

Brief of evidence of Zeean Brydon in reply

Introduction

1. My name is Zeean Brydon. I am an Associate Engineer based in Blenheim.

Qualification and Experience

1. I am an Associate Engineer with e2Environment Ltd.
2. I hold the following professional qualifications;
 - 2.1 Bachelor of Engineering (Civil)(Hons) (1994) from the University of Canterbury and am a member of Engineering New Zealand.
3. I am a member of the following professional societies and organisations:
 - 3.1 Engineering New Zealand.
4. I have 28 years' experience working as an Engineer in Hamilton, Bristol (UK) and Blenheim with projects throughout New Zealand. Specifically, my experience includes 5 years as a consulting Engineer to Wellington Water between 2015 and 2017, and again from late 2020 to present. During this time, I have processed a wide range of subdivision and land use consents on behalf of the Wellington Water Land Development Team.
5. My primary field of work and experience is providing specialist advice regarding stormwater management, flood management, drainage infrastructure and reticulation, and stormwater treatment and attenuation.
6. My relevant work experience includes the following. See also my CV in Appendix A.
 - 6.1. I have acted as the Technical Lead for the Wellington Water Land Development Team 2023 to 2024, providing Technical Reviews and support to the Wellington Water Land Development Team.
 - 6.2. I have acted as an Associate Engineer within the Wellington Water Land Development Team assessing resource consent applications, engineering approvals, section 224 applications 2015 to 2017 and 2020 to present.
 - 6.3. I have delivered expert evidence at a previous hearing relation to stormwater management within a flood prone area.

- 6.4. I have completed hundreds of civil engineering designs through the UK and NZ requiring stormwater and flood management.
- 6.5. I am familiar with the Wellington City District Plan, the Regional Policy Statement for the Wellington Region as well as the Wellington City Council Code of Practice for Land Development and the Wellington Water Regional Standard for Water Services and Regional Specification for Water Services.
7. I have been provided with a copy of the Code of conduct for expert witnesses in Schedule 4 High Court Rules. I have read and agree to comply with that Code. Except where I state that I am relying upon the specified evidence of another person, my evidence in this statement is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions which I express.
8. I have read and agree to comply with ACENZ Practice Notes: B51, Evidence and Court Procedure and B52, The Expert Witness.

Scope of my evidence

9. I have been engaged by Wellington Water to;
- 9.1 Review and comment on submissions on the Land Use Application SR517439 as they relate to;
- Stormwater management,
 - Flood management,
 - Wastewater servicing,
 - Water supply servicing.
10. The submissions I will respond to are collated and summarised in Table 1 below.
11. A full list of submissions and individual responses is included in **Appendix B**.

Table 1 - Summary of Submissions

Issue	Submitters
Issue 1 – Summary - The increase in asphalt surfacing will result in an increase in surface water / stormwater runoff.	
Specific Submissions	
The proposal will increase surface water runoff.	<p>Nicola Molloy, 4 Maldive Street, Khandallah</p> <p>Amanda and Tom O’Brien, 38 Nicholson Road, Khandallah</p> <p>Robert Vale, 42 Ganges Road, Khandallah</p> <p>Ray O’Hagan, 5 Tower Way, Crofton Downs</p> <p>Andrew Flemming & Catherine McGachie, 39 Nicholson Road, Khandallah</p> <p>Michael Hayward, 40 Ganges Road, Khandallah</p>
<p>The increased asphaltting of the proposed car park will result in less land for natural rain runoff.</p> <p>The proposal will increase impermeable surfacing.</p>	<p>Fiona Calderwood, 31 Ranui Crescent, Khandallah</p> <p>Brenda Vale, 42 Ganges Rd, Khandallah</p> <p>Sarah Berry, 8A Clutha Avenue, Khandallah</p>
Lack of neutral or lesser stormwater runoff compared to the predevelopment scenario.	Lynn Cadenhead, 69A Cashmese Avenue, Khandallah
Stormwater runoff and retention.	Michael Hayward, 40 Ganges Road, Khandallah

