Date: 02 May 2025

Respond to Request Further Information 2 September 2024

Private Plan Change Request (Ref: PC0003/23) – Coniston Park Ltd, Farm & Racecourse Roads, Ashburton

1. Assessment of a 1% Annual Exceedance Probability design for stormwater.

The stormwater ponds have been designed to attenuate the site development flow to no greater than pre-development flow for all rain events up to 2% AEP 48hr duration.

There is overland flow path for the proposed development and therefore the stormwater design event will be no greater than 2% AEP. This is in accordance to ADC stormwater guidelines 2018 (draft).

2. For stormwater neutrality calculations, assessment against 80% pre-development flow/volume, as per the Council's Stormwater Design Guidelines (see Section 7.2 / Eqn 8-1 / Eqn 8.4).

DOA have carried out discussion with Andrew Tish on 10 April 2025. From the discussion, the stormwater neutrality calculation for the proposed development stormwater attenuation design is to be restrict discharges to a pre-development discharge flow limit as per ADC stormwater guidelines 2018 (draft) Section 5.3.

That means the average post-development discharge does not exceed pre-development discharge and not against 80% pre-development flow/volume equation.

Refer to Appendix D – Confirmation with Andrew Tish via email.

Storm and Sanitary Analysis hydraulic model was used to model the proposed development stormwater system.

From the model scenario output tabulated below, it demonstrated the discharge flow from the proposed development will be no greater than pre-development flow for all rain events up to 2% AEP 48hr duration.

Proposed Development Catchment (2% AEP)						
	60min	120min	360min	720min	1440min	2880min
Post Development Flow (m^3/s)	378.22	297.65	154.17	85.75	52.55	33.40
Pre Development Flow (m^3/s)	446.20	305.65	169.20	105.07	66.86	50.49
	-67.98	-8.00	-15.03	-19.32	-14.31	-17.09

The final flow figure will be confirmed during the Engineering Design Approval, once the dimensions of the ponds have been finalized.

3. A full analysis of seasonal high-water table (SHWT) and historic highest groundwater. This is required to give confidence in a soakage design as the groundwater and soakage are concerns for this site and can be an issue around this area. The assumptions related to groundwater and available soakage directly relate to the size of the SMAs proposed. The Infrastructure Servicing report mentions a groundwater depth of 2.2m – 3.8m bgl, but this appears to be a moment in time snapshot from the soakage testing conducted.

Please refer to the Groundwater Depth Assessment in Appendix A to be read in conjunction with this response. The stormwater ponds have been re-designed to consider the impact of high groundwater on stormwater attenuation and treatment performance.

During a high groundwater event, the western pond's soakage storage will be compromised but will continue to infiltrate at the design infiltration rate. The first flush treatment will not be compromised during this event. However, due to insufficient storage capacity for attenuation, the western pond will overflow and discharge directly into Wakanui Creek.

In this instance, the eastern pond is not affected by the 95th percentile high groundwater level and will be designed to accommodate the additional attenuation volume from the western pond. The flow from the eastern pond is also designed to manage the 95th percentile high groundwater event. This will ensure that the total discharge into Wakanui Creek does not exceed the pre-development flow for all rainfall events up to a 2% AEP, 48-hour duration.

4. Confirmation of the highest groundwater level across the site, especially in the areas of the proposed SMAs, how frequently do these highs occur, and for what duration.

A statical probability approached was used to determine the 95% seasonal high ground water table for the site.

The probability of both the 20% AEP event and the 5% high groundwater level condition occurring in a given year is 1%.

The probability of both the 2% AEP event and the 5% high groundwater level condition occurring in a given year is 0.1%.

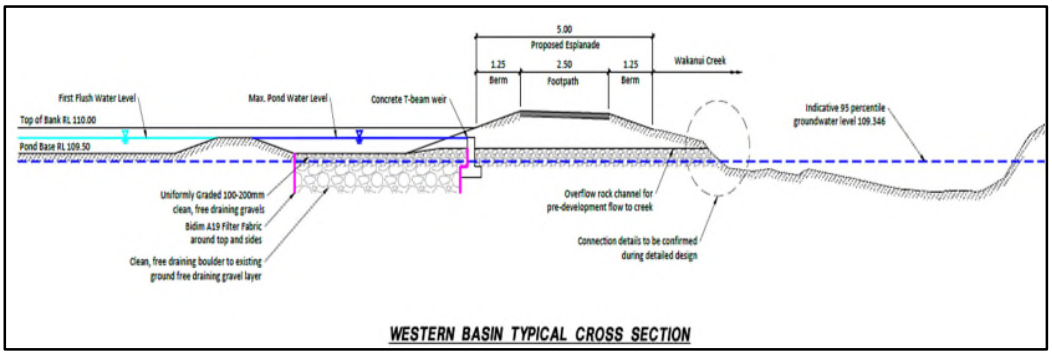
ECAN's bore historical measurements were based on monthly readings and therefore we are not able to determine the duration of the high groundwater within those historical periods.

Please refer to the Groundwater Depth Assessment in Appendix A for more details.

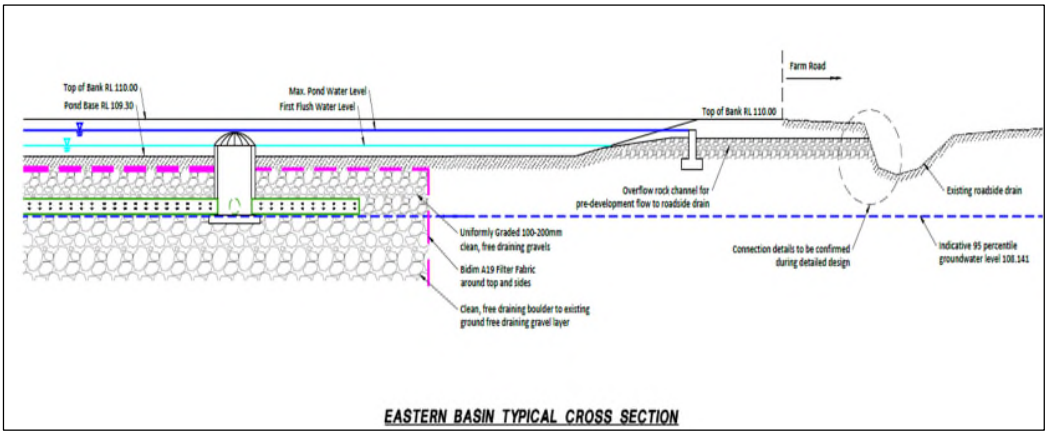
5. Confirmation of whether the piezometers recommended in the servicing report been installed on site.

Four standpipes were installed within the proposed development during the groundwater analysis with additional two more standpipes to verify the groundwater measurements for standpipe #4. The standpipes are still in operation within the site. Please refer to Groundwater Depth Assessment in Appendix A for more details.

6. Confirmation of the separation between any soakage from the SHWT. (1m is likely required for the global consent, but a smaller separation could be accepted from the historically high groundwater level.) The current drawings show that the rapid soakage has existing groundwater level within the middle of the soakpit, which is effectively negative separation to groundwater.



WESTERN BASIN TYPICAL CROSS SECTION



EASTERN BASIN TYPICAL CROSS SECTION

According to the Geotechnical Report, the proposed development site contains a thick clay layer (greater than 1.5 m in depth) across the site before reaching the underlying drainage layer. For the soakage system to function effectively, it must extend to suitable drainage layer in order to achieve the required design infiltration rate. However, the required soakage depth will result in a no separation from the 95th percentile high groundwater table.

As shown in the cross-sections of both the western and eastern stormwater ponds, it is unlikely that sufficient separation can be achieved from the 95th percentile high groundwater level.

However, the stormwater being discharged will have undergone treatment and will not exceed the contaminant limits set by the LWRP. Furthermore, this discharge occurs after the first flush volume and will be further diluted, ensuring contaminant concentrations remain below LWRP limits.

Please refer to Appendix B - Plan PS01 – Infiltration Basin Typical Cross Section for the groundwater level, soakage, pond base, existing drain and creek levels.

7. Consideration of the following comments:

a. Soakage testing has been conducted with groundwater exposed. Based on the results, there is limited confidence that soakage with appropriate separation to groundwater is feasible and appropriate. The servicing report also notes: "*infiltration testing was undertaken at the end of summer (27 March). Significantly lower levels of infiltration would be expected when groundwater levels rise*".

Please refer to the Groundwater Depth Assessment to be read in conjunction with this response. The stormwater ponds have been re-designed to consider the impact of high groundwater on stormwater attenuation and treatment performance.

The western stormwater pond will be designed to provide treatment and partial attenuation for the western catchment of the proposed development. During a high groundwater event, the western pond will provide sufficient stormwater treatment but will not be capable of discharging to ground. Instead, it will discharge directly to Wakanui Creek.

In this instance, the eastern pond is not impacted by the 95th percentile high groundwater and will be designed to accommodate the attenuation volume and flow from the western pond. This will ensure that the total discharge into Wakanui Creek does not exceed the pre-development flow for all rain events up to a 2% AEP, 48-hour duration.

b. Soakage and the potentially high groundwater raise concerns with soakage of roof water on the lots (the attenuation tanks will help) and the depth and suitability of the SMAs.

The proposed stormwater design intention was considering the worst case where all lot discharges to pond. If the allotment is capable to discharge to ground, then it will improve the capacity of the stormwater ponds. However, the landowner will need to carry out infiltration test on their specific site to confirm the suitability for the proposed allotment to be able to discharge to ground on site as per the Building Code.

c. First flush treatment depth is 18mm for the Council's global consent – not 25mm.

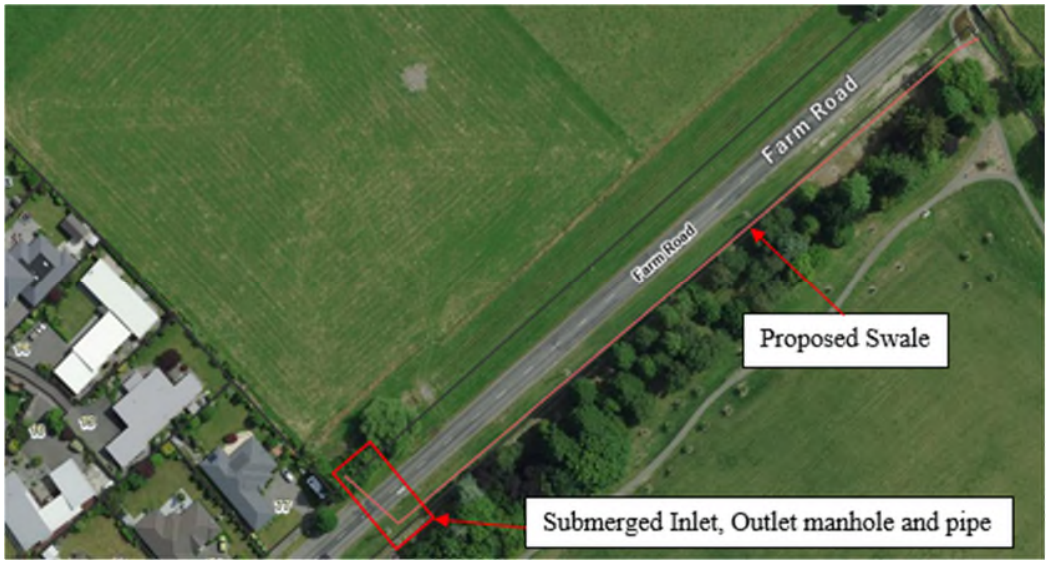
The first flush depth to be designed to 18mm.

d. Best practice for first flush and attenuation basins, especially for sites this big, is to separate the first flush and attenuation basins and for them to be managed via a splitter box.

We acknowledge the option of splitter box, however the proposed stormwater system treatment will able to meet the LWRP contaminants limits as stated in Infrastructure Servicing Report (Dec 2023).

e. If the swale from Coniston Park (which runs alongside Farm Road), which is used as the treatment and attenuation device from that subdivision, is removed due to the subdivision upgrades for the plan change site, the additional stormwater flow will need to be accounted for within the stormwater systems for the plan change site.

