are not intended to apply to existing dwellings already established within these areas. It is considered unreasonable to force a Property Owner to raise the floor level of an existing dwelling.

4.45. **Process**

4.46. There is an established working group of staff who are involved in flood assessment, 3 Waters, Subdivision Engineering, Building Consents and Planning. This group meets regularly to ensure that there is a coordinated approach to Council processes, focusing on customer service and delivery, consistent standards, learning, debriefing when issues have been identified, assessing current applications and helping to develop the Technical Practice Note.

4.47. The attached flow chart (attachment iii) shows how the Technical Practice Note will be implemented by staff. The process will be fully documented within the Promapp system which clearly spells out key decision points, staff roles and responsibilities.

4.48. **District Plan**

4.49. The natural hazards chapter was reviewed as part of the district plan review. This review included flood risk as a natural hazard in the district. This practice note aligns with the current district plan as well as the proposed natural hazards chapter. In terms of hierarchy the district plan sets the policy. This technical practice note relates at an operational level and sets out how the district plan policy and rules are implemented by staff. When the district plan natural hazards chapter is adopted the technical practice note will be reviewed and if necessary updated to incorporate any changes or requirements of the new district plan.

4.50. In existing urban areas, brownfield developments could result in floor levels of new dwellings being noticeably higher than the existing adjacent dwellings. This would potentially have an effect on recession planes with more dwellings breaching the District Plan and requiring consent. Such impacts will be considered at the time of building consent under the relevant built form standard that applies (either the operative plan, proposed plan or the built form standards amended under the housing intensification variation.

4.51. **Key Changes**

4.52. A lot of the technical practice note does not change current practice. However, there are some areas where requirements will be made clearer, there will be more consistency or higher standards will be required. The key changes from current practice that will be implemented as a result of the technical practice note are summarised below:

4.52.1. The typical freeboard that was previously applied in all cases was 300mm. This will remain the same for water depths up to 100mm and increase to 400mm for low hazard areas (water up to 300mm deep) and further increase to 500mm for medium and high hazard areas (water depths of greater than 300mm).

4.52.2. In existing urban areas where there are accurate 1% AEP flood maps available these will be used. Previously there had not been a consistent approach, and it relied a lot more on the discretion of the Council Engineer assessing the risk on a case-by-case basis.

4.53. **Options**

4.54. The Utilities and Roading Committee and Council have three broad options available. These are outlined below:

4.55. **Option 1. Recommended Option**

4.55.1. Adopt the Practice Note. This will provide a clear framework for staff to work within and is supported by the Council Engineers with expertise in flooding and development.

4.56. **Option 2. Require reconsideration or amendment**

4.56.1. Request the Manager Utilities and Roading to revise the detail of the Technical Practice Note or provide more information if there are any outstanding issues in the mind of the Council. This would allow staff to consider any issues raised by Council and allow these to be addressed before bringing a revised technical practice note back to the Committee and Council for adoption.

4.57. **Option 3. Decline**

4.57.1. Decline to approve the technical practice note and instruct staff to do no further work on it. This is not recommended as it would leave the Council exposed to risk and continue to create uncertainty for staff and property owners.

4.58. **Management Team**

4.59. The Management Team have reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. **Mana whenua**

5.1.1. Te Ngāi Tūāhuriri hapū are likely to have an interest in the subject matter of this report. Flooding in parts of Tuahiwi have previously been raised as issues by the Runanga.

5.2. **Groups and Organisations**

5.2.1. No specific engagement has been carried out in preparation of this report. When the technical practice note is completed it will be made publicly available, particularly to engineers working on behalf of Developers within the district.

5.3. **Wider Community**

5.3.1. Flooding is an issue that impacts on the wider community. In general feedback from the community, particularly following flood events is that the Council should be doing more in reducing the risk of flooding to houses. This Technical Practice Note helps achieve this.

5.3.2. Following adoption of the Technical Practice Note staff will develop material for the public that covers off the key information to help them interpret flooding information in LIMS and PIMS.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. **Financial Implications**

6.1.1. The cost of flooding can be substantial to all parties involved. This Technical Practice Note will in some cases require floor levels to be built higher than has traditionally been the case. This cost is borne by the property owner when building their house.

6.1.2. The cost of raising either the building platform or the finished floor level should be borne by the Developer or Property Owner.

6.2. **Sustainability and Climate Change Impacts**

6.2.1. The recommendations in this report do have sustainability and/or climate change impacts.

6.2.2. The effects of climate change are contributing to increased likelihood of adverse weather events prompting the raising of floor levels is to protect people and property, this report is a direct response to the effects of climate change.

6.3. **Community Implication**

6.3.1. Developing the district in a way that minimises the risk of flooding is very important for the long-term wellbeing of the community.

6.4. **Risk Management**

6.4.1. This Technical Practice Note takes a risk management based approach to flood risk. The level of mitigation required is dependant of the level of flood risk.

6.4.2. The technical practice note is a significant step in improving the management of flood risk in the district.

6.5. **Health and Safety**

6.5.1. By developing in a manner that allows for the risk of flooding this will improve community Health and Safety over time.

7. CONTEXT

7.1. **Consistency with Policy**

7.1.1. This is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.1.2. This Technical Practice Note is the operational response to policy set by the Regional Policy Statement and District Plan. It standardises, documents and formalises the WDC staff practice and process in relation to flood hazard management in subdivision and building development.

7.2. **Authorising Legislation**

7.2.1. Sections 31, 74, 106, 108 and 220 of the RMA allow councils to impose conditions on subdivision or land use consents relating to hazards or to prevent or restrict development in hazardous areas.

7.2.2. The Building Act has specific requirements in relation to flooding.

7.2.3. Section 71 and 72 of the Building Act 2004 outline the limitations and restrictions on building consents in relation to natural hazards. If consents are issued, this may result in a tag being put on the certificate of title for the property under sections 73 and 74 of the Building Act.

7.3. **Consistency with Community Outcomes**

7.3.1. The Council's community outcomes are relevant to the actions arising from recommendations in this report.

There is a safe environment for all

- Harm to people from natural and man-made hazards is minimised.
- Our district has the capacity and resilience to quickly recover from natural disasters and adapt to the effects of climate change.

There is a healthy and sustainable environment for all

- Harm to the environment from the impacts of land use, use of water resources and air emissions is minimised

7.4. **Authorising Delegations**

7.4.1. This issue of flooding relates predominantly to 2 Committees of Council.

- Utilities and Roading
- District Planning and Regulation

7.4.2. As this is a Technical Practice Note that has been prepared by the General Manager Utilities and Roading and it is based on engineering advice and expertise it is being reported through the Utilities and Roading Committee.

7.4.3. Given the range of council functions covered by this matter and that it does not fit within any one committee's delegation, a resolution from the Council is requested.

WAIMAKARIRI DISTRICT COUNCIL

TECHNICAL PRACTICE NOTE

DRAFT FOR COUNCIL CONSIDERATION

FILE NO AND TRIM NO:	TSU-22 / 200106000520
DATE:	21 June 2022
TO:	Council staff involved in 3 Waters, Building, Policy, Planning and Land Development
FROM:	Gerard Cleary, Manager Utilities and Roading
SUBJECT:	Flood Mapping, Freeboard and Floor Levels

1. Purpose

1.1. The purpose of this Technical Practice Note is to document standard practice and provide guidance to achieve a consistent framework for Council staff involved in flood risk assessment and setting out and approving building floor levels. It will be used to:

1.1.1. Provide technical advice on applications for Building Consent

1.1.2. Provide technical advice on Resource Consent applications under the Operative District Plan

1.1.3. Provide advice on enquiries received from external Customers

1.2. The Practice Note is intended to be reviewed when the Proposed District Plan becomes operative.

1.3. The General Manager Utilities and Roading, 3 Waters Manager, and Project Delivery Manager will use discretion in applying this Technical Practice Note on a case-by-case basis.

1.4. Flood Maps

1.4.1. This Technical Practice Note relies on flood maps which can be found on Waimap

1.4.2. These Maps have colour coded hazard areas as follows:

- Uncoloured areas are considered to be very low hazard
- Green mapped areas are considered low hazard
- Blue coloured areas are considered medium hazard
- Red coloured areas are considered high hazard

2. Planning and Regulatory Context

2.1. General

2.1.1. The setting of floor levels is governed by the requirements of the Regional Policy Statement, Waimakariri District Plan, Building Act and Building Code. In all cases,

Building Act compliance still needs to be achieved and any necessary resource consents applied for. In many cases the guidance in this Technical Practice Note will exceed those of the Building Act and therefore the Building Act will be met by default. However, where they are not it is still a requirement that the Building Act requirements are met. There is also a requirement to meet any floor level requirements of consent notices on the property title, or any district plan rule.

2.2. Building Consents

2.2.1. The applicant for a Building Consent is required to demonstrate that the proposed development complies with the Building Act and Building Code as part of their building consent application. This includes achieving minimum floor levels in relation to surrounding ground levels and predicted flood levels.

2.3. Subdivision or Land Use Consents under the District Plan

2.3.1. The applicant for a subdivision consent, or land use consent is required to demonstrate that they comply with the District Plan, and any relevant regional plan such as the Land Water Regional Plan, in addition to having regard to the flood mitigation and avoidance policies of the Canterbury Regional Policy Statement (CRPS) in the consent assessment. Reference should also be made to section 106 (hazards relating to subdivision) and any consent notice in relation to floor levels and flood hazards.

2.4. Private District Plan Change

2.4.1. For private plan change proposals, any amendments proposed to the District Plan must 'give effect' to the policies of the CRPS and any relevant national policy statements. Expert evidence will need to be provided to demonstrate this.

2.4.2. In order to demonstrate compliance the applicant is required to provide a flood assessment report from a Suitably Qualified and Experienced Person (SQEP) for Council consideration, assessment and approval. This assessment will need to include consideration of the flood hazard and a freeboard requirement.

3. General Requirements

3.1. Flood assessment methodology

3.1.1. Where the development is changing the underlying ground level, or there are new roadways being constructed, then the applicant will need to provide evidence from a SQEP to demonstrate the effect of the development. The evidence shall consider both the effect on the potential occupants of the development, as well as neighbouring properties, and will apply freeboard requirements as per the District Plan, if available and as set out in this practice note. The applicant may request information pertaining to the site from the Council's flood hazard model to assist with providing the required assessment and evidence.

3.1.2. Where the development is being carried out in a manner that will not disrupt the existing overland flow-paths, then upon request the Council will provide a Minimum Floor Level that will meet Council requirements. Examples of this include building consent applications and development or subdivisions of four lots or less. The Minimum Floor Level will be based on the Council's flood hazard model and other relevant information held by Council, and will apply the general principles below, including freeboard requirements.

3.1.3. If the applicant disagrees with the Council's Minimum Floor Level, then they can commission a flood assessment report signed by a SQEP and submit to the Council for consideration. If the Minimum Floor Level is required under the District

Plan, the Council consideration will be undertaken as part of a resource consent application assessment.

3.2. Existing (Post 2000) Large Scale Subdivisions and Land Use Consent Areas

3.2.1. Most large scale residential subdivisions that have been established since 2000 (for example Silverstream and Beach Grove) will have pre-approved minimum floor levels that were established for the specific subdivision at the time of the development. In these cases the minimum floor levels specified in the resource consent documentation will apply. Should a new development seek to build outside of the resource consent parameters then the District Plan (including the Minimum Floor Level) might apply.

3.3. Extensions to existing houses

3.3.1. Provided that the Building Act and Building Code requirements are met in relation to predicted flooding, extensions up to 30 percent of the existing floor area would likely be considered acceptable. The reasoning for this is that this does not create a substantial additional risk to an existing house and would allow, for example, the addition of a bedroom.

3.4. Existing Developments and Existing Buildings

3.4.1. It is important to note that existing buildings that have been constructed to previously applicable standards are not impacted by this technical note. As with many development standards that change over time any previously constructed and consented activities will continue to enjoy any existing use rights. This technical note is forward looking only.

3.5. Benchmarks

3.5.1. The developer shall provide local benchmarks to be used to set out floor levels. A minimum of two benchmarks are required, visible by line of sight, to each lot frontage.

4. Demonstrating Compliance with Required floor level for Building Consent

4.1. PDU staff will identify any formally received applications (for PIM or Compliance Check in conjunction with a Building Consent or as a PIM Only) that require a Finished Floor Level (FFL) Assessment. Following identification PDU will set up a new FL application in Tech 1 and associate the Building Consent number as a related application.

4.2. Set up and FFL assessment will be undertaken by the Project Planning & Quality and Development Teams. Advice provided by PDU will depend on whether the FL was tabulated through the subdivision process or not, in accordance with the process set out in TRIM record 210514077201.

4.3. Location of structures on site, and access

4.3.1. In all cases, care shall be taken to avoid siting buildings in flood hazard areas and where possible to site the building on the property clear of ponding or overland flow paths.

4.3.2. Where there is no clear area, the building should be located, where possible, on the area with the lowest flood hazard. For example locate the building site on green (low hazard) rather than blue (medium hazard) mapped areas.

4.4. Rural area – Very Low Hazard Areas (White/clear area on 1 in 200 year flood maps)

4.4.1. On generally flat areas the floor level shall be a minimum of 400mm above the highest point of the original ground level at the house site.

4.4.2. On a sloping area, or ridge, the floor level may not need to be elevated above the ground other than to simply comply with standard building act ground clearance requirements. Note that a topographical survey may be requested to confirm the building site is on a localised high point.

4.5. Rural - Low Hazard Areas (Green on 1 in 200 year flood maps)

4.5.1. The floor level shall be 400mm above the modelled 0.5% AEP flood level based on the Council's district wide flood hazard mapping.

4.4.2 If required by the Council the applicant may need to engage a Suitably Qualified and Experienced Person to provide a flood assessment report to Council showing the proposed house site and floor level and demonstrate that the floor level will be at least 400mm above the 0.5% AEP flood level and that the building or site works will not impede overland follow or exacerbate or cause flooding on any other property.

4.6. Rural – Medium Hazard Areas (Blue on 1 in 200 year flood maps)

4.6.1. If building is approved, the floor level shall be 500mm above the modelled 0.5% AEP flood level based on the Council's district wide flood hazard mapping.

4.6.2. If required by the Council the applicant may need to engage a Suitably Qualified and Experienced Person to provide a flood assessment report to Council showing the proposed house site and floor level and demonstrate that the floor level will be at least 500mm above the 0.5% AEP flood level and that the building or site works will not impede overland follow or exacerbate or cause flooding on any other property.

4.6.3. In areas where there is a Medium Hazard it may not always be possible to build because of the requirements for a floor level and all weather access will have unacceptable impacts on neighbouring properties.

4.7. Rural – High Hazard Areas (Red on 1 in 200 year flood maps)

4.7.1. It is not considered appropriate to build in these areas due to the high hazard unless a resource consent has been obtained. Any floor level requirements of the Resource Consent shall apply.

4.8. Rationale for flood events and freeboards

4.8.1. The Building Act requires new houses to be designed and built in such a way that Surface water, resulting from an event having a 2% probability of occurring annually, shall not enter buildings. The Building Act methodology suggests a 150mm freeboard in normal circumstances, and 500mm where waves may occur.

4.8.2. However, the Council has applied different flood models and freeboards as the "Acceptable Solutions" due to a recognition of the greater risks of building on an active flood plain (which covers the majority of the District), and recent experiences over the past two decades of flood events.

4.8.3. It is recognised that this is a greater requirement than the Building Act minimum requirements.

4.8.4. Therefore, the applicant can choose to supply information supporting a level in keeping with the Building Act. This would need to be a flood model assessment of the specific site, certified by a SQEP.

4.8.5. The Council does not model a 1 in 50 flood event throughout the District. The Council does have models for the 1 in 100 (1% AEP), 1 in 200 (0.5% AEP) and 1 in 500 (0.2% AEP) year events.

4.8.6. The 1 in 200 (0.5% AEP) is referenced in the RPS (Policy 11.3.2) such that development should be avoided unless (among other matters), new buildings have an appropriate floor level above the 0.5% AEP design flood level. While it is acknowledged that this policy is only triggered by a Resource Consent application, nevertheless it is an indication of where the region sets its risk profile for new buildings.

4.8.7. For this reason, the Council has adopted the 1 in 200 (0.5% AEP) flood level as an appropriate event to require protection from.

4.8.8. With regard to the freeboard, the Council rationale is as follows:

4.8.8.1. Rural very low risk (i.e.: no flooding indicated)

4.8.8.1.1.400mm total clearance above ground

4.8.8.1.2.100mm possible flooding (due to margin of error in flood model)

4.8.8.1.3.300mm freeboard above flood level (due to uncertainty in exact terrain shape, and due to uncertainty in future land surface changes in surrounding upstream areas)

4.8.8.2. Rural low risk

4.8.8.2.1.400mm total freeboard above 0.5% AEP flood level

4.8.8.2.2.100mm margin of error in flood model

4.8.8.2.3.300mm freeboard above flood level (due to uncertainty in exact terrain shape, and due to uncertainty in future land surface changes in surrounding upstream areas)

4.8.8.3. Rural Medium Risk

4.8.8.3.1.500mm total freeboard above 0.5% AEP flood level

4.8.8.3.2.100mm margin of error in flood model

4.8.8.3.3.300mm freeboard above flood level (due to uncertainty in exact terrain shape, and due to uncertainty in future land surface changes in surrounding upstream areas)

4.8.8.3.4.100mm additional freeboard due to greater variation of flood depth at greater depths.

4.8.8.4. Urban (Building Consents only)

4.8.8.4.1.400mm total freeboard above 0.5% AEP flood level

4.8.8.4.2.100mm margin of error in flood model

4.8.8.4.3.300mm freeboard above flood level (due to wash from passing vehicles)

4.8.8.5. Urban (Subdivision)

4.8.8.5.1.500mm total freeboard above 0.5% AEP flood level

4.8.8.5.2.100mm margin of error in flood model

4.8.8.5.3.300mm freeboard above flood level (due to wash from passing vehicles)

4.8.8.5.4.100mm additional freeboard to allow for other unaccounted for variables including survey error, lot level tolerance, infrastructure failure, and uncertainty in climate change allowances.

5. Demonstrating Compliance with the Operative District Plan Provisions – Greenfield Development

Table 1: Summary of Freeboard Requirements, Greenfield Development

Hazard Category	Rural	Rural Residential	Urban
Very Low (Clear)	N/A – FFL to be minimum 400mm above surrounding ground*	Freeboard = 500mm	N/A – Building Code requirements apply
Low (Green)	Freeboard = 400mm	Freeboard = 500mm	Freeboard = 500mm
Medium (Blue)	Freeboard = 500mm	Freeboard = 500mm	Freeboard = 500mm
High (Red)	No build advised	No build advised	No build advised

5.1. New Greenfield Subdivision of > = 4 lots (Res 1, 2, 3, 5, 6, 7, Bus 1 & 2)

5.1.1. In areas identified as low or medium flood hazard, the minimum requirements for floor levels are to provide a 500mm freeboard above the 0.5% (200yr) AEP flood level.

5.1.2. New greenfield subdivision with a building platform located within a high flood hazard area (or where no building platform is specified) is non-complying and resource consent would be required. It is possible that land can be raised so that it no longer meets the CRPS high flood hazard definition (high flood hazard is: where depth x velocity of flood waters is >= 1 in a 0.2% (500yr) AEP flood event.

5.1.3. Site levels should be formed to allow 225mm between the finished site level and the required minimum floor level to allow reasonable building site platforms, as required by the Building Code.

5.1.4. Overall, new greenfield development is subject to the process and outcome of the Plan Change, Ecan consents, assessment of flood displacement and / or subdivision consent.

5.2. New Subdivision of (Residential 4A and 4B)

5.2.1. Minimum requirements are 500mm freeboard above the 0.5% AEP flood level.

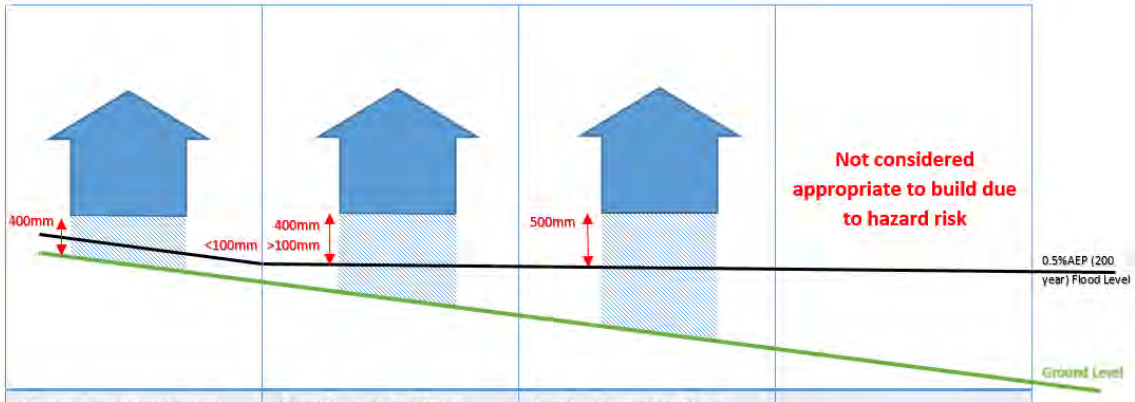
5.2.2. Regard must also be given to the 0.2% AEP flood as required by the CRPS.

5.2.3. This is subject to the process and outcome of the Plan Change or subdivision consent.

5.3. New subdivision in Rural Areas

5.3.1. General

The concepts in figure 1 apply.



	400mm above existing ground Level **or** Floor Risk Assessment (FRA) by SQEP	If possible, avoid **or** 400mm above 0.5% AEP (200 year) Flood Level **or** FRA by SQEP	Avoid, unless not possible **or** 500mm above 0.5% AEP (200 year) Flood Level or FRA by SQEP *Council may require FRA by SQEP for Medium hazard sites	
Development Manager Advice on Floor Level	X	✓	✓	✓
Development Manager Approval of Floor Level	✓	✓	✓	✓
Flood Hazard Classification	Very Low (Clear) <100mm	Low (Green) 100-300mm	Medium (Blue) 300-1000mm	High (Red) 1000+mm

Figure 1: Minimum floor level requirements (Rural and large lot residential)

5.3.2. Rural - Where very low flood Hazard is mapped. (Clear area on 0.5% AEP (200 year) Flood Hazard maps)

Floor levels should be required to meet Building Act requirements (i.e. a floor level above the 2% AEP (50 year) flood level plus a freeboard.

The freeboard will be as required by the Building Code. On generally flat areas the floor level shall be a minimum of 400mm above the highest point of the original ground level at the house site.

Where the property is on the side of a hill and obviously clear of any flooding or overland flow path the Building Act requirements in relation to floor levels above ground shall govern and the 400mm above the highest point of the existing ground may not necessarily be required. Note that a topographical survey may be requested to confirm the building site is on a localised high point.

5.3.3. Rural - Low Hazard Areas (Green on 0.5% AEP (200 year) Flood Hazard Maps)

The floor level shall be 400mm above the modelled 0.5% AEP flood level based on the Council's district wide flood hazard mapping.

5.3.4. Rural – Medium Hazard Areas (Blue on 0.5% (200 year) AEP Flood Hazard Maps)

At the Council's discretion and where the building is only partially on or at the edge of an area shown as blue, the Council's flood hazard mapping may be used to determine the minimum floor level. In this case the floor level shall be 500mm above the modelled 0.5% AEP flood level based on the Council's flood hazard mapping.

If required by the Council the applicant may need to engage a Suitably Qualified and Experienced Person. They shall provide a flood assessment report to Council showing the proposed house site and floor level and demonstrate that the floor level will be at least 500mm above the 0.5% AEP flood level and that the building or site works will not impede overland follow or exacerbate or cause flooding on any other property.

In areas where there is a Medium Hazard it may not always be possible to build because of the requirements for a floor level and all weather access will have unacceptable impacts on neighbouring properties.

5.3.5. Rural – High Hazard Areas (Red on 0.5% AEP (200 year) Flood Hazard Maps)

It is not considered appropriate to build in these areas due to the high hazard.

6. Demonstrating Compliance with the Operative District Plan Provisions – Intensification (3 or Fewer Lots)

6.1. Rural Areas and Residential 4 areas

6.1.1. Sections 5.2 and 5.3 above applies.

6.2. Residential Areas (Res 1, 2, 3, 5, 6, 7) - General

6.2.1. In existing zoned residential areas that trigger assessment under the Resource Management Act 1991 (RMA) via the District Plan, it is anticipated that all developable lots will have a finished ground level that avoids inundation in a 1% AEP flood event.

6.2.2. The consent assessment, where required, is also required to consider the 0.5% AEP flood, with regard to Policy 11.3.2 of the Canterbury Regional Policy Statement (CRPS) given in the engineering assessments and the matters covered in s106 of the RMA. Detail on 11.3.2 of the CRPS is included as appendix 1 of this report.

6.2.3. Assessment of the matters covered in Policy 11.3.2 may require consideration of the specific site conditions both within and adjacent to the subject site, and may result in the setting of finished floor levels that give effect to Policy 11.3.2.

6.2.4. This practice note is the starting point for consideration of Policy 11.3.1. For infill development in urban areas the 1% AEP flood level shall be allowed for with freeboard. The 0.5% AEP flood level should be assessed and considered as part of the setting of floor levels. In practice this may mean a floor level for 1 to 3 houses that is at or even lower than the 0.5% AEP. This needs to be considered in the context of being compatible with existing surrounding houses without causing an adverse impact on neighbours.

6.2.5. This applies to the small scale (3 houses or fewer) infill development of existing urban areas where the surrounding area has already been built on. It applies to small scale subdivisions of existing residential lots or new houses on vacant lots, or rebuild of existing houses. For large scale development (4 houses or more) the Greenfield provisions shall apply. (Refer section 5.1)

6.2.6. The Council's urban flood hazard maps shall be used where they are available. These models include provision for the open drains, stormwater pipes and pump stations that make up the urban stormwater network. In the absence of urban flood hazard maps the district wide flood hazard maps shall apply.

6.2.7. In all cases, care shall be taken to avoid siting buildings in flood hazard areas and where possible to site the building on the property clear of ponding or overland flow paths.

6.2.8. Where there is no clear area (very low hazard), the building should be located, where possible, on the area with the lowest flood hazard. For example locate the building site on green (low hazard) rather than blue (medium hazard) mapped areas.

6.2.9. Where a dwelling is being replaced, the floor level for the new dwelling shall be no lower than the original dwelling. And where flood modelling is available for such a site an assessment shall be made by Council to the home owner/applicant to set a minimum floor level.

6.3. Existing residential areas (Res 1, 2, 3, 5, 6, 7) (excluding Kaiapoi and coastal urban areas) - Where very low flood hazard is mapped. (Clear area on 1% AEP Flood Hazard maps)

6.3.1. Floor levels should be required to meet Building Act requirements (i.e. a floor level above the 2% AEP (50 year) flood level plus a freeboard.

6.3.2. The freeboard will be as required by the Building Code.

6.3.3. Note - Isolated small pockets of flooding shown on the flood hazard maps may be treated as “Clear” at the sole discretion of the Council.

6.4. Existing residential areas (Res 1, 2, 3, 5, 6, 7) (Excluding Kaiapoi and coastal urban areas) - Where a low or medium flood hazard is mapped. (Green and Blue areas on the 1% AEP Flood Hazard Maps)

6.4.1. The floor level of houses shall have a freeboard above the 1% AEP (100 year) flood level.

6.4.2. The freeboard requirements shall be 400mm above 1% AEP for the mapped Green areas (Low Hazard).

6.4.3. The freeboard requirements shall be 500mm above 1% AEP for the mapped Blue areas (Medium Hazard).

6.4.4. Consideration shall also be given to the spill level of the secondary flow path based on known topographical levels.

6.5. Existing residential areas (Res 1, 2, 3, 5, 6, 7) (Excluding Kaiapoi and coastal urban areas) – Where a high hazard area is mapped (Red on 0.5% AEP (200 year) Flood Hazard Maps)

6.5.1. It is not considered appropriate to build in these areas due to the high hazard flood risk.

6.5.2. If a building is approved, then the floor level of houses shall have a freeboard of 500mm above 1% AEP (100 year) flood level

6.6. Kaiapoi and coastal urban existing residential areas (Kaiapoi, The Pines Beach, Kairaki, Woodend Beach and Waikuku Beach)

6.6.1. The Council Flood Hazard Models assume that the underlying drainage infrastructure (including pipes and pumps) continues to operate. This is a satisfactory assumption for the majority of the District where there is little need to pump stormwater and good secondary flow paths exist. However Kaiapoi and the coastal urban areas are more dependent on pumps and pipelines continuing to operate to maintain the levels that the Flood Hazard model predicts. This is not

considered to be an appropriate assumption for these areas, because it is possible that this protection would have an outage during a large rainfall event, at some time during the life of a new house.

6.6.2. Therefore, the basis for determining a minimum floor level in Kaiapoi and the existing coastal urban areas is based on the possible depth of flooding if the pumping system was not working and/or the piped system became blocked. This differs from the Flood Hazard model results where the proposed property is in a 'basin' – i.e. the property level is lower than the surrounding ground levels (including stop banks). In this situation, the 'ponding' level takes precedence over the level from the Flood Hazard model.

6.6.3. The minimum floor levels in the existing urban areas of Kaiapoi, The Pines Beach, Kairaki, Woodend Beach and Waikuku Beach, where there are no underlying floor level requirements from existing subdivision and land use consents, are shown on the maps attached as Appendix 2.

6.6.4. The diagram below explains the floor level requirements for existing urban areas of Kaiapoi and the coastal urban areas.

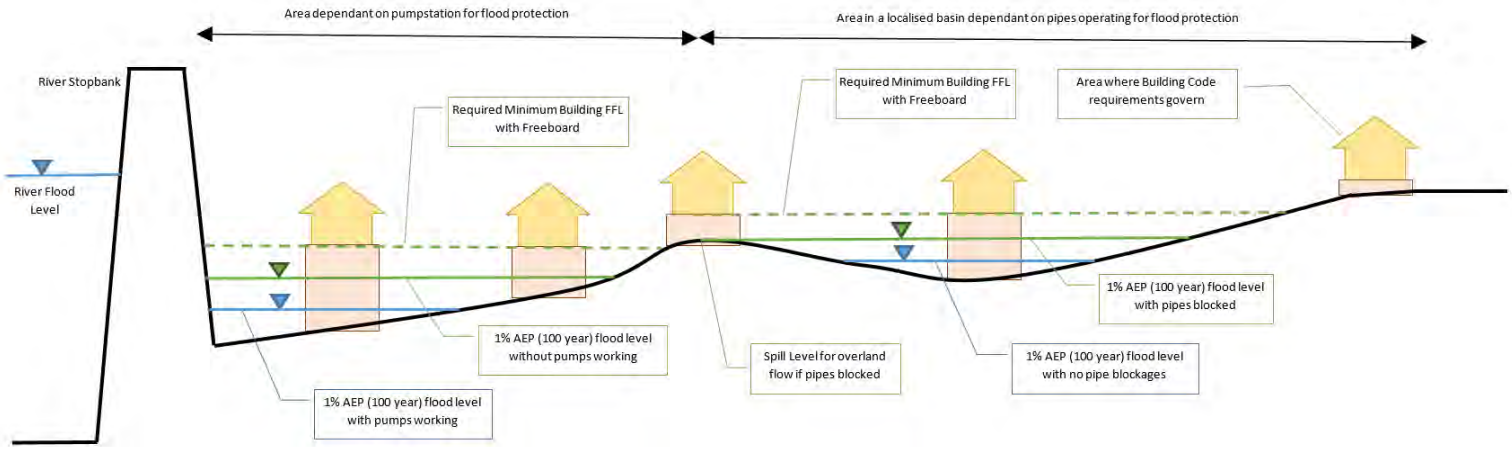


Figure 2: Urban Kaiapoi and Existing Coastal Developed Areas

7. Commercial Areas (Business 1, 2)

7.1. Advice will be given for these areas in relation to the flood level and freeboard as it would apply to residential. This information shall be advice only and the Building Act provisions shall apply.

8. Definitions

8.1. Annual Exceedance Probability is as defined in the Canterbury Regional Policy Statement: "the probability for a certain size of flood flow occurring in a single year."

8.2. Building Location Certificate – means a certificate prepared by a registered licensed professional surveyor

8.3. Current WDC Flooding Map – means the current available published localised flood hazard mapping generated by the Waimakariri District Council.

8.4. Finished Floor Level - means the level of the finished floor of the building. The finished floor level is measured from the top of the finished slab or top of floor joists and does not include decorative features or tiles. For residential sites that have been filled to achieve

minimum finished floor levels an attached garage may be exempt from compliance with a specified minimum finished floor level if the garage does not meet the building code requirements for a habitable space. If no formal finished floor level exists (for example pole sheds), the minimum finished floor level is deemed to be the height of undisturbed ground underneath the building.

8.5. Freeboard - Freeboard, for the purposes of this Technical Practice Note, refers to the height to a floor level above a mapped flood water level. The freeboard represents a margin of safety for effects of wind or wave action, vehicle wash, or other influences on the maximum height of floodwaters. It is important to note that this is not the same as height above ground level.

8.6. Greenfield development – means existing areas zoned residential (excluding rural residential) within the CRPS infrastructure boundary and that do not fall within the definition of infill development. Greenfield development includes applications for comprehensive residential allotments as defined in the Waimakariri District Plan (minimum of 4 dwellings). Note that Greenfield development areas may have specific floor level requirements imposed within the District Plan.

8.7. Height above ground level - The height above ground level is the difference between the floor level and the surrounding existing ground level.

8.8. Infill Development – means existing areas zoned residential (excluding rural residential) that contained a dwelling on <<date of practice note 2019>> and/or have the ability to erect up to three dwellings in accordance with the delineated area provisions, or a complying subdivision under the Waimakariri District Plan. Note that infill development areas may have specific floor level requirements imposed within the District Plan.

8.9. New urban Areas - New development areas have all had specific flood risk assessments as part of the Plan Change or Subdivision Consent process. In most cases this has resulted in a predetermined floor level being required for specific sites, or a set procedure to be followed to determine the minimum floor level.

8.10. Suitably Qualified Person – means a Chartered Professional Engineer with expertise in flood hazard assessment, or equivalent

8.11. Surrounding Ground Level - means the highest undisturbed natural ground level at the proposed building location and should be determined by appropriate spot heights intersecting the dwelling location. For all zones, '*Surrounding Ground Level'* should be expressed as a pre or post development level if earthworks have, or are anticipated to occur. This ensures that any cut or fill of building platforms is accounted for. '*Finished Formation Level*' has the same meaning as surrounding ground level.

9. Review

9.1. This document is anticipated to be reviewed to incorporate the updated District Plan natural hazards provisions.

Where a flood risk assessment is submitted by an external consultant reference shall be made to these standard definitions. Any alternative definition or meaning used shall be defined by the report author within the flood risk assessment.

Appendix 1 (Canterbury Regional Policy Statement 33.3.2)

11.3.2 Avoid development in areas subject to inundation
In areas not subject to Policy 11.3.1 that are subject to inundation by a 0.5% AEP flood event; any new subdivision, use and development (excluding critical infrastructure) shall be avoided unless there is no increased risk to life, and the subdivision, use or development:

1. *is of a type that is not likely to suffer material damage in an inundation event; or*
2. *is ancillary or incidental to the main development; or*
3. *meets all of the following criteria:*
    a. *new buildings have an appropriate floor level above the 0.5% AEP design flood level; and*
    b. *hazardous substances will not be inundated during a 0.5% AEP flood event;*

The table below summarises the flood level and freeboard requirements (Except for Kaiapoi and coastal urban areas, where there is a separate Flood Level Map.

Figure 3:

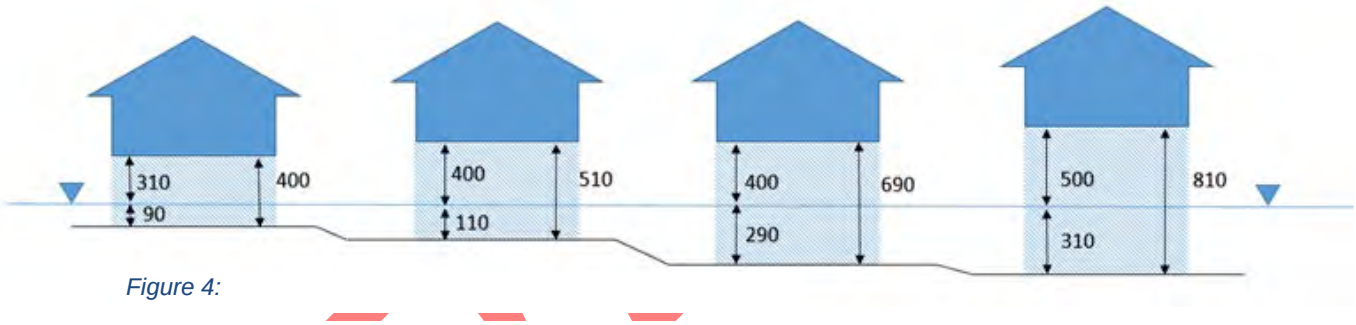
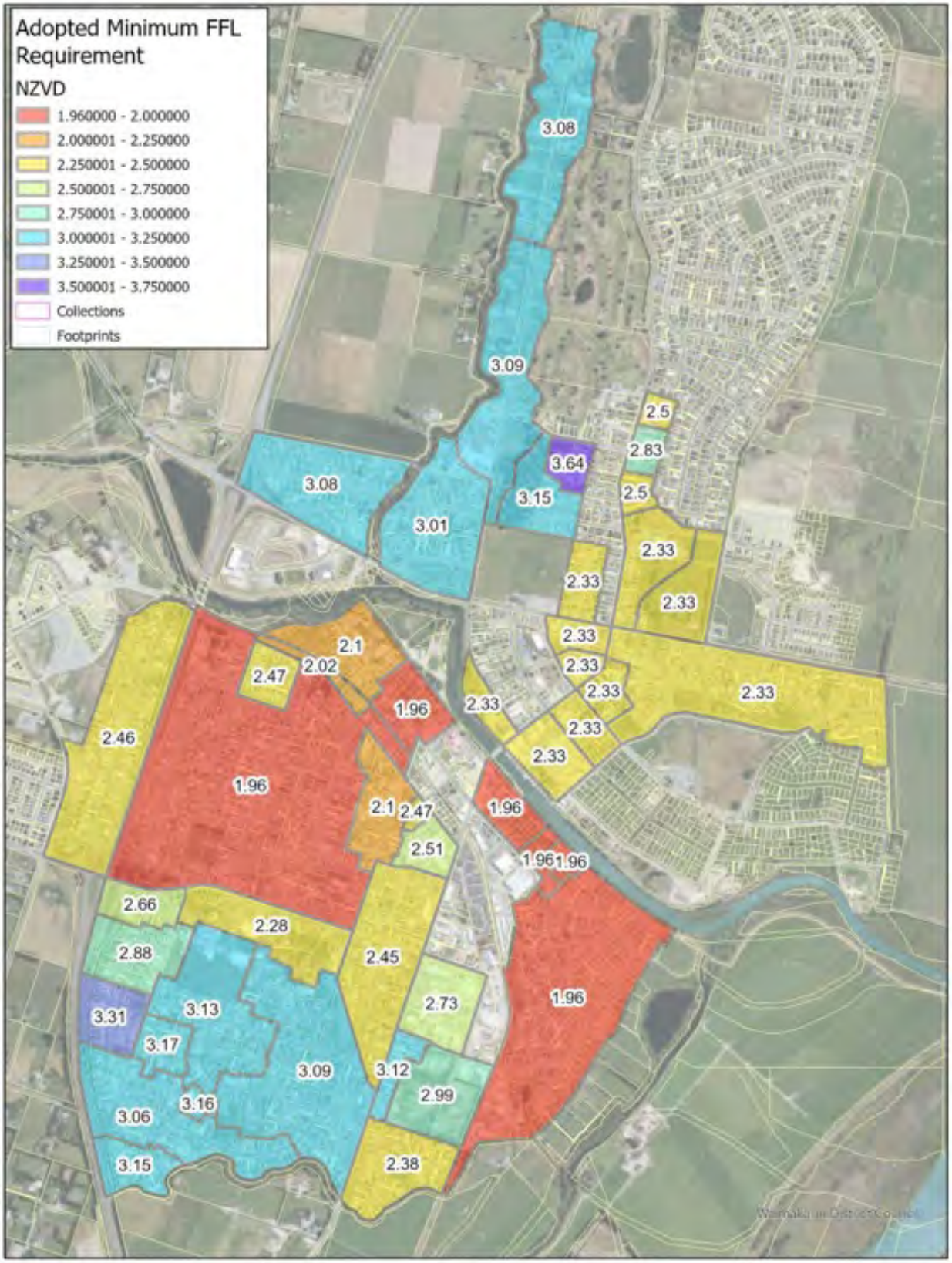


Figure 4:

FREEBOARD			
	Urban Greenfield (4 or more buildings)	Urban Brownfield (3 or fewer dwellings)	Rural (200yr)
Very low (VL)	500mm (200 year)	BC / RC	300mm (400mm above ground allows for 100mm with + 300mm freeboard)
Low (L)	500mm (200 year)	400mm (100 year)	400mm
Medium (M)	500mm (200 year)	500mm (100 year)	500mm
High (H)	500mm (200 year)	500mm (100 year)	No Build

Appendix 2) Kaiapoi and Existing Developed Coastal Urban Areas Minimum Finished Floor Levels



Adopted Minimum FFL Requirement

NZVD

- 1.960000 - 2.000000
- 2.000001 - 2.250000
- 2.250001 - 2.500000
- 2.500001 - 2.750000
- 2.750001 - 3.000000
- 3.000001 - 3.250000
- 3.250001 - 3.500000
- 3.500001 - 3.750000

WAIMAKARIRI DISTRICT COUNCIL	Coastal Settlements Adopted Minimum Floor Level Requirements New Zealand Vertical Datum 2016	SCALE (A4) 1:12,000 DATE 26/07/2022	

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO AND TRIM NO:	TSU-22 / 200106000237
DATE:	6 January 2020
MEMO TO:	Flood and Floor Level Working Group
FROM:	Gerard Cleary, Manager Utilities and Roading
SUBJECT:	Minimum Floor Levels in Kaiapoi (existing urban area)

Background

Recent modelling work and discussions with the working group have led to a detailed assessment of two critical flood basins in Kaiapoi.

For most of the existing town of Kaiapoi a minimum floor level based on the 200 year flood (with the pump system working) plus freeboard gives floor levels that are sensible and in keeping with the surrounding urban area. The Network Planning Team Leader, Chris Bacon, has prepared maps that break the town into areas with minimum floor levels based on this criteria.

There are two areas that warranted a more detailed analysis.

1. The Meadow Street / Bracebridge / Feldwick area.
2. The Otaki Street area, bounded by Whitefield Street / Ohoka Road/ Williams Street / and the Kaiapoi River.

This memo discusses each of these areas separately.

These two areas are low lying and reliant on stop banks, a functioning drainage network and pumps to prevent flooding in extreme floods. They are areas that have flooded in the past and require active management by staff and contractors during flood events. Due to these factors additional freeboard is required to manage the additional risks associated with these areas.

Attachments

i. Feldwick / Meadow Street Area, Ground Level Map
ii. Otaki Street Area, Ground Level Map
iii. Feldwick / Meadow Street FFL Examples
iv. Otaki Street Area FFL Examples

Area 1. East Kaiapoi (Feldwick/Meadow/Bracebridge)

The proposed minimum floor level for this area is 2.0m RL.

Typical Ground levels.

The lowest ground levels in this area are road levels that are just at or below 1.0m RL in Meadow Street, Bracebridge, Kalmia, and Ellen Place (Road). The lowest ground level in this area is 0.89m RL on the road carriageway near the eastern end of Bracebridge Street.

There is a small area of residential land between Bracebridge and Beach Road that is at or just below 1.0m RL. Otherwise the lowest lying residential areas in Bracebridge and Meadow Street are in the order of 1.0m to 1.2m RL. With the rest of the low lying areas in Grey Crescent,

Feldwick and Moore Street 1.2 to 1.4m RL. Higher ground in these areas is in the order of 1.4 to 2.0m RL.

Flood Levels

Various flood model levels are discussed in the sections below to compare against the proposed minimum floor level of 2.0m RL.

2019 Urban Kaiapoi Flood Model.
Recent modelling work which includes the Pump Stations in Kaiapoi operating have yielded the following flood levels.

1% AEP (100 year) Flood level 1.29m RL
0.5% AEP (200 year) Flood level 1.39m RL.

Ashley River Breakout (ECAN) Model
An additional check has been made for the following flood scenarios.
Ashley River Ecan Breakout modelling, 100 year, no flooding in this area.
Ashley River Ecan Breakout modelling, 200 year, 0.3 to 0.62m deep flooding in the lowest point in Bracebridge Street. (Approx. flood level 1.51m RL).

Actual Flood Observations
My own observations during storms in June 2014 and June 2019 would indicate water levels of up to 1.2m RL.

2015 Localised Flood Hazard Mapping
The 2015 Localised flood mapping for this area that was carried out by Waimakariri District Council and is used for the district wide flood hazard assessment was also considered. This is accepted as being very conservative and not directly applicable to Kaiapoi given that it does not make any allowance for the primary reticulation and assumes none of the pumps are working.