Issue 2 – Summary – The lack of detention within the Dekka St parking.	
The lack of stormwater detention within the Dekka St parking.	John Andrews, 68 Khandallah Road, Khandallah
Issue 3 – The increase in car parking and associated asphalt surfacing will result in an increase in pollution which does not safeguard the hydrology and ecology of the receiving environment.	
Specific Submissions	
Increase in pollution due to the asphalt.	Ray O’Hagan, 5 Tower Way, Crofton Downs.
Safeguarding the hydrology and ecology of the receiving waterway.	Lynn Cadenhead, 69A Cashmese Avenue, Khandallah
Lack of high-quality water sensitive urban design.	Lynn Cadenhead, 69A Cashmese Avenue, Khandallah
Issue 4 - Summary – The proposal does not appropriately address climate change.	
Specific Submissions	
The proposal does not appropriately address climate change.	Nicola Molloy, 4 Maldive Street, Khandallah Brenda Vale, 42 Ganges Rd, Khandallah Sarah Berry, 8A Clutha Avenue, Khandallah
Trees and vegetation removal, which is a well-documented driver of climate change.	Ray O’Hagan, 5 Tower Way, Crofton Downs.
Issue 4 –Summary – General Stormwater concerns.	
In addition to Issues 1 and 4 the following general submissions were also received relating to stormwater	

The proposal does not provide stormwater management.	Robert Vale, 42 Ganges Rd, Khandallah
Drainage and Stormwater concerns	Dave and Michelle Soper, 25 Nicholson Rd, Khandallah
Issue 5 – The proposal will result in additional flooding and peak flood flows.	
Specific Submissions	
Increase in peak flooding	John Andrews, 68 Khandallah Road, Khandallah
Additional flooding	Andrew Flemming & Catherine McGachie, 39 Nicholson Road, Khandallah

12. The following is not reviewed:

12.1 Any work not described above.

12.2 Areas outside of my expertise such as traffic management, landscaping, and ecology site work that has occurred across the various investigations of which I was not involved;

Background

13. The 5,317 m² site is located at #26 Ganges Road, ##3 Dekka Street, #31-33 Nicholson Road, Khandallah. The site currently consists of the existing New World supermarket at #26 Ganges Road with a gross floor area of 1,317 m². Foodstuffs (New World Khandallah) also owns the neighbouring properties at #3 Dekka Street and #31-33 Nicholson Road.

14. A Land Use Consent Application was received July 2022 for the extension to the existing supermarket car parking area.

15. There are 38 existing car parking spaces at #26 Ganges Road. Four of these spaces will be removed to provide for a connecting internal accessway between #26 Ganges Road and ##3 Dekka Street.

68 new parking spaces are proposed at ##3 Dekka Street and #31-33 Nicholson Road which will result in a total of 102 supermarket parking spaces.

16. To facilitate the new car parking area three existing residential dwellings on ##3 Dekka Street, and #31- 33 Nicholson Road will be removed and associated earthworks, retaining. The works will additionally include entrance modifications, lighting, signage and landscaping.
17. At the time of the application whilst WCC were undertaking a review of its existing District Plan the proposed notified plan change has not statutory force and the application was assessed against the provisions of the Wellington City District Plan.

Stormwater Management

Receiving Environment

18. Stormwater runoff from #3 Dekka Street currently discharges via two Kerb and Channel connections to Dekka Street, whilst #31 and #33 Nicholson Road each have a single Kerb and Channel connection to Nicholson Road.
19. All stormwater discharge to the Kerb and Channel is collected into the stormwater network via local roading sumps located west of the Dekka Street discharges and northwest of the Nicholson Road discharges.
20. The receiving stormwater network is largely a piped network with some short sections of open channel passing through an urban environment before discharging to the Kaiwharawhara stream approximately 1 km downstream of the site.
21. The Wellington Water Flood Modelling identifies the southwestern portion of #33 Nicholson Road as being subject to a flood hazard – identified as an ‘inundation area’ within the current proposed district plan. The remainder of the site is flood free.
22. The Wellington Water Flood Model identifies a top flood level through the site of 154.6 m RL.
23. In addition to the on-site flooding there is flooding within the receiving catchment downstream of the site.