The proposal was to shape a proper swale treatment with combination of pipes to discharge to Wakanui Creek. Another alternative was diverting the flow to the other side of Farm Road close Argyle Park. Further discussion with ADC will be required to consider the alternative option.



8. Taking into account the above, please consider whether changes are required to the ODP in relation to the size and location of the Indicative SMAs.

The size and shape of the stormwater pond will be confirmed through Engineering Design Approval with Council. The location of the indicative SMAs should remain the same to the ODP.

Reserves

NOTE: Plan OP01 is for Plan Change, Plan OP02 and OP03 is for RFI purposes.

9. For the proposed reserve area adjoining Wakanui Creek, please provide cross sections of the creek and esplanade reserve (near Lots 26 and 48 on the Subdivision Layout Plan) so that the appropriate width for this reserve can be determined and agreed prior to the finalization of the ODP.

Refer to Plan OP03 – Cross Section – Outline Development Plan in Appendix C

PART 2 – Changes Requested by the Council

Part 2 of this letter sets out changes to the ODP that have been identified by Council officers as being appropriate. Please consider these requests and amend the ODP accordingly:

a. **The way that 'green areas' are described and displayed on ODPs can create expectations around what reserves are required by the Council and which ones are eligible for reserve contribution credits. Utility reserves (i.e. local purpose reserves) should be distinguished from esplanade reserves. With respect to recreation reserves, the Council does not consider that any such reserves are appropriate for this development and therefore should not be included in the ODP. To provide certainty for future development, the size of these areas should also be provided on the ODP. Please amend the ODP so there is clear delineation between the various types of reserves proposed. The areas and the widths of these areas should also be included, consistent with the specific requests below.**

   Refer to ODP plan in Appendix C. Specific Local Purpose Reserves and esplanade have been distinguished.

b. **The proposed "Local purpose reserve with indicative pedestrian link to Wakanui Creek" (Lot 302 on the Subdivision Layout Plan) is supported, as this provides an important pedestrian linkage to the Ashburton Lyndhurst Irrigation area. This linkage should be increased to a minimum 10m width to improve it visibility and to be consistent with CPTED principles. It should be labelled as 'Local Purpose Reserve (Walkway)' and its width increased to 10m.**

   Refer to ODP plan in Appendix C. The plan has indicated the linkage to have a minimum 10m width.

c. **The proposed open green space beneath the above reserve (Lot 301 on the Subdivision Layout Plan) is not supported and should be removed from the ODP. The rationale for this reserve is not clear. It is considered too small for a neighborhood park and as it is located within the 400m distance from Argyle Park it is considered unnecessary. Please remove this as an open space area on the ODP.**

   Refer to ODP plan in Appendix C. The proposed open green space (Lot 301) has been removed.

d. **The proposed green space (Lot 305 on the Subdivision Layout Plan) is not supported as a reserve area. It is noted that this space is labelled as "potential link to neighboring land" but the Council does not consider this to be necessary as either a pedestrian or roading link. Please remove this as an open space area on the ODP.**

   Refer to ODP plan in Appendix C. This have been removed and converted to residential area as fee simple title.

e. The primary purpose of the proposed green space link connecting streets (Lot 304 on the Subdivision Layout Plan) appears to be to drain stormwater. The provision of a pedestrian link through this reserve by the developer is supported, but the primary purpose should be reflected through labelling this area as 'Local Purpose Reserve (Drainage)' and details of its width should be included on the ODP.

Refer to ODP plan in Appendix C. This have been amended to reflect to include the labeling of this area as "Local Purpose Reserve (Drainage)" at a minimum of 10m width.

f. For the proposed indicative stormwater management areas (Lots 300 and 303 on the Subdivision Layout Plan):

a. the proposed pedestrian cycle link/route provided by the developer through Lot 303 is supported. Lot 300 should have a similar pedestrian link/path on its western boundary connecting the road to the pedestrian link along Wakanui Creek. Please amend the ODP to include this additional pedestrian link.

Refer to ODP plan in Appendix C. This have been amended to have similar pedestrian link / path on its western boundary.

b. **these are shown as stormwater management areas but with reserve areas around the perimeters. As the primary purpose of these lots are for stormwater management they should be shown on the ODP in entirety as either 'Indicative Stormwater Management' or 'Local Purpose Reserve (Stormwater Management)', with the entire area shaded blue.**

Refer to ODP plan in Appendix C. This have been amended to show "Indicative Stormwater Management."

g. The proposed reserve area adjoining Wakanui Creek should be labelled as an 'Esplanade Reserve' and details of its width should be included on the ODP (noting this links to the earlier request to provide cross sections in order to determine appropriate width for this reserve before the ODP is finalized).

Refer to Plan OP03 - Cross Section – Outline Development Plan in Appendix C to show the appropriate widths and cross sections respectively at the Esplanade Reserve.

PART 3 – Comments Provided by Council Officers for Future Reference

Part 3 of this letter sets out comments which have been provided by Council officers on more detailed aspects of the information provided with the request, but which do not form part of the plan change itself (including the Concept Subdivision Scheme Plan and Engineering detail contained in Annexure 4 to the Request). These comments are provided on a without prejudice basis and are intended to assist the applicant in planning for development of the site, should the plan change request be approved. It should be noted that the Council's comments are preliminary only and should not be taken as full and final comments on the proposed subdivision shown in the concept plan.

Engineering Matters

- **Future design for the waterway will need to look at culvert(s) crossing the Wakanui Creek and the flood capacity of the waterway.**

  The stormwater design for the post-development discharge is no greater than pre-development for all rain events up to 2% AEP 48hr duration and therefore is not required to do so.

  According to Ashburton Urban Stormwater Strategy Hydraulic Modelling Plans (Feb 2015) supplied by ADC the culvert across Farm Road and the stream maintains the flood water within Wakanui Creek both upstream and downstream of the culvert. This demonstrated there is sufficient flood capacity within the area.

  Please refer to Ashburton Urban Stormwater Strategy Hydraulic Modelling Plans (Feb 2015) in Appendix D for the 10%, 2% and 1% AEP 48hr duration model output plans.

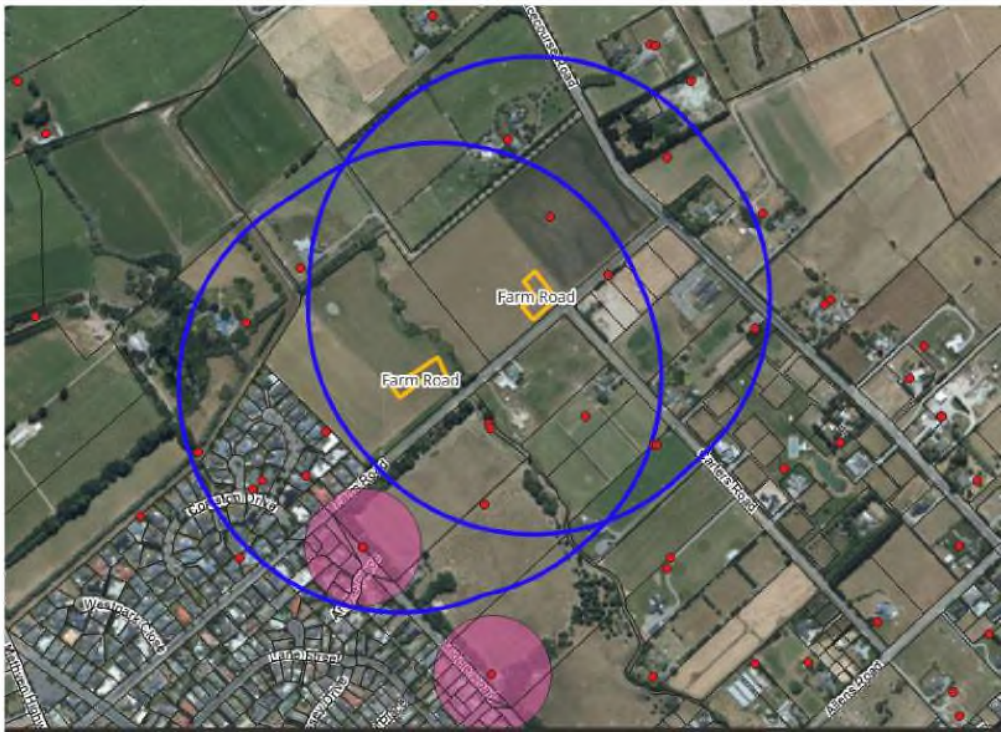
- **A consent from ECan will be needed for construction-phase stormwater discharges, as the site is 16.3 ha and includes Wakanui Creek, and the Council do not accept these high-risk sites into the global consent where it relates to construction-phase stormwater (even if all stages are less than 2ha).**

  The developer will obtain discharge consent for construction phase stormwater.

- **The orifice for the rain tanks seems quite large; tanks need to be full throughout the critical/overflow portion of the event to be considered appropriate for storage offsetting. Additionally, first flush and therefore time at which rapid soakage start should not include the volume of the roofs that are being captured by the rain tanks.**

  This has been modelled in the SSA where each allotments water travelled to the stormwater pond with time of concentration of 10minutes.

- **The Council's global consent requires a 'capture zone' analysis, as described in the consent conditions. A 365m buffer is required for rapid soakage systems, which is approximately shown below.**



Further understanding whether the "capture zone" analysis is required to be undertaken. We will like to know what is the purpose of this analysis in order to modelled with the right outcomes or is it necessary.

Reserve Matters

- **It is expected that the proposed "Local purpose reserve with indicative pedestrian link to Wakanui Creek" (Lot 302 on the Subdivision Layout Plan) will be vested as Local Purpose Reserve (Walkway) and provided by the developer at their cost as part of providing pedestrian linkages though the subdivision.**

  Noted. This is to be agreed during Engineering Design Approval for potential contribution offset from beautification and benefits.

- **The proposed green space link connecting streets (Lot 304 on the Subdivision Layout Plan), proposed indicative stormwater management areas (Lots 300 and 303 on the Subdivision Layout Plan) and proposed reserve area adjoining Wakanui Creek are not eligible for reserve contribution credits.**

  Accepted it is for stormwater drainage purposes, however this is to be agreed during Engineering Design Approval for potential contribution offset from beautification and benefits.

- **The construction of all pathways within reserve areas should be at the developers' expense.**

  Noted. This is to be agreed during Engineering Design Approval for potential contribution offset from beautification and benefits.

Roading Matters

- **As part of future subdivision of the area, Farm Rd and Racecourse Rd frontages will need to be upgraded (to include kerb and channel, footpaths and streetlights). No swales are to be located on the roadside. If needed for stormwater treatment from this or existing subdivisions, then provision to connect to the retention/treatment areas of the new subdivision will be required**.

  There is an existing swale along Farm Road (West) and an unprofiled drain along Farm Road (East), which currently convey stormwater from upstream catchments to Wakanui Creek.

  The stormwater pond design is intended solely for the proposed development and should not include flows from other catchments. Including external catchment flows would significantly increase the stormwater volume to be managed, as the design already accommodates the first flush and all rainfall events up to the 2% AEP (48-hour duration). This would require a large area of land within the proposed development site for stormwater infrastructure, making the development economically unfeasible.

  The existing swale along Farm Road (West) will be upgraded to a combination of swale and pipework. An alternative flow path exists along Farm Road near Argyle Park; however, further discussions with Ashburton District Council (ADC) are required to explore this option.

  The existing unprofiled drain along Farm Road (East) will be reshaped as part of the required road upgrades to ensure it has sufficient capacity to convey both existing flows and discharge from the development to Wakanui Creek.

- **11 m wide kerb to kerb on both roads (Farm Rd and Racecourse Rd) i.e. 5.5m from centreline.**

  Accepted.

- **Underground power will be required on Racecourse Rd and discussion with EA Networks will be required.**

  To be confirmed with EA Networks.