This model yields the following results:
1% AEP (100 year) 0.61m deep flooding in the lowest point in Bracebridge Street. (Approx. flood level 1.50m RL).
0.5%AEP (200 year) 1.18m deep flooding in the lowest point in Bracebridge Street. (Approx. flood level 2.07m RL).

Floor Levels

A minimum floor level of 2.0m RL is proposed for this area. This achieves a freeboard of 700mm above the 1% AEP flood level and 600mm above the 0.5% AEP flood level.

Most houses in the area are timber floors on plies and joists. These floor levels would typically be up to 0.5m above the ground level. So in the lowest lying areas house levels will be as low as 1.5m. More typical levels will be 1.7 to 1.9m RL.

There is no absolute minimum floor level that has been adopted in the District. Discussions with relevant engineers within WDC have suggested that it would be appropriate to have a mandatory minimum level. There is some merit in this approach. For the purposes of the assessment in this area 2.0m has been adopted. This equates to the same water level in the Kaiapoi River at high tide during a fresh in the Waimakariri River. Using this as an absolute minimum for Kaiapoi will give some reassurance that in the event of pumps not working or a serious disaster situation where the river bank was breached outside a major storm event house levels would be at least at this level.

The proposed level of 2.0m is tested below against a number of scenarios.

1% AEP, 100 year flood level pumps on 1.3mRL, plus 700mm freeboard.
0.5% AEP 200 year flood level pumps on 1.4m RL, plus 600mm freeboard.
1% AEP 100 year flood level pumps not working, 1.5m RL. plus 500mm freeboard. (Note that this is a very conservative scenario as described above)
0.5% AEP, 200 year flood level pumps off, no freeboard. Flood level is approximately 70mm above the floor level. (Note that this is an unrealistic and overly conservative scenario as described above)

A comparison of this level with typical ground levels is also made below for the purposes of seeing how this will fit into existing housing and the local landscape. Diagrams of some typical houses have been appended to this report. This shows that a minimum floor level of 2.0m will result in houses that will be able to fit into the existing streetscape.

In the lowest lying area the ground level is 1.0m RL a floor level of 2.0m would require the house to be 1.0m above the ground. They will be out of context with other existing houses that may be 400 to 500mm above the ground. Given these areas are regularly subject to flooding this is not unreasonable.

The majority of the area is 1.2 to 1.4m RL. This would put the houses 600mm to 800mm above the ground level. This will not be entirely out of context in this situation and should fit into the landscape reasonably well.

Area 2, The Otaki Street area, bounded by Whitefield Street / Ohoka Road/ Williams Street / and the Kaiapoi River.

The proposed minimum floor level for this area is 2.82m RL. This achieves a freeboard of 1.0m above the 1% AEP (100 year) flood level. The minimum floor level matches the predicted 0.5% AEP (200 year) flood level. On balance this provides a good level of protection for an area that is already built up with most existing houses built lower than this level.

Typical Ground levels.

The lowest ground levels in this area are road levels these are between 1.0 and 1.2m in Evans Place and Porters Place.

The lowest property levels are in the order of 1.4 and 1.6m RL. The typical property levels in the broader area are 1.6 to 1.8m RL.

Flood Levels

Various flood model levels are discussed in the sections below to compare against the proposed minimum floor level of 2.0m RL.

2019 Urban Kaiapoi Flood Model.
Recent modelling work which includes the Pump Stations in Kaiapoi operating have yielded the following flood levels.

1% AEP (100 year) Flood level 1.82m RL
0.5% AEP (200 year) Flood level 2.82m RL.

Ashley River Breakout (ECAN) Model
Checks made against the Ashley River Breakout modelling show that no flooding will occur in this area either in the 1% AEP (100 year) or 0.5% AEP (200 year) events.

Actual Flood Observations
My own observations during storms in June 2014 and June 2019 would indicate water levels of up to1.6m RL.

2015 Localised Flood Hazard Mapping
An additional check has been made against the 2015 Localised Flood Mapping for this area which is considered very conservative and not directly applicable to Kaiapoi given in does not make any allowance for the primary reticulation and assumes none of the pumps are working. Furthermore, the Kaiapoi River stopbanks in this area are not modelled accurately enough in the 2015 study resulting in unrealistic water levels in the urban area.
For the 0.5% AEP (200 year) scenario, approximately 2.3m deep flooding is modelled on properties in the lowest lying areas, and 1.5 to 2.0m in the broader area. (Approx. flood level 3.40m RL).
For the 1% AEP (100 year) scenario, 2.0m deep flooding is modelled in the lowest properties in the lowest lying areas, and 1.2 to 1.7m in the broader area. (Approx. flood level 3.10m RL).
Given these scenarios are unrealistic and overly conservative this assessment is dismissed for the purposes of this memo. The 2015 modelling was prepared solely to help identify flood hazard areas and is not suitable for setting minimum floor levels in the existing urban area of Kaiapoi.

Floor Levels

A minimum floor level of 2.82m RL is proposed for this area.

Most houses in the area are timber floors on plies and joists. These floor levels would typically be up to 0.5m above the ground level. So in the lowest lying areas house levels will be as low as 2.0 m. More typical levels will be 2.1 to 2.2m RL.

For the purposes of this memo a 2.82 minimum floor level is tested.
This would equate to 1.0m freeboard above the 1% AEP storm with the pumps and primary system operating. It is also at a level that matches the localised 0.5% AEP flood level (with pumps and primary system working).

In terms of being in context with the surrounding area this would make houses substantially higher than neighbouring properties. This in itself can lead to localised drainage issues with one property due to being so much higher than its neighbour causing localised issues. Also in term of the streetscape this can cause issues with privacy and day to day living.

The working group has carried out an assessment of how any new houses constructed to a 2.82m floor level would relate to the existing street scape. Some diagrams showing this assessment are appended to this report. This shows that despite having floor levels higher than neighbouring properties houses could be constructed in keeping with the streetscape.'

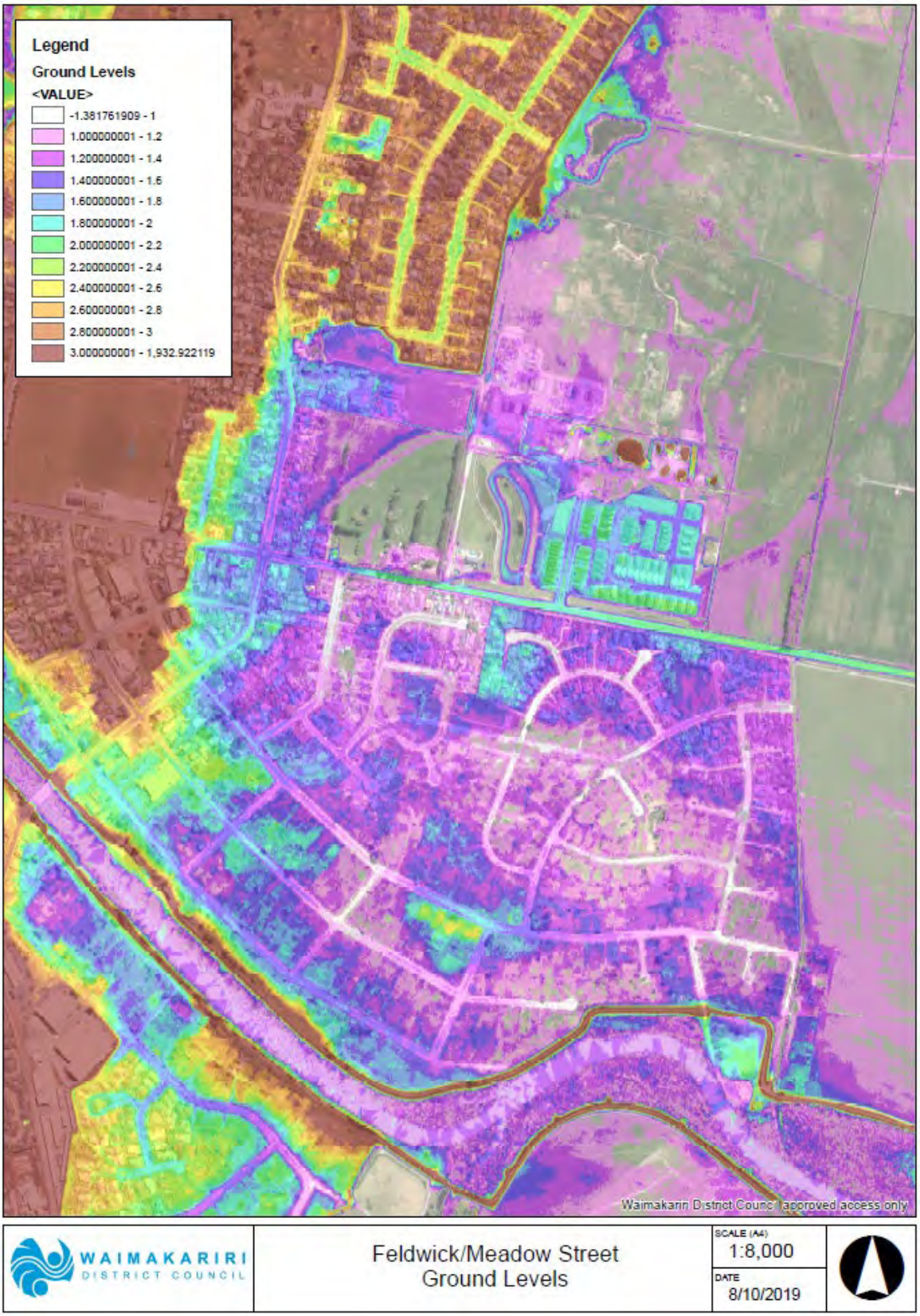
Conclusion / Recommendation.

It is recommended that the following minimum floor levels are adopted.

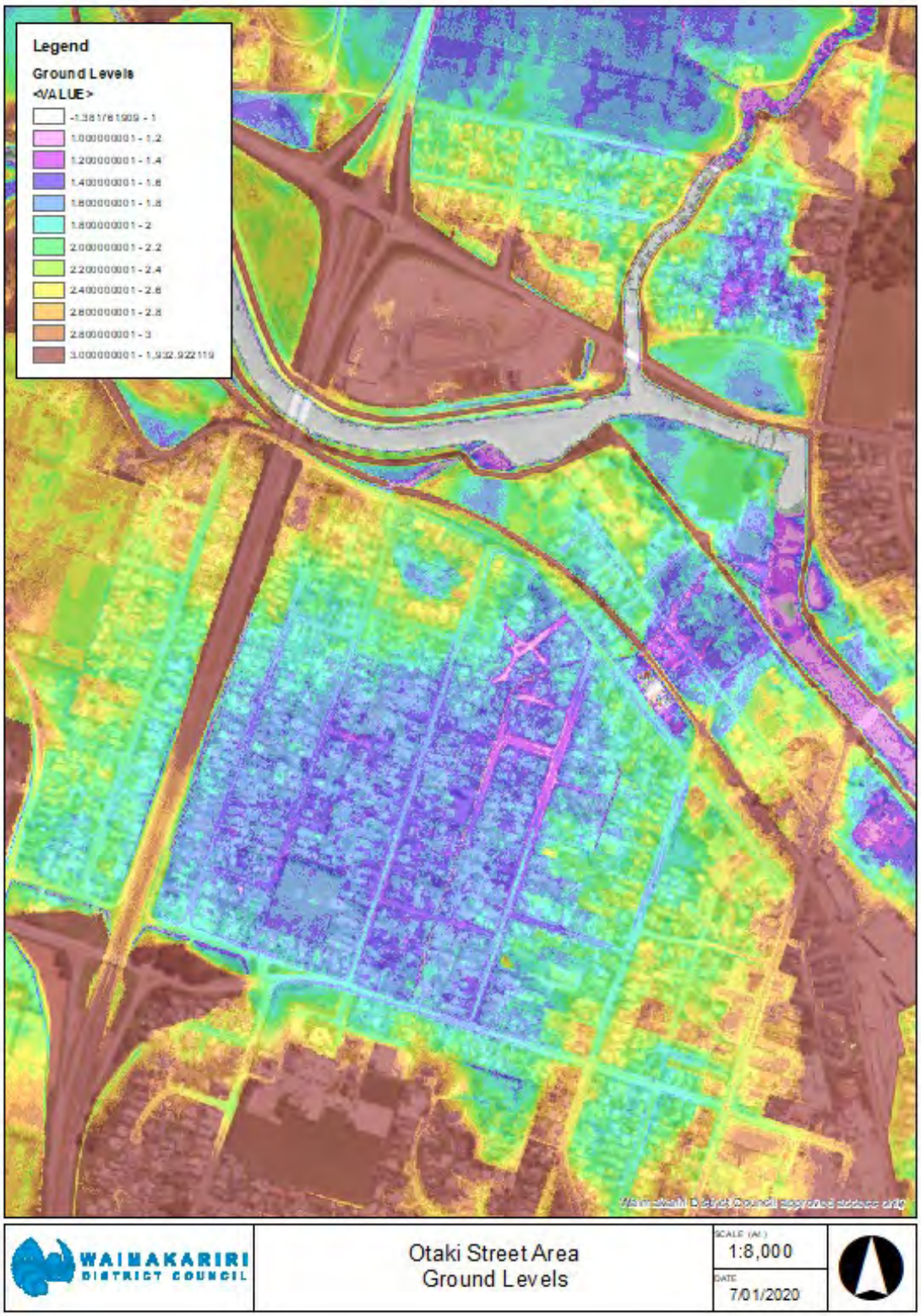
Area 1. East Kaiapoi (Feldwick/Meadow/Bracebridge). The proposed minimum floor level for this area is 2.0m RL.

Area 2, The Otaki Street area, bounded by Whitefield Street / Ohoka Road/ Williams Street / and the Kaiapoi River. The proposed minimum floor level for this area is 2.82m RL.

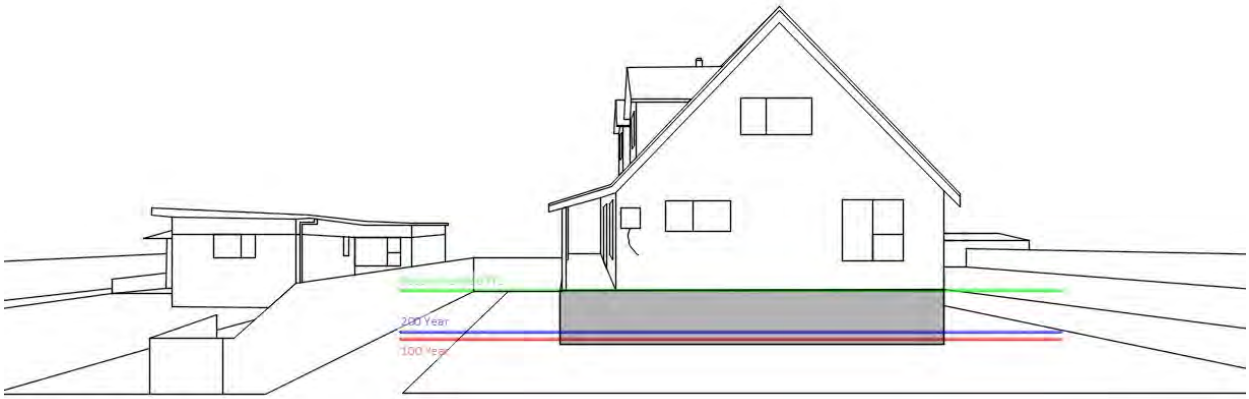
Appendix i) Feldwick / Meadow Street Area

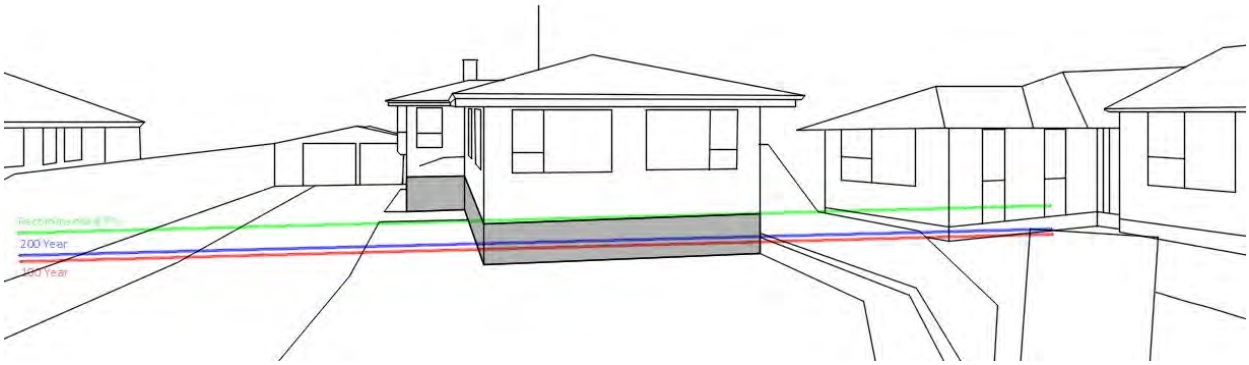


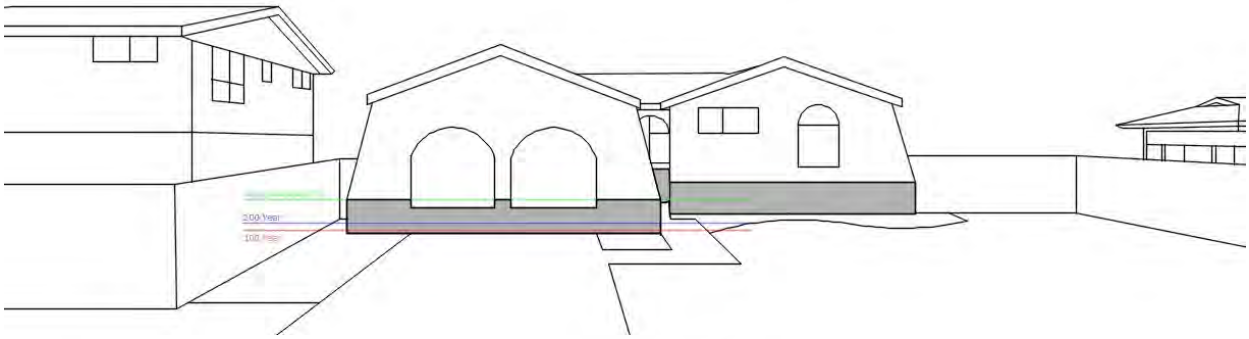
Appendix ii) Otaki Street Area



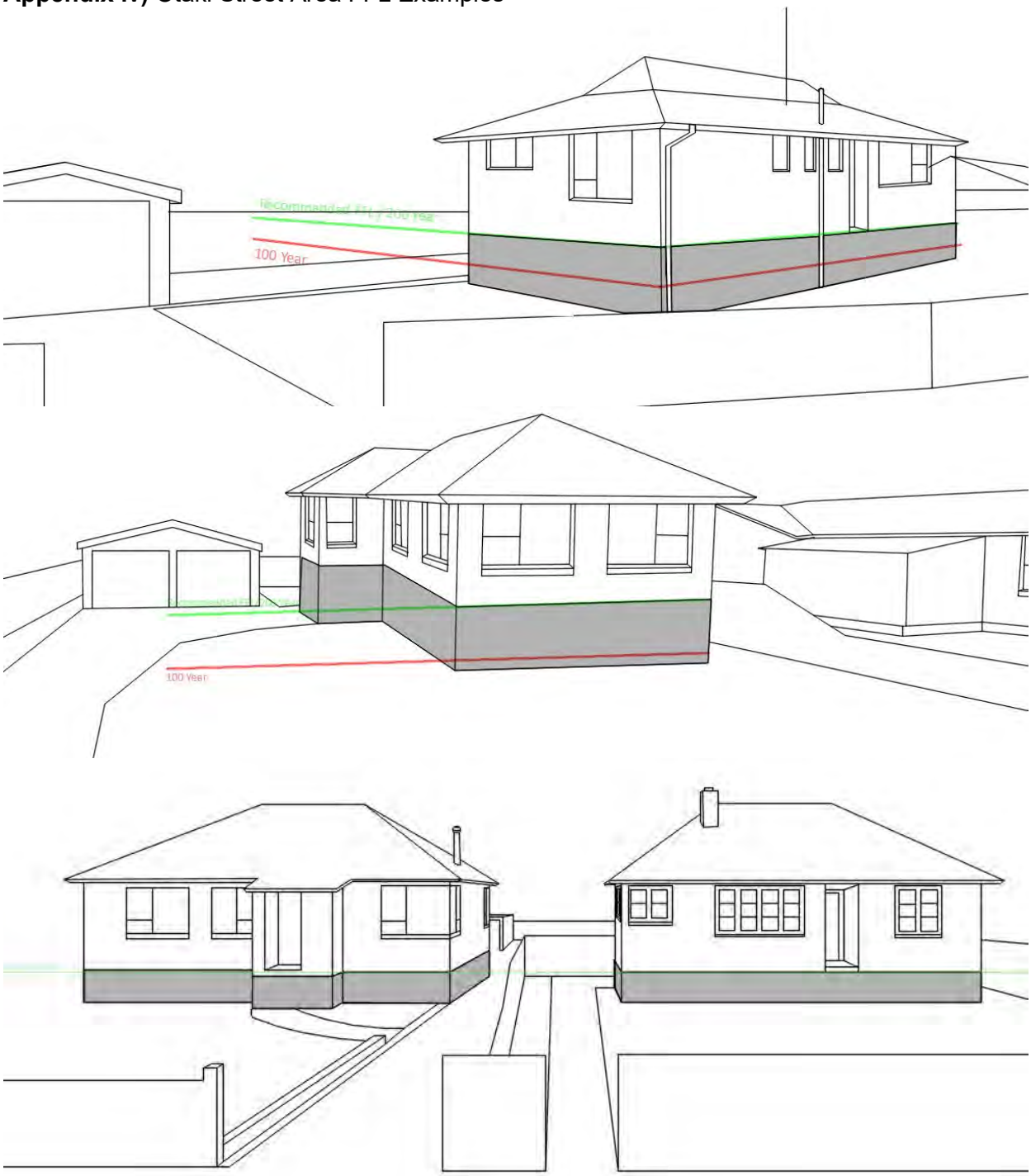
Appendix iii) Feldwick / Meadow Street FFL Examples

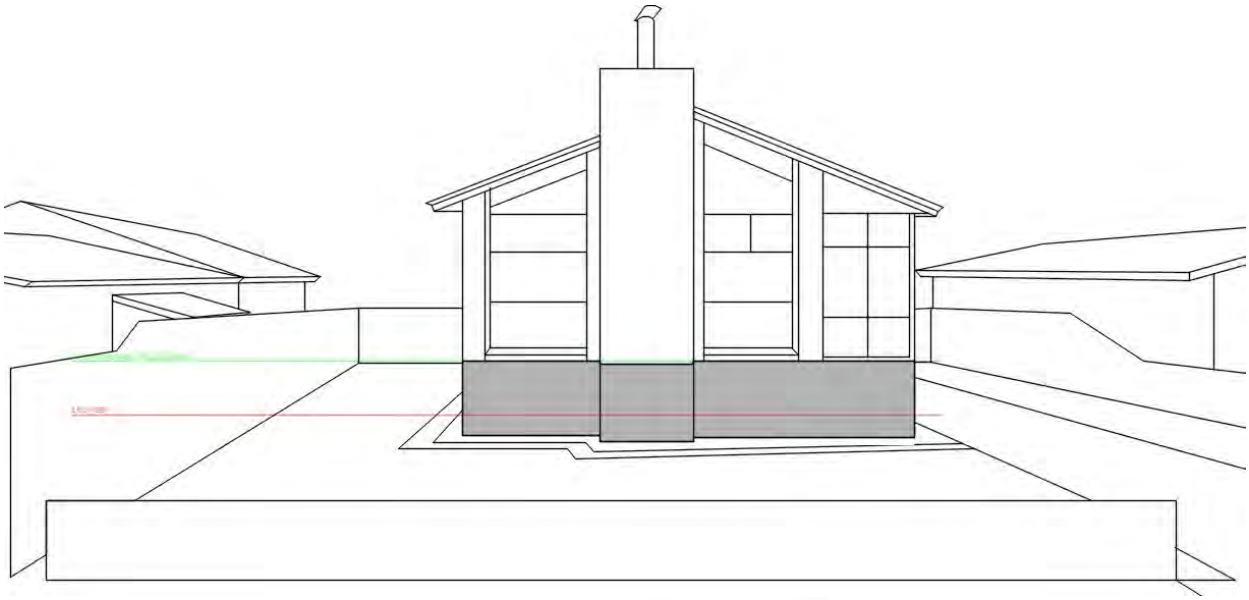


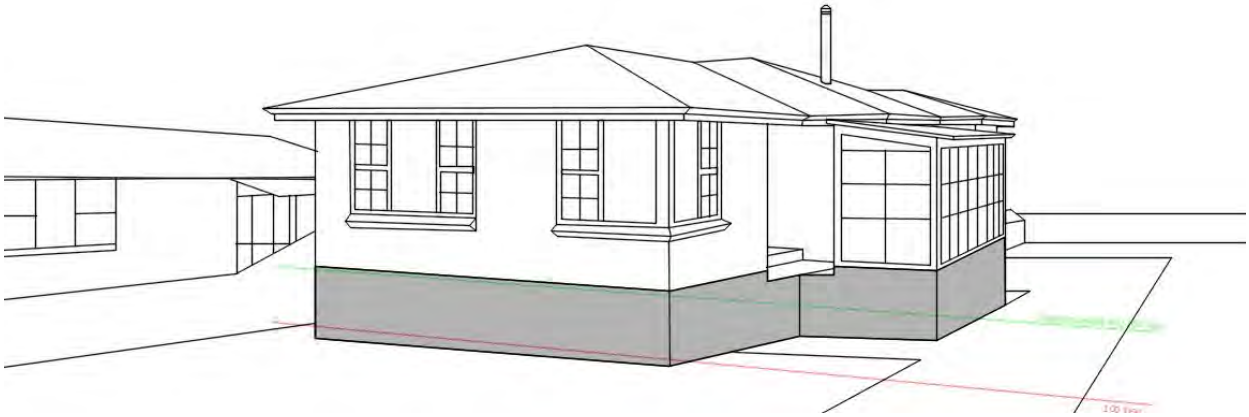




Appendix iv) Otaki Street Area FFL Examples







WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO AND TRIM NO:	TSU-22 / 200114003406 [v2]
DATE:	29 July 2022
MEMO TO:	Gerard Cleary, Manager – Utilities and Roading
FROM:	Chris Bacon, Network Planning Team Leader
SUBJECT:	Kaiapoi Minimum Finished Floor Level – Technical Memorandum 2022 Update

Gerard

The purpose of this memo is to document the technical work undertaken to help determine the minimum Finished Floor Levels (or FFL) that the Council should adopt within the Kaiapoi township and the Coastal settlements of Pines Kairaki, Woodend Beach and Waikuku Beach.

This work is a revision of the work undertaken in 2020 which incorporates a number of improvements including:

- Updated 2020 Flood Modelling
- Coastal Inundation Modelling
- Levels expressed in terms of New Zealand Vertical Datum 2016
- Inclusion of the residential beach settlements of Pines Kairaki, Woodend Beach and Waikuku Beach

Refer to TRIM 200114003406 [v1] for the previous 2020 Memo.

This work will inform the Technical Practice Note on Flood Mapping Freeboard and Finished Floor Levels (TRIM 200106000520).

This memo contains a number of figures and plans which can all be found in full scale in the Appendix.

1. Information and Data

The 2020 District Flood Modelling was used as the basis for this work. This work was completed in 2020 and featured the following assessments

- Localised Flooding
- Ashley Breakout Modelling
- Coastal Inundation

The 100 year ARI flood event was used throughout this work as this represents the return period to demonstrate compliance with the Building Act. It is noted that new greenfield subdivision or other comprehensive developments would normally require specific assessment with regards to the 200 year ARI flood event to meet the requirements under the ECAN Regional Policy Statement. Therefore the minimum finished floor levels presented in this memo should not be used for comprehensive or greenfield development within the urban zone without specific approval from the Utilities and Roading Manager or the Planning and Regulation Manager.

Refer to Figure 1 and Figure 2 for the 2020 Flood Modelling Results for Kaiapoi and the coastal settlements.

The 2020 Flood Modelling was based on the 2014 LiDAR survey with the inclusion of developer provided DEMs where available. The LiDAR data and the flood modelling results were used to determine the Flooding RL levels.

Refer to Figure 3 and Figure 4 for the 2014 LiDAR Ground Levels in the Kaiapoi Area and the Coastal Beach Settlements.

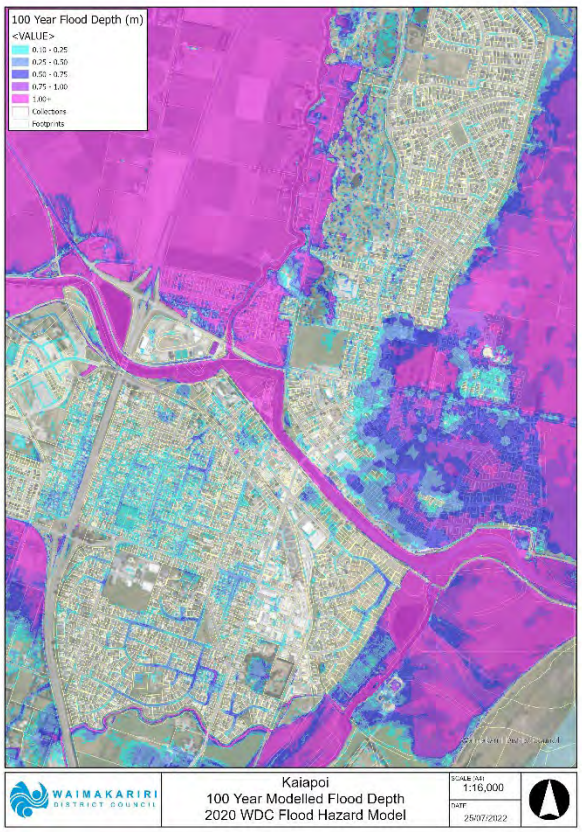


Figure 1 - Kaiapoi 100 Year Modelled Flood Depth

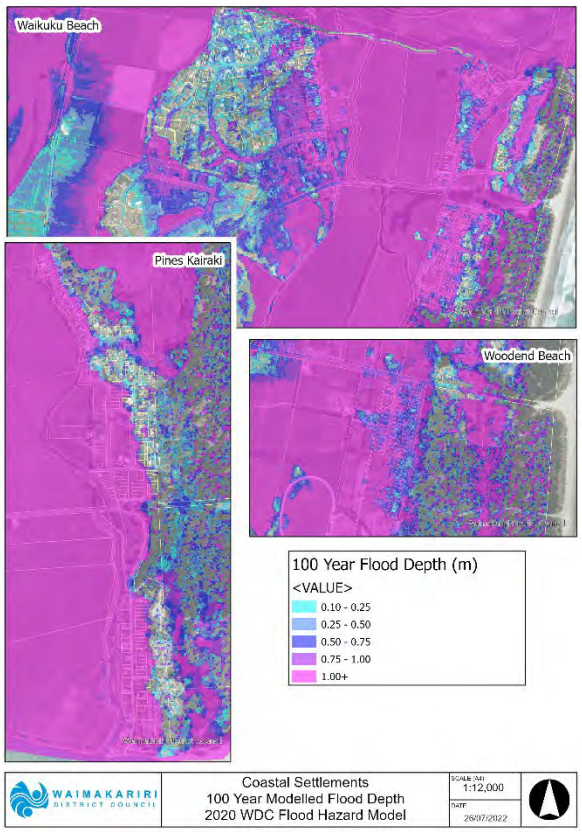


Figure 2 - Coastal Settlements 100 Year Modelled Flood Depth

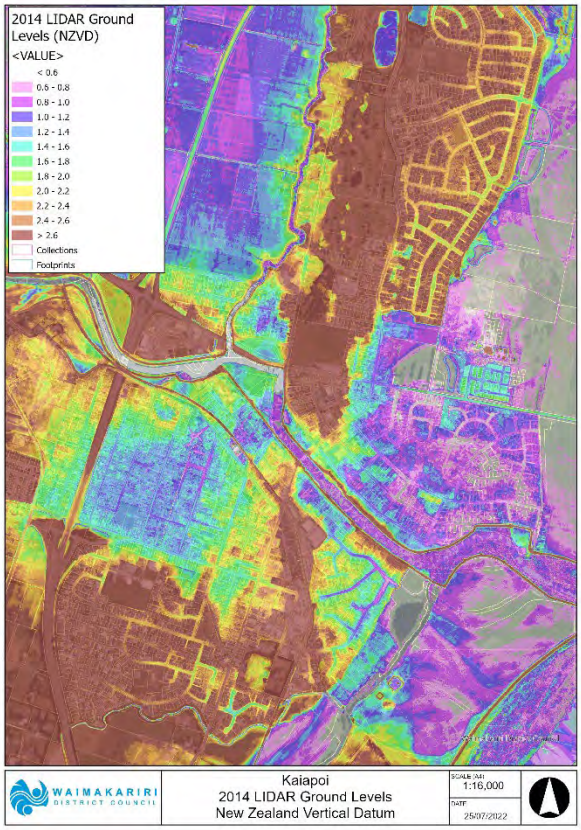


Figure 3 - Kaiapoi LIDAR Levels

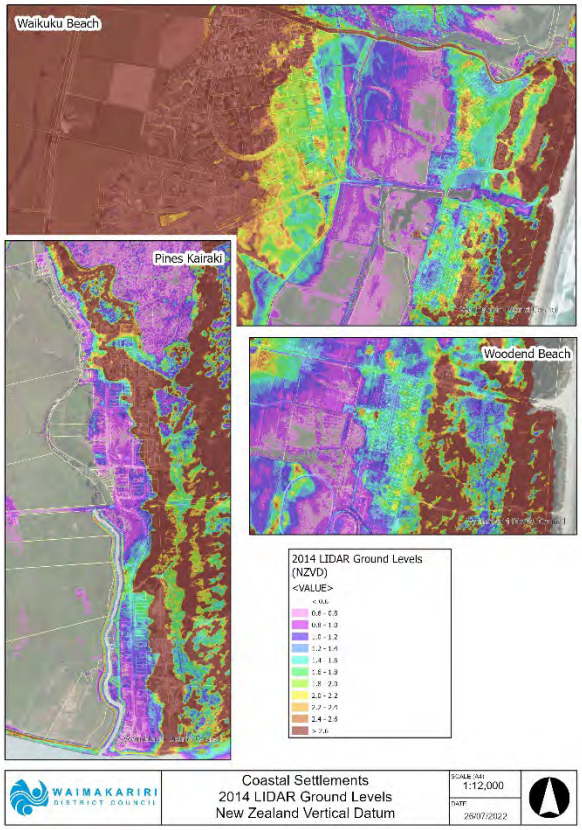


Figure 4 - Coastal Settlements LIDAR Levels

2. Delineation of Flood Basins

In Kaiapoi it was necessary to consider the impact of a localised flood basins in the event that stormwater infrastructure (such as pipes, pumps etc) could fail. In these areas overland flowpaths are not available and flood depths could be more significant than those presented in the flood model results.

In the Coastal Settlements these flood basins only represented areas directly affected by Coastal or Ashley Breakout Flooding where properties formed part of a larger flood basin often covering the full settlement.

Flood depths from the model results were used to determine localised flood basins where flood levels represented a homogenous surface and there was no overland flowpath available. Flooding within these basins would occur whenever the primary infrastructure failed or was overwhelmed by incoming stormwater flows. The basins were delineated manually using the mapped flood depths and the 2014 LiDAR data.

Refer to Figure 5 and Figure 7 for the assessed flood basins in Kaiapoi and the Coastal Settlements.

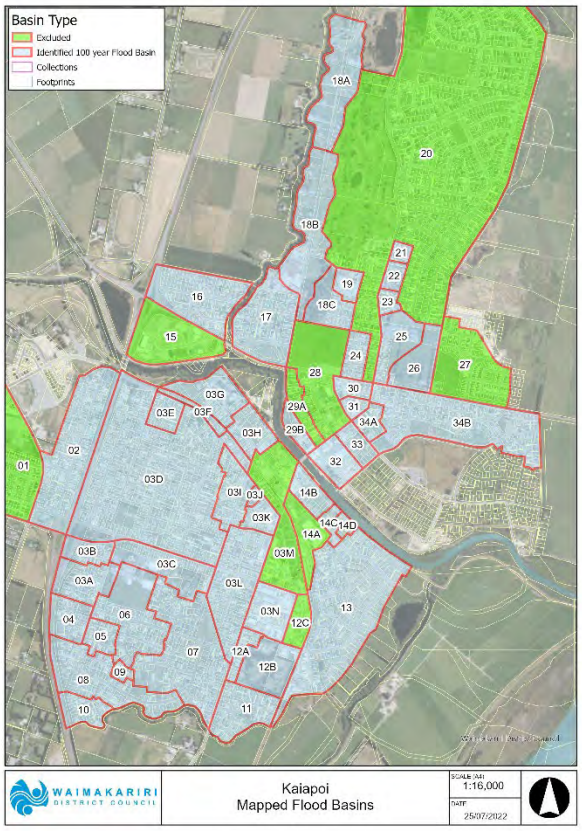


Figure 5 - Kaiapoi Flood Basins

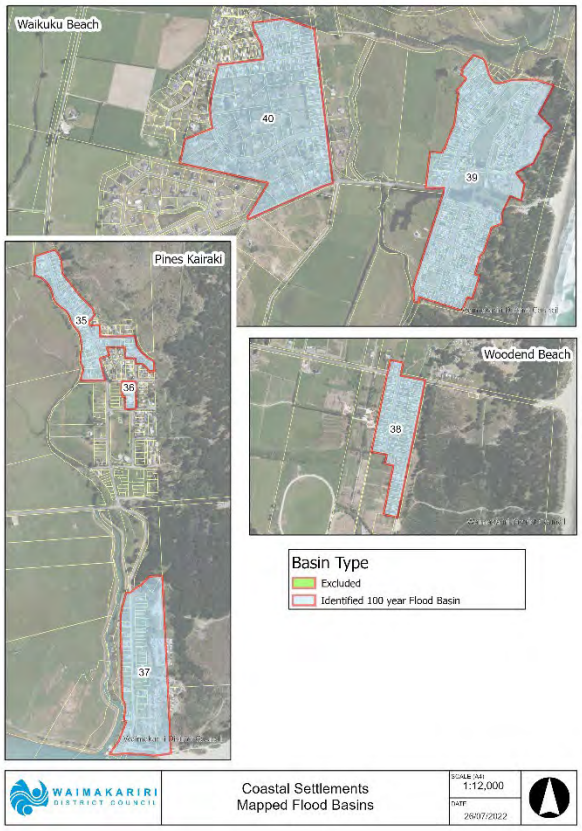


Figure 6 - Coastal Settlements Flood Basins

Some of the urban areas in Kaiapoi were specifically excluded from this flood basin assessment either because

a) They were subject to specific Resource Consent Conditions for Finished Floor Levels and/or
b) They did not feature any significant flooding or exhibit basin behaviour (ie floodwaters were able to flow away freely)

These areas are shown in green on Figure 5.

Using the flood depths from the flood models and LiDAR data it was then possible to determine a relative flood level for each basin in terms of Reduced Level[1] (or RL). The flood level was determined based on where the homogenous flood surface had formed. Areas where floodwater was flowing across land or where surface water had formed in small localised hollows were ignored. This was undertaken as a manual exercise.

Refer to Figure 7 and Figure 8 for the 100 Year Flood Levels in each assessed Flood Basin

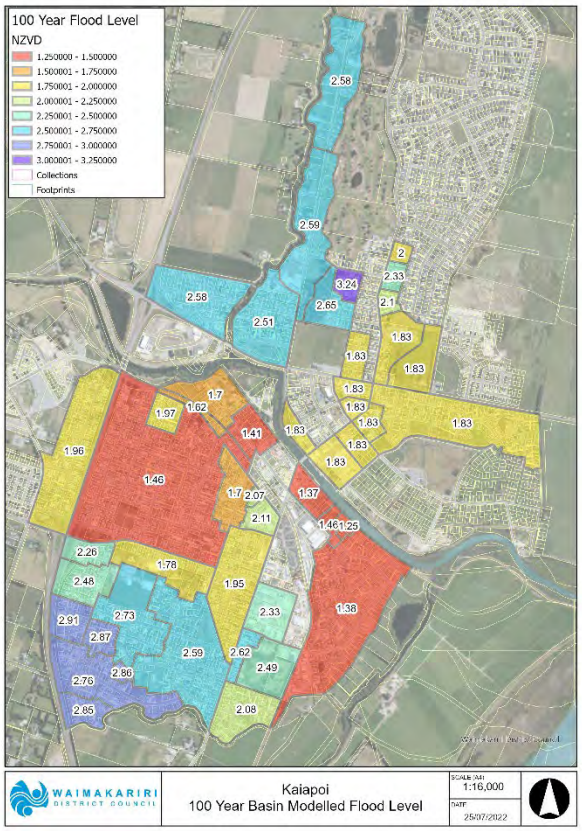


Figure 7 - Kaiapoi 100 Year Flood Level

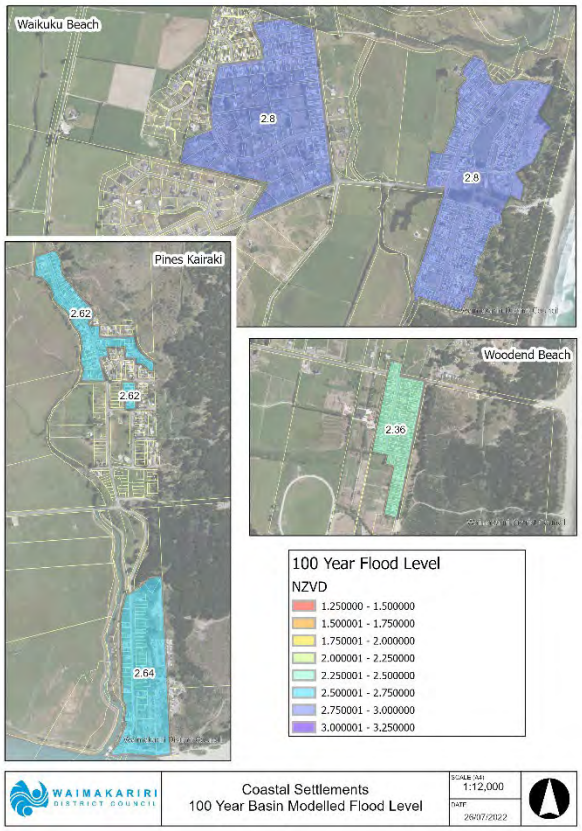


Figure 8 - Coastal Settlements 100 Year Flood Level

[1] The Reduced Level used is based on the New Zealand 2016 Vertical Datum. These levels have been translated from the Lyttelton 1937 Vertical Datum which was the vertical datum used for both the 2020 Flood Modelling and the 2014 LiDAR survey.

3. Determination of Freeboard

Each flood basin was then assigned a suitable freeboard based on the modelled flood hazard and the freeboard guidelines developed as part of the Flood Mapping Freeboard and Finished Floor Levels Practice Note (TRIM 200106000520). Table 1 summarises the freeboard requirements used for the different hazard categories.

Table 1 - Minimum Freeboard Requirements

Flood Hazard[2]	Minimum Freeboard
Very Low (White)	300mm
Low (Green)	400mm
Medium to High (Blue and Red)	500mm

Refer to Figure 9 and Figure 10 for the Modelled 100 Year Flood Hazard Categories

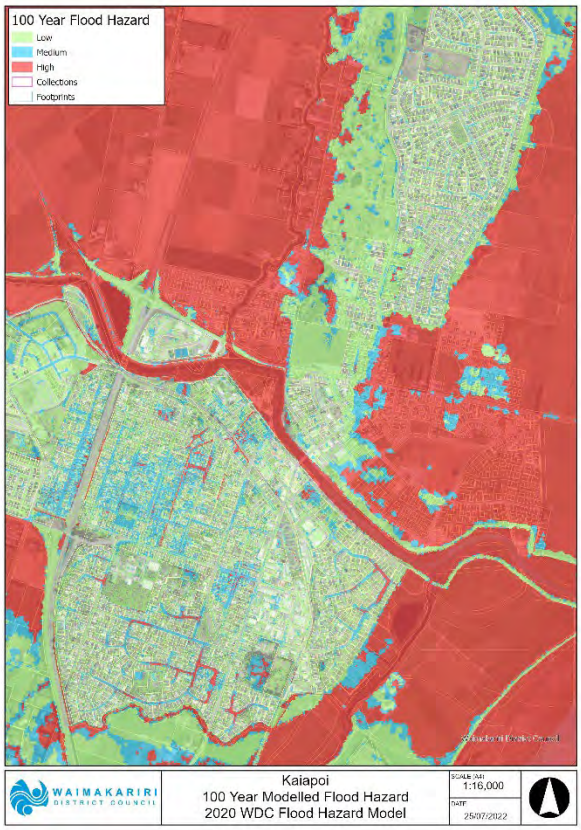


Figure 9 - Kaiapoi 100 Year Flood Hazard

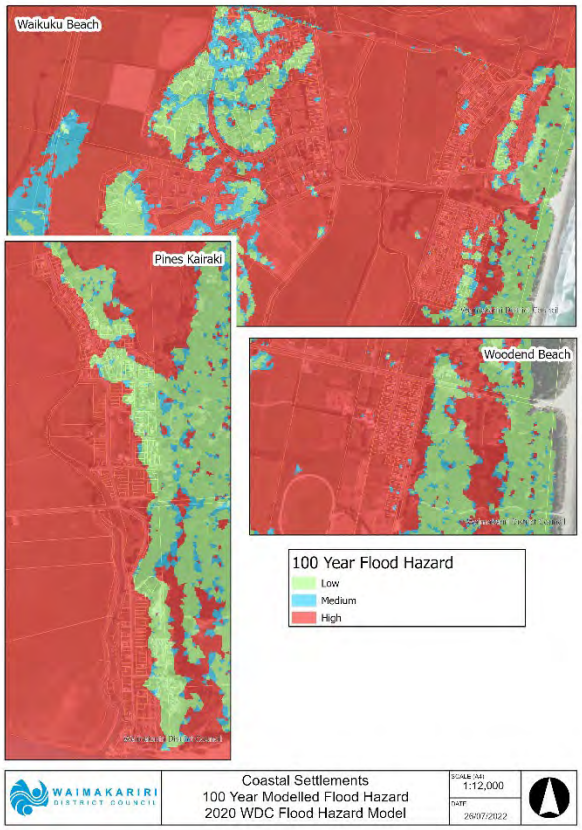


Figure 10 - Coastal Settlements 100 Year Flood Hazard

[2] Flood Hazard as assessed on land parcels. Higher levels of flood hazard may be present on the adjoining road corridor

Refer to Figure 11 and Figure 12 for the assessed freeboard requirement at each basin for the 100 Year flood events.

