

To

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W-REF: P24-128 MDL Fast Track Application
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STORMWATER MEMORANDUM

1. Introduction

This stormwater memorandum has been prepared to support the proposed Milldale development Stages 10, 11, 12 and 13 through the fast-track consenting process. This document addresses Subpart 2 of the Fast Track Approvals Bill, section 14 - Referral application, (3) - (v), as stated below:

A description of whether and how the project would be affected by climate change and natural hazards

This memorandum confirms:

- That the proposed development is not at risk of flooding caused by the effects of climate change or natural hazards, and,
- That the performance and resiliency of the stormwater infrastructure (existing and future) addresses the effects of climate change.

2. Existing work done to date

There is currently an adopted Stormwater Management Plan that covers the Milldale development extent, this document is referred to as the "Wainui East Stormwater Management Plan" (SMP) which was prepared by Woods and dated September 2016.

The work undertaken as part of this adopted SMP considered climate change based on 2.1°C increase in temperature by 2090, This was based on the Ministry for Environment and Auckland Council guidelines at the time.

As part of the continual development of Milldale, the flood models prepared for the Wainui East SMP have gone through various Healthy Waters reviews. The recent model review was undertaken by Healthy Waters in 2022 where several updates were made, these include (but are not limited to) the following:

- Updating of roughness coefficients;
- Updating tailwater conditions used in the model; and
- Updating the model and simulating using a 3.8°C future climate change allowance by 2110.

In addition to this, there is currently work being undertaken for the wider Wainui and Milldale North Structure Plan area. An updated Wainui East SMP has been prepared currently under consultation with Healthy Waters. As noted above the currently adopted SMP only considered impacts of future climate change for 2.1°C by 2090, whilst the updated SMP considers both 2.1°C and 3.8°C by 2110 scenarios.

Appendix A of this memorandum contains the details of the 100-year 3.8°C rainfall depth and TP108 rainfall profile used in the flood model.

3. Model Information

3.1. Key assumptions

The flood modelling undertaken is based on the parameters and assumptions set out in the Wainui East SMP. Key assumptions are summarised as follows:

- The model scenario incorporates consented landform and stormwater infrastructure information to date (with the use of as-built data) and proposed design for the current Milldale Stages under EPA and resourcing consenting phase.
- All the future earthworks have been included in the models based on a preliminary design surface which lifts the proposed development outside the floodplain.
- Pass flows forward strategy has been adopted for all future stages. This is noted to be in line with the recommendation provided in the adopted Wainui East SMP.
- Maximum Probable Development (MPD) impervious coverage was assumed for the entire Milldale development area. This is noted to be constant 65% impervious coverage which is in line with the adopted Wainui East SMP.

4. Model Results

Figure 1 shows the peak water depth for the simulated Post Development flood model during a 100-year ARI storm event with allowance for 3.8°C future climate change.