- **Internal roads are to have AC rather than chip seal.**

  This is not specified in Council specs and would like to discuss this further.

- **No kerb and channel to separate traffic lane from parking lane on main road.**

  Accepted.

- **No pavers or exposed aggregate at intersections and no trees near intersections that restrict visibility of Give Way or Stop signs.**

  Accepted.

Other Matters

- **Only one species of street tree per street should be used. Street trees are required on both sides of roads.**

  Accepted.

- **Fencing covenants restricting the height and permeability of fences and limiting the Council's liability for construction and maintenance costs will be required for all lots with common boundaries along reserves**.

  Accepted.

- **Entrance features such as walls and signs will need to be on private lots so Council is not liable for their ongoing maintenance.**

  Accepted and to be confirm whether there will be entrance features.

APPENDICES

Appendix A – Groundwater Depth Assessment

Appendix B – Plan PS01 – Infiltration Basin Typical Cross Section

Appendix C – Outline Development Plans and Cross Sections

- Plan OP01 - Outline Development Plan
- Plan OP02 - Outline Development Plan (Cross Section)
- Plan OP03 - Cross Section – Outline Development Plan

Appendix D – Ashburton Urban Stormwater Strategy Hydraulic Modelling Plans (Feb 2015)

- 10% AEP 48hr
- 2% AEP 48hr
- 1% AEP 48hr

Appendix E – Confirmation with Andrew Tish via email.

APPENDIX A – GROUNDWATER DEPTH ASSESSMENT

Davis Ogilvie (Aoraki) Ltd
12 The Terrace / PO Box 359, Timaru 7940
0800 888 350 / timaru@do.nz / www.do.nz

Date: 1 May 2025

Groundwater Depth Assessment

Location: Farm Road, Ashburton

1. Physical Information:

Six standpipes were installed in Farm Road, Ashburton as shown in Figure 1.

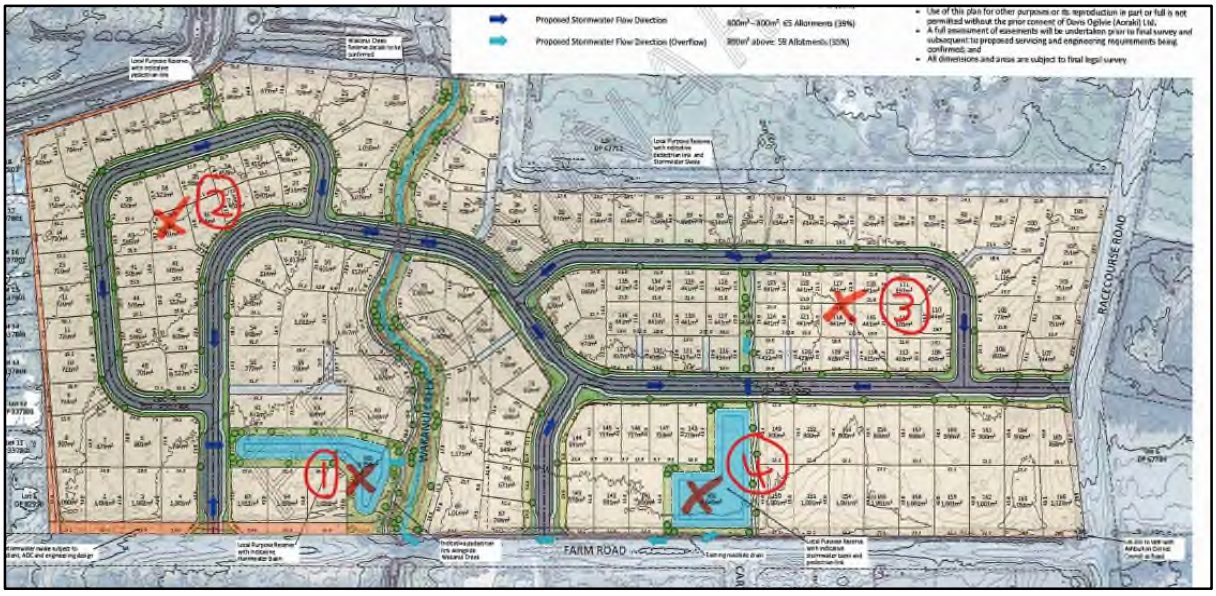


Figure 1: Standpipe locations in Farm Road, Ashburton (Proposed Site)

ECAN bore K37/0398 records was used to correlate with the proposed site recordings with approximately 1 km distance shown in Figure 2.

Figure 2: ECAN Well Bore Location (K37/0398) relative location and distance from the site

All four sites have the top of the measuring point (MP) to the existing ground level (GL) surveyed as shown in Table 3.

Table 3: Baseline Reference Data			
	GL to Top of MP (m)	Elevation GL at MP location (Lyttleton 1937)	Notes:
Standpipe #1	0.31	110.161	Surveyed
Standpipe #2	0.29	111.578	Surveyed
Standpipe #3	0.46	111.187	Surveyed
Standpipe #4	0.55	110.331	Surveyed
Standpipe #5	0.47	110.232	Added later, Surveyed
Standpipe #6	0.46	110.220	Added later, Surveyed
ECAN – K37/0398	0.15	116.810	Surveyed

Standpipe #5 and Standpipe #6 were installed on 8 April 2025 to confirm the measurements of Standpipe #4 is relevant due to different geology layer within the site.

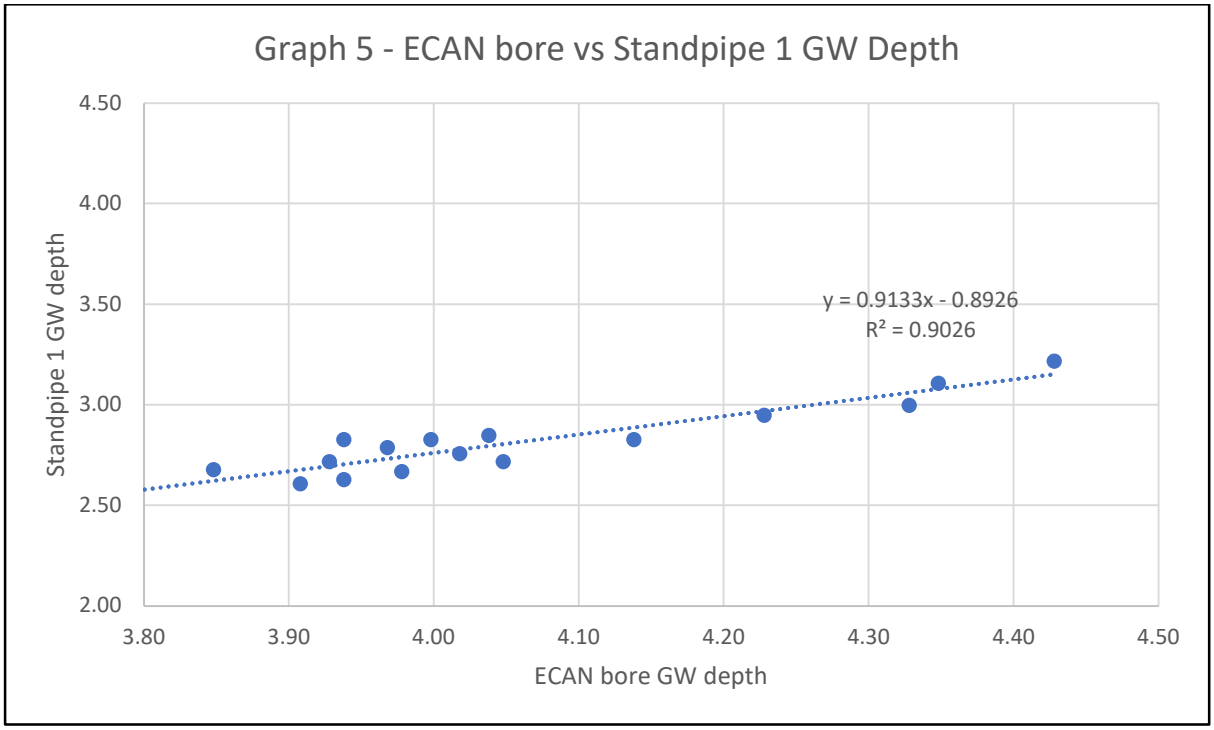
2. Groundwater Measurements:

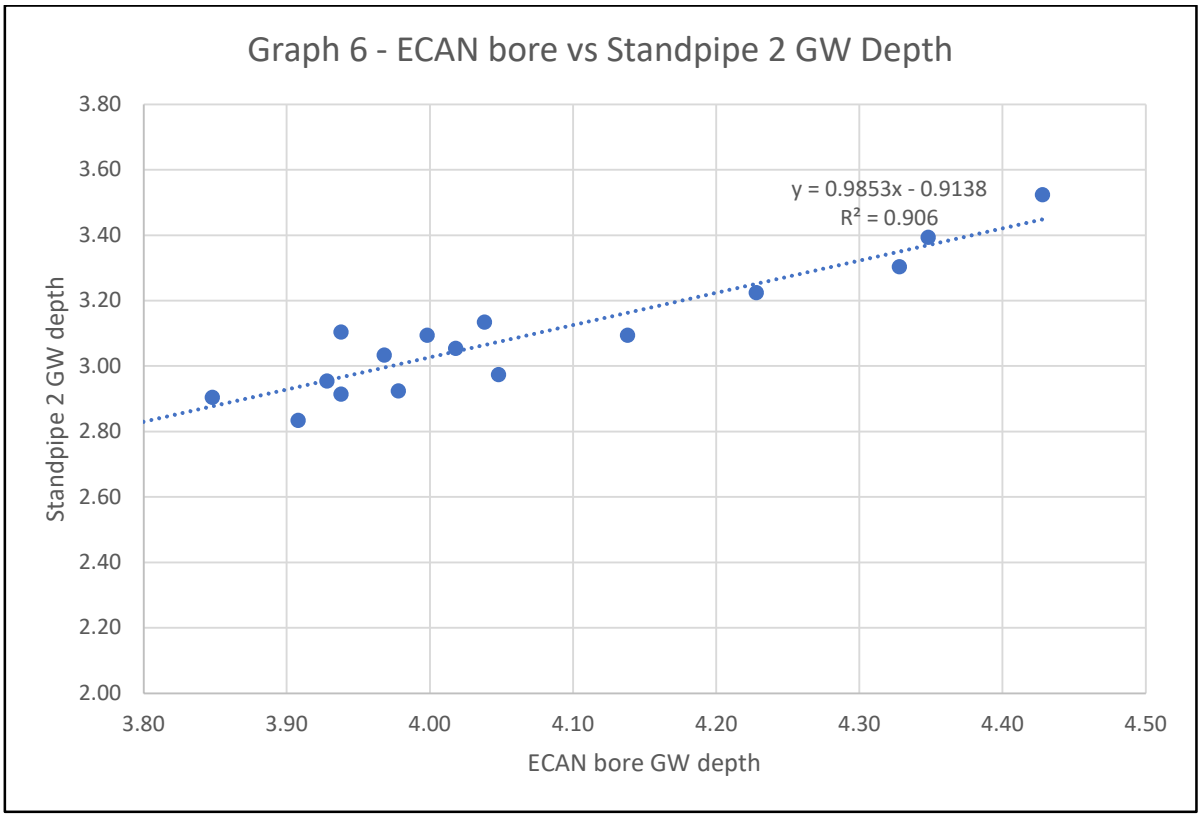
	Groundwater Depth (m) from Existing Ground Level						
Date	**K37/0398**	**Standpipe 1**	**Standpipe 2**	**Standpipe 3**	**Standpipe 4**	**Standpipe 5**	**Standpipe 6**
19/11/2024	3.94	2.63	2.91	2.98	3.51		
26/11/2024	4.02	2.76	3.05	3.07	3.56		
3/12/2024	4.04	2.85	3.13	3.14	3.64		
10/12/2024	4.33	3.00	3.30	3.34	3.77		
17/12/2024	4.43	3.22	3.52	3.50	3.90		
24/12/2024	4.35	3.11	3.39	3.43	3.84		
31/12/2024	4.23	2.95	3.22	3.32	3.76		
7/01/2025	4.14	2.83	3.09	3.23	3.70		
14/01/2025	4.05	2.72	2.97	3.18	3.66		
21/01/2025	3.98	2.67	2.92	3.11	3.58		
28/01/2025	3.91	2.61	2.83	3.00	3.51		
4/02/2025	3.93	2.72	2.95	3.06	3.55		
11/02/2025	3.94	2.83	3.10	3.10	3.58		
25/02/2025	4.00	2.83	3.09	3.15	3.62		
4/03/2025	4.12	3.10	3.32	3.56	4.13		
18/03/2025	4.00	2.99	3.19	3.44	4.03		
25/03/2025	3.94	2.90	3.13	3.41	3.99		
1/04/2025	3.91	2.83	3.08	3.30	3.93		
8/04/2025	3.81	2.75	2.98	3.29	3.87	3.66	4.10