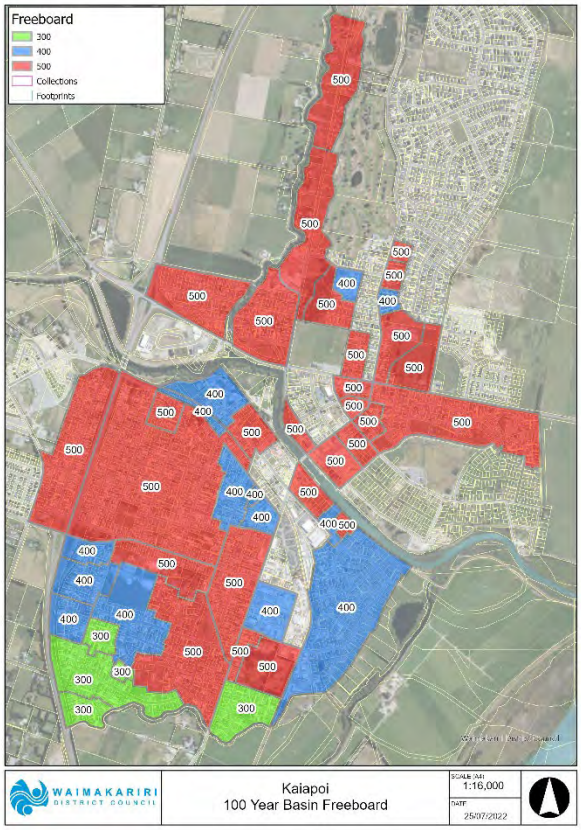


Figure 11 - Kaiapoi 100 Year Freeboard Requirement

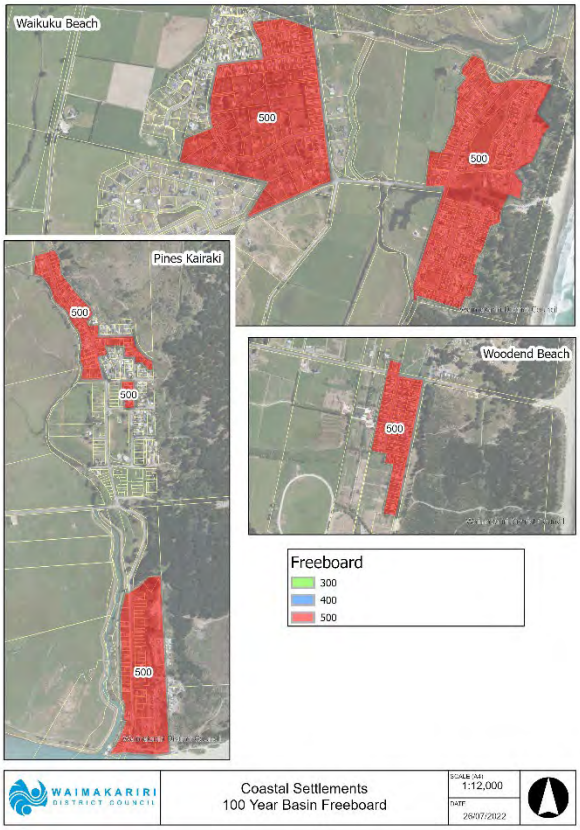


Figure 12 - Coastal Settlements 100 Year Freeboard Requirement

4. Determination of Minimum Finished Floor Level

Taking the adopted freeboard for each flood basin and adding this to the modelled flood depth it was then possible to specify a minimum FFL for each basin. This FFL represents the safe finished floor level within each basin area to prevent inundation due to ponding. Some properties may still require higher floor levels where they are subject to overland flow or Building Code requirements.

Refer to Figure 13 and Figure 14 for the minimum Finished Floor Level requirement for each flood basin.

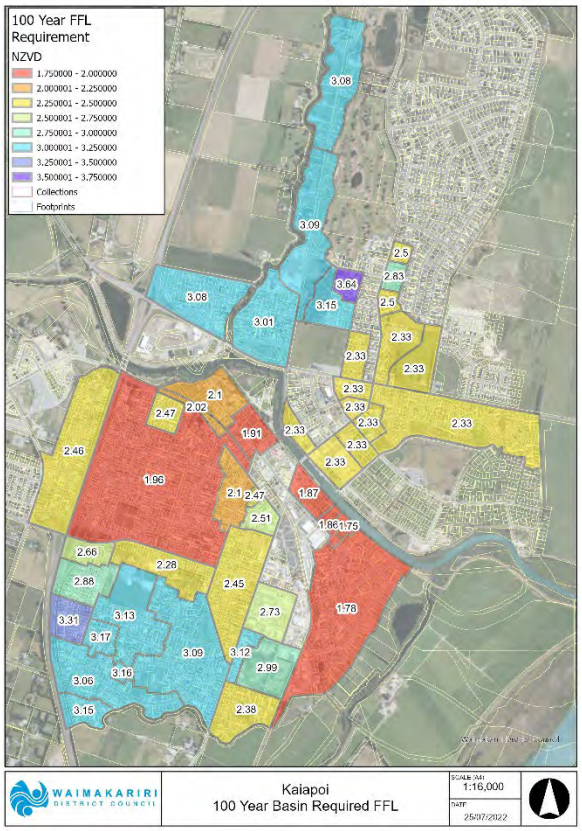


Figure 13 - Kaiapoi 100 Year FFL Requirement

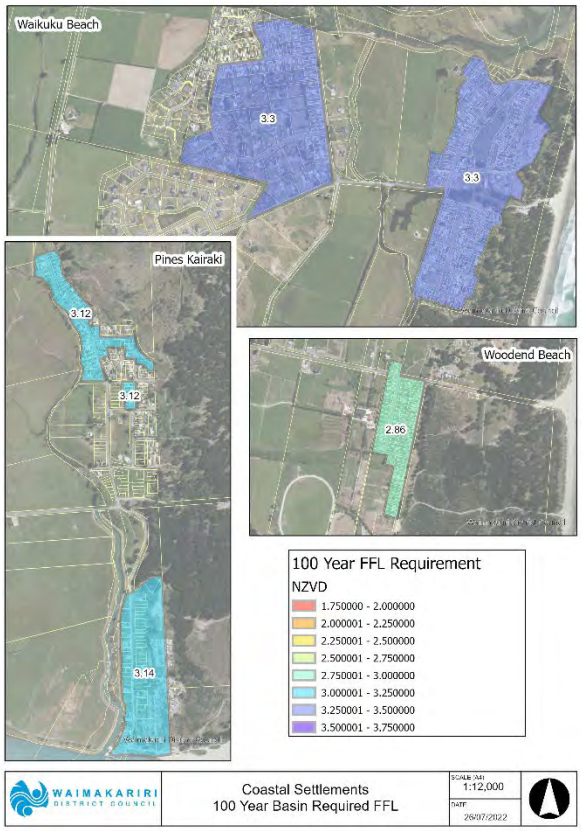


Figure 14 - Coastal Settlements 100 Year FFL Requirement

For new dwellings built in the existing urban area that are replacing existing dwellings the Council has adopted the 100 year level of protection in line with the requirements under the Building Act.

5. Further Assessment of Absolute Minimum Finished Floor Level Requirement

Following the assessment of the Minimum Finished Floor Level requirements for each flood basin it was deemed necessary to consider a higher minimum Finished Floor Level that would provide further protection for the low lying areas on the southern side of the Kaiapoi River. This absolute minimum level would supersede any modelled flood level information in these areas and provide additional protection for events such as a pumpstation failure in Kaiapoi.

Four potential absolute minimum FFL levels were subsequently assessed as outlined in Table 2

Table 2 – Absolute Minimum FFL Assessment

Potential Absolute Minimum FFL	Justification	Comments
1.65m RL	Correlates to historically observed high tide levels in the Kaiapoi River.	This is less than any of the assessed 100 year FFL levels, so this would not be appropriate for an absolute minimum FFL
1.96m RL	Correlates to the assessed minimum FFL level for the Otaki Street area	The Otaki Street area is one of the lowest lying parts of Kaiapoi and regular experiences surface flooding following moderate to large rain events. Therefore using the assessed 100 year FFL level for this area to set the absolute minimum FFL for the district appears to make logical sense.
2.05m RL	Correlates to recently consented minimum FFL for subdivisions in Kaiapoi where not subject to Coastal Inundation.	In areas not subject to Coastal Inundation this would provide some consistency with recent consented subdivisions, however it doesn't necessary reflect the flood levels across all low lying areas.
2.91m RL	CCC adopted minimum FFL for Christchurch City	Assessed to compare the existing requirements of a neighbouring local authority. However it is noted that this level would be impractical for most eastern urban communities in Waimakariri where the ground level is often in the order of 1.00m RL.

6. Final Minimum Finished Floor Level Requirements for Kaiapoi and the Coastal Settlements

Following this work it was decided to adopt the 100 year minimum FFL requirements in Kaiapoi and the Coastal Settlements. Furthermore it was determined that an absolute minimum FFL requirement of 1.96m be applied to all areas to match the requirement in the Otaki Street area.

Refer to Figure 15 and Figure 16 for plans showing the adopted Minimum FFL for Kaiapoi and the Coastal Settlements. Areas not shaded or coloured on the map may be subject to further Minimum FFL requirements under Resource Consent conditions.

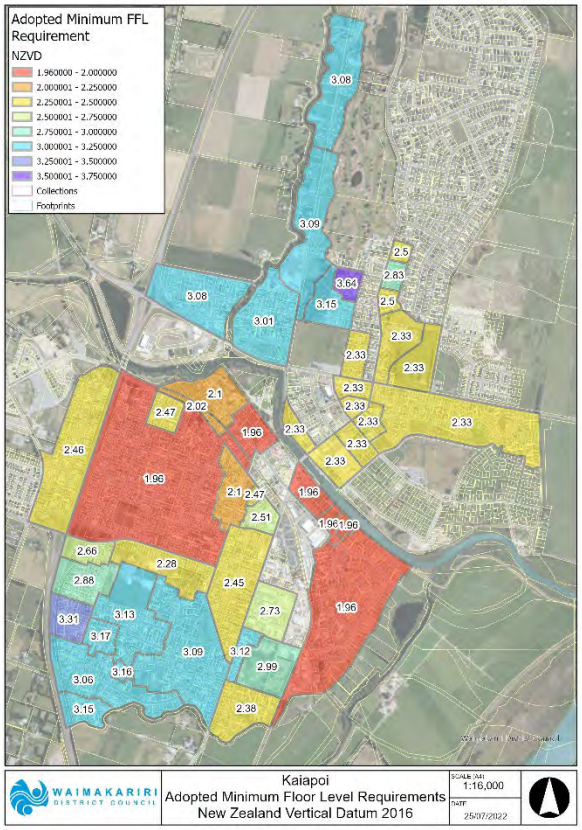


Figure 15 - Kaiapoi Adopted Minimum FFL Requirement

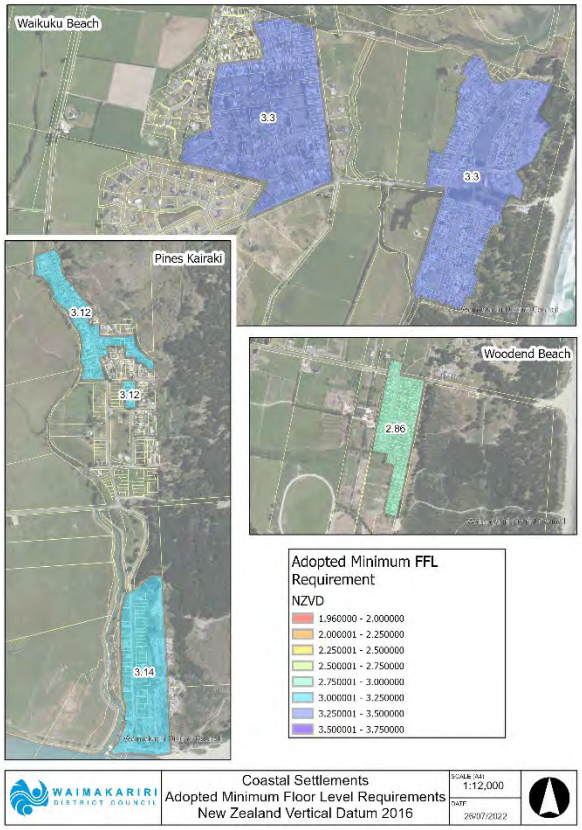
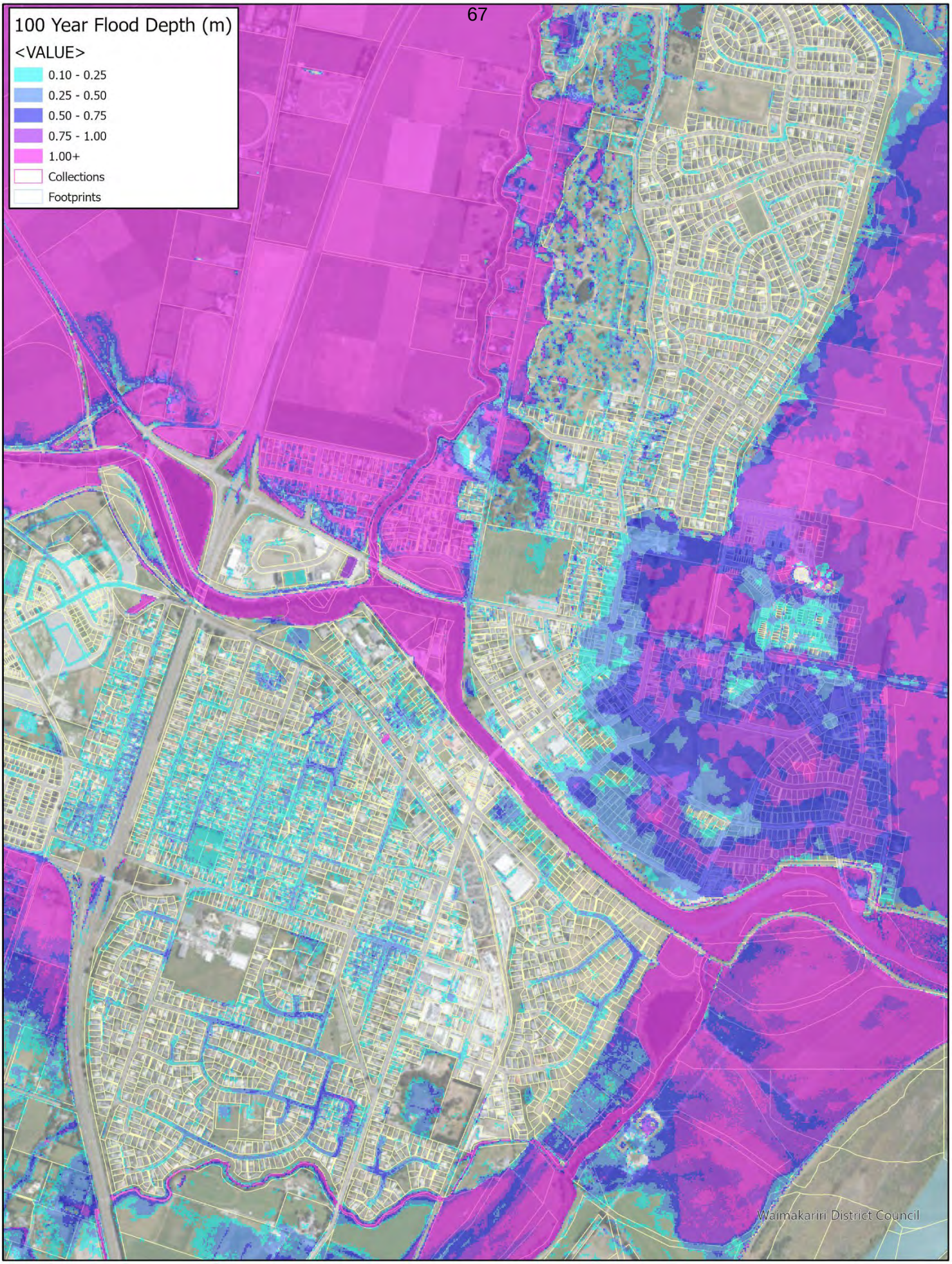


Figure 16 - Coastal Settlements Adopted Minimum FFL Requirement

APPENDICES

Figure 1 - Kaiapoi 100 Year Modelled Flood Depth
Figure 2 - Coastal Settlements 100 Year Modelled Flood Depth
Figure 3 - Kaiapoi LIDAR Levels
Figure 4 - Coastal Settlements LIDAR Levels
Figure 5 - Kaiapoi Flood Basins
Figure 6 - Coastal Settlements Flood Basins
Figure 7 - Kaiapoi 100 Year Flood Level
Figure 8 - Coastal Settlements 100 Year Flood Level
Figure 9 - Kaiapoi 100 Year Flood Hazard
Figure 10 - Coastal Settlements 100 Year Flood Hazard
Figure 11 - Kaiapoi 100 Year Freeboard Requirement
Figure 12 - Coastal Settlements 100 Year Freeboard Requirement
Figure 13 - Kaiapoi 100 Year FFL Requirement
Figure 14 - Coastal Settlements 100 Year FFL Requirement
Figure 15 - Kaiapoi Adopted Minimum FFL Requirement
Figure 16 - Coastal Settlements Adopted Minimum FFL Requirement

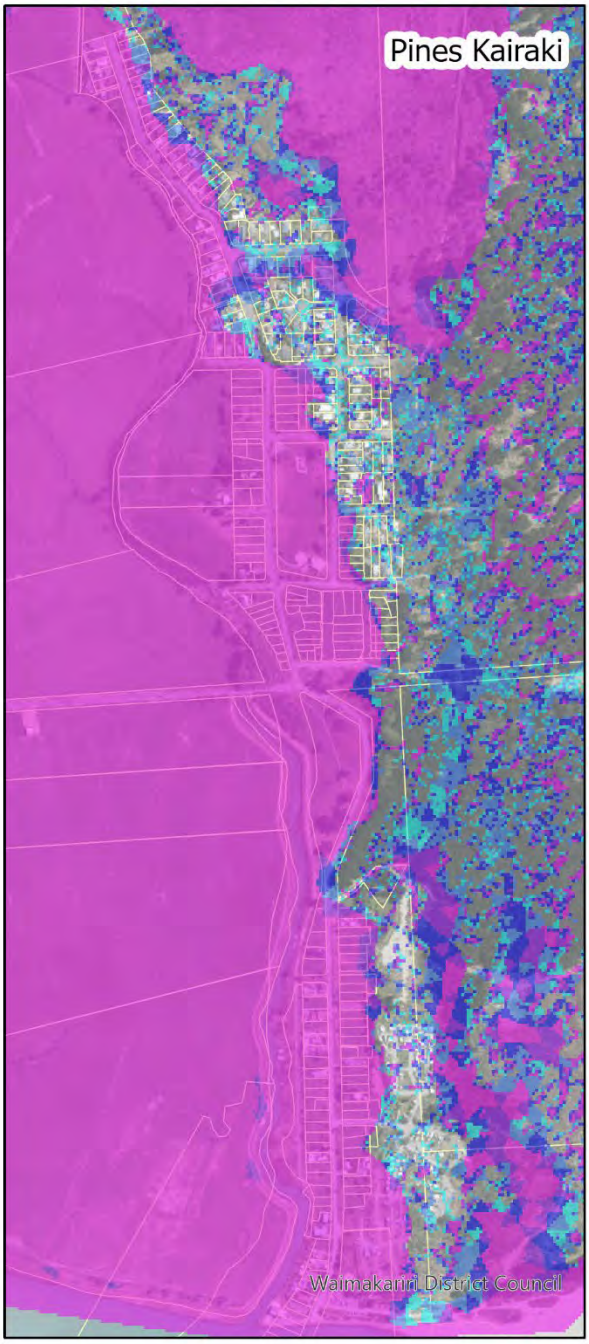


WAIMAKARIRI DISTRICT COUNCIL

Kaiapoi
100 Year Modelled Flood Depth
2020 WDC Flood Hazard Model

SCALE (A4)
1:16,000

DATE
25/07/2022



100 Year Flood Depth (m)

<VALUE>

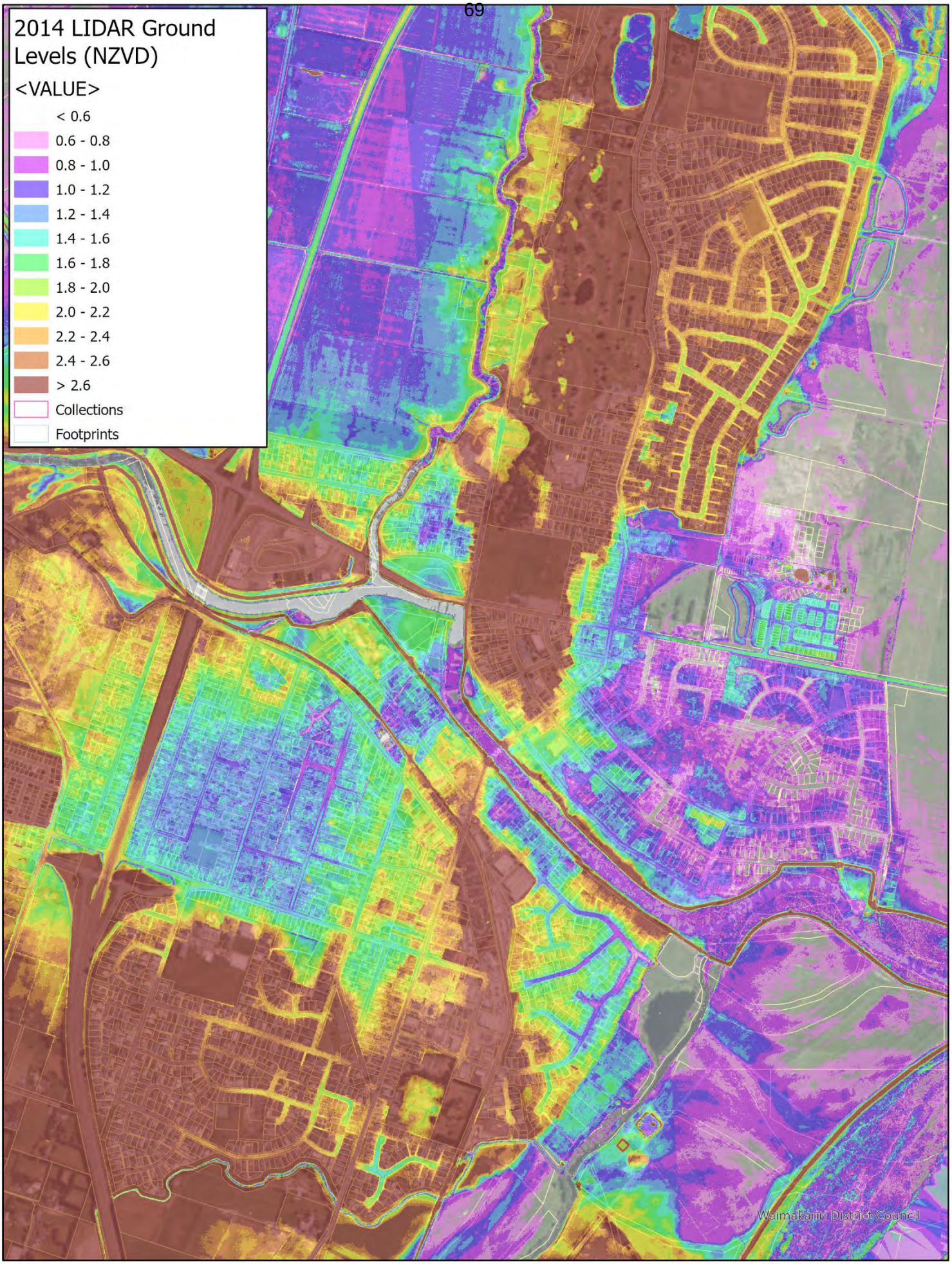
- 0.10 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00+

WAIMAKARIRI DISTRICT COUNCIL

Coastal Settlements
100 Year Modelled Flood Depth
2020 WDC Flood Hazard Model

SCALE (A4)
1:12,000

DATE
26/07/2022

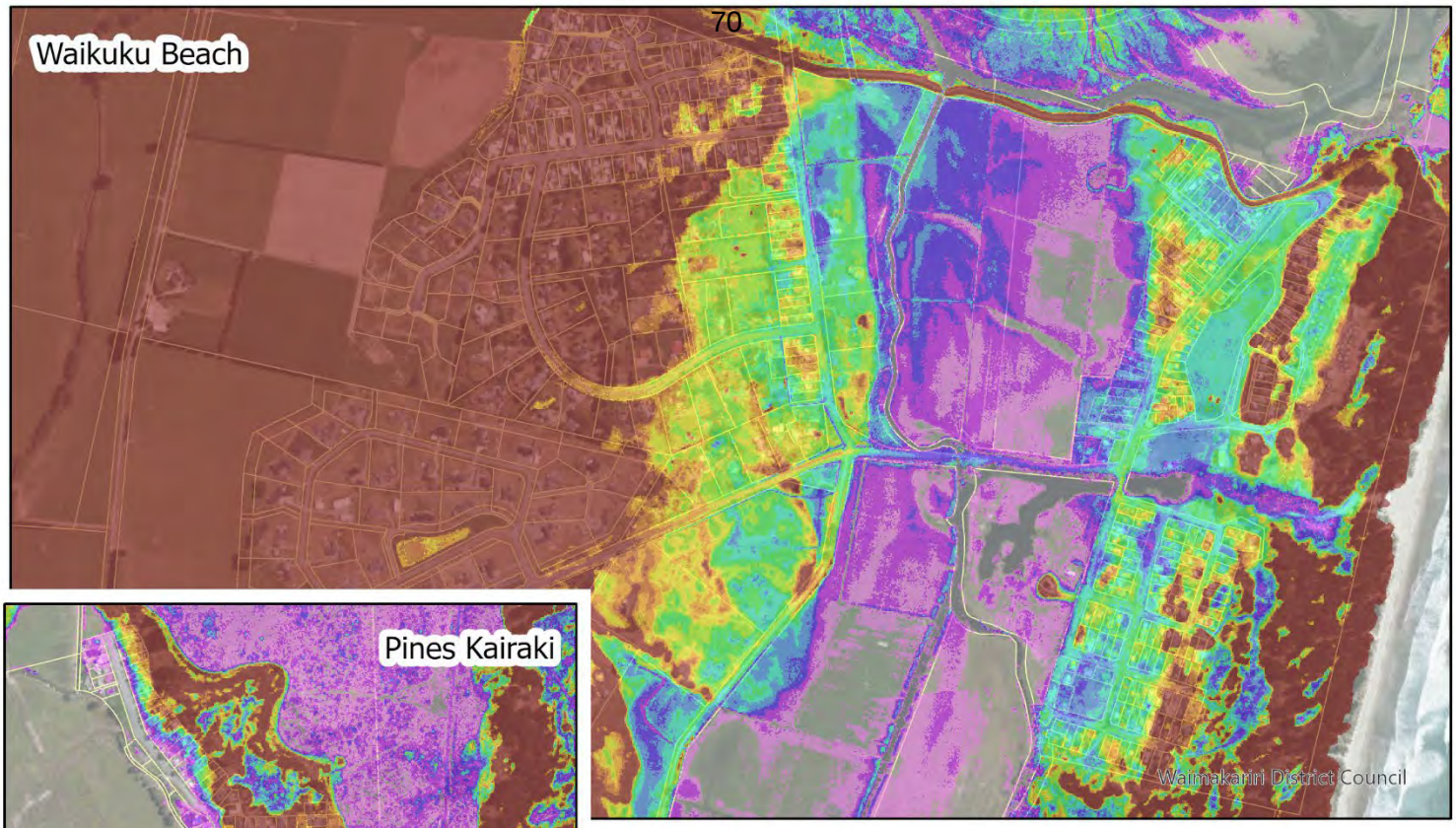


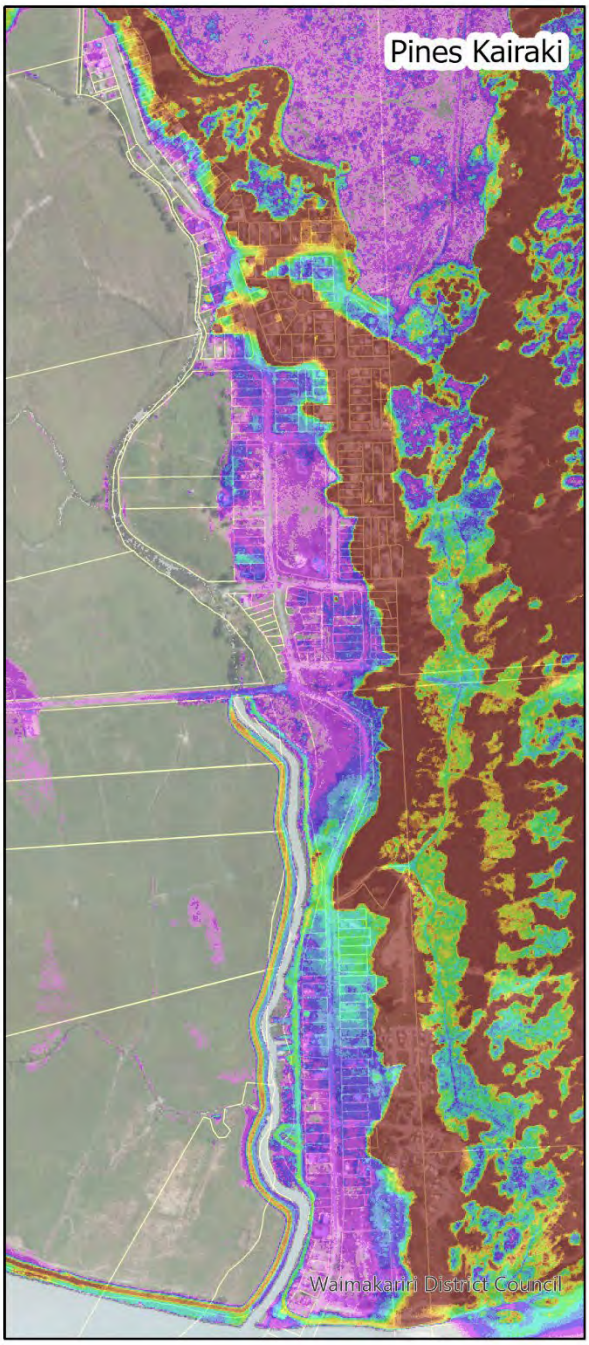
WAIMAKARIRI DISTRICT COUNCIL

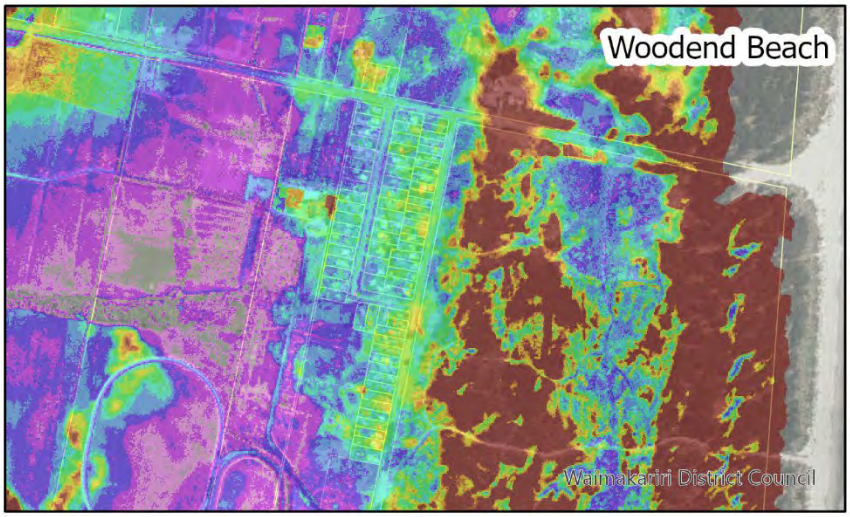
Kaiapoi
2014 LIDAR Ground Levels
New Zealand Vertical Datum

SCALE (A4)
1:16,000

DATE
25/07/2022







2014 LIDAR Ground Levels (NZVD)

<VALUE>

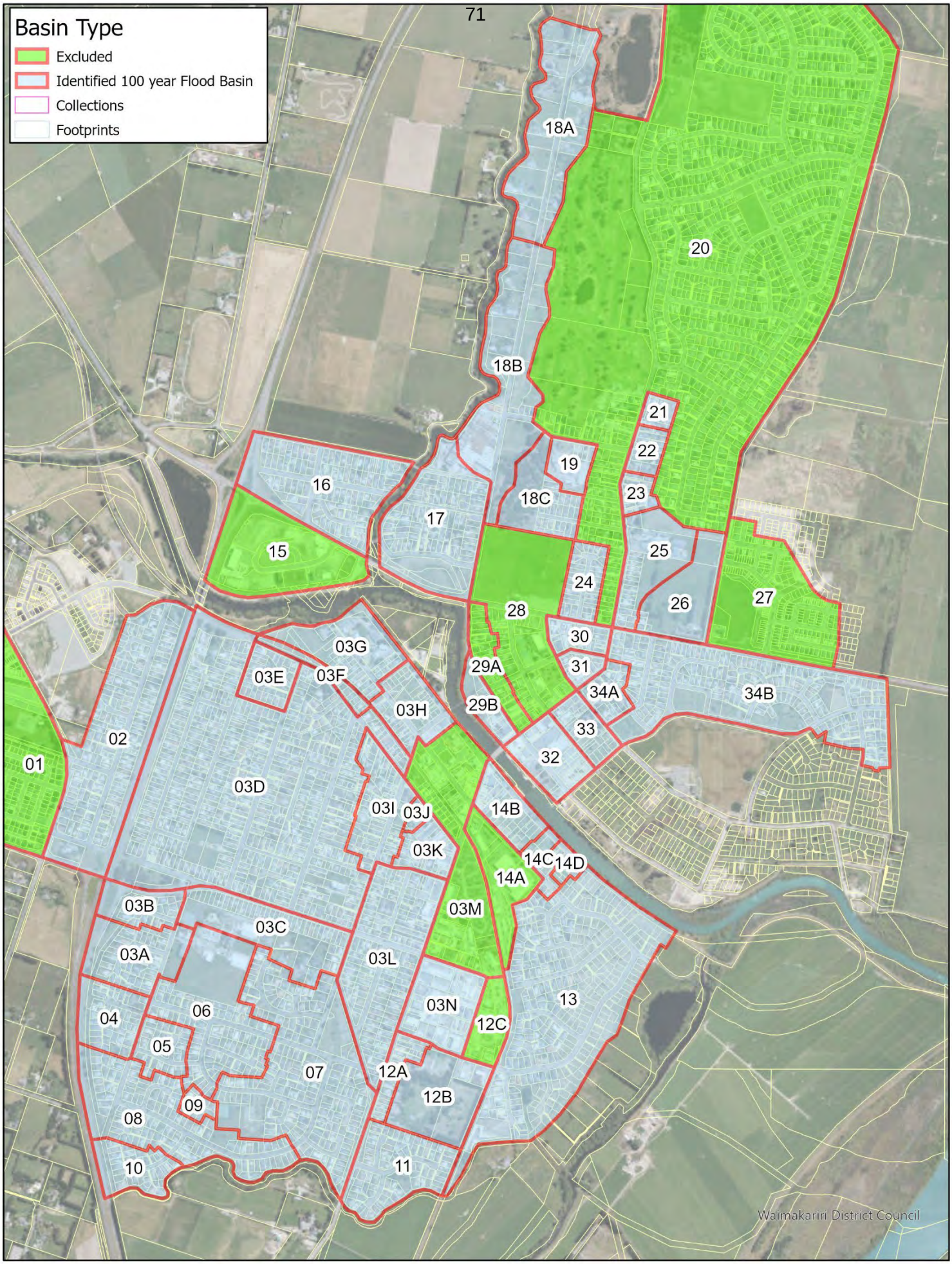
- < 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- 1.2 - 1.4
- 1.4 - 1.6
- 1.6 - 1.8
- 1.8 - 2.0
- 2.0 - 2.2
- 2.2 - 2.4
- 2.4 - 2.6
- > 2.6

WAIMAKARIRI DISTRICT COUNCIL

Coastal Settlements
2014 LIDAR Ground Levels
New Zealand Vertical Datum

SCALE (A4)
1:12,000

DATE
26/07/2022

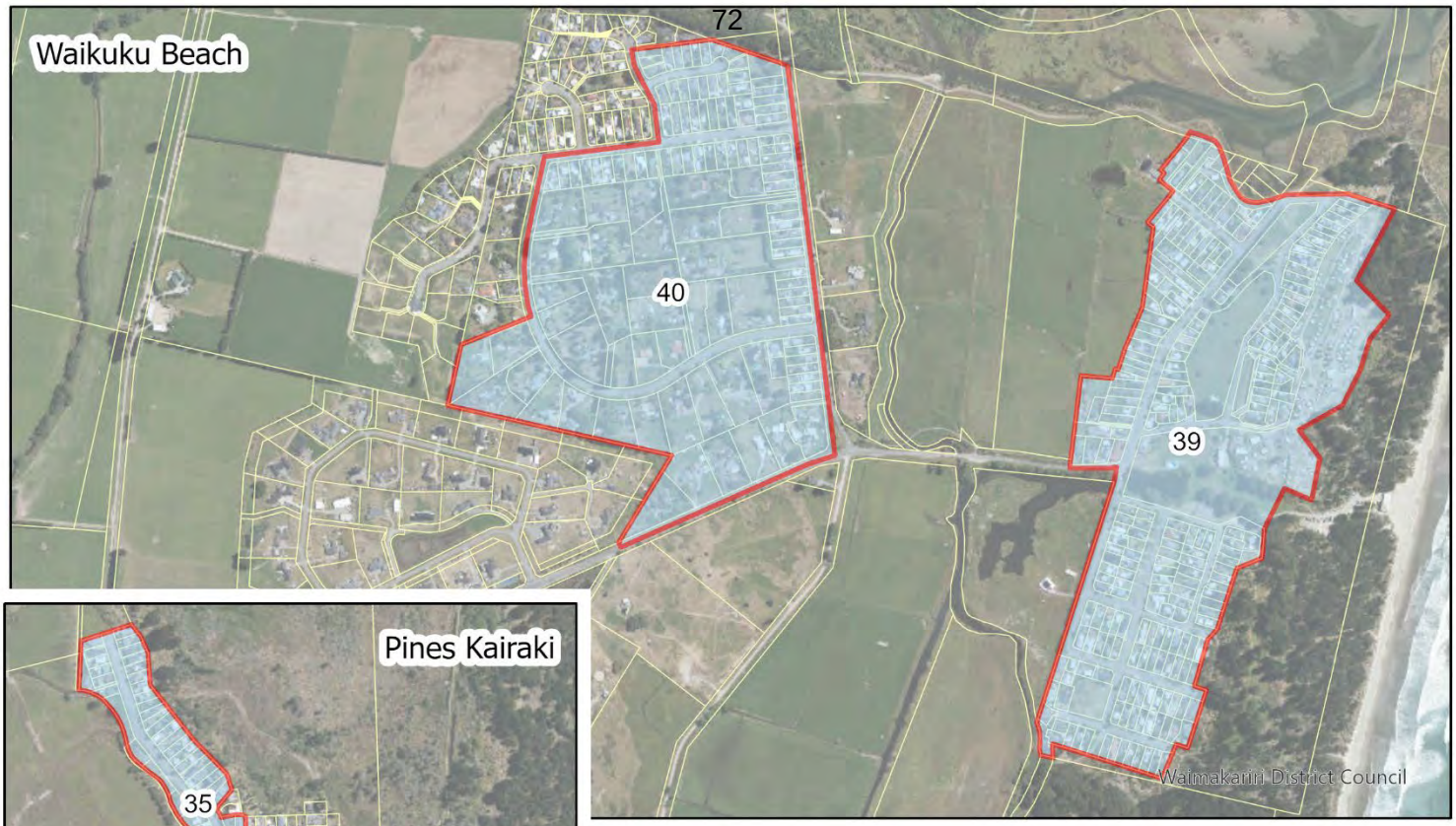


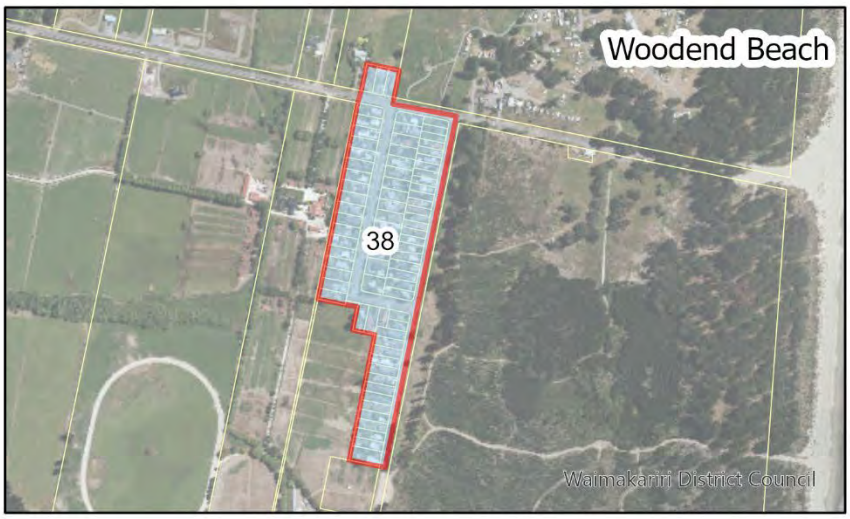
WAIMAKARIRI DISTRICT COUNCIL

Kaiapoi
Mapped Flood Basins

SCALE (A4)
1:16,000

DATE
25/07/2022





Basin Type

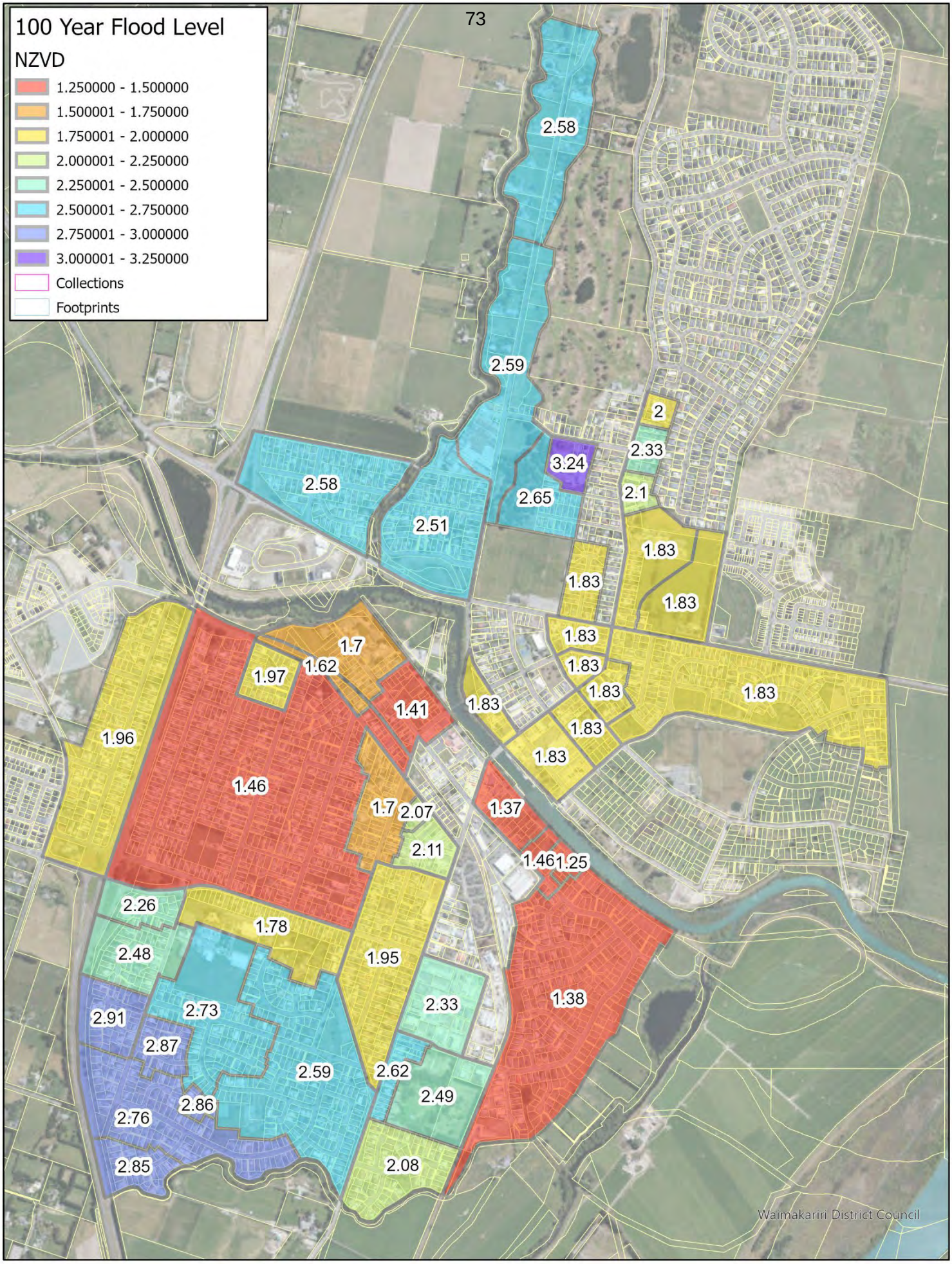
- Excluded
- Identified 100 year Flood Basin