Stormwater Neutrality

24. The level of service for Wellington City Council for the primary private network is the 10-year rainfall event with allowance for climate change. This means that the piped drainage network must have capacity to convey run off from 'design storms' expected to occur statistically every 10 years. Another way of describing this is that there is a 10% chance of run off occurring annually – the so called 10% Annual Exceedance Probability (AEP).
25. On private property such as this, the primary network needs to have capacity for a 10% AEP, to comply with the NZBC Clause E1 Surface Water. At a high level, E1 prohibits nuisance flooding in the 10% AEP events and prohibits water entering habitable areas of residential buildings in up to the 50-year event (2% AEP event).
26. In addition to the primary level of service Wellington City Council require all development to achieve hydraulic neutrality so that the design peak discharge from the development (post construction) is not greater than the existing design peak discharge (predevelopment) for all events up to an included the 1 in 100 year event (1% AEP event) plus allowance for climate change.
27. The applicant's proposal is to collect stormwater runoff from the car into a below ground private drainage network before discharging off site to kerb and channel (Dekka Street) and to the public stormwater system (Nicholson Road). New sumps will be installed within the proposed car park to collect stormwater into the new below ground drainage.
28. To achieve hydraulic neutrality to site stormwater design will need to collect all flows up to the 1% AEP event plus climate change into the drainage network. The existing drainage plan only identifies single sumps within the stormwater catchments, additional sumps may be required within the final design.
29. The applicant's design calculations are based on Hirds V4 Historical Rainfall Data with 20% allowance for climate change. This complies with advice provided within the Wellington Water Reference Guide for Design Storm Hydrology which states that 'the rainfall depth estimates need to be adjusted by 20% to allow for the estimated effects of climate change. This is consistent with the Ministry for the Environment September 2018 publication (Climate change projections for New Zealand: Atmosphere Projections Based on Simulations for the IPCC Fifth Assessment, 2nd Edition).

30. The site is currently occupied by 3 residential dwellings with associated impervious surfacing (driveways, paths etc). The proposed car park will result in an approximate 1,932 m² increase in impervious area.
31. The increase in impermeable area will increase the peak stormwater discharge from the site. To mitigate for this effect the applicant's proposal includes 3 m³ of stormwater detention. The applicant shows the stormwater detention as being achieved within a 3 m³ stormwater detention tank near the Nicholson Road car park entrance.
32. The applicant has provided calculations to support the stormwater detention sizing. These calculations demonstrate that a maximum of 2.64 m³ of stormwater detention is required on site so that the post development peak stormwater for the 10 year and 100-year rainfall events does not exceed the predevelopment peak flows.
33. The calculations include an appropriate allowance for climate change over the development lifetime (20% increase in rainfall intensity using NIWA HIRDS V4 data).
34. The calculations provided in support of the application are not accepted by Wellington Water.
 - 30.1 The calculations do not comply with the methodology required in the Wellington Water Reference Guide for Storm Hydrology in that they are based on a spreadsheet assessment rather than using a modelling package (HEC HMS, Infoworks or DHI as required in the Reference Guide).
 - 30.2 The calculations are based on a single overall catchment, and whilst this is acceptable in terms of the effect on the wider catchment (downstream of the Dekka St / Nicholson Road Junction), they do not show the effect of the development immediately downstream of the proposed Dekka Street kerb and channel discharge or on the Nicholson Road stormwater network.
35. Further calculations will be provided in support of the Engineering Approval which will be required to be signed off prior to construction commencing on site.
36. Whilst further calculations are required it is my professional opinion that;

- 32.1 The stormwater design can be amended (if required) to collect all the 1% AEP stormwater flows into the below ground network.
- 32.2 The site stormwater system can be designed to achieve stormwater neutrality for both the Dekka Street and Nicholson Road stormwater discharges.
- 32.3 The proposed car park is sufficiently elevated above Dekka Street (approximately 1.5 m) to provide stormwater detention upstream of the Dekka Street kerb and channel discharge if required.
- 32.4 There is sufficient space within the proposed car park to provide additional stormwater detention, if required.