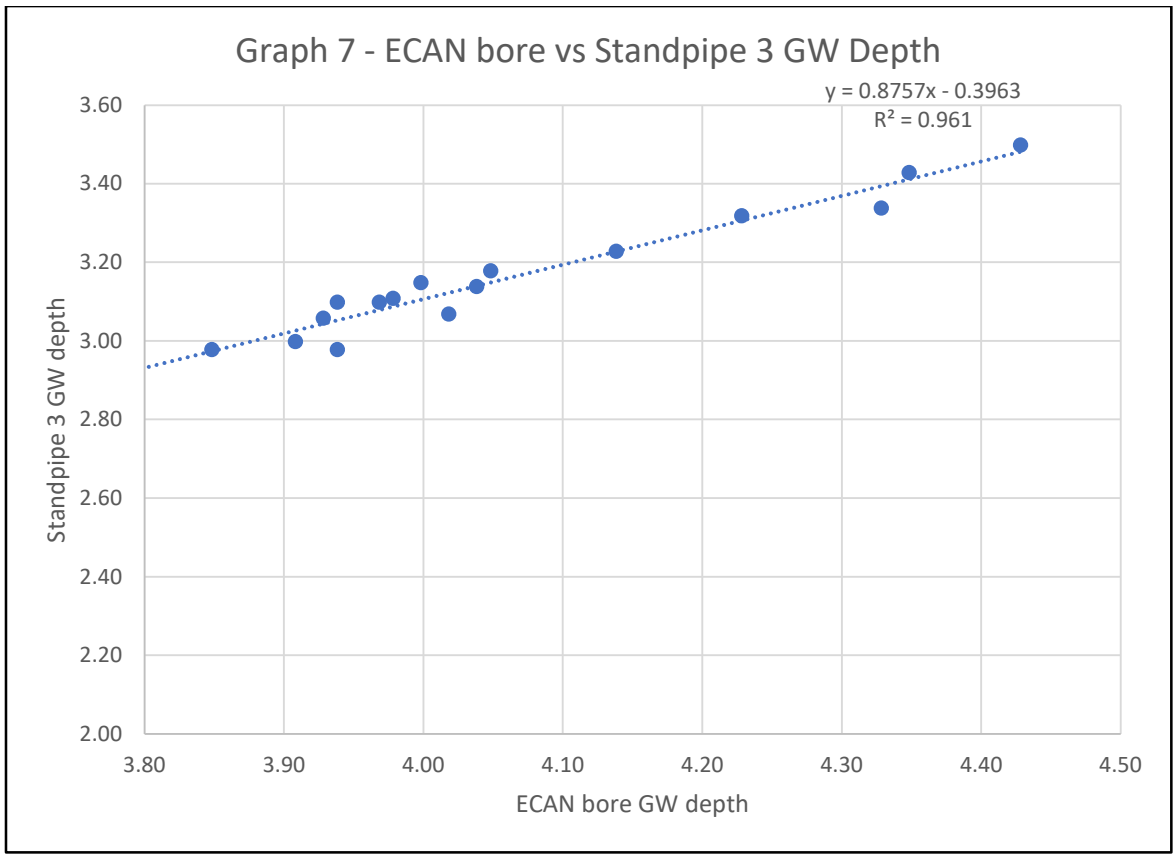
Table 4: Groundwater depth (m) from existing ground level

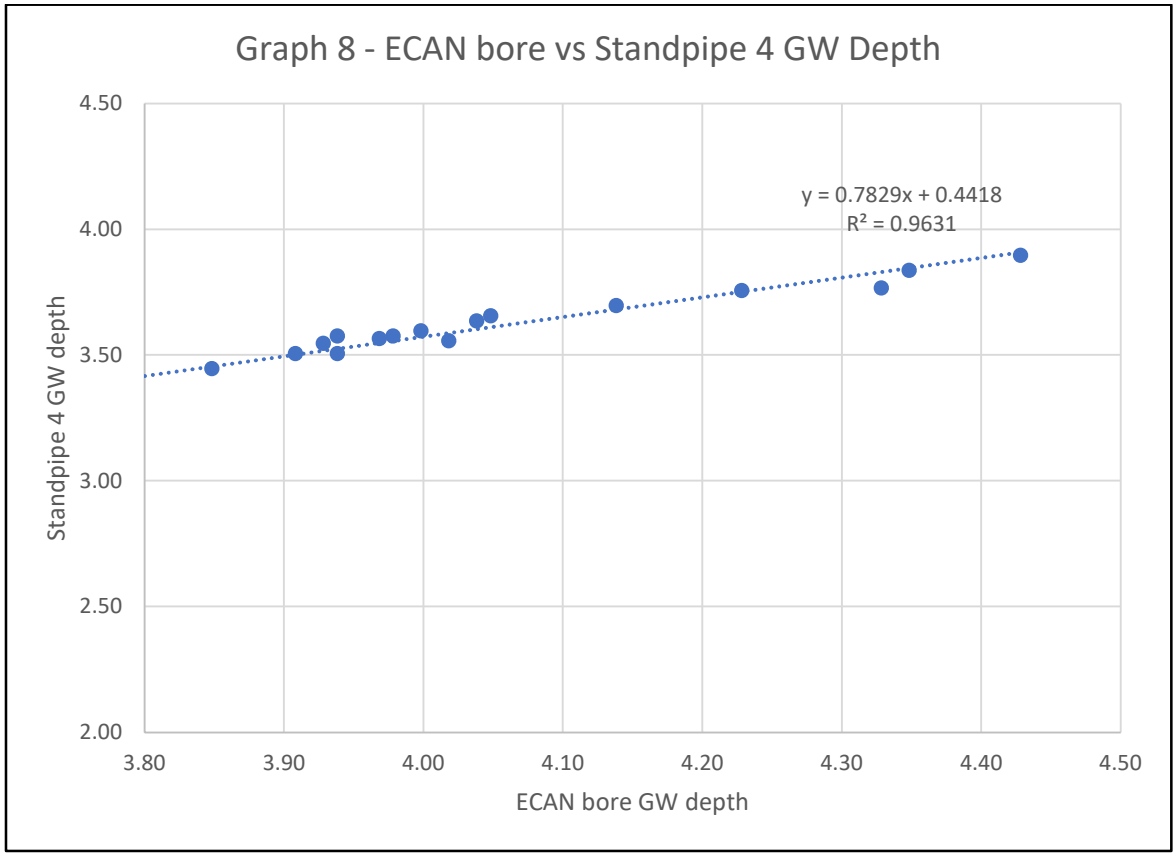
3. Groundwater Correlation Analysis:

Utilising the groundwater recorded measurement shown in either Table 4, coefficient of determination (R^2) method was applied to provides a measure of how well the model explains the variability in the dependent variables. Below Graph 5, 6, 7 and 8 shows the graph of each standpipe data against ECAN bore data.






Graph 7 - ECAN bore vs Standpipe 3 GW Depth
y = 0.8757x - 0.3963
R² = 0.961
Standpipe 3 GW depth
3.60
3.40
3.20
3.00
2.80
2.60
2.40
2.20
2.00
3.80
3.90
4.00
4.10
4.20
4.30
4.40
4.50
ECAN bore GW depth


Graph 8 - ECAN bore vs Standpipe 4 GW Depth
y = 0.7829x + 0.4418
R² = 0.9631
Standpipe 4 GW depth
4.50
4.00
3.50
3.00
2.50
2.00
3.80
3.90
4.00
4.10
4.20
4.30
4.40
4.50
ECAN bore GW depth

	R^2 value	Interpretation
Standpipe # 1 to ECAN bore (K37/0398)	0.9026	Very Strong Correlation
Standpipe # 2 to ECAN bore (K37/0398)	0.9060	Very Strong Correlation
Standpipe # 3 to ECAN bore (K37/0398)	0.9610	Very Strong Correlation
Standpipe # 4 to ECAN bore (K37/0398)	0.9631	Very Strong Correlation

Table 9: Summary for R^2 value of each standpipe records to ECAN – K37/0398 record

From the analysis, there is a strong correlation relationship between groundwater levels in Standpipes #1, #2, #3 and #4 to ECAN bore K37/0398. The linear equation derived from the graph can be plotted to each of the Standpipes groundwater depth (y-value) based on ECAN bore groundwater depth (x-value) respectively as shown in Figure 9 as dotted line.

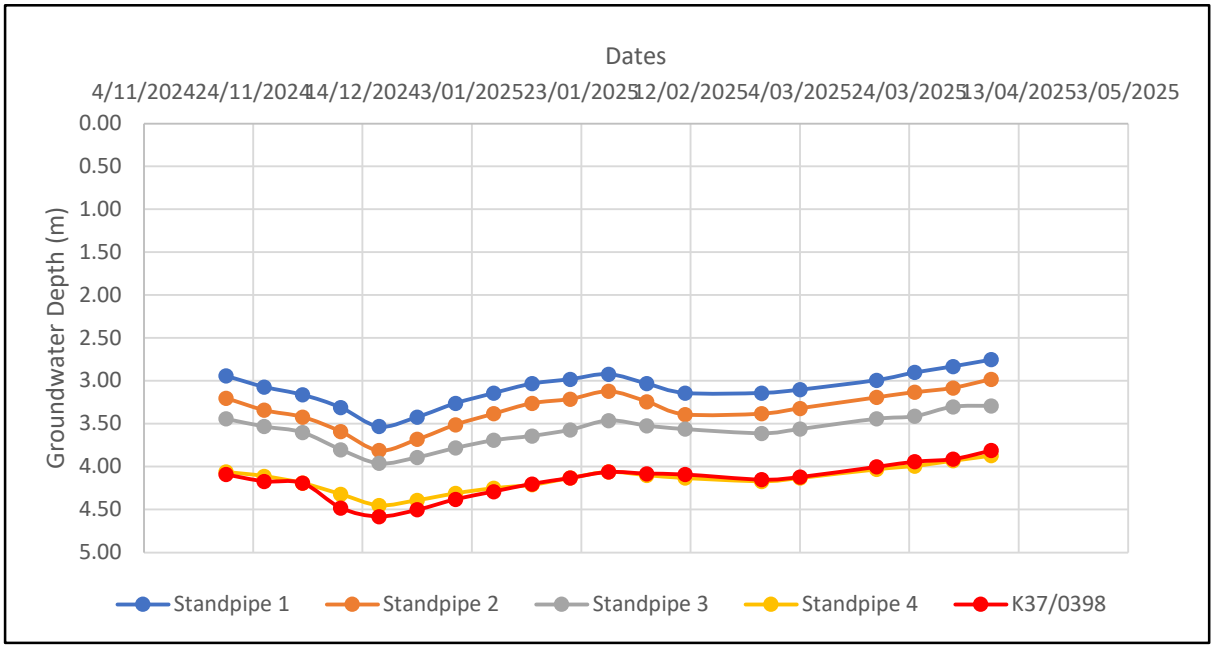


Figure 10: Measured and Model Groundwater Depth Profile (m)

4. Determine 95th percentile high groundwater records at ECAN bore – K37/0398:

ECAN bore K37/0398 have approximately 315 records from 24 May 1974 to 8 April 2025. There are sufficient records to determine the 95th percentile high groundwater depth at K37/0398 site as shown in Table 11.