WAIMAKARIRI DISTRICT COUNCIL

Coastal Settlements Mapped Flood Basins

SCALE (A4)
1:12,000

DATE
26/07/2022

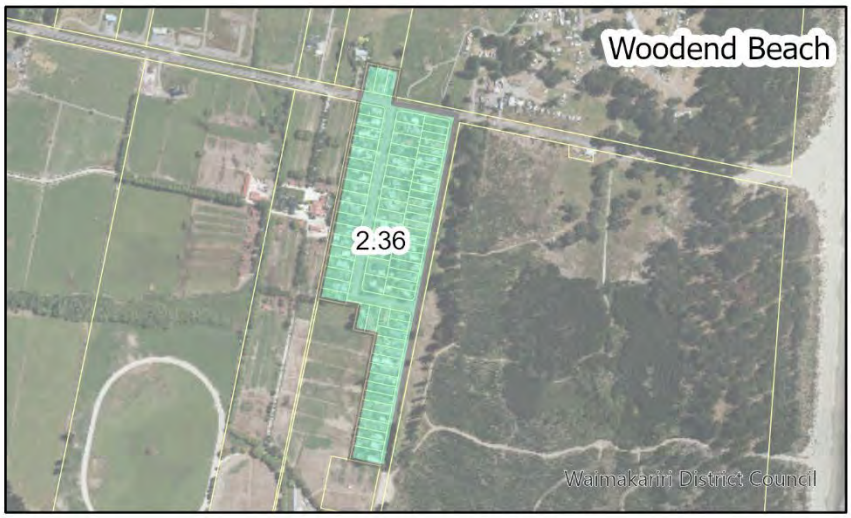


WAIMAKARIRI DISTRICT COUNCIL

Kaiapoi
100 Year Basin Modelled Flood Level

SCALE (A4)
1:16,000

DATE
25/07/2022



100 Year Flood Level

NZVD

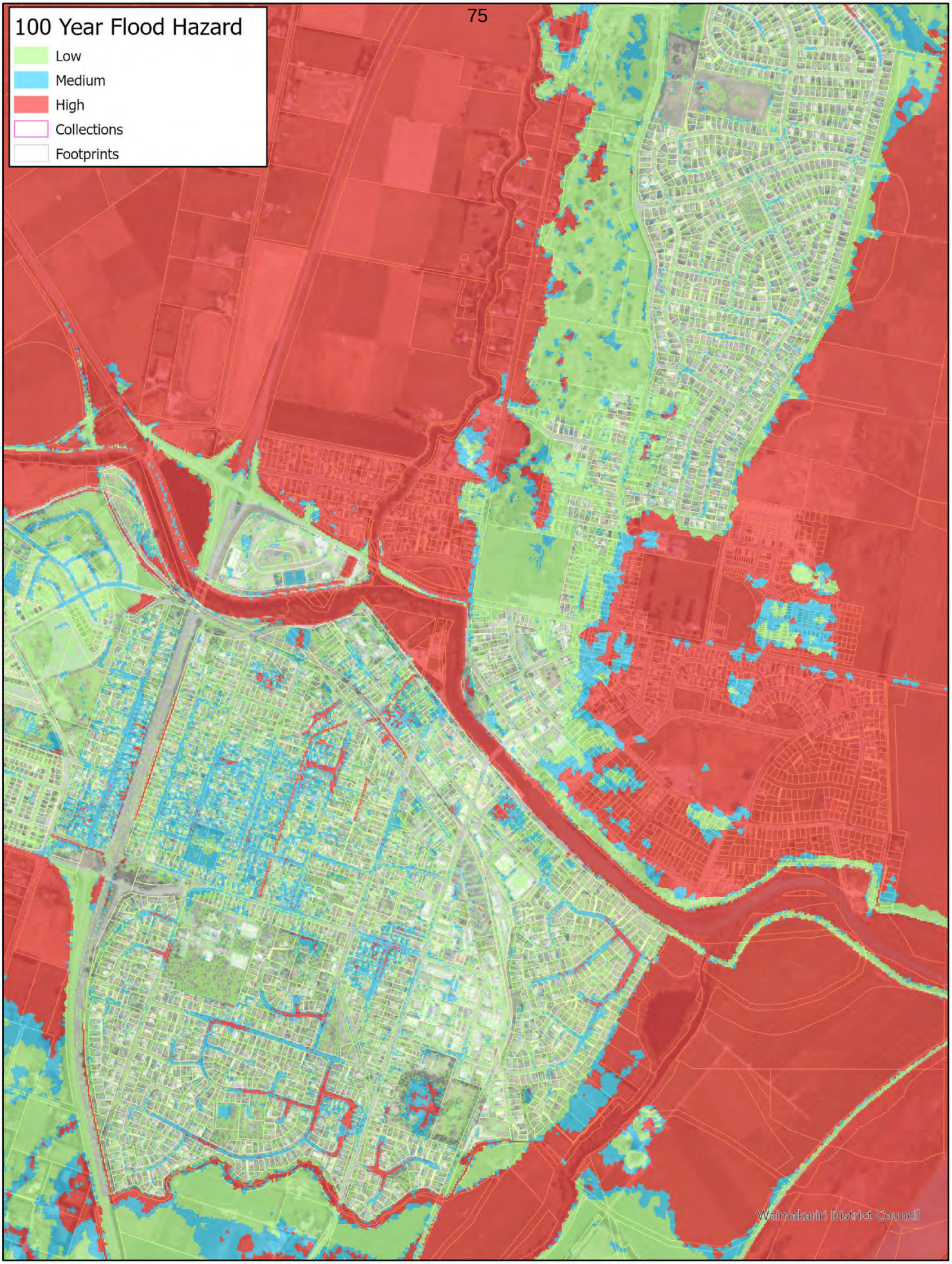
- 1.250000 - 1.500000
- 1.500001 - 1.750000
- 1.750001 - 2.000000
- 2.000001 - 2.250000
- 2.250001 - 2.500000
- 2.500001 - 2.750000
- 2.750001 - 3.000000
- 3.000001 - 3.250000

WAIMAKARIRI DISTRICT COUNCIL

Coastal Settlements
100 Year Basin Modelled Flood Level

SCALE (A4)
1:12,000

DATE
26/07/2022

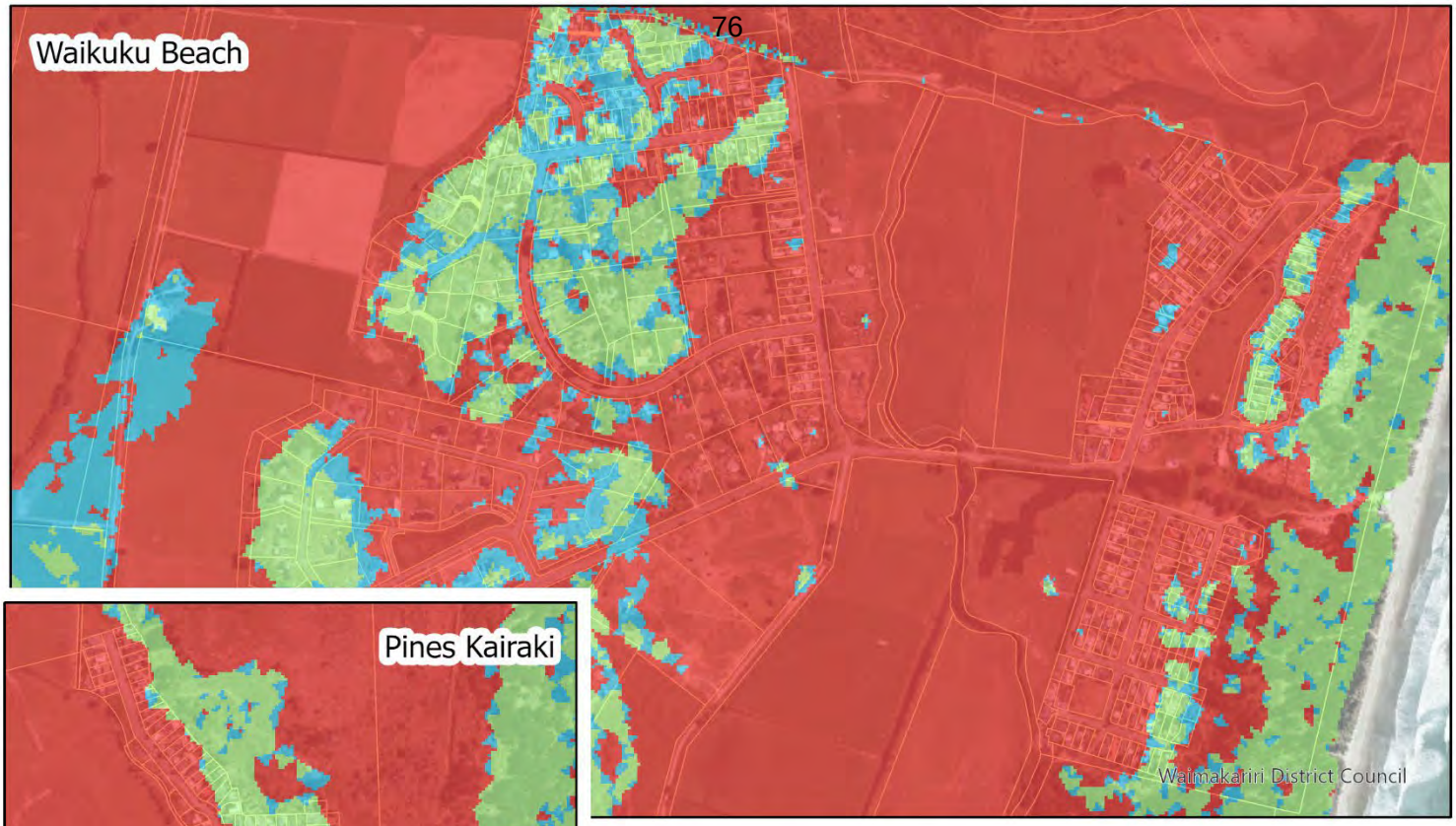


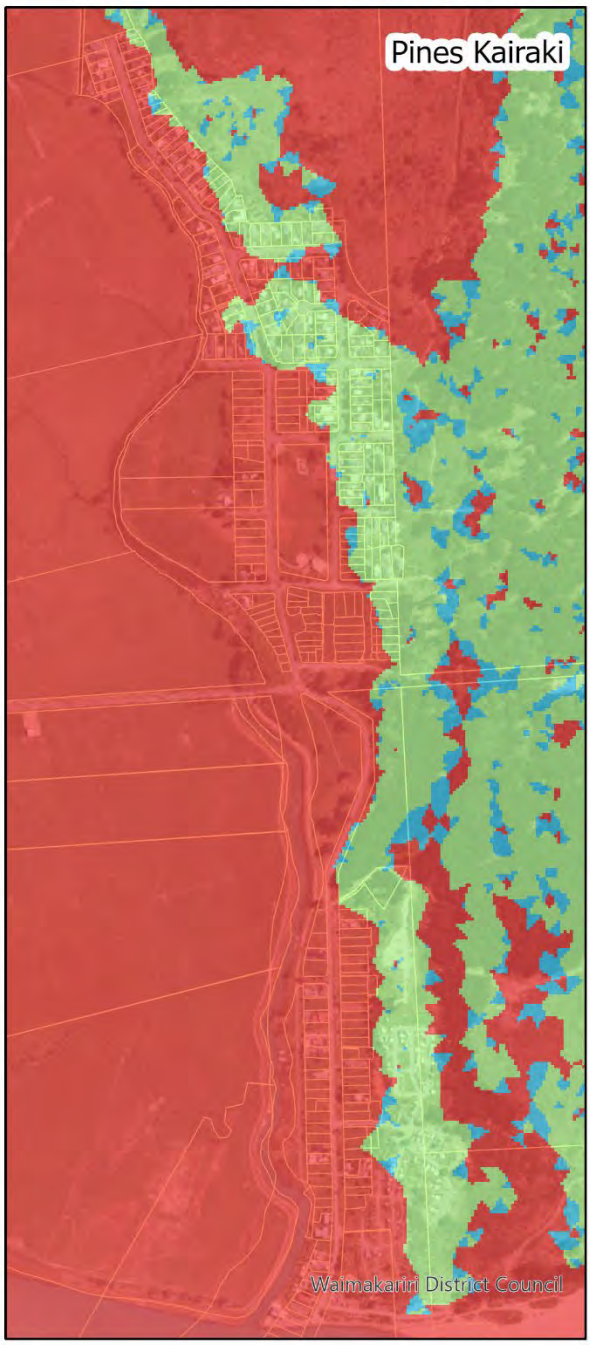
WAIMAKARIRI DISTRICT COUNCIL

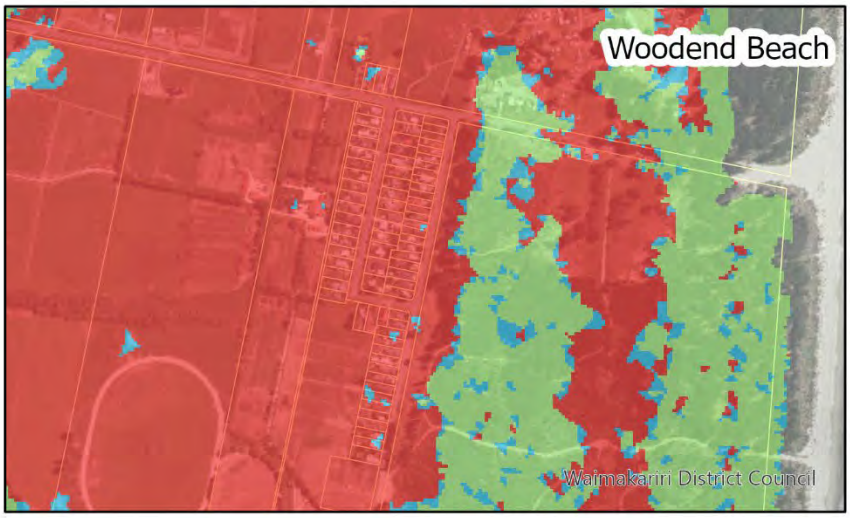
Kaiapoi
100 Year Modelled Flood Hazard
2020 WDC Flood Hazard Model

SCALE (A4)
1:16,000

DATE
25/07/2022







100 Year Flood Hazard

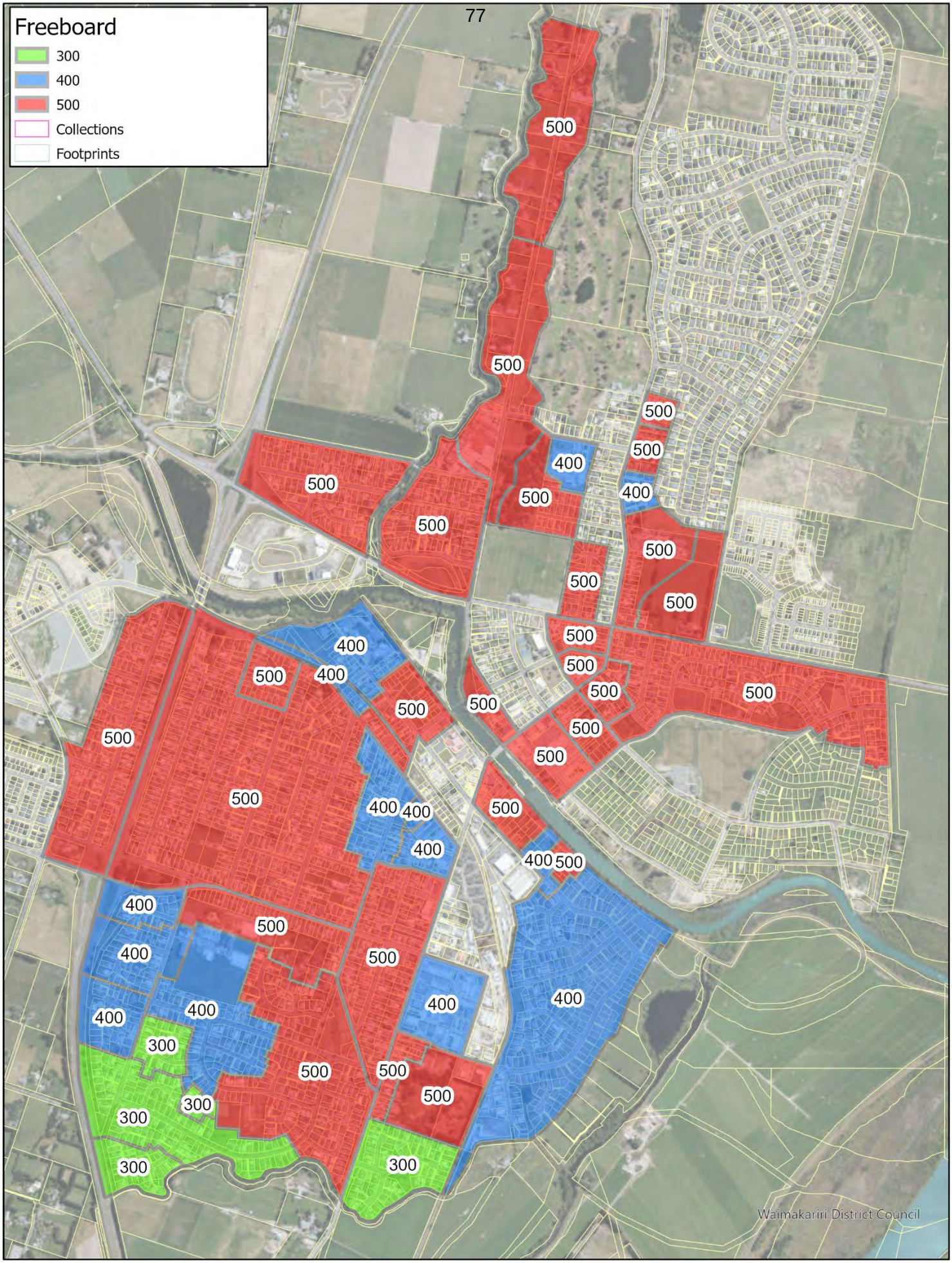
- Low
- Medium
- High

WAIMAKARIRI DISTRICT COUNCIL

Coastal Settlements
100 Year Modelled Flood Hazard
2020 WDC Flood Hazard Model

SCALE (A4)
1:12,000

DATE
26/07/2022

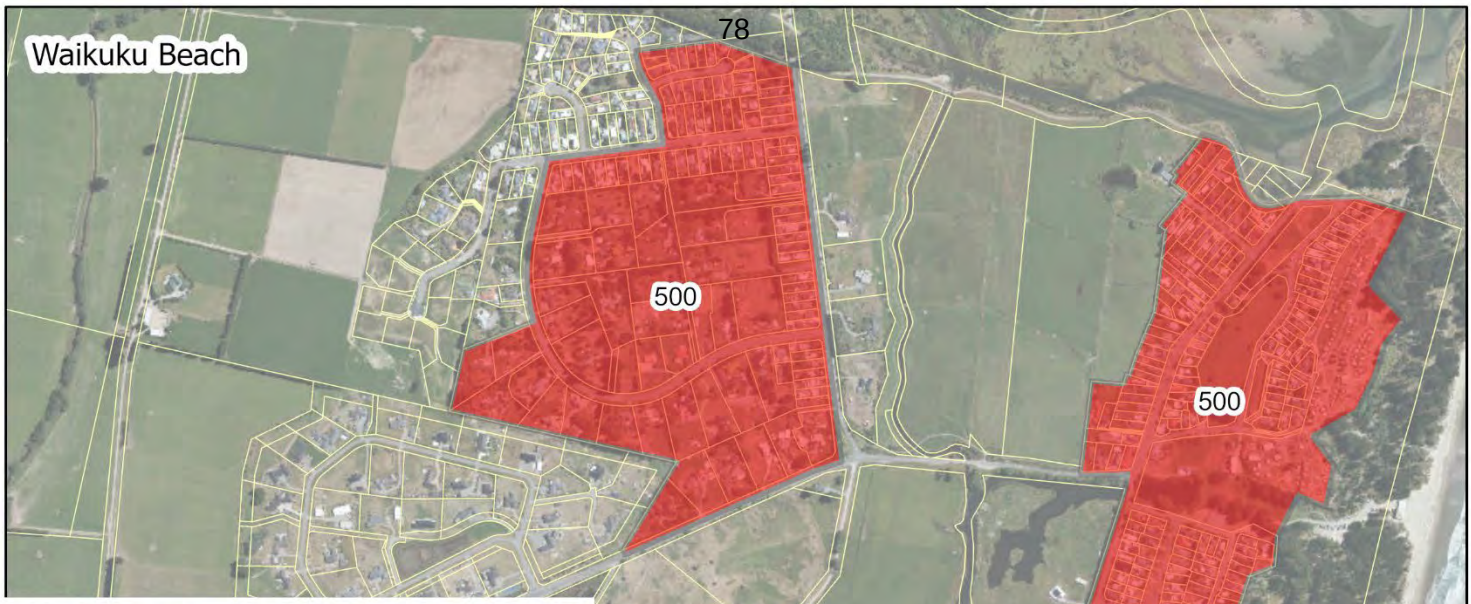


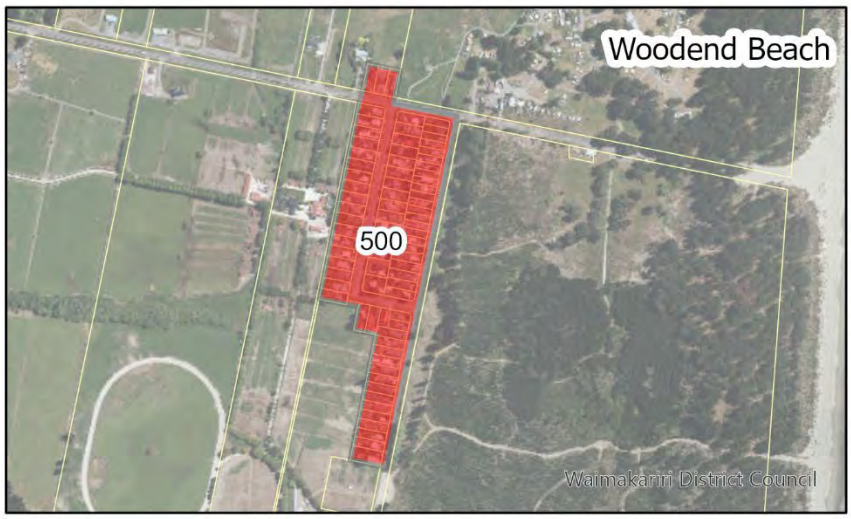
WAIMAKARIRI DISTRICT COUNCIL

Kaiapoi
100 Year Basin Freeboard

SCALE (A4)
1:16,000

DATE
25/07/2022





Freeboard

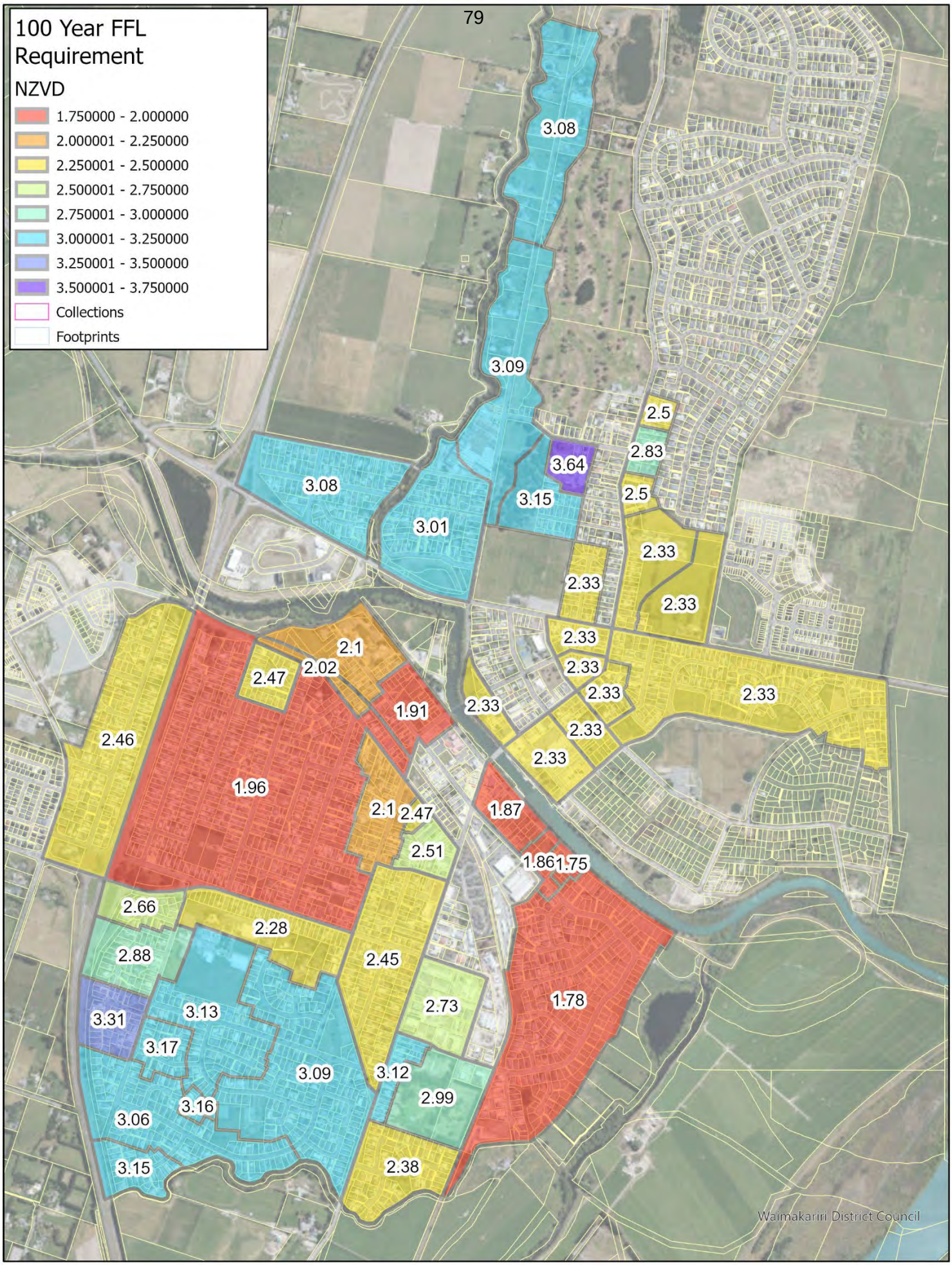
- 300
- 400
- 500

WAIMAKARIRI DISTRICT COUNCIL

Coastal Settlements
100 Year Basin Freeboard

SCALE (A4)
1:12,000

DATE
26/07/2022

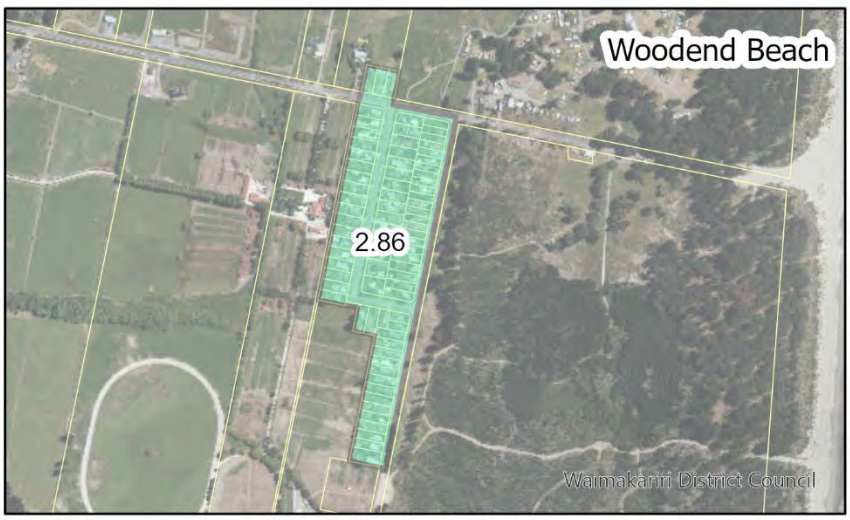


WAIMAKARIRI DISTRICT COUNCIL

Kaiapoi
100 Year Basin Required FFL

SCALE (A4)
1:16,000

DATE
25/07/2022



100 Year FFL Requirement

NZVD

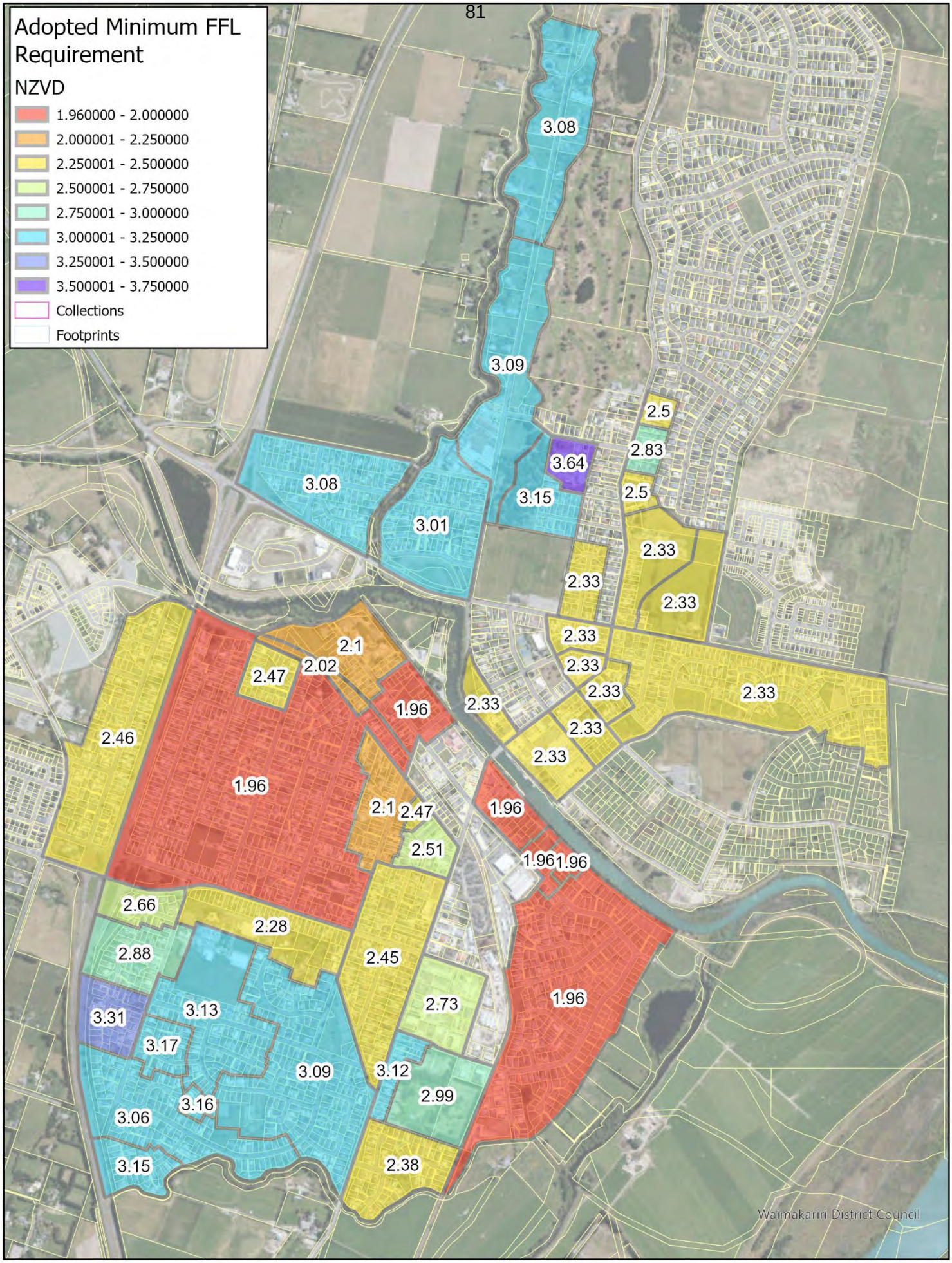
- 1.750000 - 2.000000
- 2.000001 - 2.250000
- 2.250001 - 2.500000
- 2.500001 - 2.750000
- 2.750001 - 3.000000
- 3.000001 - 3.250000
- 3.250001 - 3.500000
- 3.500001 - 3.750000

WAIMAKARIRI DISTRICT COUNCIL

Coastal Settlements
100 Year Basin Required FFL

SCALE (A4)
1:12,000

DATE
26/07/2022

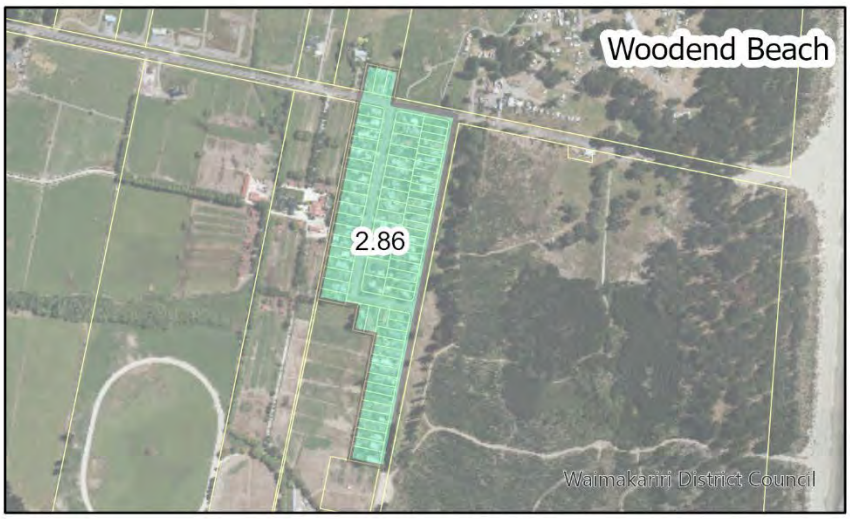


WAIMAKARIRI DISTRICT COUNCIL

Kaiapoi
Adopted Minimum Floor Level Requirements
New Zealand Vertical Datum 2016

SCALE (A4)
1:16,000

DATE
25/07/2022



Adopted Minimum FFL Requirement

NZVD

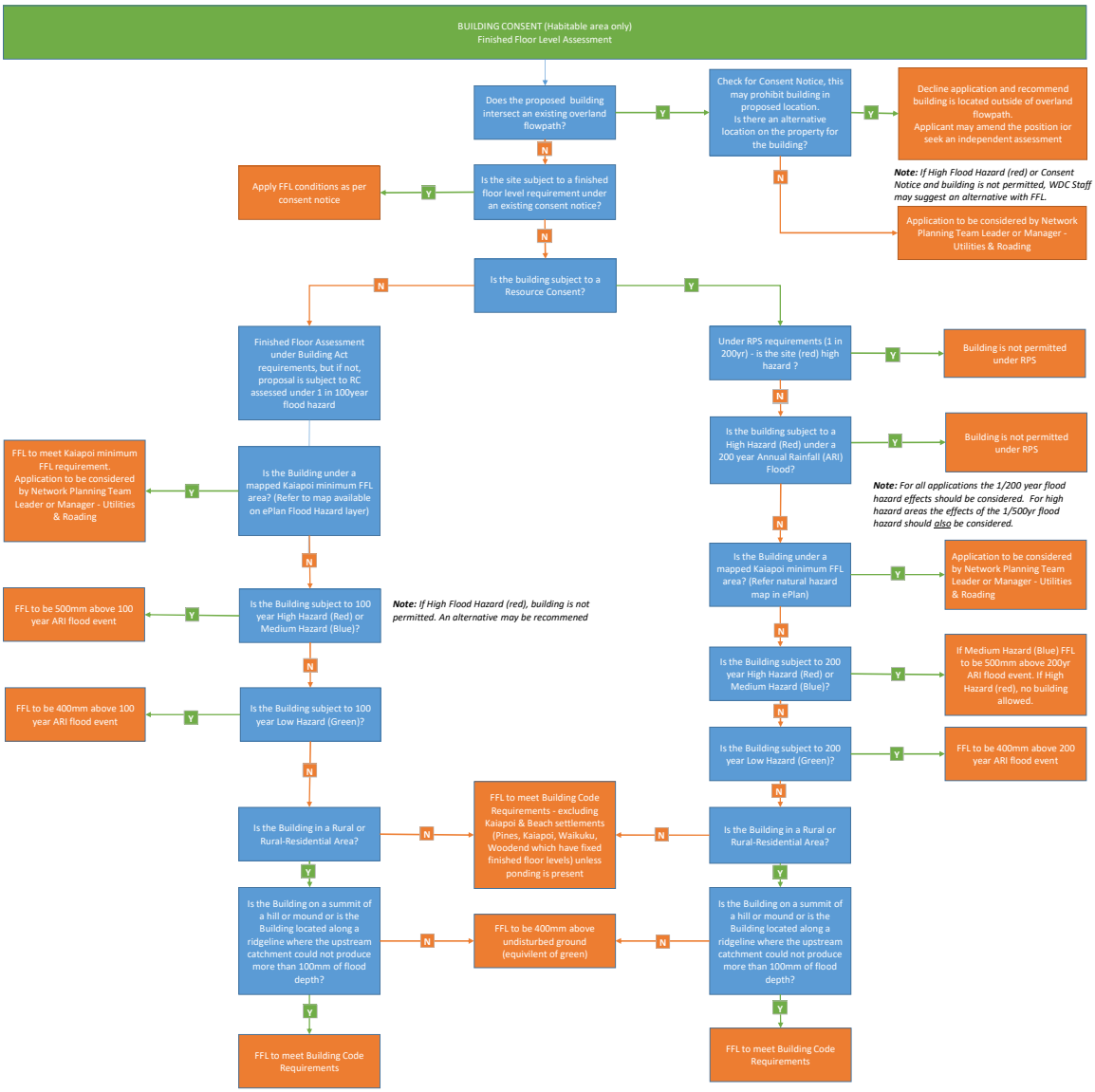
- 1.960000 - 2.000000
- 2.000001 - 2.250000
- 2.250001 - 2.500000
- 2.500001 - 2.750000
- 2.750001 - 3.000000
- 3.000001 - 3.250000
- 3.250001 - 3.500000
- 3.500001 - 3.750000

WAIMAKARIRI DISTRICT COUNCIL

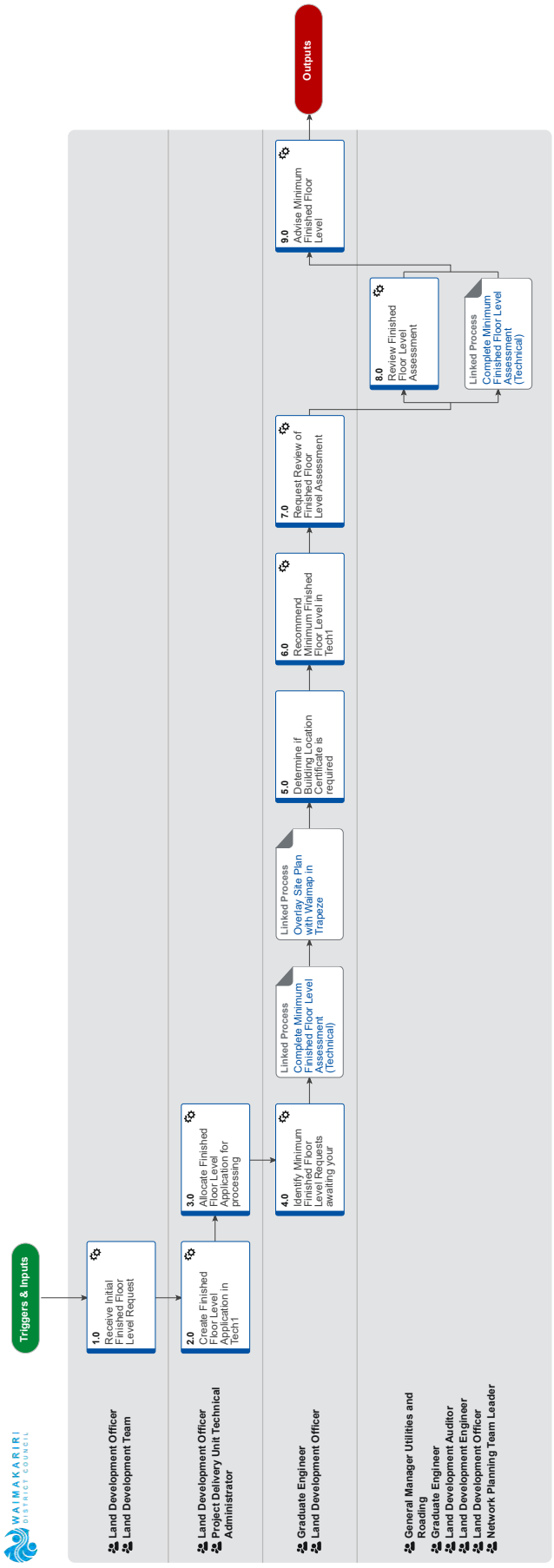
Coastal Settlements
Adopted Minimum Floor Level Requirements
New Zealand Vertical Datum 2016

SCALE (A4) 1:12,000

DATE 26/07/2022


BUILDING CONSENT (Habitable area only)
Finished Floor Level Assessment
Does the proposed building intersect an existing overland flowpath?
Y
Check for Consent Notice, this may prohibit building in proposed location.
Is there an alternative location on the property for the building?
Y
Decline application and recommend building is located outside of overland flowpath.
Applicant may amend the position ior seek an independent assessment
N
Note: If High Flood Hazard (red) or Consent Notice and building is not permitted, WDC Staff may suggest an alternative with FFL.
Application to be considered by Network Planning Team Leader or Manager - Utilities & Roading
N
Is the site subject to a finished floor level requirement under an existing consent notice?
Y
Apply FFL conditions as per consent notice
N
Is the building subject to a Resource Consent?
N
Y
Finished Floor Assessment under Building Act requirements, but if not, proposal is subject to RC assessed under 1 in 100year flood hazard
Under RPS requirements (1 in 200yr) - is the site (red) high hazard ?
Y
Building is not permitted under RPS
N
Is the building subject to a High Hazard (Red) under a 200 year Annual Rainfall (ARI) Flood?
Y
Building is not permitted under RPS
Note: For all applications the 1/200 year flood hazard effects should be considered. For high hazard areas the effects of the 1/500yr flood hazard should also be considered.
FFL to meet Kaiapoi minimum FFL requirement. Application to be considered by Network Planning Team Leader or Manager - Utilities & Roading
Y
Is the Building under a mapped Kaiapoi minimum FFL area? (Refer to map available on ePlan Flood Hazard layer)
N
Is the Building under a mapped Kaiapoi minimum FFL area? (Refer natural hazard map in ePlan)
Y
Application to be considered by Network Planning Team Leader or Manager - Utilities & Roading
FFL to be 500mm above 100 year ARI flood event
Y
Is the Building subject to 100 year High Hazard (Red) or Medium Hazard (Blue)?
Note: If High Flood Hazard (red), building is not permitted. An alternative may be recommened
N
Is the Building subject to 200 year High Hazard (Red) or Medium Hazard (Blue)?
Y
If Medium Hazard (Blue) FFL to be 500mm above 200yr ARI flood event. If High Hazard (red), no building allowed.
FFL to be 400mm above 100 year ARI flood event
Y
Is the Building subject to 100 year Low Hazard (Green)?
N
Is the Building subject to 200 year Low Hazard (Green)?
Y
FFL to be 400mm above 200 year ARI flood event
Is the Building in a Rural or Rural-Residential Area?
N
FFL to meet Building Code Requirements - excluding Kaiapoi & Beach settlements (Pines, Kaiapoi, Waikuku, Woodend which have fixed finished floor levels) unless ponding is present
N
Is the Building in a Rural or Rural-Residential Area?
Y
Y
Is the Building on a summit of a hill or mound or is the Building located along a ridgeline where the upstream catchment could not produce more than 100mm of flood depth?
N
FFL to be 400mm above undisturbed ground (equivilent of green)
N
Is the Building on a summit of a hill or mound or is the Building located along a ridgeline where the upstream catchment could not produce more than 100mm of flood depth?
Y
FFL to meet Building Code Requirements
FFL to meet Building Code Requirements

Provide Minimum Finished Floor Level Advice [Awaiting Approval] v2.33



Provide Minimum Finished Floor Level Advice [Awaiting Approval] v2.33

Summary

Objective
Administer Finished Floor Level (FFL) advice via Tech1. This process will be used to issue Floor Level Certificates in the future, once the District Plan Review is complete and the required rules are given effect to. Until then, staff will administer this process in support of the Technical Practice Note which will be adopted by Council.