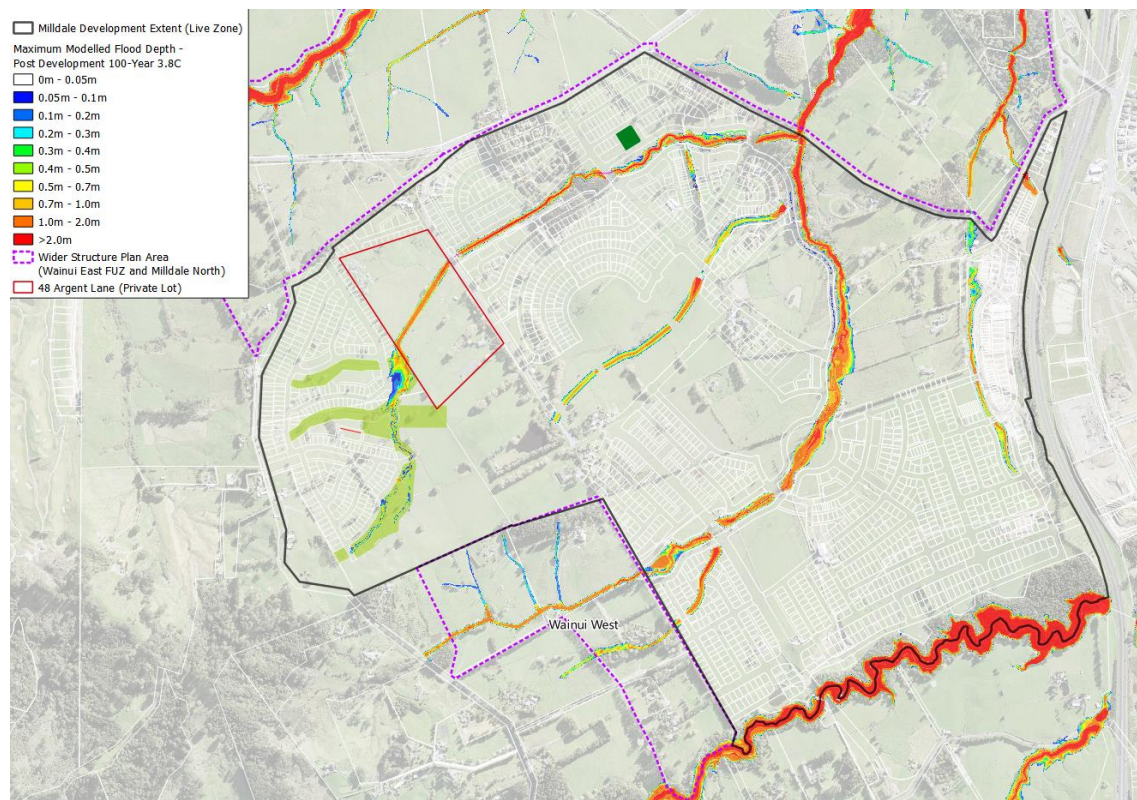


Figure 1: Peak flood depth - Post Development Model (100-year 3.8 ARI storm event)

A summary of the findings from model results are as follows:

- The model confirms that the flooding can be contained within the stream network, with no flooding observed within proposed development areas; and
- Adoption of the pass flows forward strategy for the future Milldale development stages does not impact any areas upstream/downstream of the site.

5. 2023 Auckland Anniversary Weekend Floods (27th Jan 2023 – 2nd Feb 2023)

On 27th Jan 2023 regions across the upper North Island of New Zealand experienced widespread catastrophic floods caused by heavy rainfall, with Auckland being the most significantly affected. The peak 24-hour rainfall depth recorded at the Milldale area was 216mm, as per the rain gauge stationed approximately 2km downstream of the site on Orewa River. It is noted for comparative purposes that the existing 24hr rainfall depth for the 100yr storm event is 225mm.

The Milldale Development was extremely resilient during this event and ultimately performed as per design. Overland flow paths were noted to be traversing on designated roads and channels with no flooding observed to encroach any properties or lots and flood flows contained within the stream network (without overtopping).

6. Conclusion

Woods have undertaken a stormwater assessment to support the Fast Track referral application for the future Milldale development Stages 10, 11, 12 and 13. This document addresses Subpart 2 of the Fast Track Approvals Bill, section 14 - Referral application, (3) - (v), as stated below:

A description of whether and how the project would be affected by climate change and natural hazards

The assessment concludes the following:

- The work undertaken to date confirms that the development is resilient to future climate change including uplift to 3.8°C by 2110 and is not identified to be at risk of being impacted by the effects of climate change or natural hazards.
- The infrastructure developed to date as part of Milldale is shown to be resilient and cater for the uplifted climate change scenario.
- The development has demonstrated its resilience as shown during the significant Auckland Anniversary weekend flood event.

APPENDIX A - 100-YEAR 3.8°C RAINFALL DEPTH AND RAINFALL PROFILE

Table 1: Rainfall depth table

Storm Event	24-hour Rainfall Depth (mm)
100-year no climate change	225
100-year with 2.1°C climate change	262.8 (+16.8%)
100-year with 3.8°C climate change	298.6 (+32.7%)

Table 2: TP108 rainfall profiles

Time (hr: min)	Time interval (min)	Existing rainfall profile	2.1°C rainfall profile	3.8°C rainfall profile
0:00 – 6:00	360	0.34	0.33	0.27
6:00 – 9:00	180	0.74	0.73	0.66
9:00 – 10:00	60	0.96	0.95	0.91
10:00 – 11:00	60	1.40	1.40	1.43
11:00 – 11:30	30	2.20	2.20	2.36
11:30 – 11:40	10	3.80	3.82	4.35
11:40 – 11:50	10	4.80	4.86	5.50
11:50 – 12:00	10	8.70	8.86	9.97
12:00 – 12:10	10	16.20	16.65	18.56
12:10 – 12:20	10	5.90	5.95	6.76
12:20 – 12:30	10	4.20	4.24	4.81
12:30 – 13:00	30	2.90	2.92	3.20
13:00 – 14:00	60	1.70	1.70	1.62
14:00 – 15:00	60	1.20	1.19	1.19
15:00 – 18:00	180	0.75	0.75	0.70
18:00 – 24:00	360	0.40	0.39	0.34