Groundwater Depth (m)	Count	Probability %	Cumulative Probability %
0 to 0.5	0	0.0000%	0.0000%
0.5 to 0.75	2	0.6349%	0.6349%
0.75 to 1.0	2	0.6349%	1.2698%
1.0 to 1.25	0	0.0000%	1.2698%
1.25 to 1.3	1	0.3175%	1.5873%
1.3 to 1.4	6	1.9048%	3.4921%
1.4 to 1.41	0	0.0000%	3.4921%
1.41 to 1.42	0	0.0000%	3.4921%
1.42 to 1.43	0	0.0000%	3.4921%
1.43 to 1.44	1	0.3175%	3.8095%
1.44 to 1.45	0	0.0000%	3.8095%

1.45 to 1.47	2	0.6349%	4.4444%
1.47 to 1.5	1	0.3175%	4.7619%
1.5 to 1.52	0	0.0000%	4.7619%
1.52 to 1.53	1	0.3175%	5.0794%
1.53 to 1.54	0	0.0000%	5.0794%
1.54 to 1.55	2	0.6349%	5.7143%
1.55 to 1.57	1	0.3175%	5.3968%
1.57 to 1.6	3	0.9524%	6.3492%
1.6 to 1.7	11	3.4921%	9.8413%
1.7 to 1.8	16	5.0794%	14.9206%
1.8 to 1.9	13	4.1270%	19.0476%
1.9 to 2.0	10	3.1746%	22.2222%
2.0 to 2.5	53	16.8254%	39.0476%
2.5 to 3.0	48	15.2381%	54.2857%
Greater than 3.0	142	45.0794%	100.000%
	315	100.0000%	

Table 11: Probability assessment for K37/0398 groundwater depth below existing ground level.

Therefore, the 95th percentile high groundwater depth at ECAN bore K37/0398 is **1.53m.**

5. Determine 95th percentile high groundwater elevation for Farm Road, Ashburton:

Applying the trendline linear equation derived from Graph 5 to Graph 8 can be applied, where value of x is the 95th percentile high groundwater depth at ECAN bore which is 1.53m below ground level (bgl).

	Trendline Linear Equation	y (m) = Depth of GW	Convert GW Depth to Elevation (RL m)
Standpipe #1	y = 0.9133x – 0.8926	0.505	109.346
Standpipe #2	y = 0.9853x – 0.9138	0.594	110.694
Standpipe #3	y = 0.8757x – 0.3963	0.944	119.783
Standpipe #4	y =0.7829x + 0.4418	1.640	108.141

Table 11: 95th percentile groundwater depth and elevation for Farm Road, Ashburton

Standpipe #4 is the soakage pit location for the proposed eastern stormwater basin for the development in Farm Road, Ashburton.

Therefore, Standpipe #4 groundwater elevation will be used to identify the 95th percentile high groundwater level for the proposed stormwater basin site to demonstrate the stormwater system will still perform during the 95th percentile high groundwater level. Please refer to **Plan PS01 – Infiltration Basin Typical Cross Section.**

6. Impact Assessment to Proposed Stormwater Ponds

During a high groundwater event, the western pond's soakage storage will be compromised but will continue to infiltrate at the design infiltration rate. The first flush treatment will not be compromised during this event. However, due to insufficient storage capacity for attenuation, the western pond will overflow and discharge directly into Wakanui Creek.

In this instance, the eastern pond is not affected by the 95th percentile high groundwater level and will be designed to accommodate the additional attenuation volume from the western pond. The flow from the eastern pond is also designed to manage the 95th percentile high groundwater event. This will ensure that the total discharge into Wakanui Creek does not exceed the pre-development flow for all rainfall events up to a 2% AEP, 48-hour duration.

It is impractical to achieve any separation from the 95th percentile high groundwater table due to the depth of the clay layer (over 1.5 meters thick) that would need to be excavated to reach suitable drainage layer, which lies within the 95th percentile high groundwater level. However, the stormwater being discharged will have undergone treatment and will not exceed the contaminant limits set by the LWRP. Furthermore, this discharge occurs after the first flush volume and will be further diluted, ensuring contaminant concentrations remain below LWRP limits.

7. Probability of Occurrences

The probability of both the 20% AEP event and the 5% high groundwater level condition occurring in a given year is 1%.

The probability of both the 2% AEP event and the 5% high groundwater level condition occurring in a given year is 0.1%.

Summary:

- Four standpipes that was installed in Farm Road, Ashburton have very strong correlation relationship with ECAN bore K37/0398.
- From the correlation analysis, best fit linear equation can be derived for each Standpipe #1, #2 and #3 and #4 respectively against ECAN bore K37/0398.
- The 95th percentile high groundwater depth at ECAN bore K38/0398 is 1.53m bgl.
- Standpipe #4 location is where the proposed soakage pit in the eastern stormwater basin will be installed for the proposed development in Farm Road.
- Applying the best fit linear Standpipe #4 equation to the proposed soakage pit for the 95th

I believe the information requested by ADC have been responded within this document for

- the determination of the site (both K37/0398 bore and Farm Road) 95th high groundwater table has been assessed using correlation method;
- and the impact of the 95th high groundwater table to the proposed stormwater system.

Any queries feel free to contact me.

Regards

Selwyn Chang
Principal Civil Engineer
BEng(Civil), CMEngNZ, CPEng

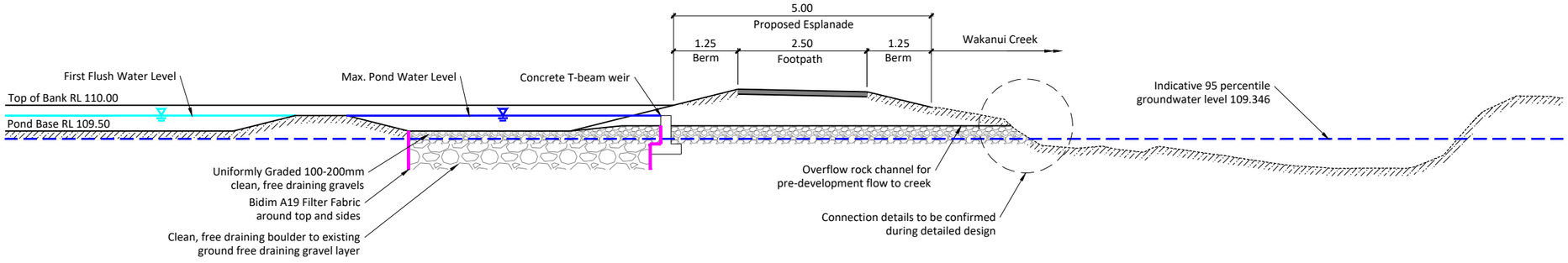
Attachments:

Plan PS01 – Infiltration Basin Typical Cross Section

Contractor to locate all existing services & verify all dimensions before commencing work

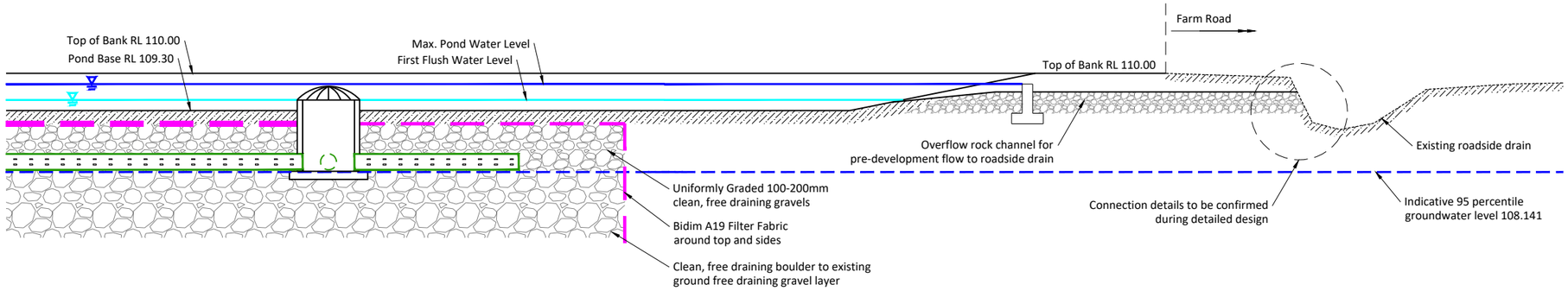
Issue	Date	Reason	Approved
A	05-25	For Plan Change	GPM

Notes:
- All dimensions in metres unless shown otherwise;
-



WESTERN BASIN TYPICAL CROSS SECTION

Scale NTC



EASTERN BASIN TYPICAL CROSS SECTION

Scale NTC

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12ds\data\DO-TIMARU\30625 TM - Farm Road, Ashburton_1072\06 CADD\XRef's\X-30625-Pond Cross Section for RFI.dwg

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Davis Ogilvie (Aoraki) & Partners Ltd
Engineers - Surveyors - Planners
12 The Terrace, Timaru 7940
P.O. Box 359 Timaru, NZ
Ph. 03 688 8350 / 0800 888 350
Also - Nelson, Christchurch, Greymouth

CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

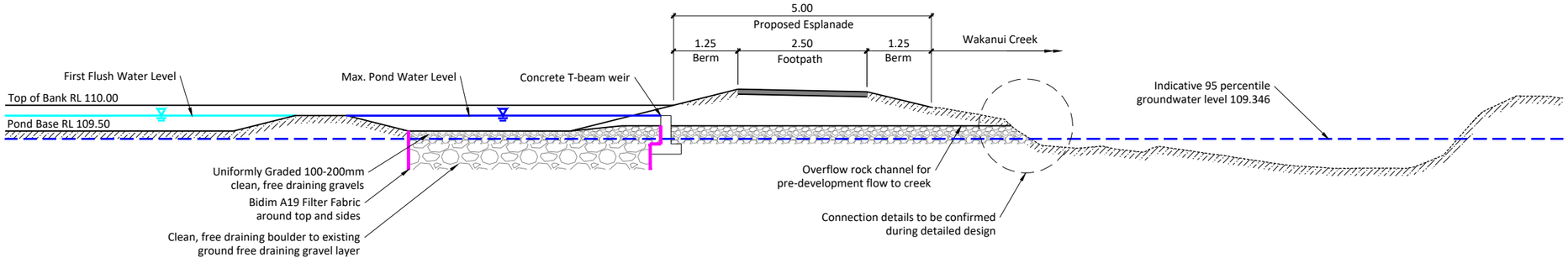
INFILTRATION BASIN TYPICAL CROSS SECTION

Design	Drawn	QA Check	DWG	Issue
RL	RL	SC	PS01	A
Scale @ A3	Date	File		
NTC	05-25	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	05-25	For Plan Change	GPM

Notes:
- All dimensions in metres unless shown otherwise;
-



WESTERN BASIN TYPICAL CROSS SECTION

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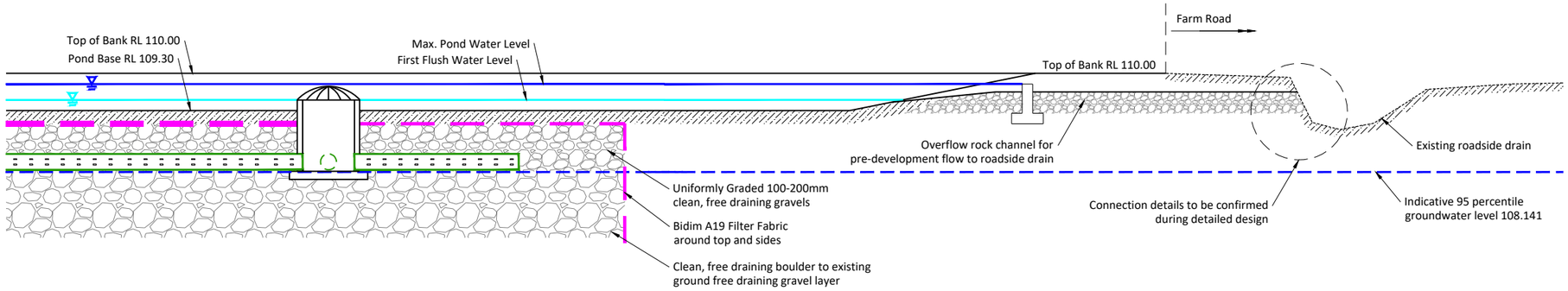