Background
A finished floor level is required to set the physical floor level of a proposed building at a height that will mitigate risk of natural flood hazard to an acceptable standard.

Owner Kelly LaValley

Expert Libica Hurley

Procedure

1.0 Receive Initial Finished Floor Level Request

Land Development Officer, Land Development Team

a Determine if a finished floor level assessment is required, either through an external enquiry or in association with a Building Consent or Resource Consent application.

NOTE **How is a Finished Floor Level Assessment triggered?**
Enquiry: An external party may request a finished floor level assessment. This should be sent to subdivapp@wmk.govt.nz for set up and response, or forwarded to this location if received by an individual staff member.

Building Consent: The 'PIMs received but not processed' Tech1 alert is checked on a daily basis. All 'dwellings' and 'alternations' should be set up in Tech1 and processed as an FL application. As this alert is checked daily, only the previous days applications should be required to be assessed at any time. This makes the job less onerous.

b Check the PIM alert in Tech1 called 'There are X PIM applications that have been formally received but not processed' on a daily basis. This pre-empts PIM requests for FFL assessments and speeds up the process. Because the list should be checked daily, staff only ever need to look at the previous days Building Consents formally received.

2.0 Create Finished Floor Level Application in Tech1

Land Development Officer, Project Delivery Unit Technical Administrator

a Open Tech1 Property and Rating and select the Application Creation Wizard.

b Step 1 - Enter the Module Code: Debtors, Primary Group: FLCert, Primary Category: FLPIM or FLExternal. Click Next.

c Step 2 - Type a brief description of the enquiry using the following format: MINIMUM FINISHED FLOOR LEVEL FFL REQUEST ENQUIRY - [ADDRESS] (BUILDING CONSENT NUMBER).
Example: MINIMUM FINISHED FLOOR LEVEL FFL REQUEST ENQUIRY - 123 ROSS ROAD, RANGIORA (BC123456). Click Next.

d Step 3 - Search for the related property address in the Tech1 fields provided. Click Retrieve. Within the search results, select the relevant property to highlight it. Click Next.

NOTE **What if the Lot doesn't exist yet because it is part of a proposed subdivision that doesn't have 224c yet?**
Set up the FL number against the underlying parent lot for the proposed subdivision.

e Step 4 - Skip this step. Click Next.

f Step 5 - Skip this step. Click Next.

g Step 6 - Review the information entered. If correct, Click 'Save and Maintain'.

NOTE **What if there is an error in the details entered?**
Using the 'Steps to Complete' Links on the left, visit previous steps again and edit as required. Click 'Next' to navigate through the remaining steps again before returning to the Application Summary (Step 6).

h Associate application using the relationship 'DebRelApp'.

NOTE **How do you link a related application using DebRelApp?**
1. Open Application Process Enquiry Screen for the FL Application you just created
2. Expand 'Associations' under Related Data (bottom left)
3. Right click 'Related Application'
4. Click 'Add a new association'
5. Add the BC number to the 'Application ID TO' field
6. Click save
7. Click close

i Add FL Number and associated details to the tracking spreadsheet in TRIM (Record No. 210118005532)

PDU LD Finished Floor Level Tracking Spreadsheet

3.0 Allocate Finished Floor Level Application for processing

Land Development Officer, Project Delivery Unit Technical Administrator

a On the Application Process Enquiry page, enter the User ID of the staff (usually the Land Development Officer) who will process the enquiry in the first instance. Click the magnifying glass and type their name to search, click to select.

b Click Save.

c Open Events List.

d Click 'New Event' to highlight.

e Enter the following event code using the Event Code boxes; Event Process: MFLProc, Event Group: MFLEvents, Event Code: MFLRecvApp. Click Save.

f Against the new event added, enter your User ID and complete the event with decision 'Yes' to formally receive the application. This will start the clock counting the days taken to process the enquiry.

NOTE **Will this step be required when the District Plan Rule is adopted and the FL Process commences charging?**
This task skips some pre-set events in Tech1 that allow for a Debtor to be set up and an invoice raised. These tasks are not required under current processes so are skipped, however in future they will be required. At such time this promapp will be updated.

g Against event 'Allocate for initial assessment', enter your User ID and complete the event using the decision drop down. Enter the individual responsible for processing the enquiry in the first instance. It will later be reallocated for review. This name should match the 'User ID' entered previously and is often the Land Development Officer.

h Add the FLXXXXX Number generated by Tech1 to the start of the TRIM metadata for future reference. This links the record in TRIM with the Tech1 application.

4.0 Identify Minimum Finished Floor Level Requests awaiting your Assessment

Graduate Engineer, Land Development Officer

a Open Tech1 Property & Rating and select Application Process Enquiry.

b Search for the relevant Application Number. Alternatively, navigate to the request via hyperlinks in your alerts/ reporting/search as described in the following note.

NOTE **How do I search which Floor Level Enquiries require my attention? (User ID entered)**
a. Open Tech1
b. Open Application Process Enquiry module
c. Click Clear
d. Primary Group: FLCert
g. Click 'Add criteria' again to add a new field. Using the drop-down select 'Status'. The middle drop-down should read '=', and the last drop down 'Current'.
h. Click Retrieve. The results shown are the active FL Cert applications allocated to your User ID for processing
i. Add as a 'Saved Search' so that the same search criteria are available automatically in the future

The results shown are the active FLCert Enquiries allocated to your User ID for processing.

c Click Save.

PROCESS Complete Minimum Finished Floor Level Assessment (Technical)

Graduate Engineer, Land Development Officer

PROCESS Overlay Site Plan with Waimap in Trapeze

Graduate Engineer, Land Development Officer

5.0 Determine if Building Location Certificate is required

Graduate Engineer, Land Development Officer

a Use the Building Location Certificate Factsheet to determine whether a BLC is required. A BLC is not required if the level is 'above undisturbed ground'.

Factsheet - Building Location Certificate
https://www.waimakariri.govt.nz/__data/assets/pdf_fil

6.0 Recommend Minimum Finished Floor Level in Tech1

Graduate Engineer, Land Development Officer

a Check for any floor level advice already given for the property concerned.

NOTE **Is the Surveyor's name required at this stage?**
The Surveyor's name is not necessary at this stage. However, in the instance where a Building Location Certificate (BLC) is NOT required, as per the BLC Fact Sheet, the Site and Level Plan for the Building Consent must be clearly identified as being provided by a Registered Professional Surveyor or Licensed Cadastral Surveyor.

NOTE **How do I check if a surveyor is registered or licensed?**
Conduct a search via one of the website links below.

Cadastral Surveyors Licensing Board
https://www.cslb.org.nz/search.html

Survey and Spatial New Zealand
https://www.surveyspatialnz.org/DataFilter?DataFilter

b Navigate back to Tech1 and complete events. The next empty event to complete should be 'Further information required?', complete with decision 'No' to indicate that no further information is required.

NOTE **What if further information is required to calculate the minimum finished floor level?**
Select 'Yes' and email/phone the relevant person requesting the information required. TRIM any correspondence in the Regulatory -08 sub-folder against the Property File or in the Consent Details .01 sub-folder if associated to a Building Consent.

c Navigate to the Application Process Enquiry Screen (either straight away or if required after further information has been received), and enter the recommended minimum finished floor level and associated reference in the Custom Fields.

d Click Save.

7.0 Request Review of Finished Floor Level Assessment

Graduate Engineer, Land Development Officer

a Open the Events List.

b Complete event, 'Request review of recommendation'. Decision option selected should be the person whom you are requesting senior approval/peer review from. They will verify the floor level you have recommended is correct.

NOTE **Where do Silverstream West Floor Level Assessments go for review?**
These can only be approved by the Project Delivery Manager

NOTE **Who can I select for senior approval/peer review?**
Any engineer with floor level assessment experience. If the assessment is complicated or requires senior advice it should go to the Network Planning Team Leader in the first instance, then possibly Manager - Utilities & Roading if Management decision is required.

c Click Save. Click Close. Return to the Application Process Enquiry page. Enter the User ID of the Reviewer selected to allocate the enquiry to them for approval. Click Save.

NOTE **When don't I need to obtain senior approval/peer review?**
If the floor level is consent noticed or tabled against the RC only one PDU check is required to ensure that the number extracted from the table correlates to the Lot number concerned. Therefore if a Building Unit Officer has identified the finished floor level and PDU have checked it, no second review is required under these circumstances.
However if the Building Unit haven't indicated what they think the required FFL will be, a PDU initial assessment is required, and a review. This applies even if the FL is consent noticed.

All Silverstream Floor Levels (West of Island Road) need to go to the Project Delivery Manager for review.

d Create email to send to reviewer with finished floor level recommendation, attach any relevant information if required. Standard text available in TRIM via following link.

PDU Standard Words - Finished Floor Level Review Requests

NOTE **What should my metadata / email title be?**
RCxxxxxx BCxxxxxx FLxxxxxx - 123 BEST STREET RANGIORA (LOT x DPxxxxxx) FINISHED FLOOR LEVEL REQUEST - FFL REVIEW

e Update tracking spreadsheet in TRIM (Record No. 210118005532)

PDU LD Finished Floor Level Tracking Spreadsheet

8.0 Review Finished Floor Level Assessment

General Manager Utilities and Roading, Graduate Engineer, Land Development Auditor, Land Development Engineer, Land Development Officer, Network Planning Team Leader

a Open the email from the Development Officer (or first reviewer) and review contents.

b Review the Technical Process for assessing a finished floor level in order to assist your review of the assessment if required, to ensure the initial assessment is correct. Process is linked below to be completed in parallel with this Activity.

c Open Tech1 Property and Rating, navigate to the Application Process Enquiry tab and search the correct FL Application Number.

d Check the minimum finished floor level entered in the Custom Field on the Application Process Enquiry screen is correct. Also check the Reference (e.g. NZVD) entered is correct.

NOTE **What if the recommended finished floor level is incorrect?**
Leave the Custom Field as is and return the enquiry to the Land Development Officer for a re-check via the Tech1 Events.

e Enter your User ID against event 'Confirm recommended FL is correct' and select the relevant event decision using the drop down options.

NOTE **What if I reject the recommendation?**
After selecting decision 'No' against event, Confirm recommended FL is correct. Click Close to return to the Application Process Enquiry page, and enter the Land Development Officers user ID to replace yours. Click Save. When the Land Development Officer (or staff who conducted the initial assessment) check their 'Saved Search' they will see it has been returned for reassessment. It may be appropriate to send a follow up email with justification as to why the recommended FL was rejected.

f Change the User ID on the Application Process Enquiry Screen to the Land Development Officer (or other initiator), this should be done if the recommended floor level is correct or incorrect. If correct, the Officer will provide an answer to the Customer (both external or internal). If incorrect the figures will be reassessed and resent for re-review.

NOTE **Who can give final approval?**
Depending on the complexity of the assessment, simpler assessments can be initially completed by the Land Development Officer and reviewed by a Graduate Engineer (or vice versa), more complicated assessments need to be reviewed by a Land Development Engineer or Auditor, Network Planning Team Leader and in some cases the Manager - Utilities & Roading.

g TRIM a copy of the plans so that the Building Consent processor can easily identify the FL has been assessed.

NOTE **How do I save a copy of the BC plans via Trapeze?**
Open Building Consent plans in Trapeze (directly from TRIM using the link).
Select site plan thumbnail
Select Stamp icon, using the dropdown select the appropriate 'Development Team' stamp (two to choose from) - either RFI required of not.
An RFI would be required when the FL can't be verified (e.g. where no reference has been provided)

h Update the Building Unit's Costing and Referral Sheet to request that the FLCert charge is applied. Add note to FIeld #11, being 'Please add charge code for FFL assessment - BCFLCert'.

PROCESS

Complete Minimum Finished Floor Level Assessment (Technical)

General Manager Utilities and Roading, Graduate Engineer, Land Development Auditor, Land Development Engineer, Land Development Officer, Network Planning Team Leader

9.0 Advise Minimum Finished Floor Level

Graduate Engineer, Land Development Officer

a Write an email to the Customer or Building Unit (depending on if the request was internal or external) outlining the required finished floor level.

NOTE **What if the Customer indicates intent to build below the advised minimum finished floor level?**

If the Customer indicates an intent to build to a lower level than advised they should be made aware that they will need to engage an engineer to justify why the floor level should be lower that that stated in the consent notice or as advised by Council staff.

If the Finished Floor Level is Consent Noticed the Customer will not only have to engage an engineer but they will also require Resource Consent to amend or remove the Consent Notice, granting of the consent is not automatic and will need to be assessed by Council Engineers.

b TRIM the response to the Customer under the Property File, 'Regulatory' (-08) or BC Consent Details .01 (whichever is relevant) sub-folder using the following metadata: MINIMUM FINISHED FLOOR LEVEL FFL REQUEST ENQUIRY - [ADDRESS] - [DATE RECEIVED]. Example: FL123456 MINIMUM FINISHED FLOOR LEVEL FFL REQUEST ENQUIRY - 123 ROSS ROAD, RANGIORA

If a BC or RC is associated state this at the front of the Metadata.
Example: BC123456 RC654321 FL123456 MINIMUM FINISHED FLOOR LEVEL FFL REQUEST ENQUIRY - 123 ROSS ROAD, RANGIORA

c Complete Tech1 events against the corresponding FL Number.

d Mark the FL as complete in the Finished Floor Level Spreadsheet.

PDU LD Finished Floor Level Tracking Spreadsheet

Triggers & Inputs

TRIGGERS

None Noted

INPUTS

None Noted

Outputs & Targets

OUTPUTS

None Noted

PERFORMANCE TARGETS

None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

Process Name	Type of Link	Assigned Role
Complete Minimum Finished Floor Level Assessment (Technical)	Process	General Manager Utilities and Roading, Graduate Engineer, Land Development Auditor, Land Development Engineer, Land Development Officer, Network Planning Team Leader
Overlay Site Plan with Waimap in Trapeze	Process	Graduate Engineer, Land Development Officer

PROCESS LINKS TO THIS PROCESS

None Noted

RACI

RESPONSIBLE
Roles that perform process activities

General Manager Utilities and Roading, Graduate Engineer, Land Development Auditor, Land Development Engineer, Land Development Officer, Land Development Team, Network Planning Team Leader, Project Delivery Unit Technical Administrator

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner	Kelly LaValley
Process Expert	Libica Hurley

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
None Noted

STAKEHOLDERS FROM LINKED PROCESSES

Process	Owner	Expert	Process Group
Complete Minimum Finished Floor Level Assessment (Technical)	Kelly LaValley	Libica Hurley	Project Delivery Unit
Overlay Site Plan with Waimap in Trapeze	Kelly LaValley	Libica Hurley	Land Development

INFORMED
Those notified of changes

All of the above, as well as; Glenn Busch[System Stakeholder], Trish Keen[System Stakeholder], Application and Database Analyst[System Stakeholder], Technical Business Analyst [System Stakeholder], Business and Technology Solutions Team[System Stakeholder], Business and Technology Solutions Team Leader[System Stakeholder], Information Management Assistant[System Stakeholder], Information Management Team[System Stakeholder], Information

Management Team Leader[System Stakeholder], Information Management Technical Administrator[System Stakeholder]. These parties are informed via dashboard notifications. 89

Systems

Outlook

TechnologyOne

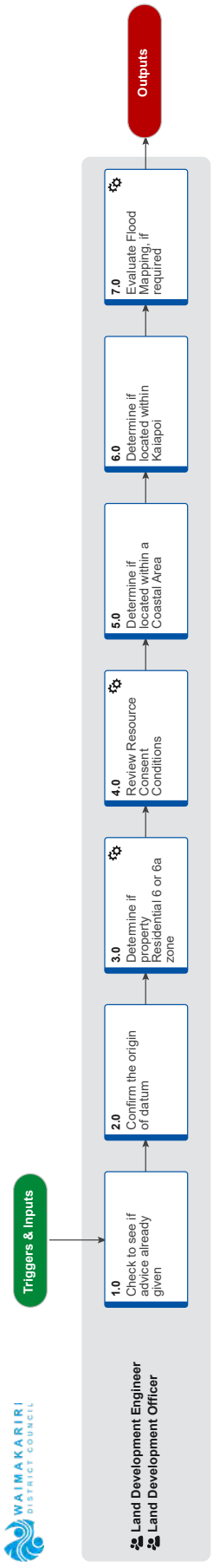
Trapeze

TRIM

Lean

None Noted

Complete Minimum Finished Floor Level Assessment (Technical) [Awaiting Approval] v1.21



Complete Minimum Finished Floor Level Assessment (Technical) [Awaiting Approval] v1.21

Summary

Objective
To assess a proposal against the process set out in the Finished Floor Level Practice Note using Council records and flood hazard mapping, to identify if the site is suitable for construction of a dwelling, if the proposed location is suitable and what the finished floor level height and associated freeboard should be.

Background
This technical process supports the Council's Technical Practice Note (Record No. 200106000520); both should be followed when assessing finished floor levels in conjunction with the individuals professional judgement and industry experience.

Owner Kelly LaValley

Expert Libica Hurley

Procedure

1.0 Check to see if advice already given
Land Development Engineer, Land Development Officer

a Undertake an 'Any word' search of the property address to see if any prior finished floor level advice has been given

NOTE **What if previous advice has already been provided and the proposal is the same?**
The original advice can be reviewed using the following process to ensure it is still correct. If so, it can be supplied again. Advice supplied should always be consistent with previous advice.

2.0 Confirm the origin of datum
Land Development Engineer, Land Development Officer

a Confirm the origin of the datum used is referenced on the Site Plan.

NOTE **What do I do if the datum is not reference on the site plan?**
If the FL is for a Building Consent that is already lodged, in your response back to the Building Unit you need to identify to the Processor that the Customer has not provided a datum. You can still assess the floor level without this information, however a Building Location Certificate may be required if the Applicant doesn't provide the information.

3.0 Determine if property Residential 6 or 6a zone
Land Development Engineer, Land Development Officer

a Determine if the property is within Residential 6 or 6a zones using the District Plan layer in Waimap. If so, apply Waimakariri District Council District Plan Rule 27.1.1.10 (only applies to Pegasus & Ravenswood).

NOTE **What is Rule 27.1.1.10?**
27.1.1.10
Within the Residential 6 and Residential 6A Zones, the finished floor level of all habitable rooms shall be not less than 3.85m above mean sea level.

Operative Waimakariri District Plan ePlan
https://waimakariri.isoplan.co.nz/eplan/#Rules/0/35/1/

b Skip the following steps of this technical process if the minimum finished floor level is now known.

4.0 Review Resource Consent Conditions
Land Development Engineer, Land Development Officer

NOTE **Is the lot proposed for development part of a recent subdivision? (post-2015)**
If so, it may have a consent condition or consent notice stating the required finished floor level. The minimum required FFL information can be found in the resource consent decision and/or s224c.

a Check to see if the finished floor level is covered by a Resource Consent Condition or Consent Notice. Check the Resource Consent conditions in the most recent decision (including any variations, if any) and any issued Consent Notices relating to Finished Floor Level and Flood Hazard requirements.

NOTE **Where do I find the Consent Conditions and Consent Notices/224c documents?**
To locate the consent conditions, find the issued decision letter in TRIM. This can be found using an 'Any word' search for the RC number and 'Decision'.

To locate the issued 224c Certificate, enter the resource consent number in TRIM and '224*' using an 'Any word' search. The Consent Notices should be attached to the 224c letter. Alternatively navigate to the resource consent subfolder -07 '223 & 224 Certificates'.

b Apply the finished floor level consent noticed, if available (otherwise the decision consent conditions are suitable). Consent notices are registered to the lot and are not able to be changed unless a resource consent is applied for to amend the consent notice.

NOTE **What if the Resource Consent DOES include floor level requirements?**
Apply as specified. Further steps in this technical process aren't required.

c Advise that the Building Code should be applied to set the Finished Floor Level in the absence of a Resource Consent Condition setting the level, if in a urban/residential subdivision (e.g. RC155328 - Woodlands Estate) that isn't within Kaiapoi, a Res 6 or 6a zone or Coastal Area and isn't subject to a consent condition or consent notice.

5.0 Determine if located within a Coastal Area
Land Development Engineer, Land Development Officer

a Apply set floor level if proposal is located within a Coastal Flood Hazard Area.

NOTE **Which Coastal areas are subject to set floor levels?**
Waikuku Beach - 3.65m
Woodend Beach - 3.21m
Pines/Kairaki - 3.47m

b Skip the following steps of this technical process if the minimum floor level is now known.

6.0 Determine if located within Kaiapoi

Land Development Engineer, Land Development Officer

a Using the Proposed ePlan 'Kaiapoi Fixed Minimum Finished Floor Level' apply the set floor level depending on the area of Kaiapoi that the proposal is located within.

b Ensure the 'Kaiapoi Fixed Minimum Finished Floor Level' layer is selected. Click the property proposed for development. Down the left-hand side of the screen results will appear including a Fixed Level (e.g. 2.45m at 5 Princess Place).

c Apply level as stated in plan.

Proposed Waimakariri District Plan - ePlan
https://waimakariri.isoplan.co.nz/draft/#/Property/0

d Skip the following step of this technical process if the minimum floor level is now known.

7.0 Evaluate Flood Mapping, if required

Land Development Engineer, Land Development Officer

NOTE **When should Flood Hazard Mapping be used to determine the freeboard and finished floor level required?**

When a consent notice or floor level requirement is not part of a Resource Consent. Often this is Rural development, either a subdivision or a rural lot proposing to build a dwelling, alteration or granny flat/secondary dwelling. Because the site is likely not the same level across its entirety, it is important to assess the exact proposed location to ensure the freeboard is correct.

Building in Red flood hazard areas should be avoided. If the red area is proposed PDU staff should advise the applicant that they need to relocate the building to part of the site not subject to a high flood hazard. If building in a red area is pursued by the Applicant despite PDU staff advice this is referred to the Manager - Utilities & Roading.

a Determine the proposed dwelling location in Waimap.

NOTE **How can I determine the exact location based off plans provided?**

Use Trapeze to overlay Waimap, see process below.

PROCESS Overlay Site Plan with Waimap in Trapeze

b Turn on the 'All Flooding Hazard 200 year' layer in Waimap (linked below) if part of a Resource Consent or if not part of a subdivision consent assess using the '100 year' layer.

NOTE **What do the 'All Flooding Hazard' layers include in Waimap?**

Coastal, Ashley Breakout, Localised Flooding

Waimap Flood Hazards
https://maps.waimakariri.govt.nz/waimap/floodhazard

c Evaluate the flood hazard present in the proposed area of development in conjunction with the Flood and Floor Level Technical Practice Note. Flood hazard is indicated by either clear, green, blue or red in Waimap. These hazards all have correlating levels of risk identified in the technical practice note, which is reflected by the freeboard above ground level required.

PDU NP DRAFT Flood and Floor Level Technical Practice Note

NOTE **Which FFL should be advised?**

The more conservative should be advised to the customer if the property is subject to both localised and breakout flooding.

Triggers & Inputs

TRIGGERS

None Noted

INPUTS

None Noted

Outputs & Targets

OUTPUTS

None Noted

PERFORMANCE TARGETS

None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

Process Name	Type of Link	Assigned Role
Overlay Site Plan with Waimap in Trapeze	Note	Land Development Engineer, Land Development Officer

PROCESS LINKS TO THIS PROCESS

None Noted

RACI

RESPONSIBLE
Roles that perform process activities

Land Development Engineer, Land Development Officer

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner	Kelly LaValley
Process Expert	Libica Hurley

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
None Noted

STAKEHOLDERS FROM LINKED PROCESSES

Process	Owner	Expert	Process

			Group
Overlay Site Plan with Waimap in Trapeze	Kelly LaValley	Libica Hurley	Land Development

INFORMED
Those notified of changes

All of the above, as well as; Trish Keen[System Stakeholder], Sheryl Cowan[System Stakeholder], Information Management Assistant[System Stakeholder], Information Management Team [System Stakeholder], Information Management Team Leader [System Stakeholder], Information Management Technical Administrator[System Stakeholder], GIS Team[System Stakeholder]. These parties are informed via dashboard notifications.

Systems

Trapeze

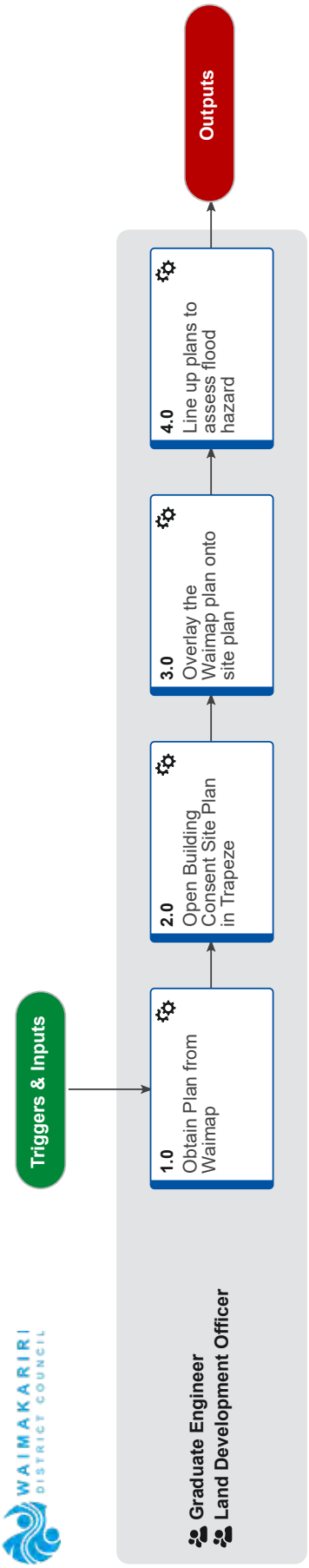
TRIM

WAIMAP

Lean

None Noted

Overlay Site Plan with Waimap in Trapeze [Awaiting Approval] v0.8



Overlay Site Plan with Waimap in Trapeze [Awaiting Approval] v0.8

Summary

Objective
This process allows you to determine the location of a proposed dwelling site in relation to flood hazard by overlaying the proposed plan on the actual aerial of the site.

Owner Kelly LaValley

Expert Libica Hurley

Procedure

1.0 Obtain Plan from Waimap
Graduate Engineer, Land Development Officer

- **a** Open Waimap and search the relevant address
- **b** Load the appropriate flood hazard layer (based on the finished floor level process)

  NOTE **Which layer do I use?**
  If assessing in conjunction with a Resource Consent the 'All Flooding Hazard 200 year' layer can be used.
  If assessing in conjunction with a Building Consent, not associated to a Resource Consent the 'All Flooding Hazard 100 year' layer should be used.
  These can both be found in the Utilities & Property module in Waimap, in or any other module by searching within the 'Add Data' tool.
- **c** Create a print of the relevant Property and save to your desktop

2.0 Open Building Consent Site Plan in Trapeze
Graduate Engineer, Land Development Officer

- **a** Locate the site plan in TRIM within the Building Consent .02 sub-folder
- **b** Open the site plan in trapeze using the TRIM link (called Trapeze 10)

3.0 Overlay the Waimap plan onto site plan
Graduate Engineer, Land Development Officer

- **a** Drag the downloaded Waimap site plan into the thumbnail section of Trapeze
- **b** Click the 'light table tool' in Trapeze (right hand side - overhead projector icon)
- **c** Click to view the Building Consent Site Plan
- **d** Drag the downloaded Waimap plan on top of the Building Consent site plan, from its thumbnail

4.0 Line up plans to assess flood hazard
Graduate Engineer, Land Development Officer

- **a** Manoeuvre the Waimap plan to match/fit the Building Consent site plan (e.g. line the boundaries up)

Triggers & Inputs

TRIGGERS

None Noted

INPUTS

None Noted

Outputs & Targets

OUTPUTS

None Noted

PERFORMANCE TARGETS

None Noted

Process Dependencies

PROCESS LINKS FROM THIS PROCESS

None Noted

PROCESS LINKS TO THIS PROCESS

None Noted

RACI

RESPONSIBLE
Roles that perform process activities

Graduate Engineer, Land Development Officer

Systems that perform process activities

None Noted

ACCOUNTABLE
For ensuring that process is effective and improving

Process Owner Kelly LaValley

Process Expert Libica Hurley

CONSULTED
Those whose opinions are sought

STAKEHOLDERS
None Noted

STAKEHOLDERS FROM LINKED PROCESSES

None Noted

INFORMED
Those notified of changes

All of the above. These parties are informed via dashboard notifications.

Systems

Trapeze

TRIM

WAIMAP

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO:	CON201960-02 /230308032092
REPORT TO:	UTILITIES AND ROADING COMMITTEE
DATE OF MEETING:	21 March 2023
AUTHOR(S):	Teifion Matthews, Project Engineer Jason Recker, Stormwater and Waterways Manager
SUBJECT:	Ashley Street Stormwater Upgrade
ENDORSED BY: (for Reports to Council, Committees or Boards)	General Manager / Acting Chief Executive

1. SUMMARY

1.1. The purpose of this report is to update the Utilities and Roading Committee on this work as agreed at the Annual Plan Budget meeting 8 February 2023. See attachment Viii.

1.2. A budget of $616,000 has been included in the draft 23/24 Annual Plan for the Ashley Street Stormwater Upgrades.

1.3. Primary stormwater infrastructure from Good Street, Kingsbury Avenue and Ashley Street does not have sufficient capacity to convey the level of service flow required by the Engineering Code of Practice (ECoP) (minimum 20% AEP). As outlined in attachment V.

1.4. There have been 5 recorded flood events (DR1800142, DR1800156, DR1800173, DR1800149 & DR2200193) within the junction of Good Street & Kingsbury Avenue between February 2018 and February 2022.

1.5. The capacity issue within the existing stormwater network has been discussed and solution agreed on, at previous Utilities and Roading Committee meetings. Refer to attachments Vi & Vii. It is noted that an elected member raised concern at these meetings as well, however the recommendations were adopted.

1.6. Additional modelling work has been undertaken to confirm the benefit of the proposed pipe upgrade. This showed that the additional 375mm/450mm pipe would reduce the flooding in Kingsbury Ave by 100mm, but not alleviate the flooding in the 20% AEP event. The cost of this upgrade is estimated to be $616,000. It is therefore considered that benefit of the upgrade versus the cost of the upgrade is not warranted at this stage as the full benefits will not be realised until the capacity in the downstream North Drain is improved.

1.7. Upgrading the existing sumps with back entry sumps along Kingsbury Avenue at a cost of $51,000 will not increase the capacity of the current stormwater system, however it will reduce the risk of blockages.

Attachments:

i. Flood investigation on Kingsbury Avenue and Golding Avenue, Rangiora (TRIM no. 180817093320)

ii. Ashley Street Stormwater Upgrade - Concept Options (TRIM no. 200310032919)

iii. Ashley Street Stormwater Upgrade - Addendum to concept design memo (TRIM no. 201208167323)

iv. Ashley Street Stormwater Upgrade – Storm investigation 29 January 2021 (TRIM no. 210222029620)

v. Ashley Street Stormwater Pipe Upgrades - Report to Utilities and Roading Committee April 2021 (TRIM no. 210309039744)

vi. Signed and Confirmed Minutes Utilities and Roading Committee meeting 16 March 2021 (TRIM no. 210311041862)

vii. Signed and Confirmed Minutes Utilities and Roading Committee meeting 20 April 2021 (TRIM no. 210420063527)

viii. DRAFT Minutes Council Annual Plan Budget Meeting 8 February 2023 (TRIM no. 230207015704)

ix. Rangiora Stormwater Management Plan Hydraulic Modelling Tech (TRIM no. 00102500017)

2. RECOMMENDATION

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 230308032092.

(b) **Approves** the recommendation to upgrade the existing sumps to back entry double sumps along Kingsbury Avenue.

(c) **Notes** that this is a reduced scope of work from the previously accepted design of stormwater pipe upgrades on Kingsbury Avenue and Ashley Street, and has come about due to the construction estimate for this upgrade being beyond the available budget.

(d) **Notes** that Council staff will monitor any future flooding along Good Street, Kingsbury Avenue and Golding Avenue intersection. When capacity improvements are made in North Drain, Council should consider the stormwater capacity upgrade to further reduce the depth of flooding.

(e) **Notes** that a road reseal is planned for this area in 2024/25, so any future upgrades would require trenching through the new seal.

(f) **Notes** that a water renewal was to be included within the same contract, however this will now likely be done as a standalone project, which is expected to increase its cost.

(g) **Notes** that Council will continue receiving complaints with the time it takes for the water to drain away.

3. BACKGROUND

3.1. A Utilities and Roading report was completed in 2021 (attachment V) and tabled on the 16 March 2021 Utilities and Roading Committee meeting (attachment Vi). The preferred solution was accepted following the 20 April meeting (attachment Vii).

3.2. Further budget was requested to fund this project at the 2023/24 Annual Plan budget meeting, February 2023. An elected member “raised concern regarding the proposed Ashley Street pipe upgrade, as they believed that the pipework was sufficient to handle any excess water during a flooding event and believed that only the sump work should be

carried out." It was agreed that a report be put forward to the U&R committee to provide further background on the design. Refer to attachment Viii.

3.3. The hydraulic model has been updated and re-run to provide the most up to date scenario outcome.

3.4. CCTV has been completed in May 2018. Refer to attachment i.

4. ISSUES AND OPTIONS

4.1. The existing primary stormwater system does not meet the required level of service. Flooding experienced at the Good Street, Kingsbury Avenue and Golding Avenue intersection during a one hour, 1 in 5 year (20% AEP) storm is shown in Figure 1.

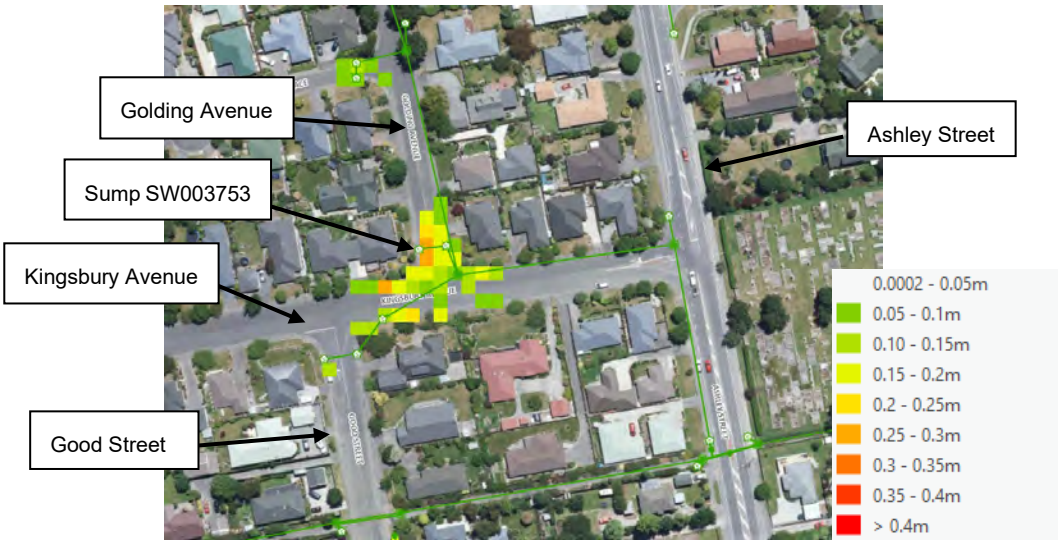


Figure 1. Flood modelling at Golding Avenue, Good Street and Kingsbury Avenue

4.2. Critical depth at sump SW003753 is 262mm,

4.3. The long section in Figure 2 shows the existing stormwater system at capacity during a one hour 1 in 5 year storm (20% AEP).

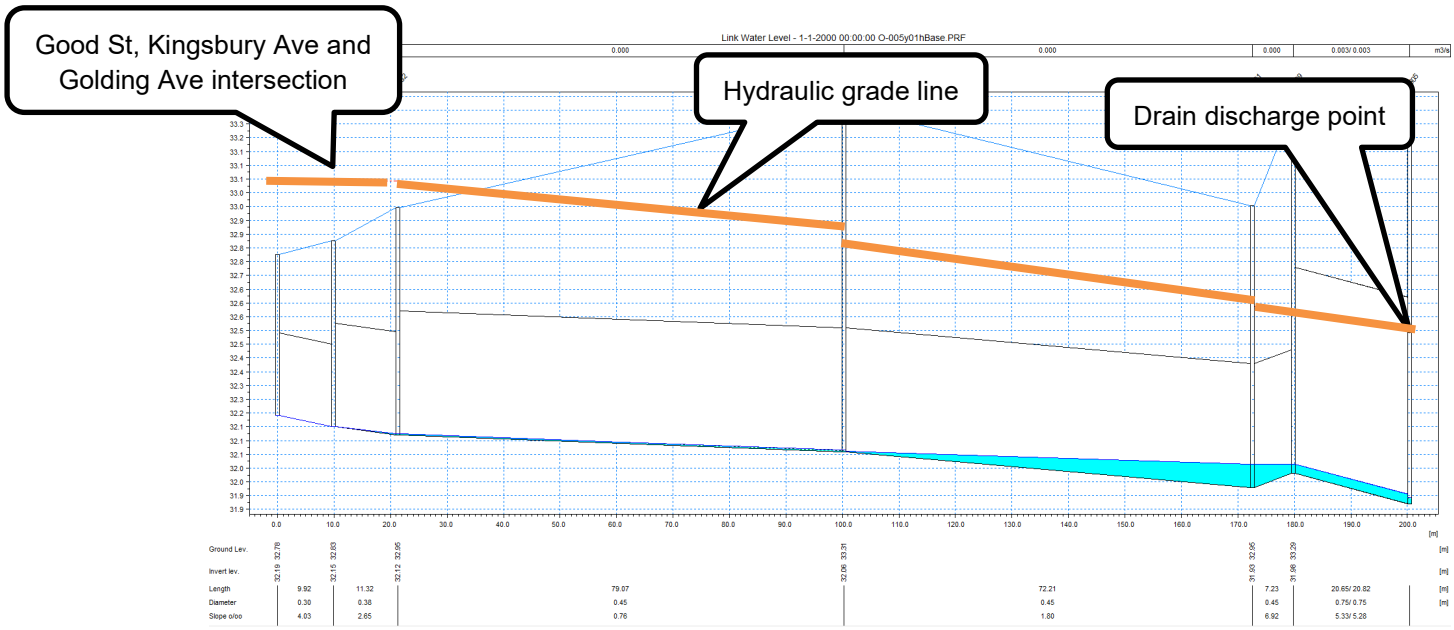


Figure 2. Base scenario long sections of existing pipe network

4.4. Post construction flood modelling results of an elected member's suggestion of only upgrading the existing sumps to back entry double sumps along Kingsbury Ave, during a one hour, 1 in 5 year storm (20% AEP) is shown in Figure 3.

Figure 3. Flood modelling of the upgraded sumps at Golding Avenue, Good Street and Kingsbury Avenue

4.5. Critical depth at sump SW003753 is 258mm,

4.6. The long section in Figure 4 shows the effects on upgrading the sumps to the stormwater network, during a one hour, 1 in 5 year storm (20% AEP). As can be seen there is no discernible change in the model outcome.

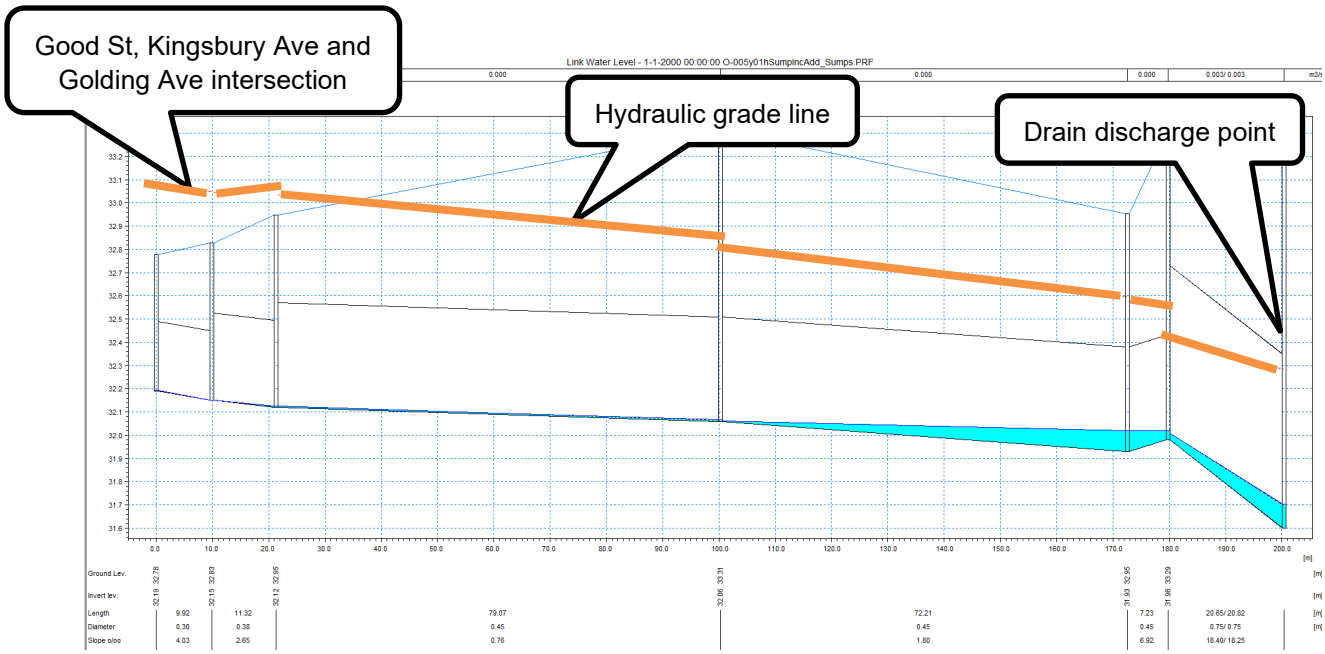


Figure 4. Upgraded sumps long sections of existing pipe network

4.7. The cost estimate for upgrading the sumps is $ 51,000.00 including professional fees and contingency

4.8. The advantage for upgrade the existing sumps are:

i. Quicker drain down time following a large rain event, due to an increase sump capacity.

ii. Reduce the risk of blockages along the greats.

iii. Least disruptive to the public during construction.

iv. Cheaper than the stormwater capacity upgrade option.

4.9. The disadvantages for upgrading the existing sumps are:

v. While the sumps have now increase capacity, the sumps are still discharging into an undersized system which will result in ponding on the streets.

vi. Does not meet the level of service in the ECoP.

vii. Back entry vulnerable to damage from vehicle collisions.

4.10. Post construction flood modelling of the capacity upgrade option along Kingsbury Ave, during a one hour 1 in 5-year storm is shown in Figure 5

Figure 5. Flood modelling results on the capacity upgrade option (red lines indicate new pipe) at Kingsbury Avenue

4.11. Critical depth at sump SW003753 is 161mm,

4.12. The long section in Figure 6 shows the effects to the stormwater network during a one hour, 1 in 5-year storm (20% AEP).