37. It is my professional opinion therefore that;

- 37.1. The increase in stormwater runoff resulting from the increase in impermeable area, as raised by submitters N Molloy, A and T O'Brien, R Vale, R O'Hagan, A Flemming, C McGachie, M Hayward, F Calderwood, B Vale, S Berry, and L Cadenhead, has been identified within the application with stormwater detention identified and although further design development is required this can be managed through appropriate conditions on the consent application.
- 37.2. Whilst A Andrew has correctly identified in his submission that the design does not currently provide stormwater detention upstream of the proposed Dekka Street discharge, the application has provided a single detention system for the entire site based on an overall catchment calculation. Whilst this demonstrates that stormwater neutrality can be achieved additional design is required to demonstrate that there is no increase in flow to Dekka Street. It is my opinion that there is sufficient height and space to accommodate additional detention if required and that this can be managed through appropriate conditions on the consent application.
- 37.3. In terms of stormwater management, the submissions raised by N Molloy, B Vale and S Berry that the application does not appropriately address climate change are

not correct as the stormwater calculations have used appropriate rainfall (Hirds V4) and make appropriate allowance for climate change (20% increase in rainfall depth).

38. Based on this assessment, Wellington Water recommend granting of the Land Use consent with conditions requiring.

38.1. No construction will be required to start prior to the following engineering documents in relation to water supply, stormwater, or wastewater drainage, being accepted in writing by the Wellington Water Land Development Team:

- i. Engineering plans
- ii. specifications

33.2 Stormwater Neutrality for all events up to the 1% AEP event plus climate change.

Stormwater – Treatment for Increased Volume and Contaminants

39. At the time the application was received it required review under the Wellington City District Plan. The site is Zoned 'Outer Residential'. The District Plan Policy 4.2.5.1 is to promote a sustainable built environment that utilises principles of low impact urban design (alternatively water sensitive urban design. This policy notes that development can have adverse effects on the environment through increased stormwater run-off. The focus of this policy is sustainable building design, use of sustainable, low impact building materials and construction methods. As there is no building on site it is not considered that there are any specific District Plan policies / objectives or rules that are triggered.

40. Although there are no specific requirements in the District Plan, the application was assessed against the;

40.1. Principles of G4.4 of the WCC Subdivision Design Guide which required consideration of measures to mitigate the effect of additional stormwater runoff on the receiving environment.

40.2. Clause 4.2.11(a) of the Regional Standard for Water Services, Clause 4.2.11(a) which requires all land development work (including land use) to development to consider and mitigate the effect on the upstream and downstream properties, including but

not limited to, changes in peak flow and flooding, erosion, sedimentation, and contamination, with works required to address any adverse effects.

41. Clause 4.2.11(c) of the Regional Standard for Water Services, requires, where practicable, and unless directed otherwise by Wellington Water, water sensitive design to be employed to minimise the potential adverse effects of the development, to;

37.1 Preserve or protect areas of ecological significance, areas of significant habitat for indigenous flora and fauna and outstanding natural features. (4.2.11(c)(ii))

37.2 Avoid, remedy, or mitigate adverse effects on freshwater ecosystems, streams and watercourses, esplanade strips, harbours and coastal maritime areas (4.2.11(c)(iii)).

42. In terms of stormwater management Low impact / water sensitive urban design achieves two key functions, volume control and treatment.

43. At the time of the application was presented hydrological control for volume increase in high frequency, low duration events was not required under the District Plan, GWRC Regional Policy Statement, the WCC Code of Practice for Land Development, WCC Water Sensitive Urban Design: A guide for WSUD Stormwater Management in Wellington or Wellington Water Regional Standard for Water Services. With the focus of the WCC and Wellington Water; Water Sensitive Urban Design Guides being stormwater treatment.