EASTERN BASIN TYPICAL CROSS SECTION

Scale NTC

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12ds\data\DO-TIMARU\30625 TM - Farm Road, Ashburton_1072\06 CADD\XRef's\X-30625-Pond Cross Section for RFI.dwg

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FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFILTRATION BASIN TYPICAL CROSS SECTION

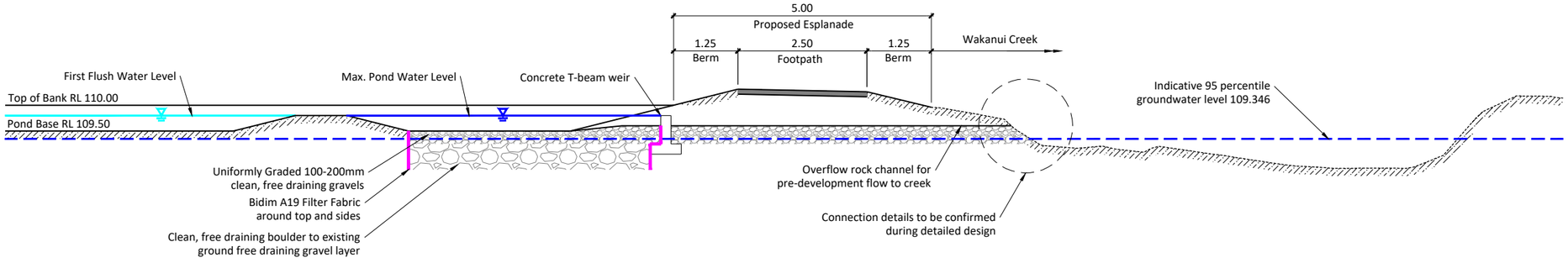
Design	Drawn	QA Check	DWG	Issue
RL	RL	SC	PS01	A
Scale @ A3	Date	File		
NTC	05-25	30625		

APPENDIX B – PLAN PS01 – INFILTRATION BASIN TYPICAL CROSS SECTION

Contractor to locate all existing services & verify all dimensions before commencing work

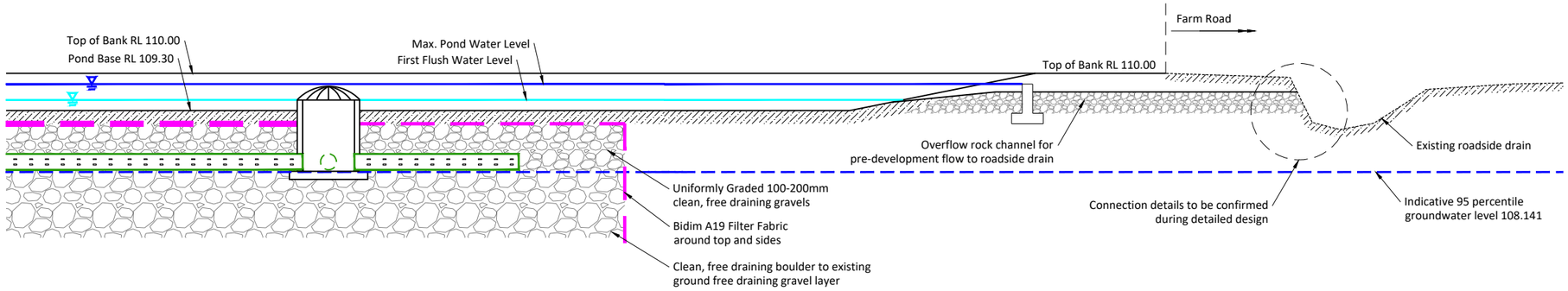
Issue	Date	Reason	Approved
A	05-25	For Plan Change	GPM

Notes:
- All dimensions in metres unless shown otherwise;
-



WESTERN BASIN TYPICAL CROSS SECTION

Scale NTC



EASTERN BASIN TYPICAL CROSS SECTION

Scale NTC

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12ds\data\DO-TIMARU\30625 TM - Farm Road, Ashburton_1072\06 CADD\XRef's\X-30625-Pond Cross Section for RFI.dwg

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FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

INFILTRATION BASIN TYPICAL CROSS SECTION

Design	Drawn	QA Check	DWG	Issue
RL	RL	SC	PS01	A
Scale @ A3	Date	File		
NTC	05-25	30625		

APPENDIX C – OUTLINE DEVELOPMENT PLANS AND CROSS SECTIONS

- Plan OP01 - Outline Development Plan
- Plan OP02 - Outline Development Plan (Cross Section)
- Plan OP03 - Cross Section – Outline Development Plan

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	12-23	For Plan Change	GPM
B	04-25	For Plan Change	GPM

NORTH

General Notes:
- All dimensions in metres unless shown otherwise;

Key

- Outline Development Plan Area
- Proposed Residential Area
- Proposed Road Corridor
- Proposed Local Purpose Reserve
- Proposed Esplanade Reserve
- Wakanui Creek
- Indicative Stormwater Management
- Indicative Road Frontage Upgrade
- Pedestrian / Cycle link / Route Location and alignment may vary

Local Purpose Reserve(Walkway)

Esplanade Reserve 5.0m wide offset from top of bank on both side of Wakanui creek.

Local Purpose Reserve (Drainage)

10.00

15.00

Pedestrian link

18.00

15.00

Pedestrian link

15.00

10.00

18.00

RACECOURSE ROAD

WAKANUI CREEK

Intersection with Racecourse Road

18.00

18.00

Intersection with Farm Road

FARM ROAD

Intersection with Farm Road

Urban Road Frontage Upgrade

Indicative Stormwater Management

Indicative Stormwater Management

CARTERS ROAD

ARGYLE PARK

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton_1072\06 CADD\Dwg\30625-Outline Development Plan A3.dwg

FOR PLAN CHANGE
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CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

OUTLINE DEVELOPMENT PLAN

Design	Drawn	QA Check	DWG	Issue
RL	SZ	GPM	OP01	B
Scale @ A3	Date	File		
1:2500	04-25	30625		

Contractor to locate all existing services & verify all dimensions before commencing work

Issue	Date	Reason	Approved
A	12-23	For Plan Change	GPM
B	04-25	For Plan Change	GPM

NORTH

General Notes:
- All dimensions in metres unless shown otherwise;

Key

- Outline Development Plan Area
- Proposed Residential Area
- Proposed Road Corridor
- Proposed Local Purpose Reserve
- Proposed Esplanade Reserve
- Wakanui Creek
- Indicative Stormwater Management
- Indicative Road Frontage Upgrade
- Pedestrian / Cycle link / Route Location and alignment may vary

Local Purpose Reserve(Walkway)

Esplanade Reserve 5.0m wide offset from top of bank on both side of Wakanui creek.

Local Purpose Reserve (Drainage)

10.00

15.00

A OP02

B OP02

C OP02

Pedestrian link

Pedestrian link

18.00

15.00

10.00

18.00

15.00

18.00

18.00

WAKANUI CREEK

RACECOURSE ROAD

Intersection with Racecourse Road

Intersection with Farm Road

FARM ROAD

Intersection with Farm Road

Urban Road Frontage Upgrade

Indicative Stormwater Management

Indicative Stormwater Management

CARTERS ROAD

ARGYLE PARK

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12dS\data\DO-TIMARU\30625 TM - Farm Road, Ashburton_1072\06 CADD\Dwg\30625-Outline Development Plan A3.dwg

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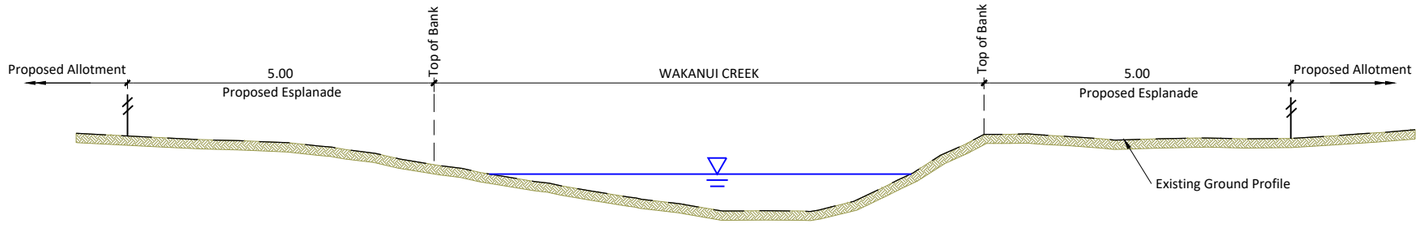
CONISTON PARK LIMITED
FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

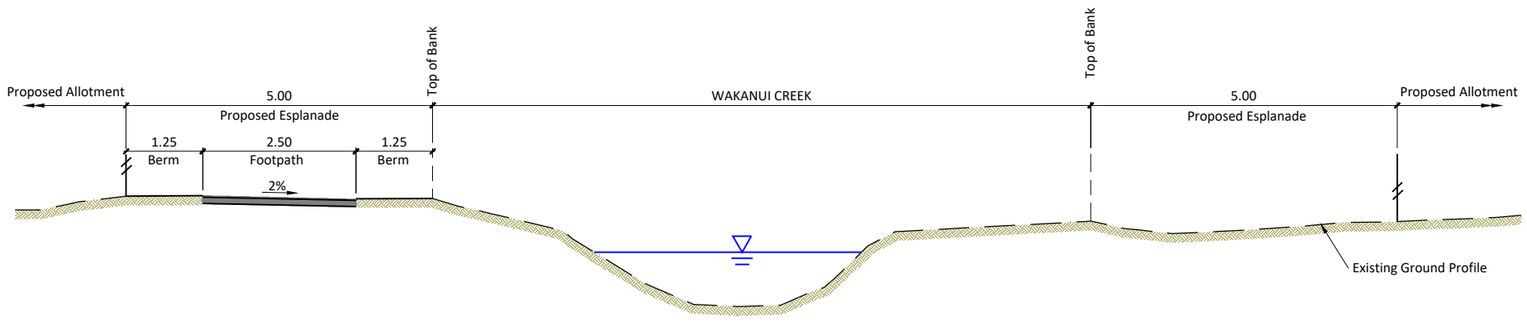
OUTLINE DEVELOPMENT PLAN (CROSS SECTION)

Design	Drawn	QA Check	DWG	Issue
RL	SZ	GPM	OP02	B
Scale @ A3	Date	File		
1:2500	04-25	30625		

Issue	Date	Reason	Approved
A	04-25	For Plan Change	GPM



SECTION A
Scale 1:100



SECTION B
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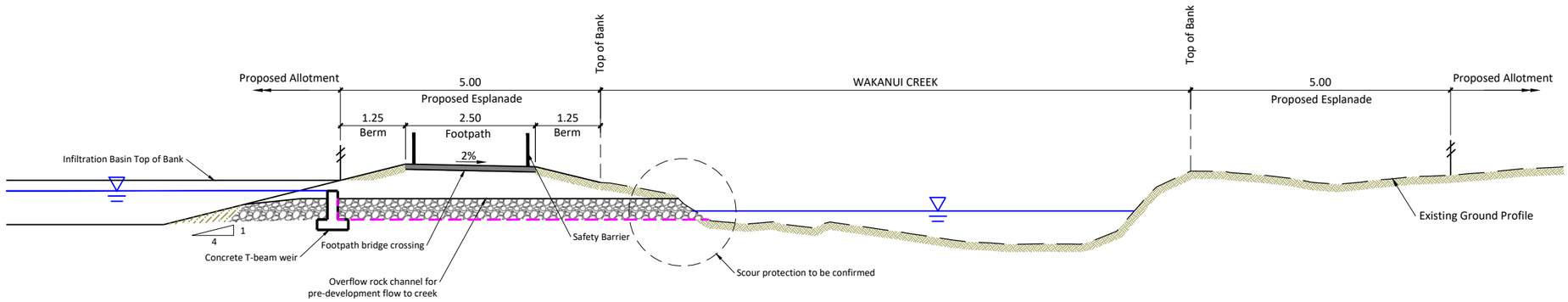