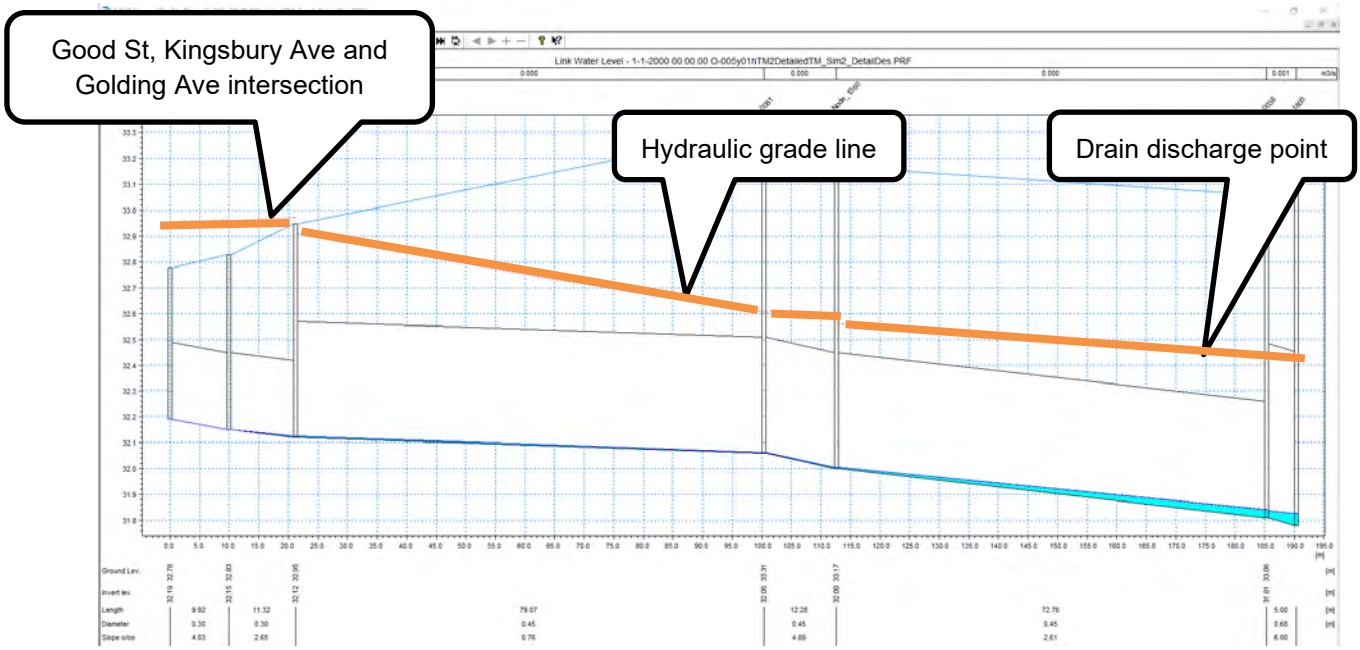


Figure 6. Capacity upgrade option long sections

4.13. The cost estimate for the capacity upgrade is $ 616,000.00 including professional fees and contingency

4.14. The advantages for the stormwater upgrade are:

i. Will meet the level of service set out in the ECoP and less ponding in larger events

ii. Increase the resilience & capacity to the stormwater network.

iii. Increasing sump resilience with new rear entry sumps

4.15. The disadvantages for the stormwater upgrade are:

iv. Most expensive option with only 5 reports of road flooding lodged in Tech one.

v. Most disruptive to the public during construction

4.16. A planned resurfacing works along Ashley Street has already been postponed until 2024/2025, to allow the stormwater upgrade & water renewal works to be completed first.

Implications for Community Wellbeing

4.17. There are not implications on community wellbeing by the issues and options that are the subject matter of this report.

4.18. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū are not likely to be affected by or have an interest in the subject matter of this report.

5.2. Groups and Organisations

There are not groups and organisations likely to be affected by, or to have an interest in the subject matter of this report.

5.3. Wider Community

The wider community is likely to be affected by, or to have an interest in the subject matter of this report.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

There are financial implications of the decisions sought by this report.

This budget is included in the 23/24 Annual Plan.

6.2. The stormwater upgrade is expected to cost approx. $616,000.00 including construction contingency. The $135,000 for the water renewal element will come from the water renewal budget. Making the combined work package to be $751,000.00

6.3. The current stormwater budget for the 2023/24 financial year is $470,000. Therefore, an additional $146,000 is required to complete the stormwater upgrade.

6.4. The main reasons for the cost estimate increase are:

- Original cost estimate didn’t allow for Main Power work
- Original cost estimate didn’t allow for an outlet structure
- Change of the alignment following a safety in design workshop and detail design
- Potholing for underground utilities
- Construction material inflation

6.5. The cost estimate to upgrade the sumps is $ 51,000.00 including professional fees and contingency, meaning the budget will be underspent by $419,000.00

6.6. By not doing the full upgrade, this will likely make the water renewal more expensive as the economies of scale are lost.

6.7. **Sustainability and Climate Change Impacts**

The recommendations in this report do not have sustainability and/or climate change impacts.

6.8. **Risk Management**

There are risks arising from the adoption/implementation of the recommendations in this report.

6.8.1. It should be noted that the proposed upgrade only improves flooding up to and including a 1 in 5 year storm. It is noted that during exceedance events (such as Cyclone Gita) flooding will continue to occur at the low point on Kingsbury Avenue due to the topography.

6.8.2. The Ashley Street stormwater upgrades are close in proximity to the St John's Anglican Cemetery.

6.8.3. A postponement to the capacity upgrade post 2024/2025, will result in excavating through newly laid carriageway seal along Ashley Street.

6.9. **Health and Safety**

There are not health and safety risks arising from the adoption/implementation of the recommendations in this report.

7. CONTEXT

7.1. **Consistency with Policy**

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. **Authorising Legislation**

This matter is covered under the Local Government Act.

7.3. **Consistency with Community Outcomes**

The Council's community outcomes are not relevant to the actions arising from recommendations in this report.

7.4. **Authorising Delegations**

The Utilities and Roading Committee has the delegated authority to accept the recommendation.

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO:	*PD001343 / 180817093320*
DATE:	16 March 2023
MEMO TO:	Kalley Simpson, 3 Waters Manager Owen Davies, Drainage Asset Manager
FROM:	Jigyasa Dhakal, Graduate Engineer
SUBJECT:	Flooding Investigation on Kingsbury Ave and Golding Ave, Rangiora.

The purpose of this memo is to address the flooding at the Kingsbury Ave and Golding Ave intersection on the 20th February 2018. This memo explores the potential causes of the incident and recommends solutions to alleviate flooding in future events. All solutions have been verified through hydraulic modelling.

BACKGROUND

Council has received six service requests in regards to drainage concerns on the Golding Ave and Kingsbury Street intersection (Refer Table 1). Four of the service requests were received during a 1/50 year event occurring on the 20th of February (Cyclone Gita). The remaining two service requests are in relation to debris blockages in the area. Due to these drainage service requests, an investigation has been undertaken to identify the causes of flooding on this stormwater system on Kingsbury Avenue (from Good Street to Ashley Street).

Table 1: Drainage service requests in the flooding area

Service Request	Location	Date	Issue	Resolution
DR1700194	9 Golding Ave	21/04/2017	*Caller has been unblocking drains of leaves and would like the sweeper truck to come out to clear up leaves in this area before the wind/rain shifts them again.*	Completed
DR1800113	9 Golding Ave	16/02/2018	*Tree branches and leaves need to be cleared form channels -come down in wind from council street trees*	Sweeper truck to sweep both streets in next run. Not that bad just little stick
DR1800142	Golding/Kingbury intersection	20/02/2018	*The Kingsbury Avenue end of Golding Avenue is flooded across the road*	Drainage cannot keep up Caller not advised
DR1800149	Golding/Kingbury intersection	21/02/2018	*I had a call from Paul Williams, please get Sicon to clear a blocked drain in Kingsbury Ave between Golding Ave and Ashley Street. Another caller advised water is right out on both sides of the road, causing hazard to drivers.*	Drained cleared
DR1800156	Golding/Kingbury intersection	20/02/2018	*Flooding Road right across the road - drains on both sides of the road*	

DR1800173	Golding/Kingbury intersection	20/02/2018	*Drainage Corner of Golding Ave and Kingsbury Ave Police have requested assistance due to flooding across road.*	Warning signs placed

The catchment investigated has two branches from Golding Ave and Good Street which connects on Kingsbury Ave and discharges into the culvert on Ashley Street. All sumps in this network have are regular roadside sumps with grates. The northern section of the catchment (above Archer Place) have rear entry sumps.

Figure 1: Aerial of Golding Ave stormwater network catchment

PREVIOUS INVESTIGATIONS

A 2001 modelling report (TRIM 00102500017) has highlighted the Good Street and Golding Avenue intersection with Kingsbury Ave as a location which has potential to flood during a two year event. The report also predicted the properties on the corner of Golding Avenue would experience ponding from overland flows during a 50 year event. This report suggested three upgrading solutions for this area, as shown in Figure 2 to 4.

Figure 2: Two year storm upgrading solution

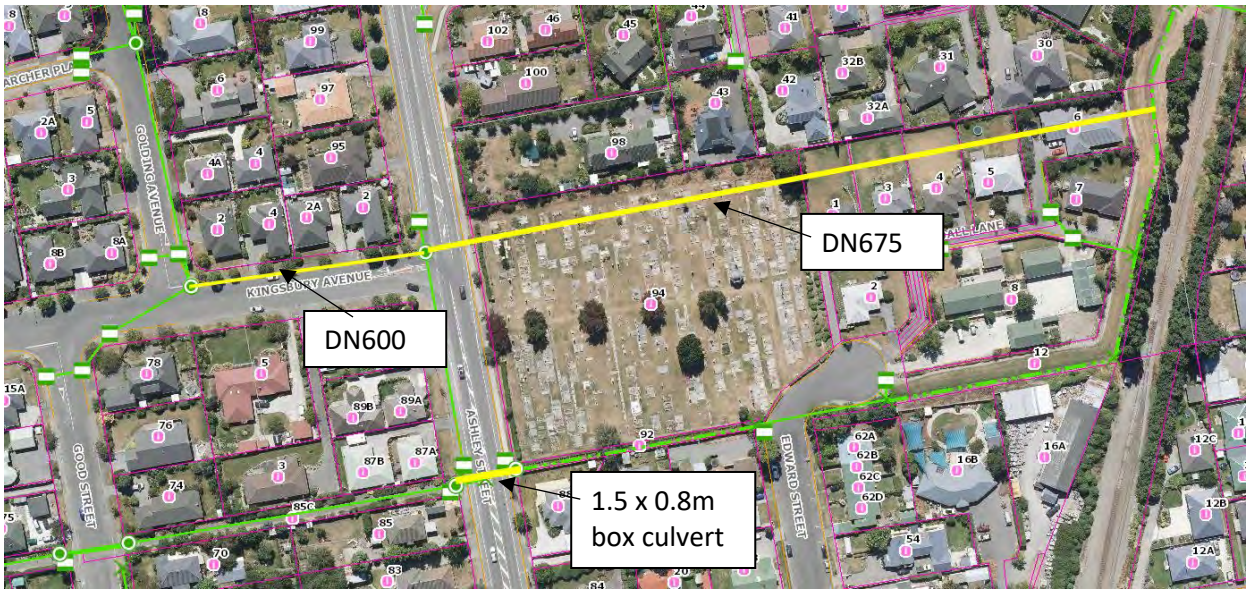


Figure 3: Five year storm upgrading solution

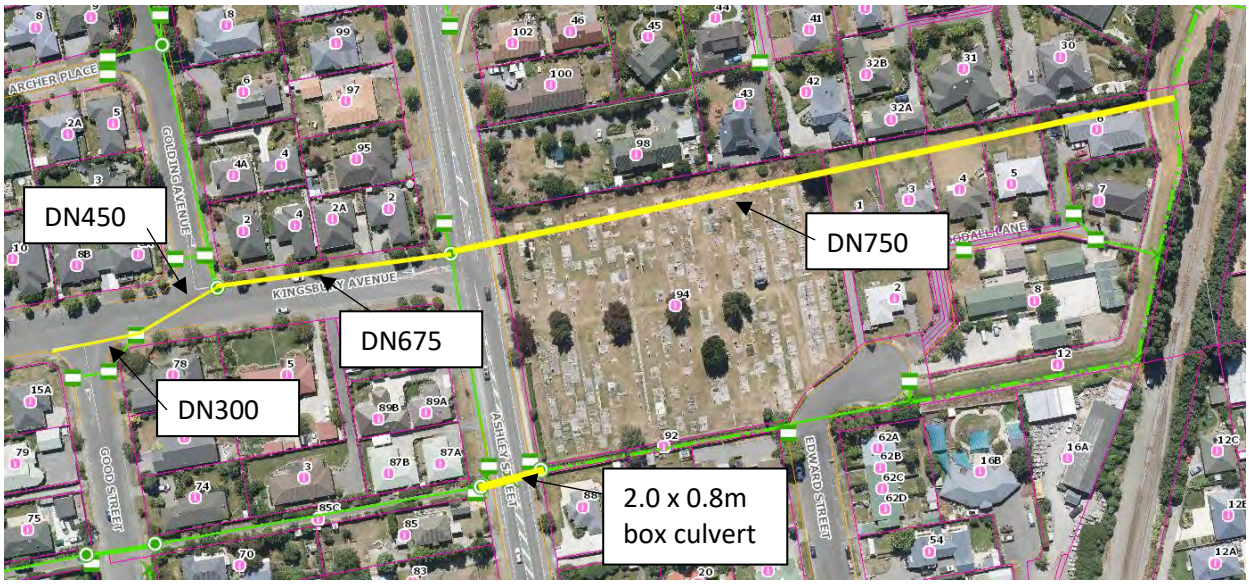


Figure 4: Ten year storm upgrading solution

A secondary 2010 modelling report (TRIM 100803027322) has also highlighted the culvert under Ashley Street contributing to significant head loss due to backwater effects from the undersized pipe upstream and the pipe running against the lay of the land.

INVESTIGATION

CCTV Investigation

A CCTV investigation was undertaken by Hydrotech to identify the location and severity of any blockages in the pipeline that could restrict capacity. Minor defects and silting were identified in the investigation but these are unlikely to contribute to significant flooding problems. The reports have been attached as Appendix A and Table 2 summaries key findings from the investigation.

Table 2: Summary of the CCTV investigation from Hydrotech

Asset/Pipeline	Location	Defects/Comments
SW007641	8 A Kingsbury Ave sump to 2 Golding Ave sump	Fine silt deposit
SW007640	2 Golding Ave sump to 2 Golding Ave Manhole	Small Crack Circumferential, Autogenously Healing + Flow Abrasion
SW007649	2 Golding Ave manhole to 2 Kingsbury Ave manhole	Underwater (10% - 35% filled)
SW006877	2 Kingsbury Ave manhole to 87 A Ashley Street sump	Small grout causing obstruction, chip in joint, minor stones and silt in lines.
SW006832	87 A Ashley Street sump to 85 C Ashley Street Culvert.	-

Visual Drain Inspection

On the 10th of July 2018 visual inspection of the drainage system was undertaken by WDC drainage engineers during dry weather.

The drain through the cemetery was overgrown with silt build up in the shape shown in Figure 5. The drain holds water in the naturally created low flow path with a depth lower than the invert of the culvert.

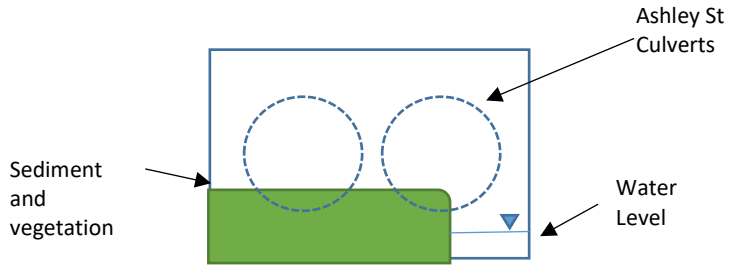


Figure 5: Cross-sectional schematic of the cemetery drain.

The inspection also highlighted all inlets and outlets to the culverts along the drain have grilles which capture a large quantity of debris (mostly leaves). The Ashley Street Grille outlet was left open with leaf debris blocking the bottom of the Grille. This suggests that this may have blocked up requiring the grille to be open to prevent blockage. Refer to Figure 3 for a photograph taken during the inspection.

Figure 3: Ashley Street Culvert Outlet

Further downstream of the cemetery drain, the inlet to the Edward street culvert had a slanted grille with leaves built up at the bottom. This drain has significantly less build up in comparison to the other two outlets however majority of the build-up is predicted to be capture upstream in the cemetery drains vegetation. On the outlet end of the Edward Street culvert, the grilles showed a similar pattern with build-up of debris at the bottom of the grille. Refer to Figure 4 and 5 for a photograph taken during the inspection

Figure 4: Edward Street Culvert Inlet

Figure 5: Edward Street Culvert Outlet

The visual inspection suggests that debris in the grates and the vegetation in the drain is reducing the flow of water and attributing to the reduced capacity of the drainage system.

GPS Survey Investigation

A GPS survey was undertaken to identify and compare the elevations of the stormwater system and how it effects the intersection flooding.

The cross section of the cemetery drain shows that the water must flow uphill 300mm to over top the 400mm weir and discharge to the north drain. Refer to Figure 5.

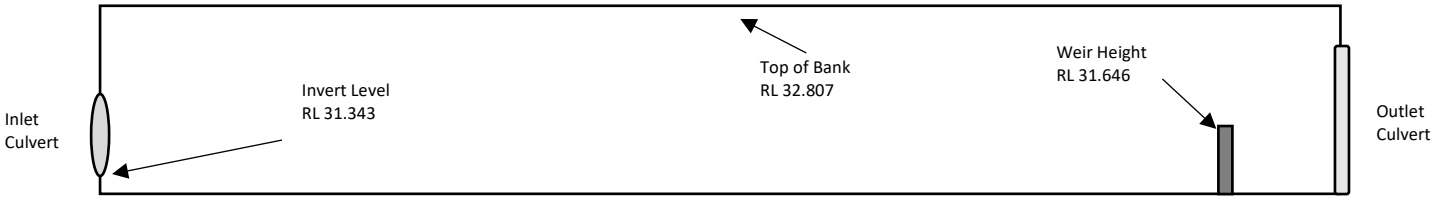


Figure 5: Cross section of the cemetery drain

The bottom of the kerb was surveyed at the intersection at Golding and Kingsbury Ave. The elevations are similar to the top of bank elevation for the Cemetery Drain. Refer to Figure 6 for the elevations. This indicates that when the water level in the cemetery drain is nearing full, the runoff from the Kingsbury Golding intersection will struggle to achieve enough of a head difference to discharge to the North drain.

Figure 6: Bottom of kerb elevations compared to bank height of the cemetery drain.

The Council Engineering Code of Practice requires primary reticulation stormwater infrastructure within the district to be designed to a minimum of 20% AEP (5 year event). As Cyclone Gita was a 50 year event, it is predicted that stormwater systems were running to capacity. Therefore it is predicted that the Ashley Street drain was at maximum water level such that the water at the intersection did not have sufficient head to flow through the stormwater system, and resulting in flooding.

If the water level in the Ashley Street drain was at or above the top of bank height, the stormwater collected upstream would not have not have sufficient head to flow through the stormwater system, and resulting in flooding in the low elevation location in the Kingsbury Golding Avenue intersection

OPTIONS & MODELLING

Hydraulic flood modelling has been undertaken to analyse the systems response to the following 4 options:

1. Current Case
2. Removal of Weir
3. Increase pipe size on Kingsbury Ave (DN600) and Ashley Street (DN675) + Removal of Weir
4. Addition of 525 pipe across Ashley Street + Removal of Weir
5. Increase pipe size on Kingsbury Ave (DN600) and Ashley Street (DN675) + Removal of Weir + Addition of 525 pipe across Ashley Street

All results are based on the maximum flow rate through the Cemetery Drain which found the 5 year, 1 hour duration storm is the critical storm.

Current Case

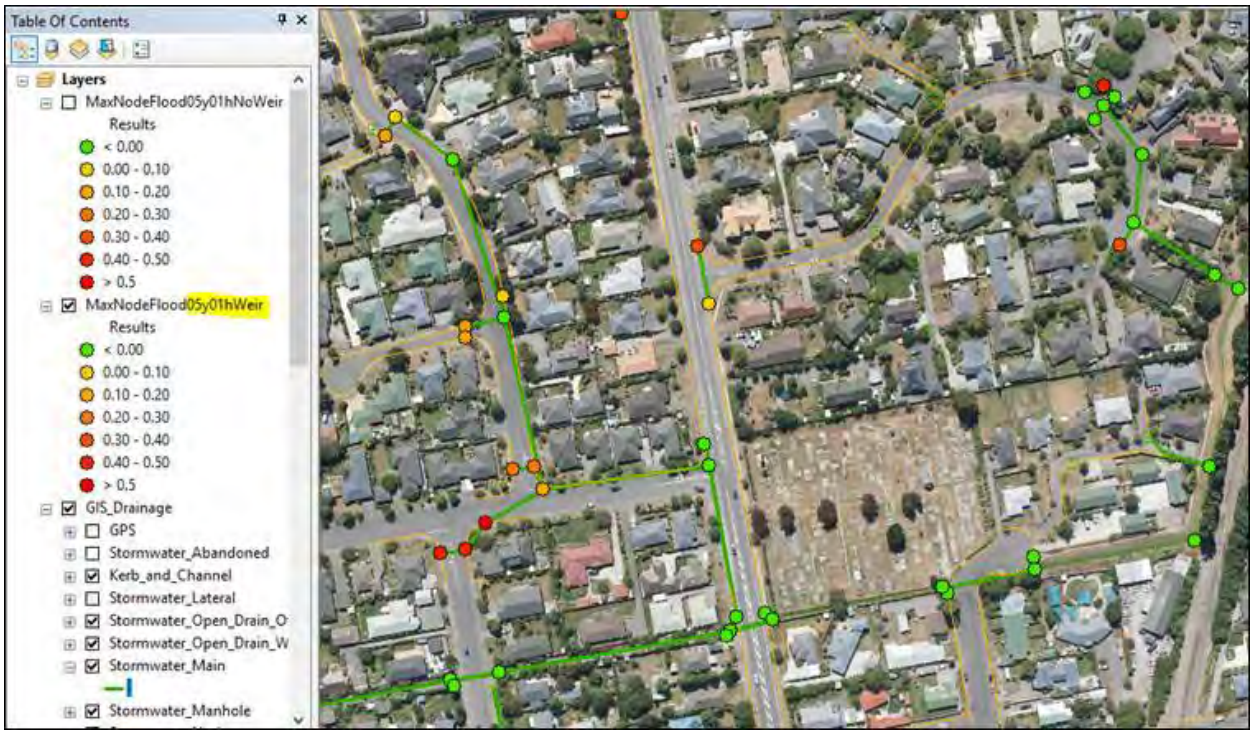


Figure 7: Modelling the flooding in sumps including the weir in the Ashley Street drain.

Removal of Weir

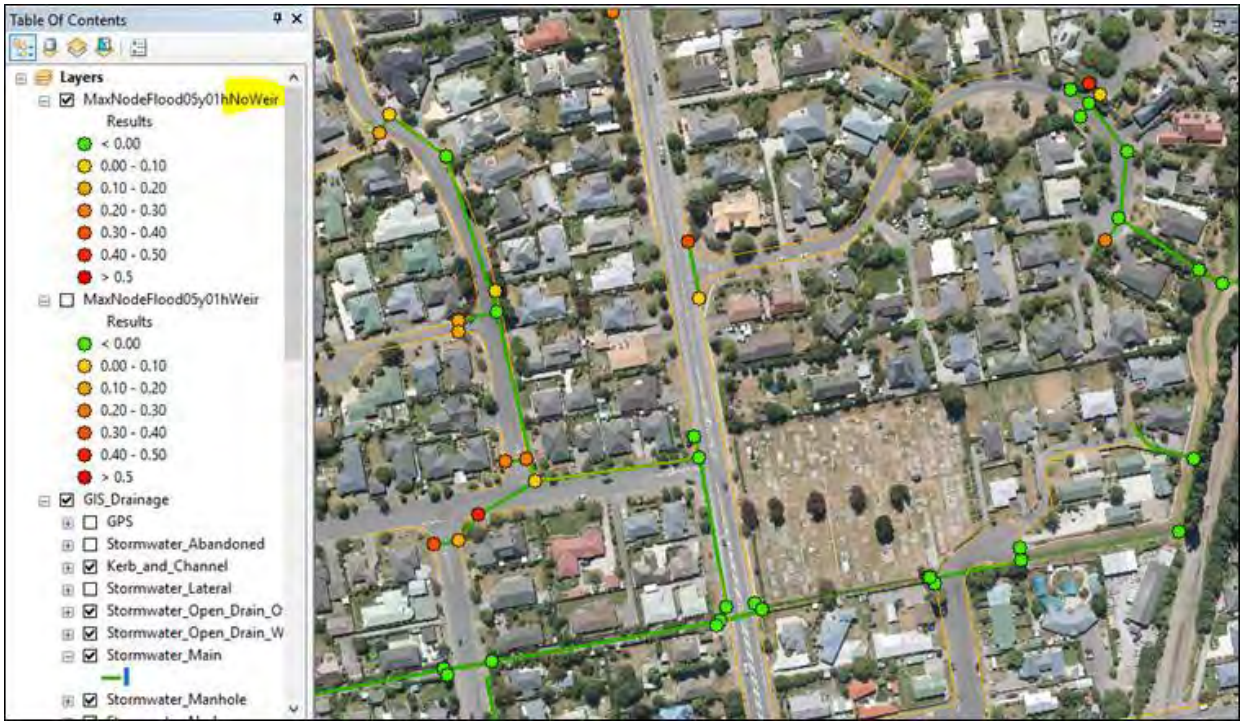


Figure 8: Modelling the flooding in sumps without the weir in the Ashley Street drain.

Increase pipe size on Kingsbury Ave (DN600) and Ashley Street (DN675) + Removal of Weir

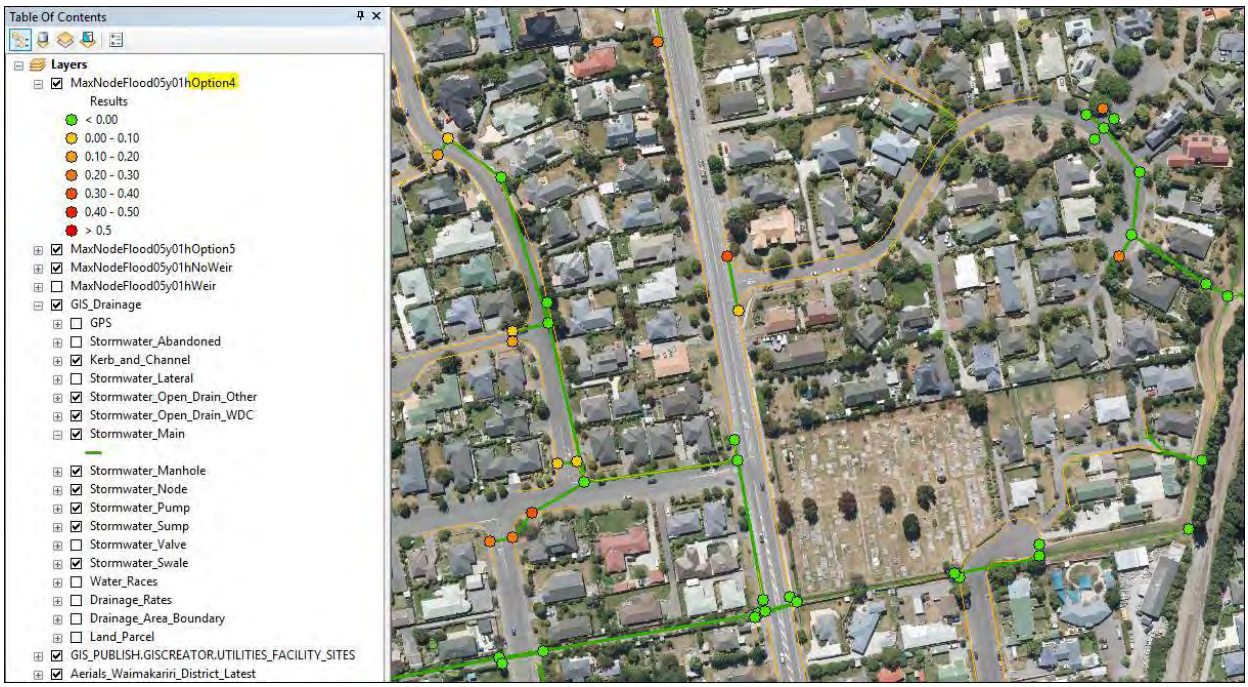


Figure 9: Modelling the flooding in sumps with pipe size increase on Kingsbury Ave (DN600) and Ashley Street (DN675) combined with the removal of the weir structure in the Cemetery Drain.

Addition of 525 pipe across Ashley Street + Removal of Weir

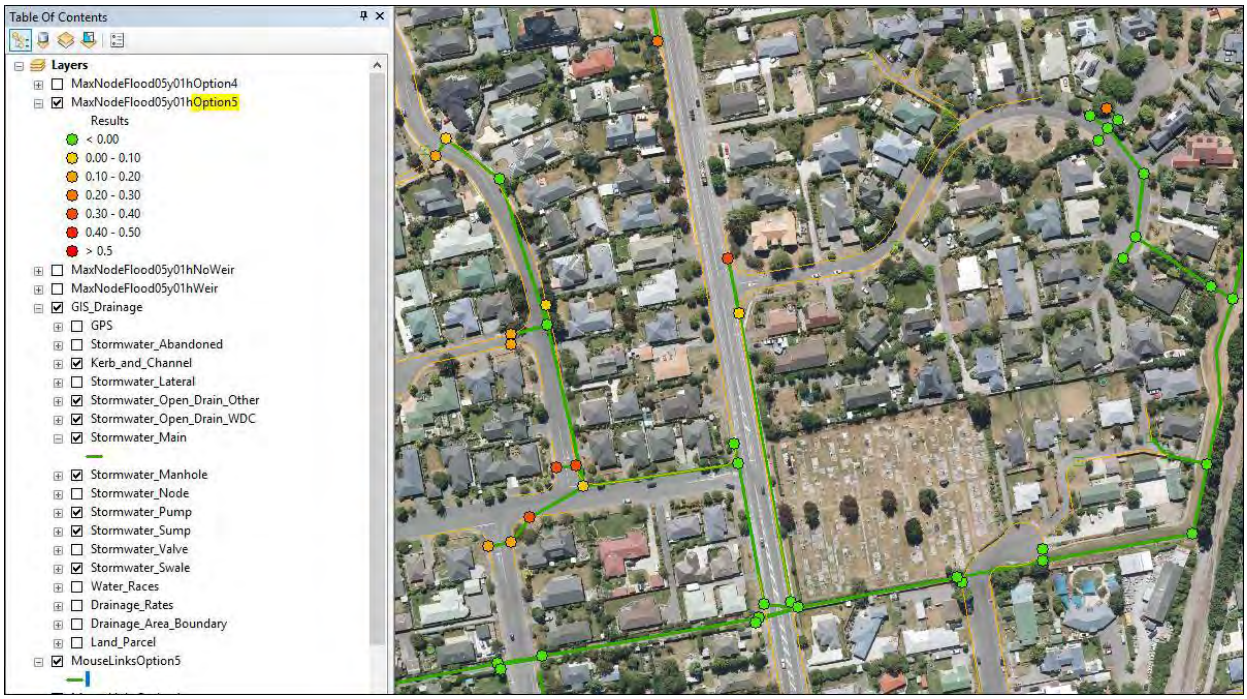


Figure 10: Modelling the flooding in sumps with an additional DN525 pipe across Ashley Street combined with the removal of the weir structure in the Cemetery Drain.

Increase pipe size on Kingsbury Ave (DN600) and Ashley Street (DN675) + Removal of Weir + Addition of 675 pipe across Ashley Street.

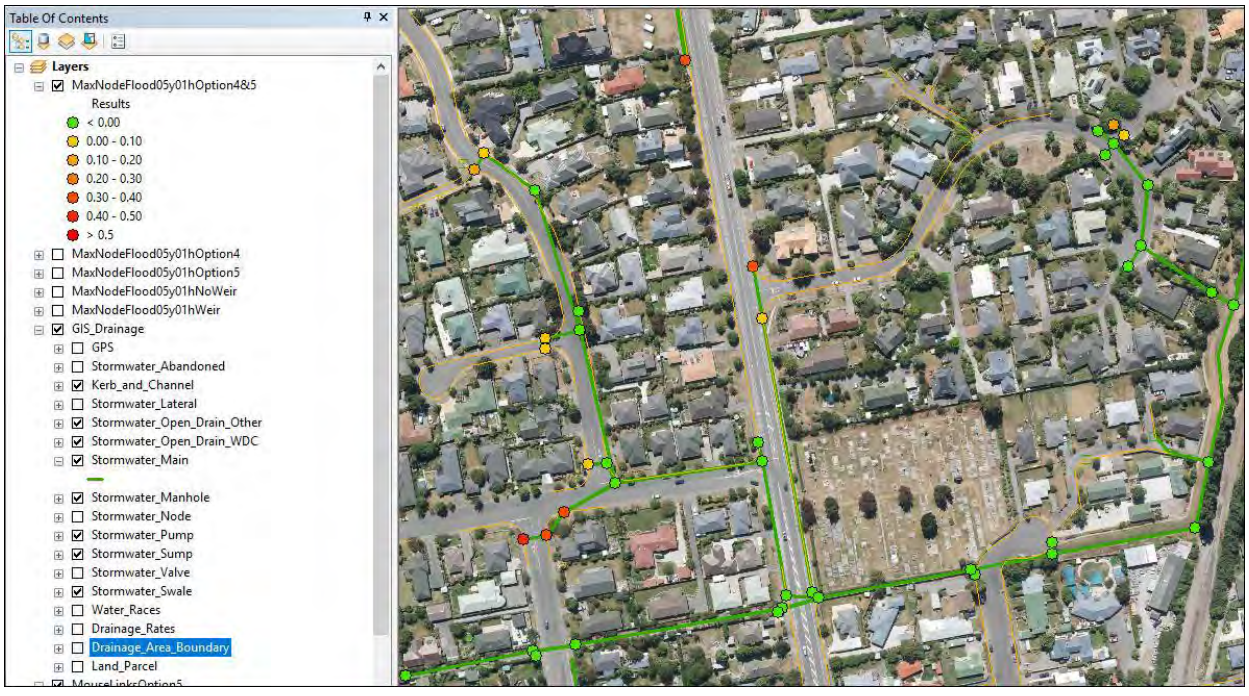


Figure 11: Modelling the flooding in sumps with pipe size increase on Kingsbury Ave (DN600) and Ashley Street (DN675), an additional DN675 pipe across Ashley Street combined with the removal of the weir structure in the Cemetery Drain.

RECOMENDATIONS

1) **AIM Team update GIS system**
   - Only one DN 450 pipe connects the northern sump to the Ashley Street culvert through a perpendicular saddle connection. (Waimaps shows two connections to a nearby manhole).
   - The eastern outlet for Ashley Street culvert has three outlets (Waimaps shows a manhole connection).

2) **Maintenance of the Cemetery Drain.**
   Delta have undertaken maintenance in July 2018 to clear the drain and blockages in the grates downstream.
   It is recommended secondary works be undertaken to level the drain to the invert height of the Ashley street culvert.

3) **Install rear entry sumps to increase flow capacity**
   The sumps on Golding Ave and Good Street be converted to rear entry sumps to alleviate leaf blockages and allow the water to drain away as quickly as possible.
   This is estimated to cost $2500 (based on prices obtained for CON18/10) to convert each existing standard sump to rear entry sump. Hence, the installation cost for 5 rear entry sumps, including professional fees of $5,000 and a 30% contingency, is estimated at $22,750.

4) **Remove Weir on Ashley Street Cemetery Drain**
   Hydraulic flood modelling shows that the removal of the weir would result in reduction of flooding upstream on Kingsbury Ave. It is recommended that the weir be removed to improve the hydraulics of the system.

5) **Upgrade the pipe size of the system.**
   The 2001 report recommended upgrading the pipeline sizes to alleviate flooding in the system. The upgrades pipe size in the existing alignment proved to reduce flooding in the Kingsbury Ave Golding Ave intersection.

Figure 6: Current pipeline alignment with recommendations from the 2001 report of pipe size increase for the system for a 5 years event.

The estimated cost to upgrade the existing stormwater was estimated at $124,900 in 2001. With the new configuration, this pipe upgrade is now estimated to cost $281,000. Refer Appendix B.

6) Additional culvert on Ashley Street

Hydraulic modelling should be undertaken to investigate if the installation of a 525 pipe across Ashley Street would increase hydraulic capacity within this system. Refer to Figure 7 for the alignment. The 525 pipe across Ashley Street is to be investigated in the configuration shown in Figure 2. This pipeline is estimated to cost $18,000 assuming the pipe is to be installed upto 2.5m deep and using 525 concrete pipe as per CON16/74. With the inclusion of $3,000 of traffic management, $7,000 professional fees and 30% contingency, the total project cost is estimated at $36,400.

Figure 2: Proposed 17.6m DN525 pipeline for modelling.

Appendix A – HydroTech CCTV Investigation Report


SW007649.pdf


SW007641.pdf


SW007640.pdf


SW006877.pdf


SW006832.pdf

Appendix B – Price Estimate of Recommendation No.4

No.	SCHEDULED ITEM	QUANTITIY	UNIT	RATE	AMMOUNT	REF.
	P&G				$ 18,990.00	10%
	Stormwater					
	70m of DN600 RCRRJ	70	m	$ 1,250.00	$ 87,500.00	SW16-19
	70m of DN675 RCRRJ	70	m	$ 900.00	$ 63,000.00	SW16-20
	Manhole 1050	1	ea.	$ 7,000.00	$ 7,000.00	
	Reinstatement					
	Kerb and Channel	180	m	$ 80.00	$ 14,400.00	SW 15-28
	Carriageways / Footpaths	180	m	$ 100.00	$ 18,000.00	SW 16-21
	Total Construction Cost				$ 208,890.00	
	Professional Fees				$ 8,000.00	
	30% Contingency				$ 65,067.00	
	Total Project Cost				**$ 281,957.00**	

Appendix C – Modelling Investigation

Appendix C - Cemetery Drain Moc

Cemetery Drain Modelling Results.m

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO AND TRIM NO:	CON201960-02 / 200310032919
YOUR REF:	PD001618
DATE:	18/05/2020
MEMO TO:	Kees Swanink, Acting Drainage and Waterways Manager
FROM:	Claudia Button, Graduate Engineer
SUBJECT:	Ashley Street Stormwater Pipe Upgrade – Alignment and Pipe Size Concept Options Assessment

The purpose of this memo is to confirm the findings from previous reports about the Kingsbury Avenue, Golding Avenue and Good Street intersection and outline potential options to reduce the risk of flooding at this location during the 1 hour critical duration 20% AEP and 2% AEP storm events. The memo recommends potential options for the Ashley Street Stormwater Pipe Upgrade.

1. BACKGROUND

During Cyclone Gita in 2017, there was a large amount of flooding covering the road in a low spot on the Kingsbury Avenue, Golding Avenue and Good Street intersection, making this section of road unsafe to traverse. See Figure 1 for the flooding location and current stormwater pipe configuration and sizes. Cyclone Gita was a 1 in 50 year storm event.

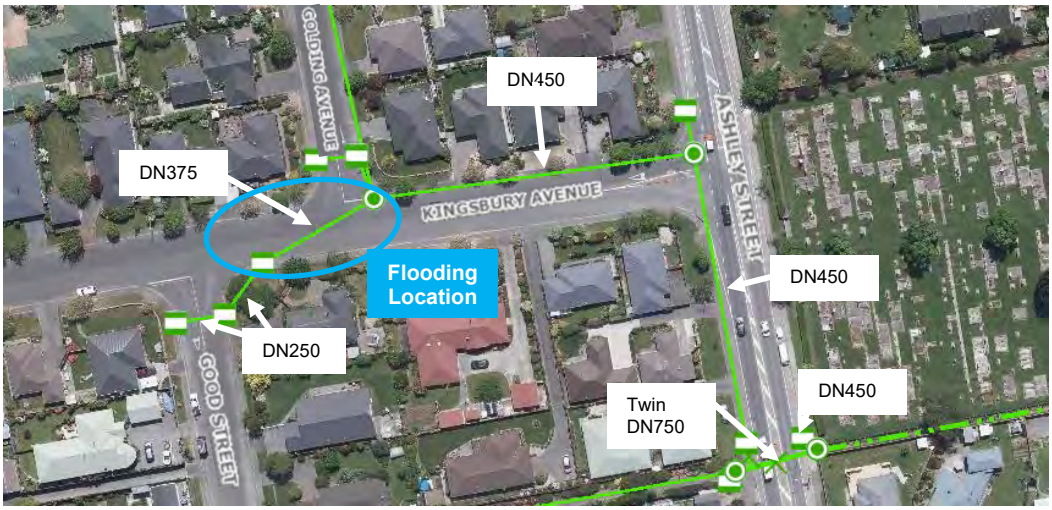


Figure 1. Current stormwater pipe locations and sizes. Flooding location indicated in blue.

1.1. The flood event and previous investigations (TRIM 100803027322, 180817093320 and 00102500017) show that this stormwater network is not meeting the level of service required by the Engineering Code of Practice (ECoP) which requires primary reticulation stormwater infrastructure within the district to be designed to a minimum of 20% AEP.

2. ISSUES

2.1. Currently the pipe network between Good Street and the Rangiora St Johns Anglican cemetery drain does not provide sufficient capacity to meet the required level of service and the model predicts flooding during a one hour 20% AEP critical duration storm event, as shown in Figure 2. The longitudinal section shows two negative gradients, hydraulic restrictions due to undersized pipework along most of the downstream pipework and identifies that the hydraulic grade line is higher than the ground level in the vicinity of the Kingsbury Avenue, Golding Avenue and Good Street intersection. It should be noted that at one pipe length upstream of the point of discharge to the drain, the level of surcharge is approx. 100 to 200mm below ground level of the lowest sump at the intersection in question. Therefore, even a small shortfall in network capacity would likely result in flooding at the intersection.

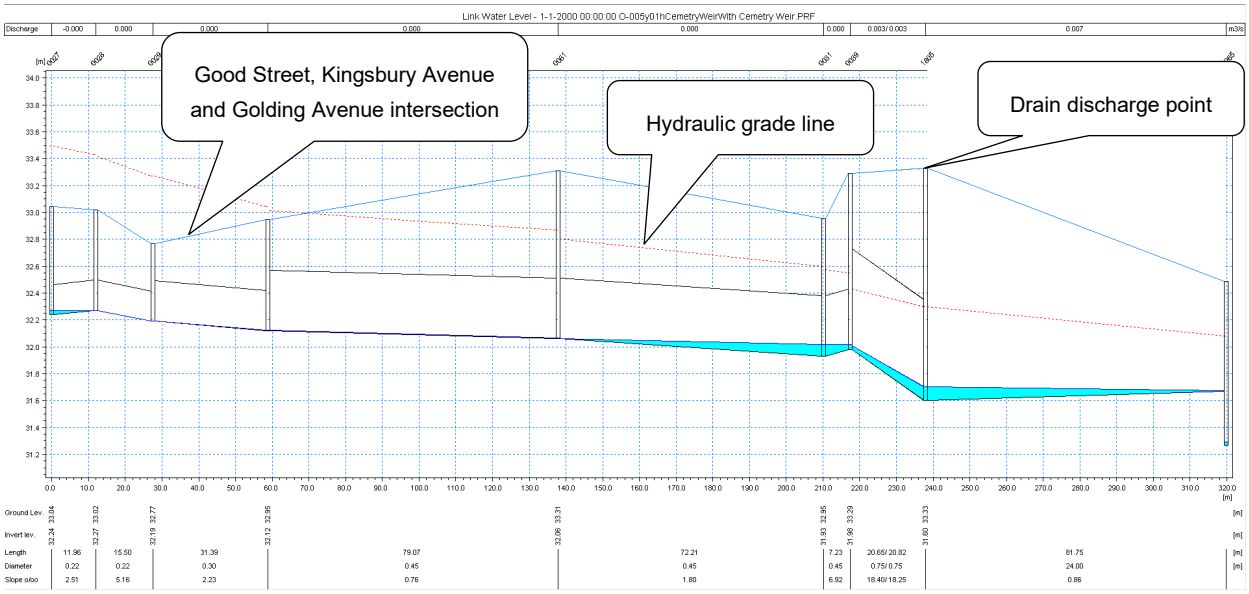


Figure 2. Base scenario long sections of pipe network

2.1. The elevation of the invert of kerb level at the Good Street, Kingsbury Avenue and Golding Avenue intersection is similar to the elevation of the top of bank of the outlet in the North Drain at the cemetery. Figure 3 shows a schematic of the sumps of interest in relation to the cemetery drain, with values under pipes indicating their invert reduced level. When the North Drain is flowing at or near its maximum capacity, the level of water at the cemetery is similar to the ground level at the intersection. Therefore, regardless of pipework size in the upstream network, it is highly likely that stormwater will pond at the intersection due to the lack of head between the locations during exceedance events.

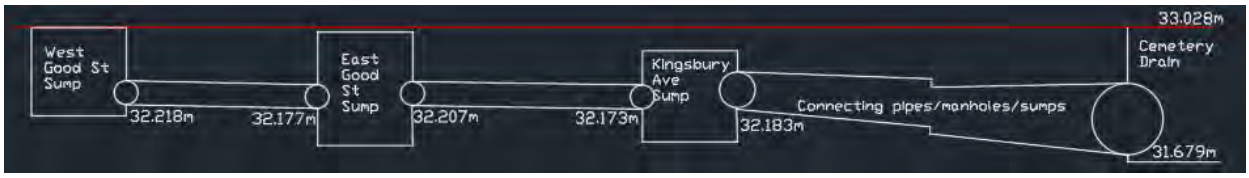


Figure 3. Hydraulics between low point and cemetery drain

2.2. The secondary overland flow path is via the road, however significant ponding in the road would occur prior to its operation. This is corroborated by customer contacts made during Cyclone Gita which indicated there was ponding across the road during the storm. Modelling of a one hour 2% AEP storm confirmed this, as seen in Figure 8 in Appendix C. Figure 4 shows the maximum flood levels and indicative flow path of the secondary overland flow during 100 year exceedance events.