44. Whilst the applicant has not incorporated low impact / water sensitive urban design devices their design does allow for the collection and treat stormwater runoff from the new car parking area using below ground proprietary private stormwater filters.

45. It is my opinion that the use of a proprietary stormwater filter to treat stormwater runoff from the car park complies with accepted industry practice for removing;

41.1 Heavy metal contamination within the receiving environment, release by wear on tyres and brake pads,

41.2 TSS as a result of dust, debris within the car park runoff,

41.3 Oil and grease released from vehicles.

46. It is my professional opinion therefore that;

43.1 The increase in pollution due to the increase in asphalt as raised in R O'Hagan's submission is addressed through the implementation of stormfilters or similar. The devices will collect and treat stormwater from the car park so that the effect on the Kaiwharawhara Stream is less than minor.

43.2 In providing stormfilters to treat stormwater runoff from the car park the development meets the minimum standards applicable at the time of application. The application is therefore considered to have addressed the submission raised by L Cadenhead by meeting the minimum requirements to safeguard the hydrology and ecology of the receiving waterway.

43.3 That submission by L Cadenhead stating that the application has not implemented Water Sensitive Urban Design is somewhat correct in that low impact / water sensitive devices have not be incorporated but the applicant in providing management for peak flow and treatment for stormwater quality the applicant has met the minimum requirements applicable at the time the application was submitted.

47. On this basis I recommend granting of the Land Use consent with conditions that require delivery in accordance with the approved plans and Engineering to be obtained prior to construction commencing (to ensure no changes in the approved design).

Flooding

48. All levels below are quoted to Wellington 1953 Datum.

49. The Wellington Water Flood Modelling identifies the southwestern portion of #33 Nicholson Road as being subject to a flood hazard – identified as an 'inundation area' within the current proposed district plan. The remainder of the site is flood free.

50. The Wellington Water Flood Model identifies a top flood level through the site of 154.6 m RL.

51. Policy 29.2.1.5 of the WCDP requires development to ensure that earthworks and associated structures do not exacerbate flood events in Flood Hazard Areas. Matters of consideration in assessing applications are;

- 51.1. Whether the earthworks and any associated structures will change the flow of flood waters,
- 51.2. Whether the earthworks and any associated structures will accelerate, worsen or result in the erosion or inundation of the site, or any other site or buildings,
- 51.3. The extent that the proposed earthworks and associated structures will be designed to use 'soft engineering' practices, which are visually unobtrusive and minimise or enhance the ecology of the stream and the flood-prone area.
- 51.4. Whether the earthworks will reduce the risk or effects of flooding.
- 51.5. Whether the potential threat to the health and safety of people, property or the environment from flooding is avoided, remedied, or mitigated.

The environmental result will be earthworks and associated structures that are designed to minimise the hazard risks on flood plains or other flood-prone areas.

Earthworks within a flood area is discretionary.

52. Within #33 Nicholson Road, the applicant's proposal involves;

- 49.1 Earthworks to reduce ground levels across most of the site,
- 49.2 A new retaining wall along the southeastern boundary of the site to facilitate excavation of the site. The existing ground levels along the site boundary will be maintained.
- 49.3 Filling of a localised low point near the site entrance.

53. The car park levels will grade from the north (rear of #33 Nicholson Road) to the south (front of #33 Nicholson Road).

54. It is my professional opinion that proposed earthworks and final car park contours will;

- 51.1 Will lower the flood level experienced on site and as a result will not change the flood risk to the existing supermarket building.
- 51.2 Will not impede the existing flood flow path and as a result the effect on the wider area flood hazard will be less than minor.

55. It is my professional opinion that;

- 55.1. The potential for the development to increase the on and off site flooding as raised by the submissions made by J Andrews, A Flemming and C McGachie is addressed has been addressed within the application through the implementation of stormwater neutrality and through lowering / not impeding flood flows through the site.

56. On this basis Wellington Water recommend granting of the Land Use consent with conditions that require delivery in accordance with the approved plans and Engineering to be obtained prior to construction commencing (to ensure no changes in the approved design).