SECTION C
Scale 1:100

General Notes:
- All dimensions in metres unless shown otherwise
- Water level shown in plan are indicative only
- Landscaping not included

Key

Existing Ground Profile

Finished Ground Profile

FOR PLAN CHANGE
NOT FOR CONSTRUCTION

CAD ref: C:\12ds\data\DO-TIMARU\30625 TM - Farm Road, Ashburton 1072\06 CADD\Dwg\30625-Outline Development Plan A3.dwg

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CONISTON PARK LIMITED

FARM ROAD SUBDIVISION - PROPOSED PLAN CHANGE

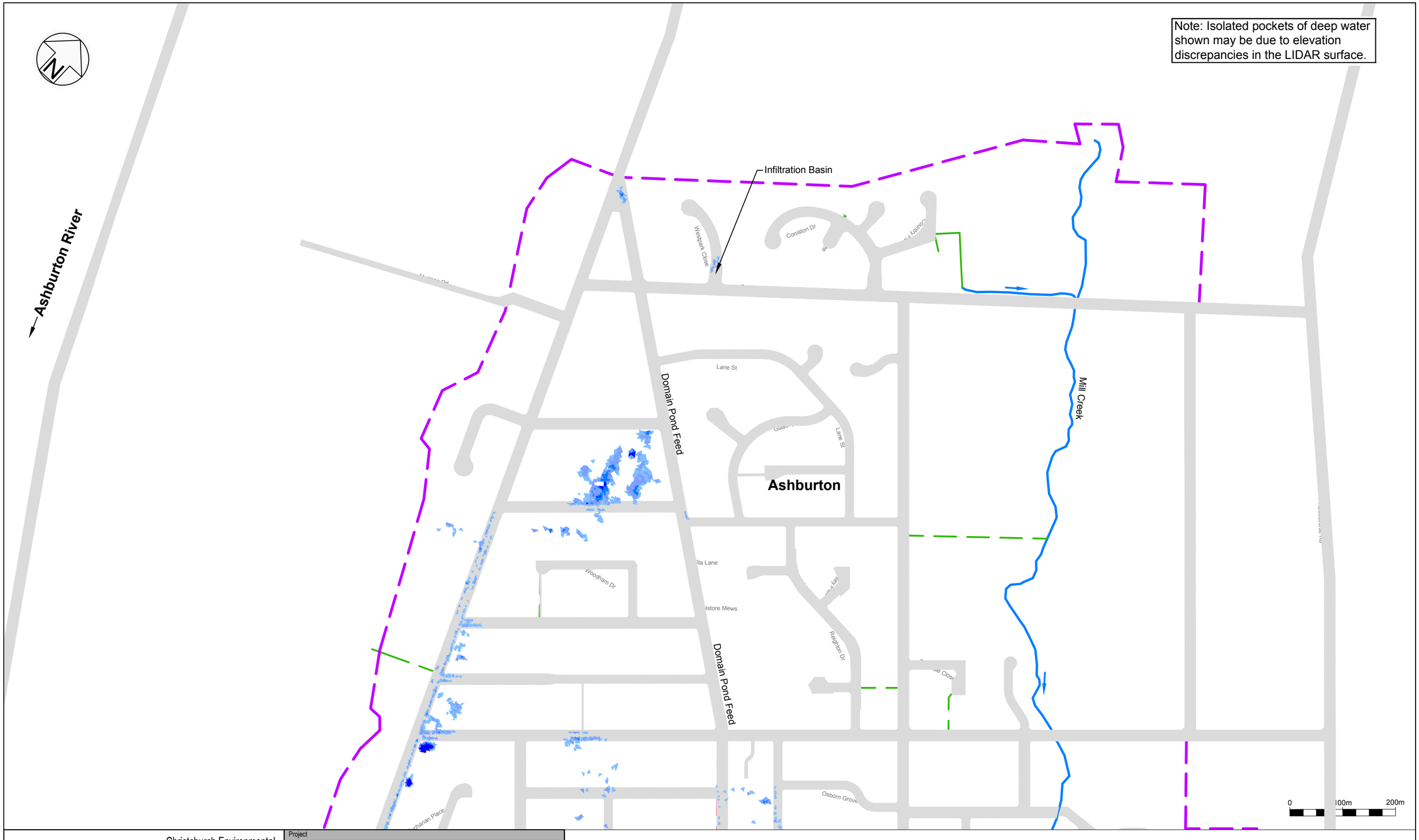
CROSS SECTION - OUTLINE DEVELOPMENT PLAN

Design	Drawn	QA Check	DWG	Issue
RL	SZ	GPM	OP03	A
Scale @ A3	Date	File		
1:100	04-25	30625		

APPENDIX D – ASHBURTON URBAN STORMWATER STRATEGY HYDRAULLIC MODELLING PLANS (FEB 2015)

- 10% AEP 48hr
- 2% AEP 48hr
- 1% AEP 48hr

Note: Isolated pockets of deep water shown may be due to elevation discrepancies in the LIDAR surface.



Refer to Sheet A2 for Continuation

OPUS
Christchurch Environmental Engineering
PO Box 1482
Christchurch 8140, New Zealand
+ 64 3 3635400

Project No.	Scale
3cw837.l0	NTS
Sheet	**Revision Date**
Flood Map 5 - A1	Feb 2015

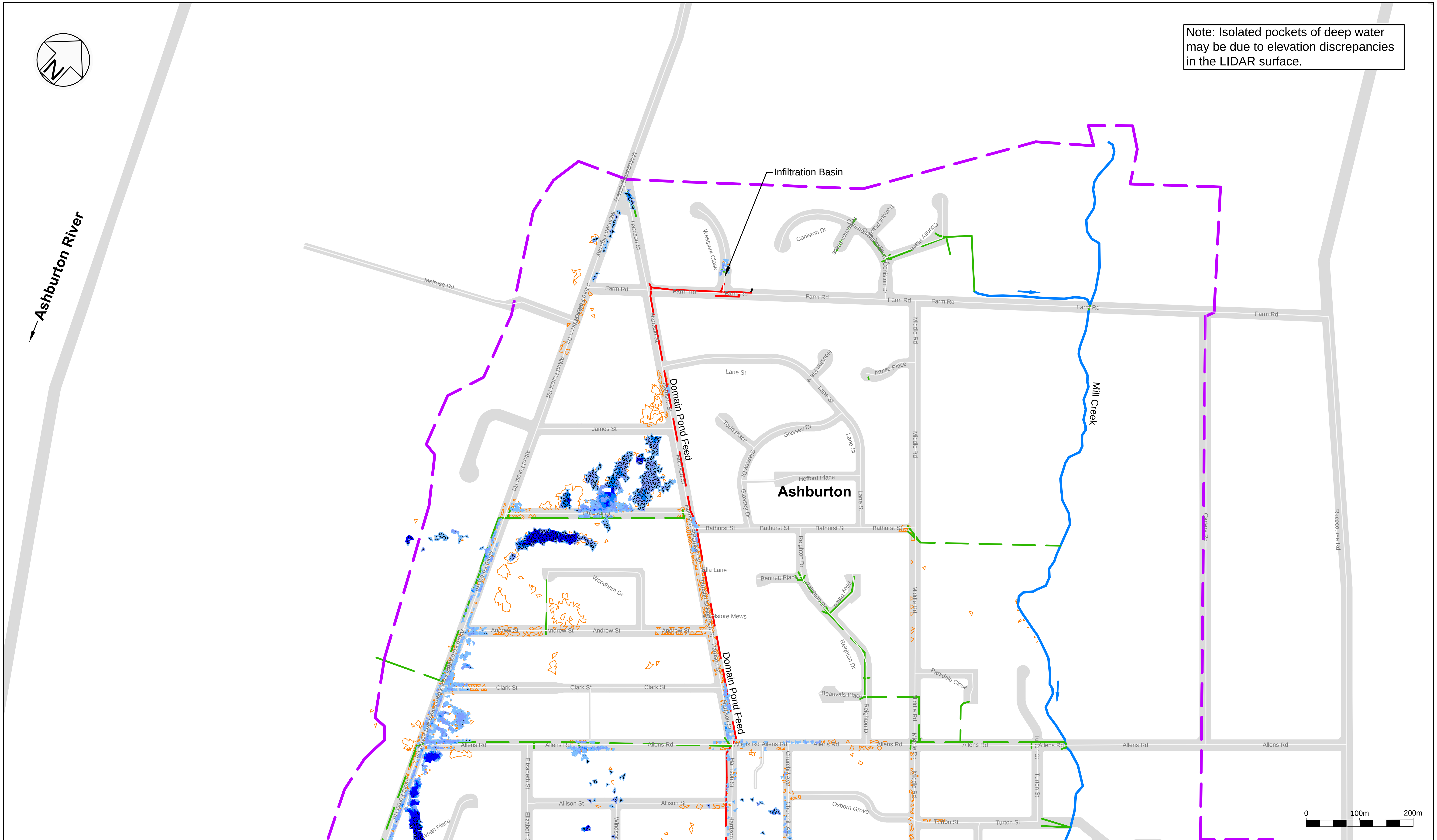
Project
Ashburton Urban Stormwater Strategy
Hydraulic Modelling

Figure
10% AEP Predicted Flood Extent
48 Hour Duration

Key:

Predicted Flood Depth
- 50 - 100mm
- 100 - 200mm
- 200 - 300mm
- >300mm

- Parcel Boundary
- Modelled Watercourse
- Modelled Pipework / Kerb and Channel
- Modelled Storage Area
- Catchment Boundary



Refer to Sheet A2 for Continuation

OPUS
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PO Box 1482
Christchurch 8140, New Zealand
+ 64 3 3635400

Project	
Ashburton Urban Stormwater Strategy Hydraulic Modelling	

Project No.	Scale	Figure
3cw837.I0	NTS	2% AEP Predicted Flood Extent 48 Hour Duration
Sheet	**Revision Date**	
Flood Map 3 - A1	Feb 2015	

Key:

- Predicted Impact of Future Growth and Climate Change in Flood Extent
- Predicted Flood Depth
  - 50 - 100mm
  - 100 - 200mm
  - 200 - 300mm
  - >300mm
- Parcel Boundary
- Modelled Watercourse
- Modelled Pipework / Kerb and Channel
- Modelled Storage Area
- Catchment Boundary

Note: Isolated pockets of deep water may be due to elevation discrepancies in the LIDAR surface.

Ashburton River

Infiltration Basin

Domain Pond Feed

Mill Creek

Ashburton

Refer to Sheet A2 for Continuation

DISCLAIMER: Whilst we have attempted to produce mapping that is as reliable as possible, Ashburton District Council and Opus International Consultants accept no responsibility for the accuracy of the mapping, nor any decisions made based on it. The mapping was prepared for strategic planning purposes only. It indicates the predicted likelihood of flooding from the stormwater network for defined areas, based on the best available information at the time of preparation and is subject to uncertainty. The mapping is not sufficiently detailed to account for individual properties , as individual properties may be subject to local factors not considered in the modeling.