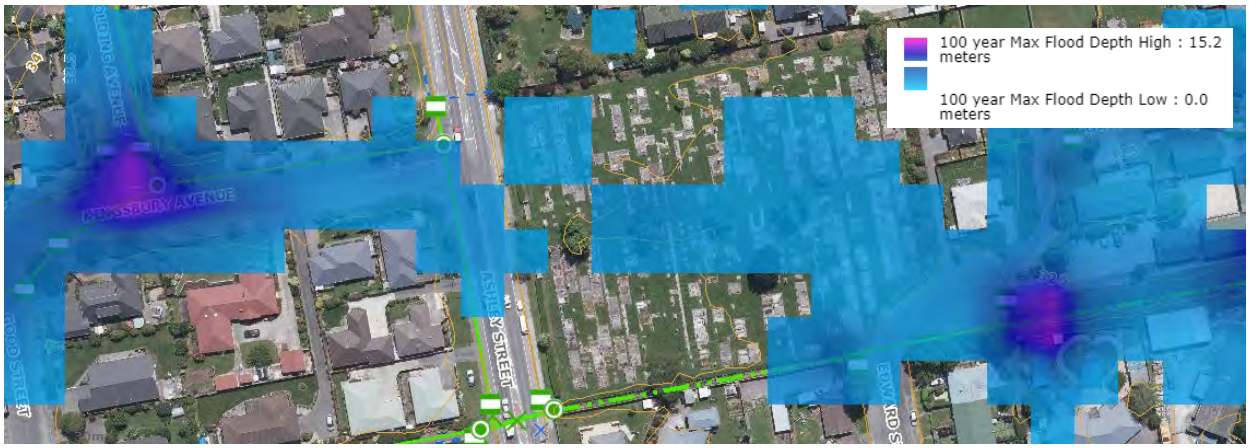


Figure 4. 100 year flood depths

Figure 4 suggests that during a 1 in 100 year event water ponds prior to spilling across and down Ashley Street and adjacent roads and entering the North Drain.

3. PIPEWORK CAPACITY REQUIREMENTS TO REDUCE THE RISK OF FLOODING

3.1. Without considering wider network modifications and attenuation, it is not viable to reduce the level of surcharge in the Cemetery Drain, therefore the capacity requirements of a pipework capacity upgrade to convey the 20% AEP in accordance with the ECoP were assessed.

3.2. Modelling simulations were undertaken for the pipe sizes recommended by a previous report (Refer Trim: 180817093320), with an alteration to the downstream end of Ashley Street pipe alignment to discharge to the downstream Cemetery Drain rather than to the culverts under Ashley Street, see Figure 4. The required pipework capacity sizes are shown in Table 1.

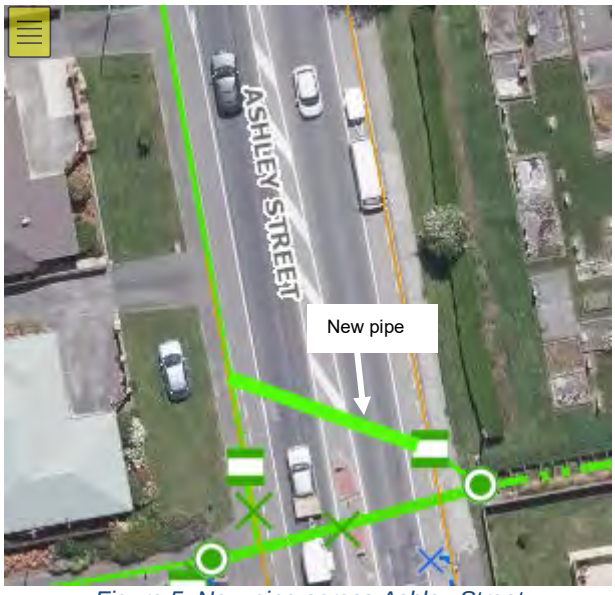


Figure 5. New pipe across Ashley Street

Table 1. Proposed pipe upgrades

Pipe	Existing size	Upgraded size
West Good St → East Good St	DN250	DN375
East Good St → South Kingsbury Ave	DN250	DN375
South Kingsbury Ave → North Kingsbury Ave	DN300	DN450
North Kingsbury Ave → North Ashley St	DN450	DN600
North Ashley St → South Ashley St	DN450	DN675
West Ashley St → East Ashley St (Figure 4)	N/A	DN675

The modelling outcome of the proposed pipe sizes is shown in Figure 6 in Appendix A. It shows the hydraulic grade line closer to the gradient of the pipes, and only a small volume of flooding at the Kingsbury Avenue sump (less than 100mm of ponding). Therefore capacity upgrades improve the level of service and should meet the requirements of the ECoP.

3.3. The grade of the downstream pipes could be optimised to assist with upstream flooding. Specifically the pipe connecting the south eastern Ashley Street sump to the drain outlet. The viability of this will be assessed in the detailed design.

3.4. Other pipe sizes were investigated, however modelling showed they did not provide the required level of service outlined in the ECoP. Alternative sizes assessed can be found in Table 4 in Appendix B.

3.5. To further improve the capacity of the system, oversizing the sumps at the intersection (to reduce the risk of blockage) and modifying the invert levels of pipework at the point of discharge to the drain might further reduce the risk of flooding. This will be further assessed in the detailed design.

3.6. Other options considered but discounted included hydraulically separating the intersection from the existing pipeline by laying a new pipeline from either the intersection to Ashley Street or to North Drain. The section from the intersection to Ashley Street was discounted as the surcharge level in the downstream network during a 20% AEP critical duration storm event would be the same as the ground level at the upstream sump at the new pipework connection point so this option would not resolve flooding. The option to lay a new pipe from the intersection to the North Drain discharge point in the cemetery is similar to that covered as part of Section 4 Option 3.

3.7. The proposed pipe upgrade will only reduce the risk of flooding up to and including the 1 hour 20% AEP critical storm event. Ponding and flooding will still occur during events exceeding the 20% AEP. It can be seen in Figure 9 in Appendix C that there will continue to be approximately half a metre of flooding at the sump on the south side of Kingsbury Avenue, near Good Street and flooding exceeding 100mm across Kingsbury Avenue, during a 2% AEP one hour storm. This means the level of service required by secondary overland flow paths is not being met with the infrastructure upgrade. This is discussed further in Section 7.

4. CAPACITY UPGRADE OPTIONS

Three options were considered to increase capacity of the network:

1. Construct a new pipeline (with pipe sizes as Table 1) on the line of the existing,
2. Construct a new pipeline (with pipe sizes as Table 1), on a new alignment and cap and abandon the existing pipework.
3. Construct a new parallel pipeline, potentially cross connected with the existing, to provide with a total capacity of both pipelines equivalent to that proposed in Table 1.

The existing pipework alignment (thin green line) and a potential alignment for Options 2 and 3 (thick green lines) are shown in Figure 5 and Table 2.

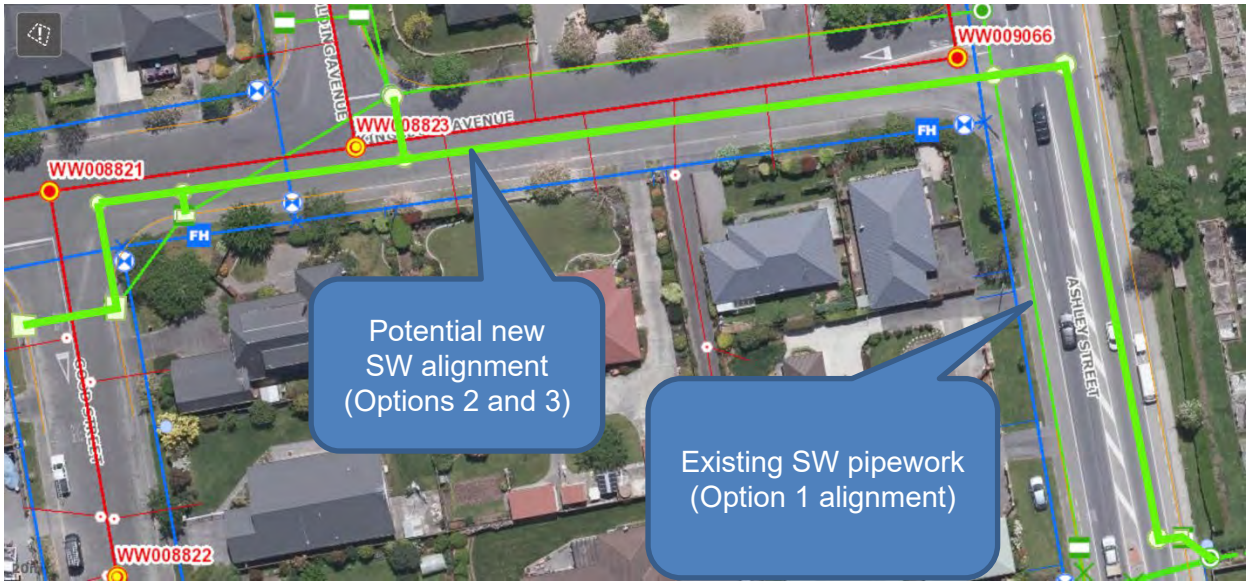


Figure 6. Proposed layout

5. BUDGET ESTIMATES

The current budget for this project is $100,000, available in the 2020/21 financial year.

Table 2 shows the high level cost estimations for the proposed options assuming 20% construction contingency, 10% professional fees and 10% project contingency.

Table 2. Cost estimations for options of Ashley Street Stormwater Upgrade

Option	*High Level Cost*	Concept Overview
Option 1	$583,000	

Option	*High Level Cost*	Concept Overview
Option 2	$569,000	
Option 3	$455,000	

Refer to Trim 200421046374 for the high level cost estimate breakdown.

6. OPTION ADVANATAGES AND DISADVANTAGES

Table 2 discusses the advantages and limitations of the three alignment options.

Table 3. Advantages and limitations of alignment options.

Option Number and Description	Advantages	Limitations
Option 1: Construct a new pipeline on the line of the existing	• Horizontal alignment already available.	• Potentially unable to adjust vertical elevation due to services. • Overhanging mature trees requiring trimming/removal • Significant kerb and channel replacement required. • More complex to demolish and lay pipework. Risk of unmapped AC pipework/contaminated material requiring remediation. • Proximity of existing services. • Existing pipework not near end of useful life (approx. 30 years old)

		• High Capital Cost for limited benefit beyond 20% AEP
Option 2: Construct a new pipeline on a new alignment and cap and abandon the existing pipework.	• Opportunity to improve the grade of pipelines to increase hydraulic capacity. • Opportunity to improve network alignment for future projects along Kingsbury Ave and Ashley Street.	• Cap and abandon a network of pipes with approximately 70 years of remaining useful life. • High Capital Cost for limited benefit beyond 20% AEP
Option 3: Construct a new parallel pipeline, cross connected with the existing, to provide required capacity	• Lowest Capital Cost of options considered • Utilises existing pipework currently in service and with approximately 70 years remaining useful life. • Opportunity to optimise positions of cross connections to existing to provide additional capacity for intersection	• Duplicating assets requiring renewal at some point in the future and potentially increased maintenance. • Limited benefit beyond 20% AEP

7. 2% AEP INFRASTRUCTURE IMPROVEMENTS

As flooding would continue to be an issue during exceedance events with the options provided for the 20% AEP level of service, consideration was given to the pipe sizes required for Options 1, 2 and 3, to convey flows resulting from the 2% AEP critical duration storm event. The pipe size requirements to convey flows during a one hour 2% AEP storm are shown in Table 4 and the model long section is shown in Figure 10 in Appendix C. The model suggests that although some ponding would occur (approximately 100mm above crown of centreline of road, circa 250mm above kerb invert) this ponding is comparable to the maximum allowed by the ECoP and approximately 200mm to 300mm less than currently experienced. It should be noted that to further improve the hydraulics and network performance the invert levels of any new pipeline would be refined during a subsequent design stage.

Table 4. 2% AEP pipe upgrades comparison to other options

Pipe	Existing size	Upgraded size 20% AEP	Upgraded size 2% AEP
West Good St → East Good St	DN250	DN375	DN375
East Good St → South Kingsbury Ave	DN250	DN375	DN375
South Kingsbury Ave → North Kingsbury Ave	DN300	DN450	DN600
North Kingsbury Ave → North Ashley St	DN450	DN600	DN750
North Ashley St → South Ashley St	DN450	DN675	DN750
West Ashley St → East Ashley St (Figure 4)	N/A	DN675	DN750

The alignment option cost estimations with the 2% AEP level of service are shown in Table 5 and are described as Option 1a, Option 2a and Option 3a in the cost estimation trim document 200421046374. They have similar advantages and limitations to Options 1 to 3 however would provide improved performance during the 2% AEP.

Table 5. 2% AEP infrastructure upgrades cost estimation and difference to 20% AEP

Sub-Option	Cost Estimation	Cost difference to Option 1, 2 or 3 respectively
Option 1a	$630,000	$48,000
Option 2a	$622,000	$54,000
Option 3a	$469,000	$14,000

8. SUMMARY

The current budget is insufficient to fund the full scope of any of the options considered. Additional budget is required to complete the full scope of works and reduce the risk of flooding during a 20% AEP or 2% AEP storm event.

Due to significant ponding that would occur during events exceeding the 20% AEP and the level of ponding that would occur before operation of the secondary overland flow path, consideration should be given to oversizing the pipes to convey flows resulting from the 2% AEP storm event. For a limited additional cost a significantly improved level of service is available. Therefore Option 3a with a capital cost in the order of $469,000 is recommended for further consideration.

As all options exceed the available budget, a segmental implementation could be considered. This could result in the chosen option being built in stages using the current budget and additional budget requested. However, the risk of flooding would remain until the full scope of the project was completed and the costs associated with segmental implementation would likely add 5-10% to the cost. Alternatively, additional budget could be requested to complete it all at once. The latter would reduce overall cost and swiftly provide the required level of service. Therefore should an option to reduce the risk of flooding be progressed, Option 3a is recommended.

Appendix A. Modelling work for level of service

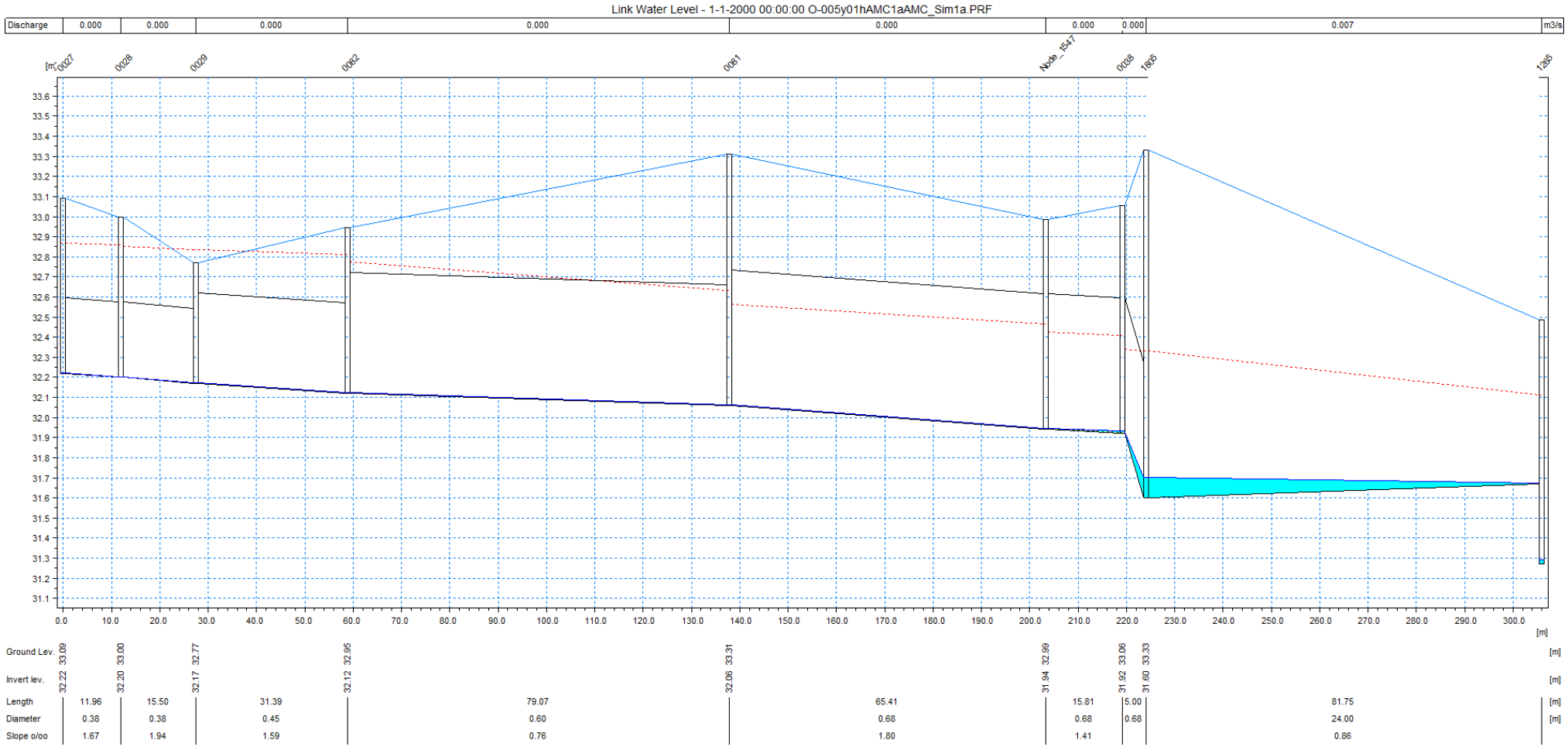


Figure 7. Simulation of pipe upgrades meeting level of service

Appendix B. Alternative pipe sizes

Table 6. Other pipe upgrades investigated (alterations shown in red)

Pipe	Existing size	Upgraded size 1	Upgraded size 2	Upgraded size 3
West Good St → East Good St	DN250	DN250	DN250	DN250
East Good St → South Kingsbury Ave	DN250	DN250	DN250	DN250
South Kingsbury Ave → North Kingsbury Ave	DN300	DN300	DN300	DN450
North Kingsbury Ave → North Ashley St	DN450	DN600	DN450	DN450
North Ashley St → South Ashley St	DN450	DN675	DN450	DN450
New pipe across Ashley St before twin DN750 to South Ashley St sump (see Figure 5)	N/A	DN675	DN525	DN525

APPENDIX C. 2% AEP LONG SECTIONS

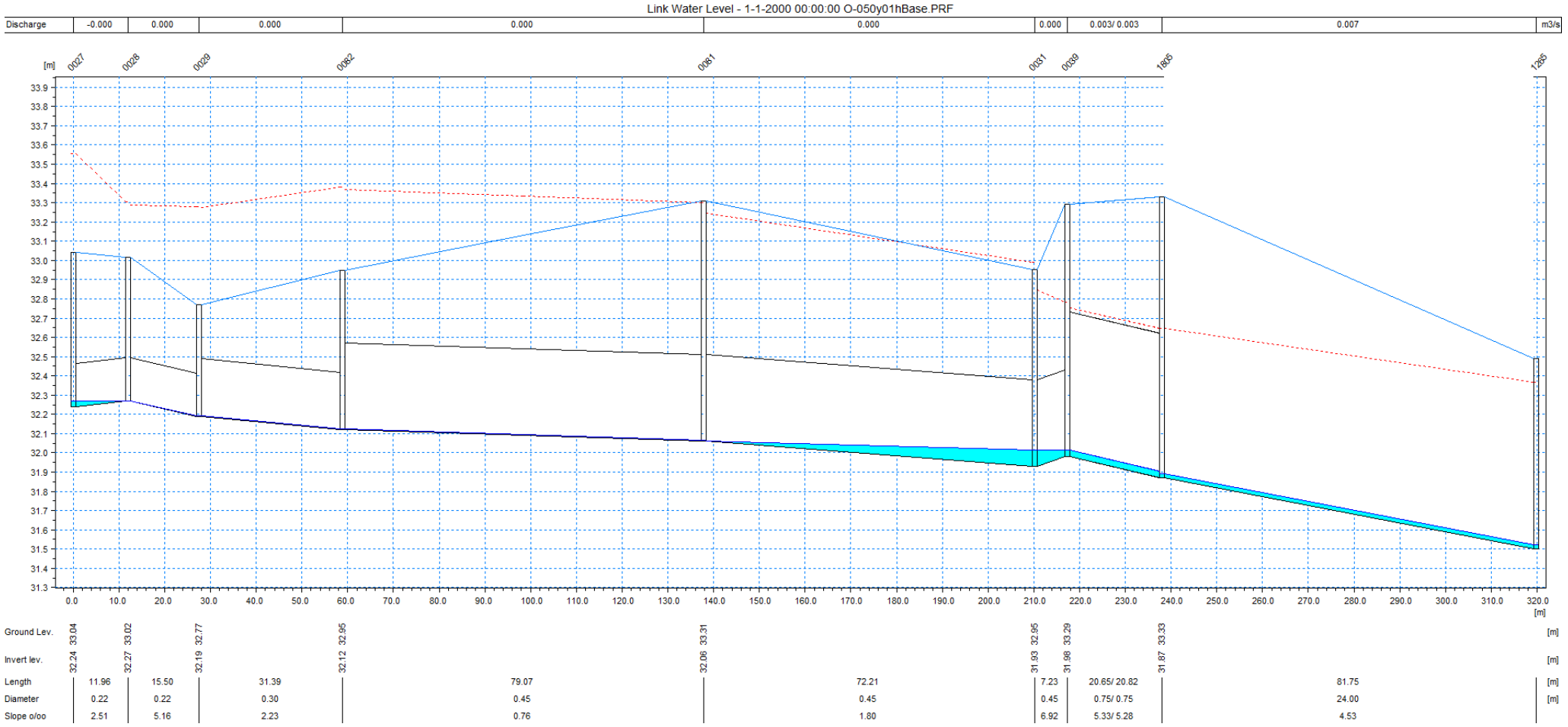


Figure 8. One hour 2% AEP storm long section without infrastructure upgrade

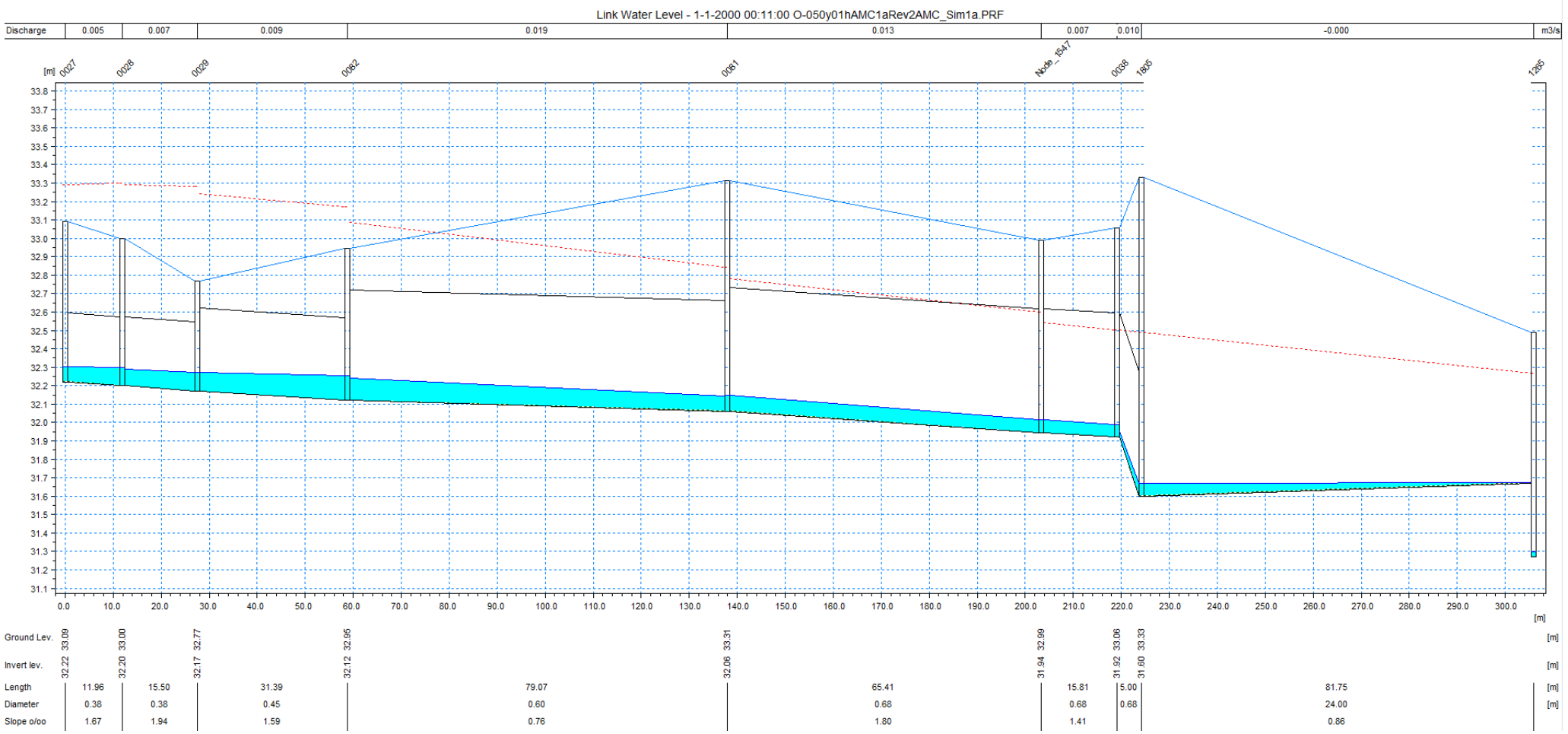


Figure 9. One hour 2% AEP storm long section with infrastructure upgrade designed for 20% AEP

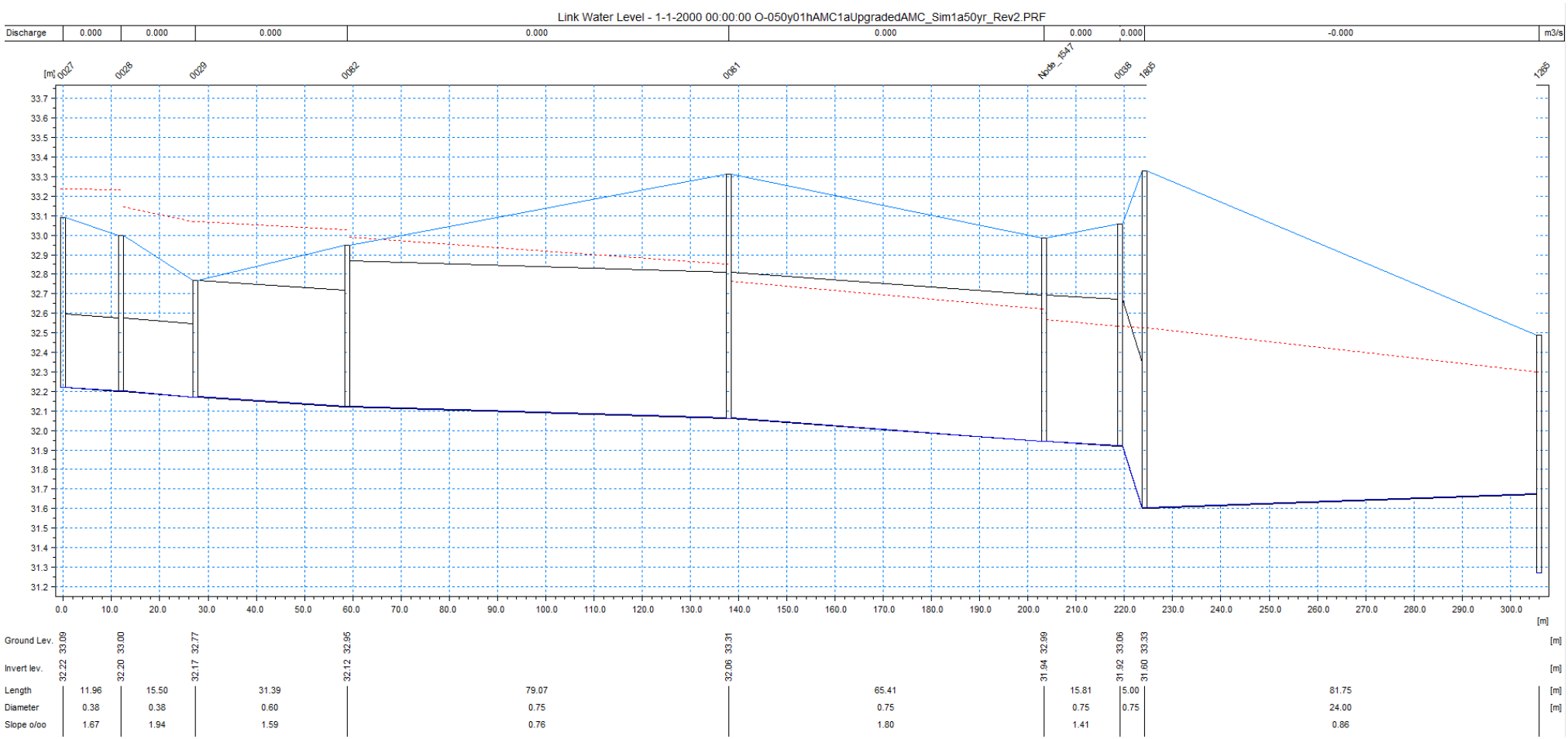


Figure 10. One hour 2% AEP long section with upsized pipes for 2% AEP storm

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO AND TRIM NO:	CON201960-02 / 201208167323
DATE:	8 December 2020
MEMO TO:	Kalley Simpson, 3 Waters Manager
FROM:	Claudia Button, Graduate Engineer
SUBJECT:	Ashley Street Stormwater Upgrade – Addendum to concept design memo

1. Background

This memorandum is an addendum report to the Ashley Street Stormwater Upgrades Concept Options Assessment Memorandum (TRIM 200310032919).

Currently there is insufficient budget to do the full level of service upgrade (1 in 5 year storm event) as recommended in the previous concept memo. There is a $100k budget available for the 2021/22 financial year for “Stage 1” minor upgrades and the following budgets available in future years for “Stage 2” major upgrades:

- 21/22 - $100,000 Stage 1 design and construction
- 22/23 – No budget allocated
- 23/24 - $40,000 Stage 2 design
- 24/25 - $360,000 Stage 2 construction

2. Issues

There is a risk of flooding at the Golding Avenue, Kingsbury Avenue and Good Street intersection due to a low point in the road and undersized infrastructure that does not meet the primary reticulation level of service of a 1 in 5 year storm. Modelling shown in Figure 1 demonstrates the extent of flooding in this area with the current infrastructure.

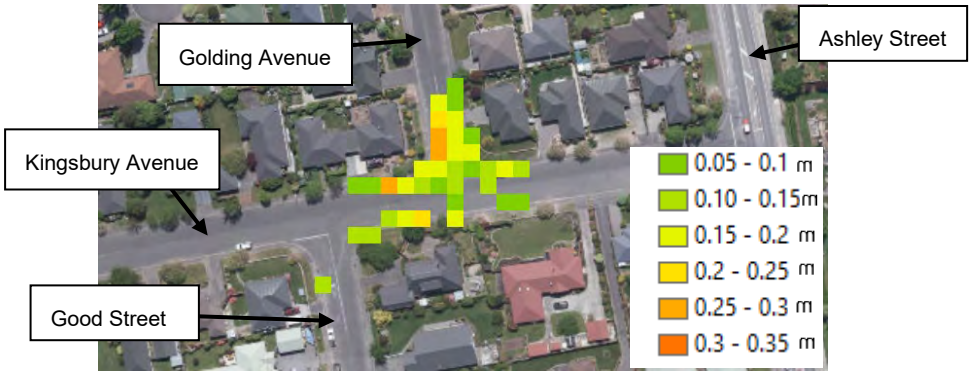


Figure 1. Flooding at Golding Avenue, Good Street and Kingsbury Avenue intersection during 1 in 5 year one hour storm

The budget available is to be spent such that the preferred option could be constructed in two stages. The upgrades in Stage 1 and Stage 2 need to compliment each other with a view to meet the primary reticulation level of service of a 1 in 5 year storm once both elements have been constructed.

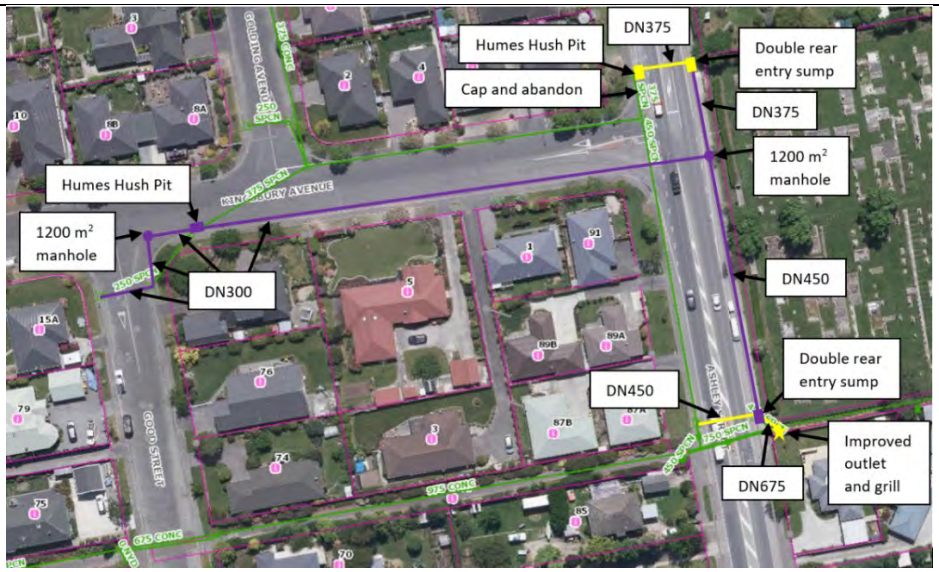
Due to a low point on northern Kingsbury Avenue near the Ashley Street corner, when stormwater sump SW007649 is at maximum capacity the excess flow from the upper Ashley Street catchment flows around the corner and contributes to the flooding experienced on Kingsbury Avenue, see Figure 2.

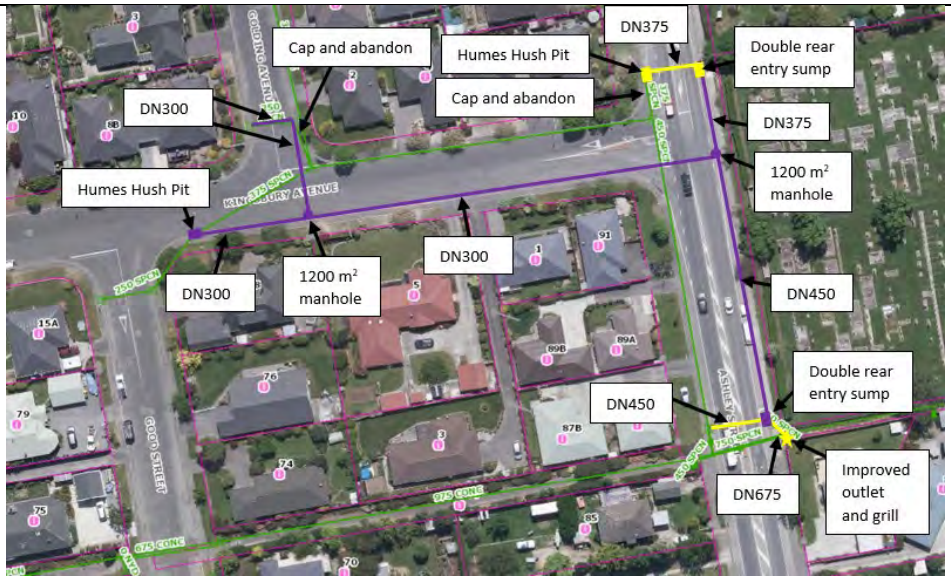
Figure 2. Flow from upper Ashley Street to Kingsbury Avenue

3. Options

In addition to the options already considered by the prior report, it has been suggested that the upper Ashley Street catchment be disconnected from the Kingsbury Avenue stormwater network by increasing the capacity of the sump and creating additional capacity and/or hydraulically separating the area of flooding from the adjacent piped network. The following table identifies the scope of four concept options which have been developed further and include staging options. Stage 1 works are identified in yellow or with yellow stars and the stage 2 works are identified in purple or with purple stars.

	Construction Options	Cost
1		**Stage 1. $92,600*** **Stage 2. $369,000*** **Total (GST exclusive) $461,600**

		
2		**Stage 1. $96,100*** **Stage 2. $357,400*** **Total (GST exclusive) $452,400**
3		**Stage 1. $101,000*** **Stage 2. $336,600*** **Total (GST exclusive) $437,600**

		
4		**Stage 1. $96,100*** **Stage 2. $364,000*** **Total (GST exclusive) $460,100**

*Note. All prices listed above have assumed a 30% construction contingency and 10% professional fees estimate. Refer to Trim 201208167292.

4. Option Advantages and Limitations

Option	Advantages	Limitations
1	Both drain outlets improved, meaning the health and safety during maintenance is improved and less gross pollutants will enter the drains. Removing the high point downstream from the north drain outlet will improve hydraulics through the drain during storm events.	Only one new pipe across Ashley Street to disconnect upper Ashley Street north of Kingsbury Avenue, so reduced flow capacity in lower section. Flooding still likely at Golding Avenue and Good Street sumps. Most expensive upgrade.
2	Two new pipes across Ashley Street to help assist with flow conveyance. Cemetery drain outlet improved, meaning the health and safety during maintenance is improved and less gross pollutants will enter the cemetery drain.	No improvements to north drain section. Flooding still occurs at Golding Avenue, where there have been multiple service requests.

3	Two new pipes across Ashley Street to help assist with flow conveyance. Both drain outlets improved, meaning the health and safety during maintenance is improved and less gross pollutants will enter the drains. Removing the high point downstream from the north drain outlet will improve hydraulics through the drain during storm events. Most affordable option.	Flooding still likely at Good Street and Golding Avenue sumps.
4	Two new pipes across Ashley Street to help assist with flow conveyance. Lower Golding Avenue catchment where flooding is problematic is separated from the existing infrastructure to improve flows from this area. Pipe upgrades on Golding Avenue improve flood levels where there have been multiple service requests (see Appendix A).	No improvements to north drain section. Minor flooding still occurs on Good Street and in Kingsbury Avenue low point. Multiple utility crossings across Kingsbury Avenue.

5. Option Assessment Modelling Results

All of the options developed utilise similar pipe sizes and connection points with a view to providing additional capacity by duplicating the pipe network between Kingsbury Avenue and the point of discharge, and intercepting flows north of Kingsbury Avenue from Ashley Street.

Options 1 and 3 were not modelled in detail since they either did not address the hydraulic deficiencies at the intersection of Good Street and Kingsbury Avenue or associated with the culvert crossing Ashely Street, identified in the prior report.

Modelling results of Option 2 and Option 4 during a 1 in 5 year one hour storm are shown in Figure 3 and Figure 4 below.

Figure 3. Modelling of Option 2 configuration during 1 in 5 year one hour storm

Figure 4. Modelling of Option 4 configuration during 1 in 5 year one hour storm

The modelling results for Options 2 and 4 show improvements to flooding on Kingsbury Avenue compared to the base model, but flood depths differ in Golding Avenue and Good Street. The model predicts that Option 2 resolves the flooding at sumps on Good Street and Kingsbury Avenue during a 1 in 5 year event but has higher flood levels on Golding Avenue. Option 4 has reduce ponding depths on Golding Avenue but some flooding remains on Good Street and Kingsbury Avenue.

The modelling identifies that although there are fewer locations of ponding in Option 2 the flood depth is likely to be similar to or exceed 150 mm above crown of road in Golding Avenue. The modelling suggests that Option 4 broadly meets the required level of service during a 1 in 5 year event (no more than 100 mm flood depth at crown of road).

6. Budget

The following table summarises the high level budget estimates for the two stages of Option 2 and 4:

Stage	Option 2	Option 4	Budget
Stage 1.	$96,100	$96,100	$100,000
Stage 2.	$357,400	$364,000	$360,000

Although Option 2 appears to be within budget the model predicts that if does not provide required level of service. The modelling predicts that Option 4 broadly provides the required level of service but the budget estimate is approximately $4,000 over budget, however this includes 30% contingency and 10% professional fees.

7. Recommendations

There is potential to further reduce the risk of flooding beyond the required level of service (by oversizing pipework), however this would increase the capital cost and would require further modelling to be undertaken.

Option 4 is the recommended solution as it achieves the required level of service and has a high level estimate similar to (but slightly higher than) the available budget.

8. Summary

There is a flooding issue on Kingsbury Avenue at the intersection with Golding Avenue and Good Street, due to a low point in the topography. Due to available budgets in separate financial years a two stage approach is required for the Ashley Street and Kingsbury Avenue upgrades.

Option 4 is recommended to be constructed in two stages:

- Stage 1 disconnects the upper Ashley Street catchment from Kingsbury Avenue and increases capacity across Ashley Street at the connection point to the Cemetery Drain, and
- Stage 2 provides the larger improvement to the level of service for the primary stormwater network by duplicating/increasing capacity of the stormwater network between Golding Avenue and the connection to the Stage 1 upgrades.

Option 4 provides the required level of service and is similar to the budget, so is the recommended solution.

APPENDIX A. Drainage service requests from TRIM 180817093320

Service Request	Location	Date	Issue	Resolution
DR1700194	9 Golding Ave	21/04/2017	*Caller has been unblocking drains of leaves and would like the sweeper truck to come out to clear up leaves in this area before the wind/rain shifts them again.*	Completed
DR1800113	9 Golding Ave	16/02/2018	*Tree branches and leaves need to be cleared form channels -come down in wind from council street trees*	Sweeper truck to sweep both streets in next run. Not that bad just little stick
DR1800142	Golding/Kingsbury intersection	20/02/2018	*The Kingsbury Avenue end of Golding Avenue is flooded across the road*	Drainage cannot keep up Caller not advised
DR1800149	Golding/Kingsbury intersection	21/02/2018	*I had a call from Paul Williams, please get Sicon to clear a blocked drain in Kingsbury Ave between Golding Ave and Ashley Street. Another caller advised water is right out on both sides of the road, causing hazard to drivers.*	Drained cleared
DR1800156	Golding/Kingsbury intersection	20/02/2018	*Flooding Road right across the road - drains on both sides of the road*	
DR1800173	Golding/Kingsbury intersection	20/02/2018	*Drainage Corner of Golding Ave and Kingsbury Ave Police have requested assistance due to flooding across road.*	Warning signs placed

Ashley Street Stormwater Improvements – Rain event investigation 3pm 29 January 2021

Map of image locations:

210222029620

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR INFOMRATION

FILE NO and TRIM NO:	CON201960-02 / 210309039744
REPORT TO:	Rangiora-Ashley Community Board
DATE OF MEETING:	14 April 2021
FROM:	Claudia Button, Graduate Engineer Kalley Simpson, 3 Waters Manager
SUBJECT:	Ashley Street Stormwater Upgrade
SIGNED BY: **(for Reports to Council, Committees or Boards)**	Utilities and Roading Manager
	pp Chief Executive

1. SUMMARY

1.1. The purpose of this report is to update the Utilities and Roading Committee regarding the proposed Ashley Street Stormwater Pipe Upgrades project in Rangiora.

1.2. Primary stormwater infrastructure from Good Street, Kingsbury Avenue and Ashley Street does not have sufficient capacity to convey the level of service flow required by the Engineering Code of Practice (ECoP) (minimum 20% AEP).

1.3. There are low points in the topography on Kingsbury Avenue and Golding Avenue, which have similar elevations to the cemetery drain top of bank. During large rainfall events (i.e. 1 in 50 year return period) when the cemetery drain is running at its full capacity there is limited capacity to discharge stormwater. This causes flooding issues as described by the service requests received during Cyclone Gita in Attachment i.

1.4. The combination of an under capacity primary system and lack of secondary overland flow path is exacerbating the extent and duration of flooding issues experienced at the intersection of Good Street, Golding Avenue, Kingsbury Avenue and Ashley Street during large rainfall events.

1.5. It is proposed the upgrade be completed in two stages so that funding available in separate financial years can be utilised.

1.6. The current budgets for the upgrade are:

- $20,000 for investigation and preliminary design in the current financial year
- $100,000 for stage 1 design and construction in 2021/22 financial year
- $40,000 for stage 2 design in 2023/24 financial year – included in the Draft Long Term Plan (LTP)
- $360,000 for stage two construction in 2024/25 financial year – included in the Draft LTP

1.7. The two stages of construction are shown in Figure 1. Yellow colouring indicates stage 1 upgrades and purple colouring indicates stage 2 upgrades.

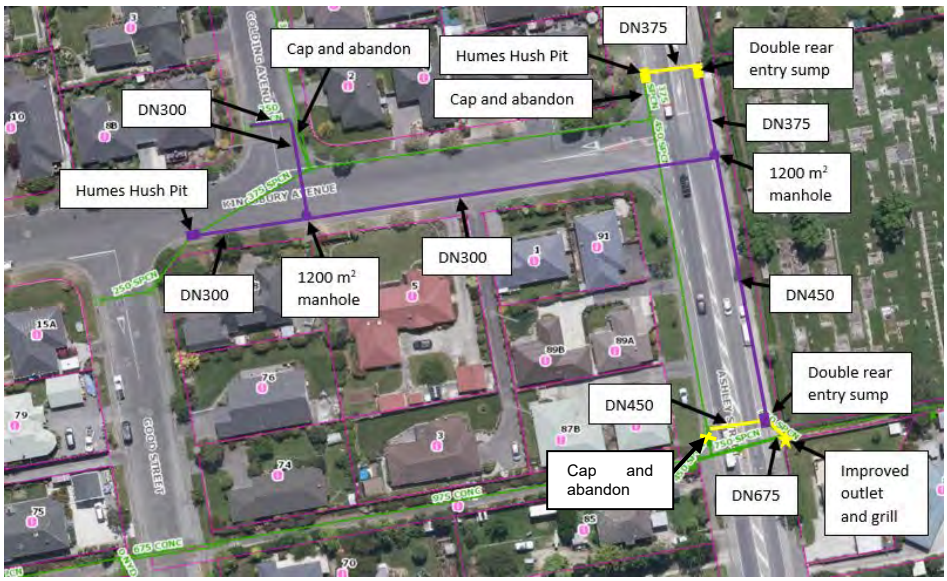


Figure 1. Recommended two stage approach to stormwater upgrades

1.8. The recommended solution achieves the required level of service for primary reticulation according to the Waimakariri District Council's ECoP. During larger rainfall events, such as a 1 in 50 year event, flooding of the road reserve will still occur but the extent and duration of flooding will be significantly reduced.