Key:

Predicted Impact of Future Growth and Climate Change in Flood Extent

Predicted Flood Depth
- 50 - 100mm
- 100 - 200mm
- 200 - 300mm
- >300mm

- Parcel Boundary
- Modelled Watercourse
- Modelled Pipework / Kerb and Channel
- Modelled Storage Area
- Catchment Boundary

OPUS
Christchurch Environmental Engineering
PO Box 1482
Christchurch 8140, New Zealand
+ 64 3 3635400

Project
Ashburton Urban Stormwater Strategy
Hydraulic Modelling

Project No.	Scale
3cw837.l0	NTS
Sheet	**Revision Date**
Flood Map 1 - A1	Feb 2015

Figure
1% AEP Predicted Flood Extent
48 Hour Duration

APPENDIX E – CONFIRMATION WITH ANDREW TISH VIA EMAIL

Selwyn Chang

From: Andrew Tisch <Andrew.Tisch@adc.govt.nz>
Sent: Monday, 14 April 2025 11:03 AM
To: Selwyn Chang
Cc: Glen McLachlan
Subject: RE: [#DOA 30625] Farm Road - Stormwater Queries

Hi Selwyn
Yes, you can quote from our email below. Is that what you are asking?

Andrew

From: Selwyn Chang <selwyn@do.nz>
Sent: Thursday, 10 April 2025 12:02
To: Andrew Tisch <Andrew.Tisch@adc.govt.nz>
Cc: Glen McLachlan <glen@do.nz>
Subject: RE: [#DOA 30625] Farm Road - Stormwater Queries

Andrew

Thanks for the clarification. I hope you are ok that I use your response to support my response to the RFI. Below is the RFI that we received and hence the confusion that is required in our design to meet the RFI design parameter.

RFI from ADC

2. For stormwater neutrality calculations, asse
flow/volume, as per the Council's Stormwater Des
Eqn 8.4).

Regards

SELWYN CHANG

Principal Civil Engineer (Timaru Lead) | BEng(Civil), CMEngNZ, CPEng

12 The Terrace, Timaru, 7910

T 0800 888 350 | **M** 027 358 9192
do.co.nz

DAVIS OGILVIE
ENGINEERS / SURVEYORS / PLANNERS

From: Andrew Tisch <Andrew.Tisch@adc.govt.nz>
Sent: Thursday, 10 April 2025 10:36 AM
To: Selwyn Chang <selwyn@do.nz>
Cc: Glen McLachlan <glen@do.nz>
Subject: RE: [#DOA 30625] Farm Road - Stormwater Queries

Hi Selwyn,

Thanks for meeting on Teams just now to discuss the Farm Rd design and SW guideline requirements. I have attached the draft ADC SW design guidelines so it can be searched.

As mentioned in the meeting, point 7 of Section 7.2.2 is most relevant to alleviate the disconnect between storage and flow. $0.8Q_{lim}$ is used in equation 8.1 for basin storage only. For flow, the main requirement is that the average post-development discharge does not exceed Q_{lim}, which means Q_{max} can be greater than Q_{lim}. I will highlight the wording directly under the 7.2.2 heading, which states:

"The size of the basin is driven by the need to restrict discharges to a pre-developed discharge limit as discussed in Section 5.3. A simplified method for designing an attenuation basin is outlined below and has been developed based on the Rational Method, assuming the difference between pre and post development flows can be used to estimate the storage volume required to attenuate flows. Alternate design methods (e.g. flow routing spreadsheet or hydraulic modelling software) may be accepted, subject to review and approval by Council."

Andrew

From: Selwyn Chang <selwyn@do.nz>
Sent: Friday, 4 April 2025 12:15
To: Andrew Tisch <Andrew.Tisch@adc.govt.nz>
Subject: RE: [#DOA 30625] Farm Road - Stormwater Queries

Andrew,

Could I organise MS team with you in regards to ADC stormwater neutrality requirement for Farm Road Development? There is a lot of conservatism in the stormwater neutrality equation in ADC. It is suitable for small to medium development but may not be for large development.

1) ADC stormwater neutrality requires the post development should not be greater than 0.8 * predevelopment flow. This is shown when calculating the Attenuation Basin Section 7.2 storage volume calculation and the RFI for this development.

7.2 ATTENUATION BASIN

7.2.1 GENERAL BASIN DESIGN CRITERIA

- Where long drain down times are likely during routine rainfall events i.e. up to and including the water quality (first flush) rainfall depth, the basin invert should be formed to provide a low flow channel with internal fall to the outlet. The lowest 100 mm depth of the basin should be landscaped with wet / dry tolerant plants or gravels to avoid mowing of water-logged areas or grass die-off in winter.
- Avoid excessive compaction of underlying soil during construction. Ensure there is an access ramp to the base of the infiltration basin for maintenance purposes. This track should be a minimum of 2 m wide, no steeper than 1v:7h gradient and constructed from a firm compacted material such as AP65.

(Section 5.3) from the developmen
design storm event (excluding clim
using the runoff calculation metho
Section 4, this will be Q_{limit}.

2. Calculate the post-developed runo
for the same design storm duration
(including climate change), using th
calculation methods outlined in Se

3. Calculate the storage volume requi

$$V_s = 3.6D(Q_{post} - 0.8Q_{limit})$$

where V_s = storage volume requ
D = design storm duratic
Q_{post} = post-developed runc
Q_{limit} = discharge limit (L/s)

4. Repeat steps 2 and 3 for a range of
durations to find the worst case tha
largest storage volume (typically a

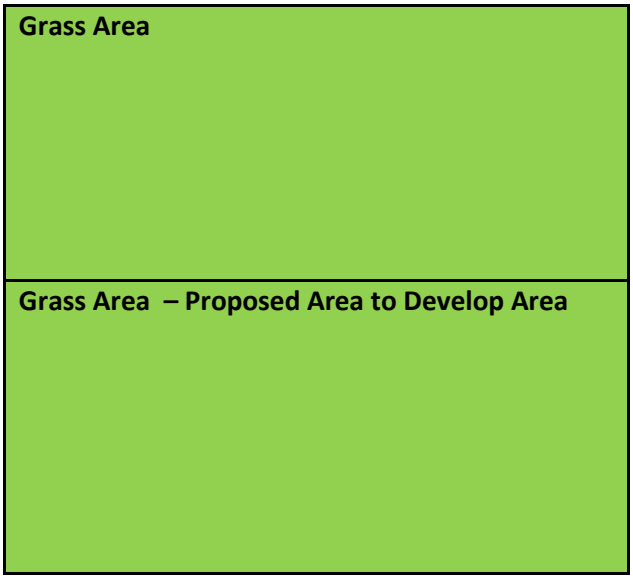
From the arithmetic understanding from Post-Pre compare to Post-0.8*Pre, which is 20% more flow to attenuated. If this 20% were to apply in the rational formula (Q = CIA), you could say the it could be applied into the rainfall intensity because the catchment area and runoff coefficient are constant. I have applied this into the ADC rainfall intensity and below is the table with and without the inclusion of 20% increase in intensity. It is just stepping up the rainfall design to be used for example if the 20% is included into the 50yr rainfall it step up closely to 100yr rainfall event. However, if the development to consider 1% AEP and include the ADC stormwater neutrality method, it is going to be as close to NIWA 250yr rainfall event. Hence the predevelopment flow calculation is using the NO CLIMATE change which make it even more conservative.

	10min	20min	30min	60min	120min	360min	720min	1440min	2880min
50year+ CC	18	26	31	38	52	86	107	138	208
50year + 20% + CC	22	31	37	45	62	104	129	165	250
100year + CC	22	31	37	40	56	96	118	152	232
100year + 20%	27	37	44	48	67	115	142	183	278
NIWA 250year	27	34	39	52	70	114	153	201	257

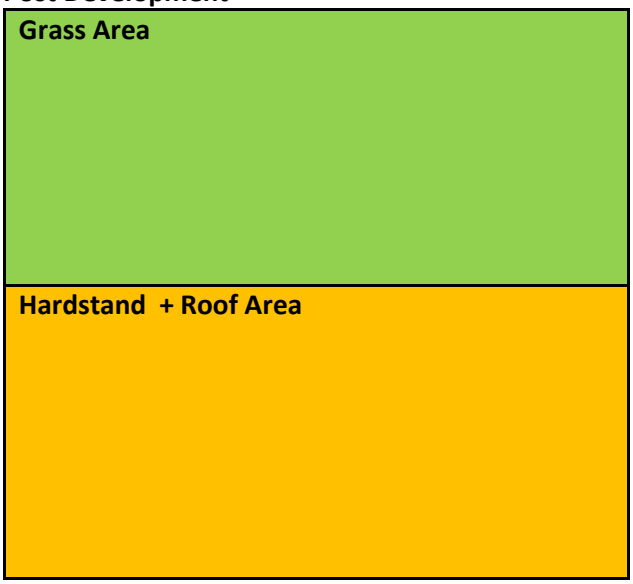
2) The formula mention in (1) also come downs to how this is going to be applied.

If this is covering the whole area (including grass) as weighted attribute. Does this mean the area the grass (both the reserved, garden in each allotment) will need to attenuate 20% more even though it was grass surface initially? It is reasonable to be applied for small and medium development, but large development where there are large grass areas then the volume to attenuate grass area is going to be confirm? Example as below

Pre Development



Post Development



Method 1: Only deal with area that have the surfaces change therefore the calculation only applies to the orange area for the Post Development and leave the grass alone.

Method 2: Apply the **whole** area of the Post Development. That means the grass surface area will also attenuate 20% more.

Method 2 will have larger flow to attenuate than Method 1. I see it is fine for small or medium development because the grass area is usually does not impact greatly. However, Farm Road have quite a lot of grass area and this have impacted hugely in terms of volume to attenuate.

Could I have a meeting with you to discuss this so ADC can take this into consideration the appropriate design method. If you have any suitable time for me to organise MS team with you or your team will be appreciated.

Regards

SELWYN CHANG

Principal Civil Engineer (Timaru Lead) | BEng(Civil), CMEngNZ, CPEng

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From: Andrew Tisch <Andrew.Tisch@adc.govt.nz>
Sent: Friday, 20 December 2024 11:08 AM
To: Selwyn Chang <selwyn@do.nz>
Cc: Glen McLachlan <glen@do.nz>
Subject: RE: Farm Road - Stormwater Queries

Hi Selwyn
Thanks for the call yesterday.

See below in blue

Andrew

From: Selwyn Chang <selwyn@do.nz>
Sent: Thursday, 19 December 2024 13:16
To: Andrew Tisch <Andrew.Tisch@adc.govt.nz>
Cc: Glen McLachlan <glen@do.nz>
Subject: Farm Road - Stormwater Queries

Andrew,

I would like to have some confirmation from ADC in regards to the queries that was raised in the meeting and RFI.

1) **ADC Stormwater Design Guidelines (Draft status)**
It was understood there was a draft ADC Stormwater Design Guidelines (SDG) however was not implemented in the design since that is a draft document. Can we confirm whether this is required to do because it is not best practice to use draft document and if it is require, I will need ADC statement of acceptance and the updated draft SDG copy for me to be able to sign the producer statement. Yes, while the doc is still draft, we require it's adoption. There may be some slight variance between this and the requirements of the global s/w consent. Where you find differences, please contact me and we can agree on which one is precedent

2) **1% AEP consideration**
From DO understanding that the stormwater attenuation was design all rain events up to 2% AEP. ECAN have provided the critical duration of Wakanui Creek for 2% AEP. I would like to confirm that the design is 2% AEP or the development and ADC would like to know what is the adverse effect of the 1% AEP rainfall from the development to the downstream of the network? I would have to come back to you on this. You may recall at the meeting that Andrew Guthrie the Assets Manager noted that it should be 1% for basins. I can confirm that it definitely needs to be 1% inc climate change, where there is no SFP (ie where the basin is impounded). ADC are moving toward 1% even with SFP. Again, will need to confirm with Andrew G as to where the ADC policy sits

Hopefully we can sort this today or tomorrow.

Regards

Selwyn Chang
Principal Civil Engineer | BEng(Civil), CMEngNZ, CPEng

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To send me large files please use my File Drop

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