1.9. A high level budget estimate has been prepared in Section 6.1 using recently tendered rates and is summarised in Table 1. This demonstrates that the two stage upgrades are within budget for their respective financial years.

Table 1. Summary of cost estimations

Section of Project	Current Budget	High Level Cost Estimate
Stage 1	$100,000	$100,000*
Stage 2 (included in the Draft LTP)	$400,000	$392,600*

* Includes professional fees, project contingency and construction contingency

Attachments:

i. Flood investigation on Kingsbury Avenue and Golding Avenue, Rangiora (TRIM no. 180817093320)

ii. Ashley Street Stormwater Upgrade - Concept Options (TRIM no. 200310032919)

iii. Ashley Street Stormwater Upgrade - Addendum to concept design memo (TRIM no. 201208167323)

iv. Ashley Street Stormwater Upgrade – Storm investigation 29 January 2021 (TRIM no. 210222029620)

2. RECOMMENDATION

THAT the Rangiora-Ashley Community Board recommends:

THAT the Utilities and Roading Committee:

(a) **Receives** report No. 210309039744.

(b) **Notes** that the budget estimate confirms that there is sufficient budget in the 2021/22, 2023/24 and 2024/25 financial years, however the required level of service will not be achieved until all works are completed.

(c) **Notes** this solution will improve the level of service for primary reticulation during a 20% AEP storm event so it complies with the ECoP. The flooding at the low point on Kingsbury Avenue and Golding Avenue during larger storm events (exceeding the design criteria) will still occur due to their similar elevation to the cemetery drain top of bank. However the increased capacity of the primary reticulation will significantly reduce the extent and duration of flooding during larger rainfall events.

3. BACKGROUND

3.1 The Council has a project to design and install stormwater upgrades in the vicinity of Good Street, Golding Avenue, Kingsbury Avenue and Ashley Street to reduce the risk of flooding during 20% AEP storm events.

3.2. The Cyclone Gita flood event and previous investigations (TRIM 100803027322, 180817093320 and 00102500017) show that this stormwater network is not meeting the level of service required by the ECoP which requires primary reticulation stormwater infrastructure within the district to be designed to a minimum of 20% AEP.

3.3. An initial upgrade investigation was completed (see Attachment ii) to evaluate upgrade options at a conceptual level. It was found that the upgrade required to meet the level of service was greater than the budget available. A two stage construction option was developed further as an addendum to the original concept report, see Attachment iii.

4. ISSUES AND OPTIONS

4.1. The primary stormwater reticulation does not meet the required level of service. Flooding experienced at the Good Street, Kingsbury Avenue and Golding Avenue intersection during a one hour 1 in 5 year storm is shown in Figure 2.

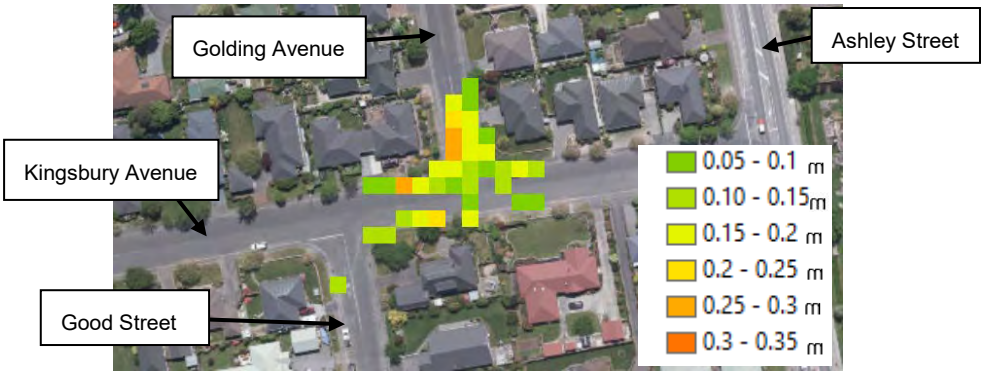


Figure 2. Flooding at Golding Avenue, Good Street and Kingsbury Avenue

4.2. Flooding in this area has been an ongoing issue for a number of years during large rainfall events. The extent of flooding covers a significant area and can pond for some time. This poses an increased risk to drivers who travel through this area and adjacent property owners having waves of stormwater lap into their properties.

4.3. The secondary overland flow path does not meet the required level of service. The secondary overland flow path is via the road, however significant ponding in the road would occur prior to its operation. This is confirmed by customer service requests made during Cyclone Gita which indicated there was ponding across the road during the storm. Modelling included in Attachment ii demonstrates the depth expected at the sump within the low point is approximately 500 mm.

4.4. The lack of secondary overland flow means that there is an increased reliance on the primary system which exasperates the extent and duration of flooding in this location. This is because the primary network was not originally designed to discharge the runoff experienced during large storm events, when the overland flow path would typically be used. Increasing the primary network capacity will reduce the extent and duration of flooding in this area during the large rainfall events as it will be able to discharge a greater volume of water.

4.5. The elevation of the invert of kerb level at the Good Street, Kingsbury Avenue and Golding Avenue intersection is similar to the elevation of the top of bank of the outlet in the North Drain at the cemetery, as shown in Figure 3.

Figure 3. Elevation comparison of cemetery drain and low points upstream

4.6. There is significant headloss where the Ashley Street stormwater network connects with the twin 750mm stormwater pipes that cross Ashley Street and flow into the cemetery drain as shown in the long sections included within Attachment ii.

4.7. The preferred option is to be completed in two stages to align with available budgets.

4.8. The two stages comprise of:

Stage 1. Improve the stormwater network where it enters the cemetery drain by constructing a new pipeline across Ashley Street, disconnecting the network from the twin 750 mm pipeline beneath Ashley Street and construct new inlet to the cemetery drain. This stage will improve the headloss at the lower end of the network and the new inlet will prevent blockages in the grates currently experienced, see image 15 in Attachment iv. Construct new pipeline across Ashley Street north of Kingsbury Avenue to convey the upper catchment across to the eastern side of Ashley Street to prevent overflow from the sump travelling around the corner and down northern Kingsbury Avenue.

Stage 2. Create a secondary system along Kingsbury Avenue and Ashley Street to convey the stormwater runoff to the cemetery drain. This will provide the level of service upgrade required by primary reticulation.

Note: There are multiple different combinations available for the two stage upgrade, as shown in Attachment iii. The alignment and pipe sizes will be confirmed during the detailed design stage. If the stage 1 detailed design cost estimate does not allow for both pipelines across Ashley Street, priority will be given to the southern section.

Modelling results for the pipe alignment is shown in Figure 4. This shows a significant reduction in flooding compared to Figure 2.

Figure 4. Modelling result for Option 2 during one hour 1 in 5 year storm

4.9. The Management Team have reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. Groups and Organisations

5.1.1. Community views have not been sought for the proposed options.

5.2. Wider Community

5.2.1. Service requests have been received from customers, primarily around the time of Cyclone Gita in 2017.

5.2.2. No public consultation has been carried out in relation to the proposed stormwater upgrades.

6. IMPLICATIONS AND RISKS

6.1. Financial Implications

6.1.1. There is a budget allowance of $100,000 in the 2021/22 financial year to design and construct the first stage, $40,000 in the 2023/24 financial year to design stage 2 and $360,000 available in the 2024/25 financial year to construct stage 2.

6.1.2. Following concept design of the works a revised Budget Estimate has been prepared using recently tendered rates and allowance for professional fees and contingency, see Table 2.

Table 2. Cost estimations

Section of Project	Current Budget	High Level Cost Estimate
Stage 1	$100,000	$100,000*
Stage 2 (included in Draft LTP)	$400,000	$392,600*

* Includes professional fees, project contingency and construction contingency

6.1.3. The two stage approach is affordable within the budgets available in the 2021/22, 2023/24 and 2024/25 financial years, however the required level of service will not be achieved until all works are completed.

6.2. Community Implications

6.2.1. The upgrade of the stormwater system will improve the level of service for residents who traverse along Kingsbury Avenue.

6.2.2. Ashley Street is a main thoroughfare into Rangiora from the north so the works along here would be disruptive to road users during the construction period.

6.3. Risk Management

6.3.1. The project includes construction of up to 675 mm diameter pipework and associated manholes and sumps at depths in the order of 1.5 to 2.0 metres. A design report and Safety in Design review will be undertaken at the detailed design stage and key risks will be highlighted to prospective tenderers during both tender processes.

6.3.2. The High Level Budget Estimate has been developed from average tendered rates and includes 10% professional fees, project contingency and 30% construction contingency which should reduce the risk of funding shortfall.

6.3.3. It should be noted that the proposed upgrade only improves flooding up to and including a 1 in 5 year storm. It is noted that during exceedance events (such as Cyclone Gita) flooding will continue to occur at the low point on Kingsbury Avenue due to the topography.

6.3.4. The Ashley Street stormwater upgrades are close in proximity to the St John's Anglican Cemetery. Prior to any works commencing there will liaison with the Anglican Church and if an archaeological assessment is required the correct protocols will be followed.

6.4. Health and Safety

6.4.1. The project will be tendered in accordance with Council Procurement Policy using an Open Tender process. The tender will be assessed using a Price Quality method and will require tenderers to provide a detailed methodology, programme and draft traffic management plans which will be assessed as part of their non-price tender submission. The successful tenderer will be required to provide a site specific health and safety plan for acceptance prior to the works commencing.

7. CONTEXT

7.1. Policy

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. Legislation

There is no legislation applicable to this project.

7.3. Community Outcomes

7.3.1. There is a safe environment for all

- Harm to people from natural and man-made hazards is minimised.
- Our district has the capacity and resilience to quickly recover from natural disasters and adapt to the effects of climate change.
- Crime, injury and harm from road crashes, gambling, and alcohol abuse are minimised.
- Our District is well served by emergency services and volunteers are encouraged.

7.3.2. Core utility services are provided in a timely and sustainable manner

- Harm to the environment from sewage and stormwater discharges is minimised.

- Council sewerage and water supply schemes, and drainage and waste collection services are provided to a high standard.

7.4. Delegations

7.4.1. The Rangiora-Ashley Community Board have delegation to receive this report.

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO:	*PD001343 / 180817093320*
DATE:	30 March 2021
MEMO TO:	Kalley Simpson, 3 Waters Manager Owen Davies, Drainage Asset Manager
FROM:	Jigyasa Dhakal, Graduate Engineer
SUBJECT:	Flooding Investigation on Kingsbury Ave and Golding Ave, Rangiora.

The purpose of this memo is to address the flooding at the Kingsbury Ave and Golding Ave intersection on the 20th February 2018. This memo explores the potential causes of the incident and recommends solutions to alleviate flooding in future events. All solutions have been verified through hydraulic modelling.

BACKGROUND

Council has received six service requests in regards to drainage concerns on the Golding Ave and Kingsbury Street intersection (Refer Table 1). Four of the service requests were received during a 1/50 year event occurring on the 20th of February (Cyclone Gita). The remaining two service requests are in relation to debris blockages in the area. Due to these drainage service requests, an investigation has been undertaken to identify the causes of flooding on this stormwater system on Kingsbury Avenue (from Good Street to Ashley Street).

Table 1: Drainage service requests in the flooding area

Service Request	Location	Date	Issue	Resolution
DR1700194	9 Golding Ave	21/04/2017	*Caller has been unblocking drains of leaves and would like the sweeper truck to come out to clear up leaves in this area before the wind/rain shifts them again.*	Completed
DR1800113	9 Golding Ave	16/02/2018	*Tree branches and leaves need to be cleared form channels -come down in wind from council street trees*	Sweeper truck to sweep both streets in next run. Not that bad just little stick
DR1800142	Golding/Kingbury intersection	20/02/2018	*The Kingsbury Avenue end of Golding Avenue is flooded across the road*	Drainage cannot keep up Caller not advised
DR1800149	Golding/Kingbury intersection	21/02/2018	*I had a call from Paul Williams, please get Sicon to clear a blocked drain in Kingsbury Ave between Golding Ave and Ashley Street. Another caller advised water is right out on both sides of the road, causing hazard to drivers.*	Drained cleared
DR1800156	Golding/Kingbury intersection	20/02/2018	*Flooding Road right across the road - drains on both sides of the road*	

DR1800173	Golding/Kingbury intersection	20/02/2018	*Drainage Corner of Golding Ave and Kingsbury Ave Police have requested assistance due to flooding across road.*	Warning signs placed

The catchment investigated has two branches from Golding Ave and Good Street which connects on Kingsbury Ave and discharges into the culvert on Ashley Street. All sumps in this network have are regular roadside sumps with grates. The northern section of the catchment (above Archer Place) have rear entry sumps.

Figure 1: Aerial of Golding Ave stormwater network catchment

PREVIOUS INVESTIGATIONS

A 2001 modelling report (TRIM 00102500017) has highlighted the Good Street and Golding Avenue intersection with Kingsbury Ave as a location which has potential to flood during a two year event. The report also predicted the properties on the corner of Golding Avenue would experience ponding from overland flows during a 50 year event. This report suggested three upgrading solutions for this area, as shown in Figure 2 to 4.

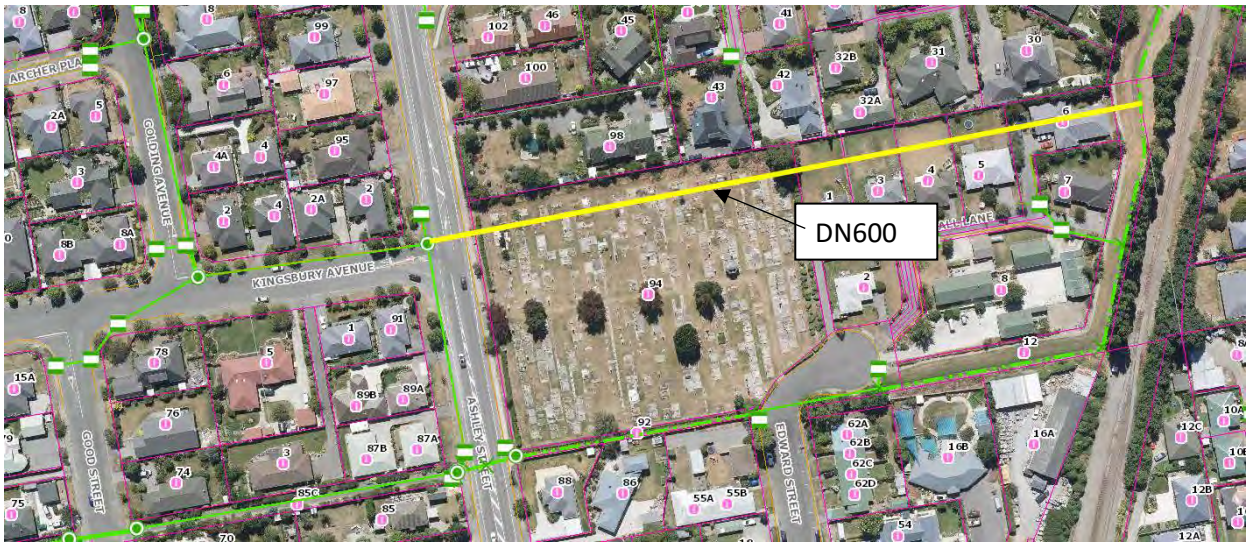


Figure 2: Two year storm upgrading solution

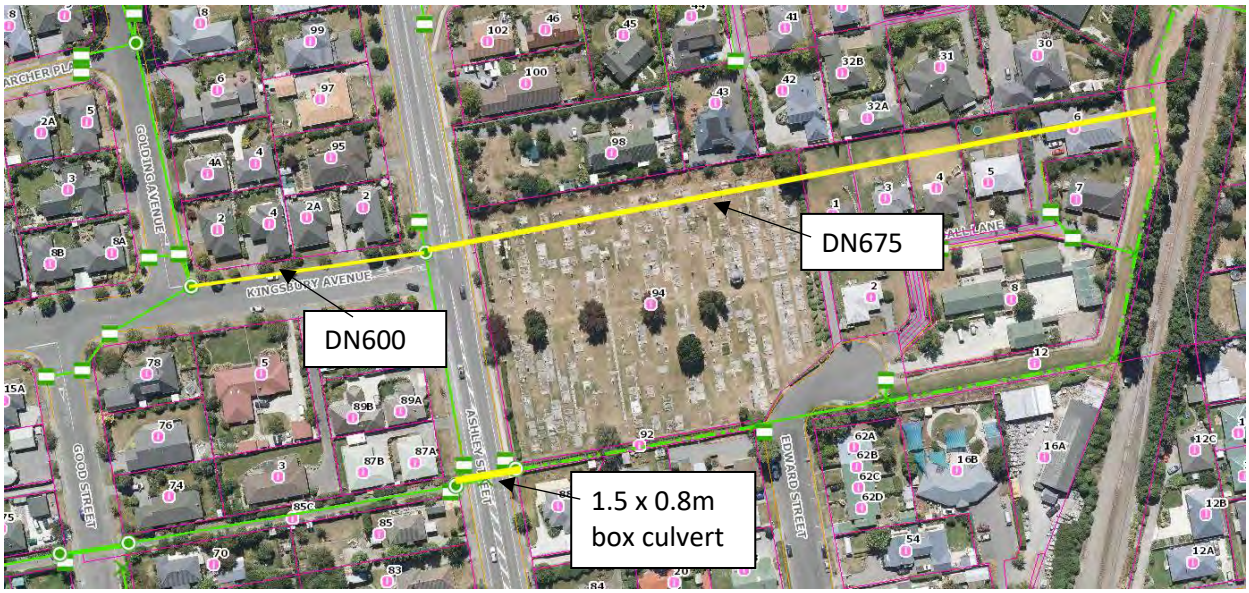


Figure 3: Five year storm upgrading solution

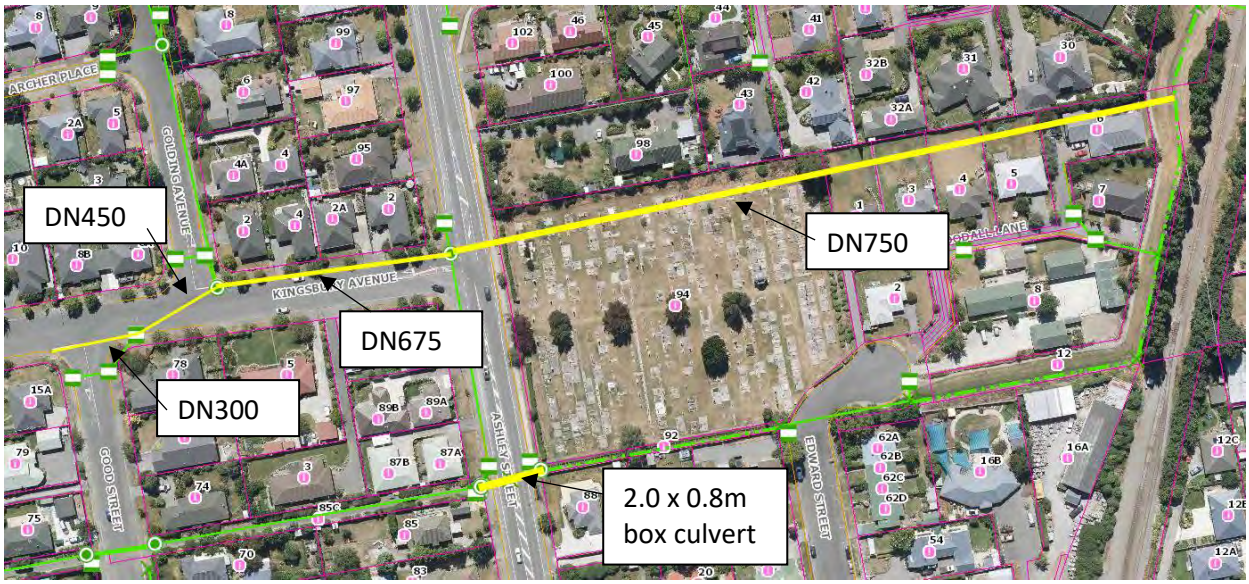


Figure 4: Ten year storm upgrading solution

A secondary 2010 modelling report (TRIM 100803027322) has also highlighted the culvert under Ashley Street contributing to significant head loss due to backwater effects from the undersized pipe upstream and the pipe running against the lay of the land.

INVESTIGATION

CCTV Investigation

A CCTV investigation was undertaken by Hydrotech to identify the location and severity of any blockages in the pipeline that could restrict capacity. Minor defects and silting were identified in the investigation but these are unlikely to contribute to significant flooding problems. The reports have been attached as Appendix A and Table 2 summaries key findings from the investigation.

Table 2: Summary of the CCTV investigation from Hydrotech

Asset/Pipeline	Location	Defects/Comments
SW007641	8 A Kingsbury Ave sump to 2 Golding Ave sump	Fine silt deposit
SW007640	2 Golding Ave sump to 2 Golding Ave Manhole	Small Crack Circumferential, Autogenously Healing + Flow Abrasion
SW007649	2 Golding Ave manhole to 2 Kingsbury Ave manhole	Underwater (10% - 35% filled)
SW006877	2 Kingsbury Ave manhole to 87 A Ashley Street sump	Small grout causing obstruction, chip in joint, minor stones and silt in lines.
SW006832	87 A Ashley Street sump to 85 C Ashley Street Culvert.	-

Visual Drain Inspection

On the 10th of July 2018 visual inspection of the drainage system was undertaken by WDC drainage engineers during dry weather.

The drain through the cemetery was overgrown with silt build up in the shape shown in Figure 5. The drain holds water in the naturally created low flow path with a depth lower than the invert of the culvert.

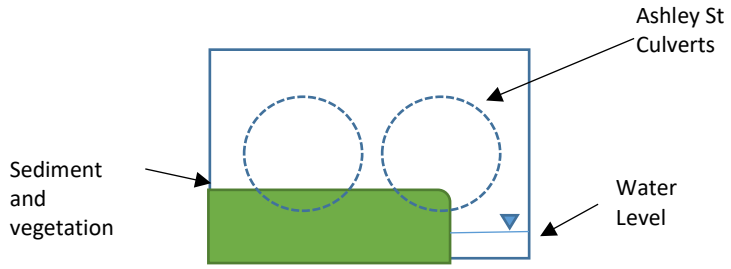


Figure 5: Cross-sectional schematic of the cemetery drain.

The inspection also highlighted all inlets and outlets to the culverts along the drain have grilles which capture a large quantity of debris (mostly leaves). The Ashley Street Grille outlet was left open with leaf debris blocking the bottom of the Grille. This suggests that this may have blocked up requiring the grille to be open to prevent blockage. Refer to Figure 3 for a photograph taken during the inspection.

Figure 3: Ashley Street Culvert Outlet

Further downstream of the cemetery drain, the inlet to the Edward street culvert had a slanted grille with leaves built up at the bottom. This drain has significantly less build up in comparison to the other two outlets however majority of the build-up is predicted to be capture upstream in the cemetery drains vegetation. On the outlet end of the Edward Street culvert, the grilles showed a similar pattern with build-up of debris at the bottom of the grille. Refer to Figure 4 and 5 for a photograph taken during the inspection

Figure 4: Edward Street Culvert Inlet

Figure 5: Edward Street Culvert Outlet

The visual inspection suggests that debris in the grates and the vegetation in the drain is reducing the flow of water and attributing to the reduced capacity of the drainage system.

GPS Survey Investigation

A GPS survey was undertaken to identify and compare the elevations of the stormwater system and how it effects the intersection flooding.

The cross section of the cemetery drain shows that the water must flow uphill 300mm to over top the 400mm weir and discharge to the north drain. Refer to Figure 5.

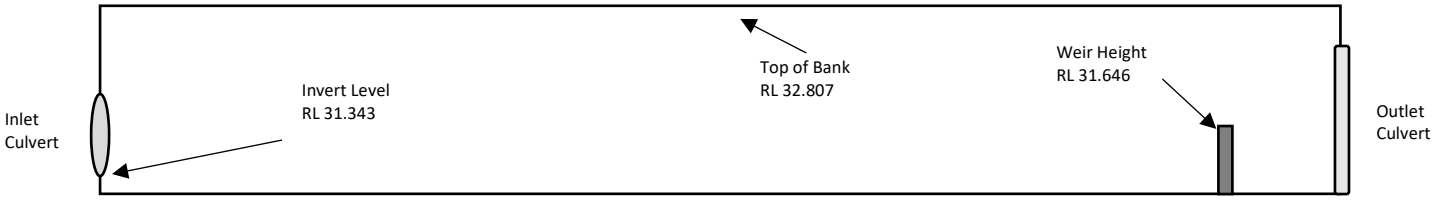


Figure 5: Cross section of the cemetery drain

The bottom of the kerb was surveyed at the intersection at Golding and Kingsbury Ave. The elevations are similar to the top of bank elevation for the Cemetery Drain. Refer to Figure 6 for the elevations. This indicates that when the water level in the cemetery drain is nearing full, the runoff from the Kingsbury Golding intersection will struggle to achieve enough of a head difference to discharge to the North drain.

Figure 6: Bottom of kerb elevations compared to bank height of the cemetery drain.

The Council Engineering Code of Practice requires primary reticulation stormwater infrastructure within the district to be designed to a minimum of 20% AEP (5 year event). As Cyclone Gita was a 50 year event, it is predicted that stormwater systems were running to capacity. Therefore it is predicted that the Ashley Street drain was at maximum water level such that the water at the intersection did not have sufficient head to flow through the stormwater system, and resulting in flooding.

If the water level in the Ashley Street drain was at or above the top of bank height, the stormwater collected upstream would not have not have sufficient head to flow through the stormwater system, and resulting in flooding in the low elevation location in the Kingsbury Golding Avenue intersection

OPTIONS & MODELLING

Hydraulic flood modelling has been undertaken to analyse the systems response to the following 4 options:

1. Current Case
2. Removal of Weir
3. Increase pipe size on Kingsbury Ave (DN600) and Ashley Street (DN675) + Removal of Weir
4. Addition of 525 pipe across Ashley Street + Removal of Weir
5. Increase pipe size on Kingsbury Ave (DN600) and Ashley Street (DN675) + Removal of Weir + Addition of 525 pipe across Ashley Street

All results are based on the maximum flow rate through the Cemetery Drain which found the 5 year, 1 hour duration storm is the critical storm.

Current Case

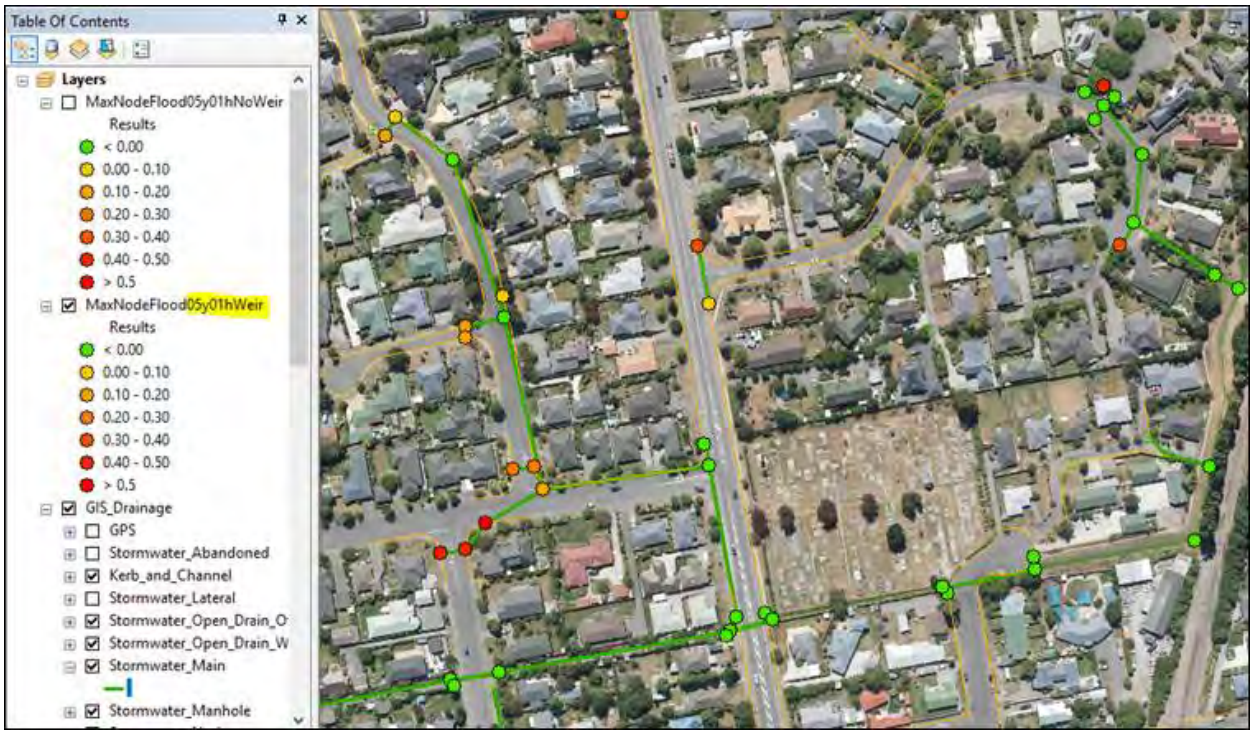


Figure 7: Modelling the flooding in sumps including the weir in the Ashley Street drain.

Removal of Weir

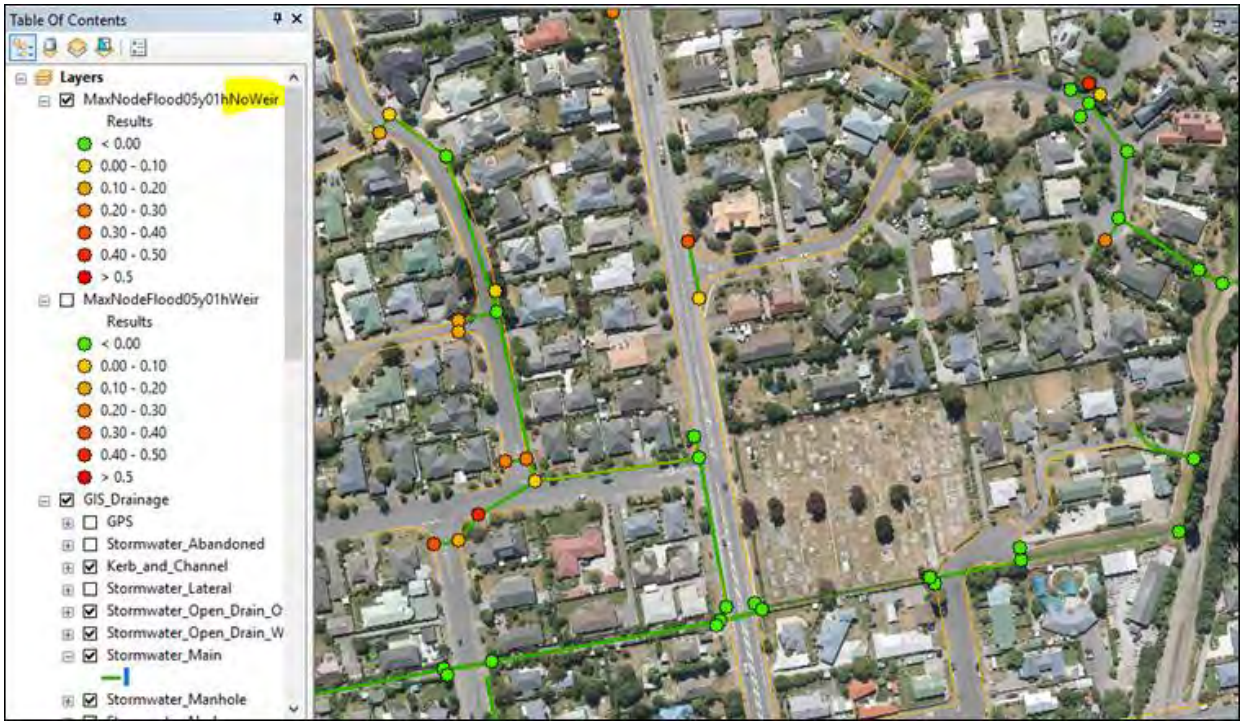


Figure 8: Modelling the flooding in sumps without the weir in the Ashley Street drain.

Increase pipe size on Kingsbury Ave (DN600) and Ashley Street (DN675) + Removal of Weir

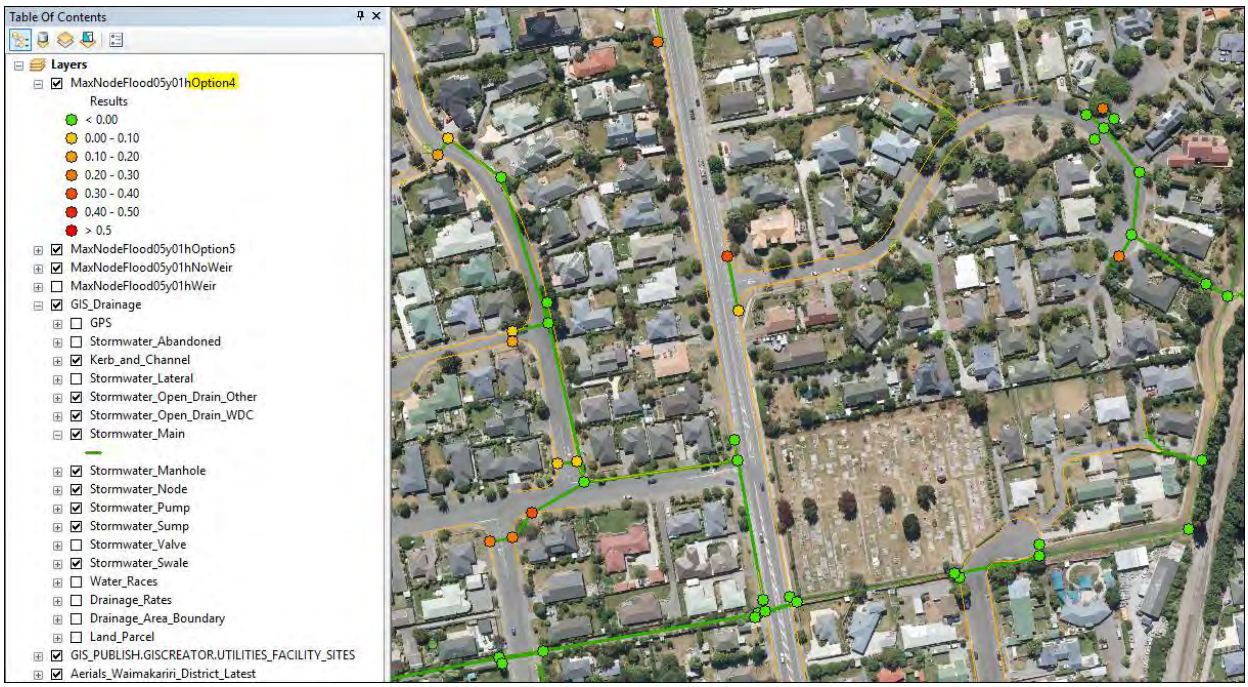


Figure 9: Modelling the flooding in sumps with pipe size increase on Kingsbury Ave (DN600) and Ashley Street (DN675) combined with the removal of the weir structure in the Cemetery Drain.

Addition of 525 pipe across Ashley Street + Removal of Weir

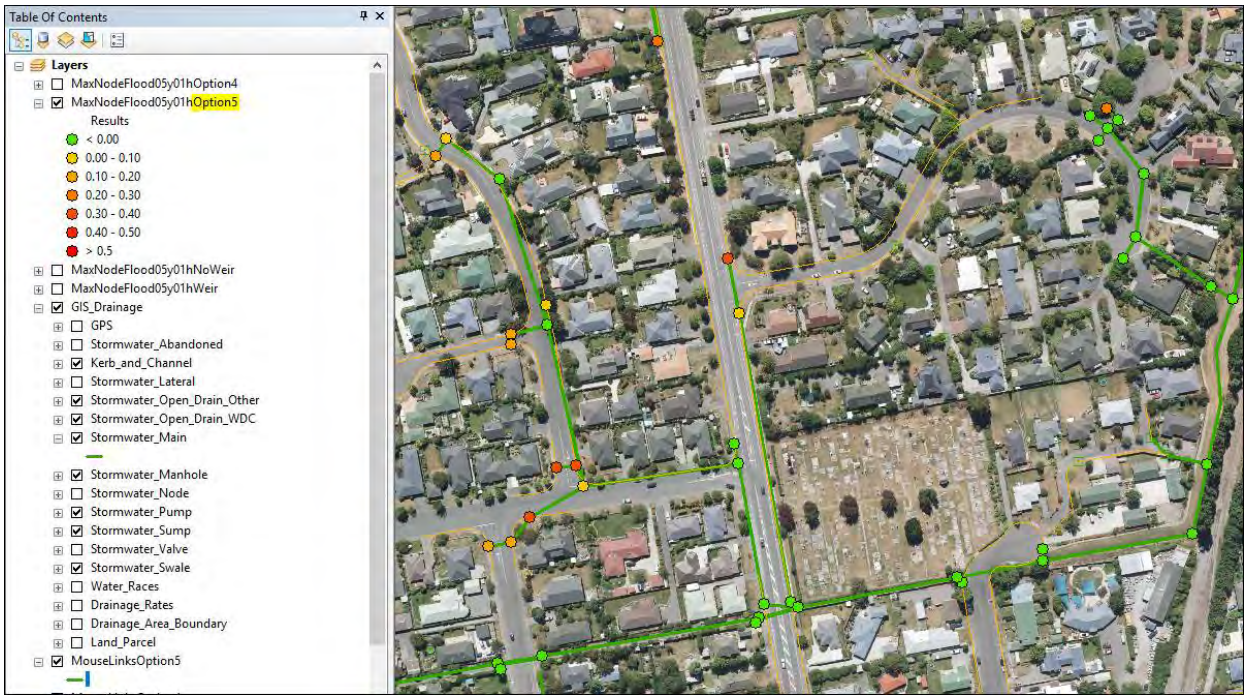


Figure 10: Modelling the flooding in sumps with an additional DN525 pipe across Ashley Street combined with the removal of the weir structure in the Cemetery Drain.

Increase pipe size on Kingsbury Ave (DN600) and Ashley Street (DN675) + Removal of Weir + Addition of 675 pipe across Ashley Street.

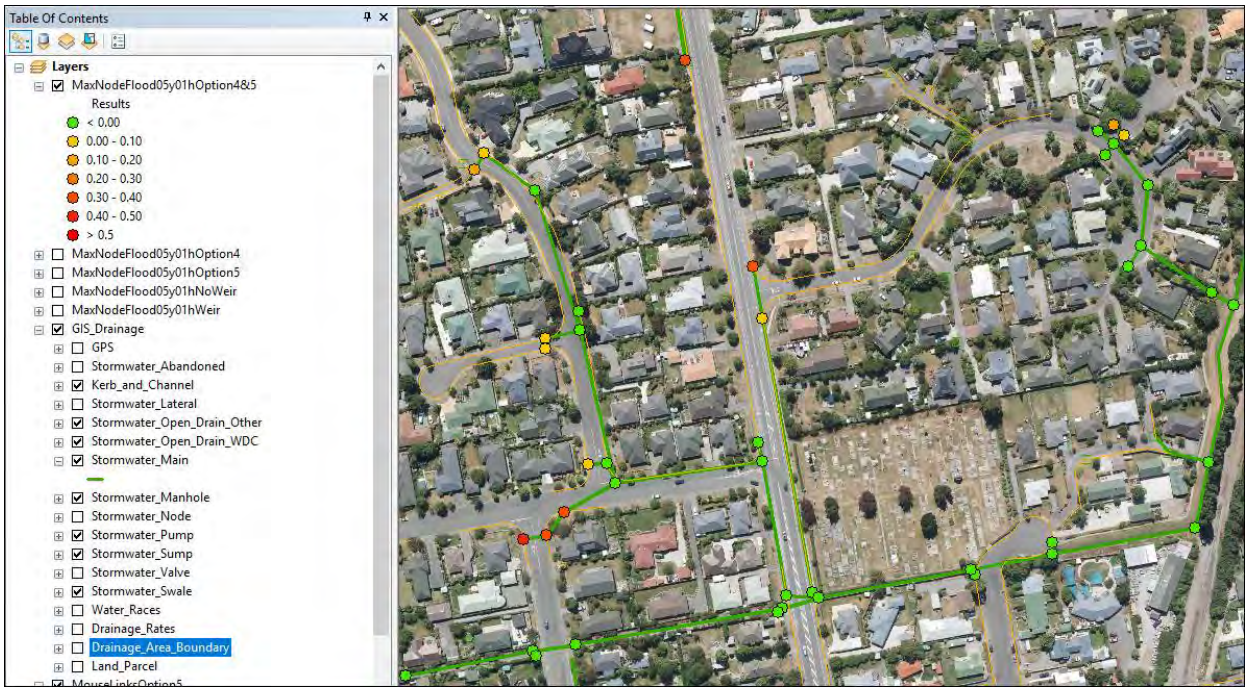


Figure 11: Modelling the flooding in sumps with pipe size increase on Kingsbury Ave (DN600) and Ashley Street (DN675), an additional DN675 pipe across Ashley Street combined with the removal of the weir structure in the Cemetery Drain.

RECOMENDATIONS

1) **AIM Team update GIS system**
   - Only one DN 450 pipe connects the northern sump to the Ashley Street culvert through a perpendicular saddle connection. (Waimaps shows two connections to a nearby manhole).
   - The eastern outlet for Ashley Street culvert has three outlets (Waimaps shows a manhole connection).

2) **Maintenance of the Cemetery Drain.**
   Delta have undertaken maintenance in July 2018 to clear the drain and blockages in the grates downstream.
   It is recommended secondary works be undertaken to level the drain to the invert height of the Ashley street culvert.

3) **Install rear entry sumps to increase flow capacity**
   The sumps on Golding Ave and Good Street be converted to rear entry sumps to alleviate leaf blockages and allow the water to drain away as quickly as possible.
   This is estimated to cost $2500 (based on prices obtained for CON18/10) to convert each existing standard sump to rear entry sump. Hence, the installation cost for 5 rear entry sumps, including professional fees of $5,000 and a 30% contingency, is estimated at $22,750.

4) **Remove Weir on Ashley Street Cemetery Drain**
   Hydraulic flood modelling shows that the removal of the weir would result in reduction of flooding upstream on Kingsbury Ave. It is recommended that the weir be removed to improve the hydraulics of the system.

5) **Upgrade the pipe size of the system.**
   The 2001 report recommended upgrading the pipeline sizes to alleviate flooding in the system. The upgrades pipe size in the existing alignment proved to reduce flooding in the Kingsbury Ave Golding Ave intersection.

Figure 6: Current pipeline alignment with recommendations from the 2001 report of pipe size increase for the system for a 5 years event.

The estimated cost to upgrade the existing stormwater was estimated at $124,900 in 2001. With the new configuration, this pipe upgrade is now estimated to cost $281,000. Refer Appendix B.

6) Additional culvert on Ashley Street

Hydraulic modelling should be undertaken to investigate if the installation of a 525 pipe across Ashley Street would increase hydraulic capacity within this system. Refer to Figure 7 for the alignment. The 525 pipe across Ashley Street is to be investigated in the configuration shown in Figure 2. This pipeline is estimated to cost $18,000 assuming the pipe is to be installed upto 2.5m deep and using 525 concrete pipe as per CON16/74. With the inclusion of $3,000 of traffic management, $7,000 professional fees and 30% contingency, the total project cost is estimated at $36,400.

Figure 2: Proposed 17.6m DN525 pipeline for modelling.

Appendix A – HydroTech CCTV Investigation Report


SW007649.pdf


SW007641.pdf


SW007640.pdf


SW006877.pdf


SW006832.pdf

Appendix B – Price Estimate of Recommendation No.4

No.	SCHEDULED ITEM	QUANTITIY	UNIT	RATE	AMMOUNT	REF.
	P&G				$ 18,990.00	10%
	Stormwater					
	70m of DN600 RCRRJ	70	m	$ 1,250.00	$ 87,500.00	SW16-19
	70m of DN675 RCRRJ	70	m	$ 900.00	$ 63,000.00	SW16-20
	Manhole 1050	1	ea.	$ 7,000.00	$ 7,000.00	
	Reinstatement					
	Kerb and Channel	180	m	$ 80.00	$ 14,400.00	SW 15-28
	Carriageways / Footpaths	180	m	$ 100.00	$ 18,000.00	SW 16-21
	Total Construction Cost				$ 208,890.00	
	Professional Fees				$ 8,000.00	
	30% Contingency				$ 65,067.00	
	Total Project Cost				**$ 281,957.00**	

Appendix C – Modelling Investigation


Appendix C - Cemetery Drain Moc


Cemetery Drain Modelling Results.m