

Before the Hearings Commissioners at Wellington City Council

under: the Resource Management Act 1991

in the matter of: an application by Ryman Healthcare Limited for resource consent to construct, operate and maintain a comprehensive care retirement village at 26 Donald Street and 37 Campbell Street, Karori, Wellington

between: **Ryman Healthcare Limited**
Applicant

and: **Wellington City Council**
Consent Authority

Statement of evidence of **Ajay Anilrao Desai** on behalf of
Ryman Healthcare Limited

Dated: 29 August 2022

Reference: Luke Hinchey (luke.hinchey@chapmantripp.com)
Nicola de Wit (nicola.dewit@chapmantripp.com)

chapmantripp.com
T +64 9 357 9000
F +64 9 357 9099

PO Box 2206
Auckland 1140
New Zealand

Auckland
Wellington
Christchurch



STATEMENT OF EVIDENCE OF AJAY ANILRAO DESAI ON BEHALF OF RYMAN HEALTHCARE LIMITED

INTRODUCTION

- 1 My full name is Ajay Anilrao Desai.
- 2 I am a Senior Associate – 3 Waters Engineer at Woods. I hold a Bachelor of Civil Engineering and Master of Civil Engineering degrees, specialising in Water Resources and Environmental Engineering, from the University of Pune, India.
- 3 I have twelve years of experience as a Civil Engineer on a wide range of infrastructure projects in New Zealand, the United Kingdom and the Middle East.
- 4 I am a Chartered Professional Engineer (CPEng) and a Chartered Member of Engineering New Zealand (CMEngNZ). I am also a Chartered Engineer (CEng MICE) with the Institution of Civil Engineers and a member of the Chartered Institution of Water and Environmental Management (MCIWEM).
- 5 I have been the principal author and lead three waters engineer for a wide range of infrastructure and flood modelling reports to support private land development and planning frameworks in New Zealand. In addition, I have been involved in and prepared numerous catchment scale hydraulic models, detailed reticulation network models and integrated catchment management plans for private clients, as well as for district and regional councils.
- 6 My relevant experience includes:
 - 6.1 I was the three waters Discipline Lead for various neighbourhoods within the Tamaki precinct in Auckland for Kāinga Ora. I was responsible for developing and reviewing Stormwater Management Plans and Servicing Plans for three water infrastructure required to support ongoing housing developments.
 - 6.2 I prepared evidence for a 3.3ha retirement village at Park Terrace in Christchurch for Ryman Healthcare Limited (*Ryman*).
 - 6.3 I was the lead stormwater engineer and completed the stormwater modelling flood analysis and stormwater runoff and overland flow path assessments for:
 - (a) Drury South Precinct Development, Auckland – 361ha.
 - (b) Drury East Development, Auckland – 231ha; and

(c) Sleepyhead Estate Development, Ohinewai – 178ha.

- 6.4 I was the technical reviewer for flood and damage assessments undertaken for various areas affected by the Darfield earthquake that hit the Canterbury Region on 4 September 2010.
- 7 I am familiar with Ryman’s resource consent application to construct and operate a comprehensive care retirement village (*Proposed Village*) at 26 Donald Street and 37 Campbell Street, Karori, Wellington (*Site*).
- 8 I prepared the Infrastructure Assessment Report dated 25 August 2020 (*Infrastructure Report*). I also prepared the water and wastewater demand and vehicle entrances / dockways elevations aspects of the Section 92 Response dated 30 September 2020 (*Further Information Response*).
- 9 I have visited the Site and its surroundings on 9 August 2022.

CODE OF CONDUCT

- 10 Although these proceedings are not before the Environment Court, I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note (2014), and I agree to comply with it as if these proceedings were before the Court. My qualifications as an expert are set out above. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

- 11 My evidence sets out the following:
- 11.1 A summary of the Infrastructure Report and Further Information Response;
- 11.2 My response to the infrastructure matters raised in submissions;
- 11.3 My response to the infrastructure matters addressed in the Council Officer’s Report (*Officer’s Report*), and in particular the earthworks assessment prepared by Mr John Davies dated 14 July 2022 and the evidence of Mr David Wilson dated 19 August 2022;
- 11.4 My comments on the draft conditions;
- 11.5 Conclusions.

SUMMARY OF EVIDENCE

Earthworks

- 12 The Proposed Village requires the excavation of approximately 37,000 m³ of cut and 2,500 m³ of fill within the Site. The maximum fill depth is 3.5 m and maximum cut depth is 7 m in a very isolated area internal to the Site, which relates to basement excavation. The latest cut and fill plan is included in **Appendix A** of my evidence.
- 13 The potential for sedimentation and erosion effects during the course of the earthworks will be managed via compliance with the 'Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Wellington Region' (February 2021). This approach will include the preparation of an Erosion and Sediment Control Plan (ESCP) for certification by the Wellington City Council (*Council*) prior to the commencement of each stage of earthworks on the Site. This ESCP will include stabilisation details, sizing of the diversion bunds (i.e. cleanwater and dirty water) and methods to be employed to reduce tracking of material onto Donald and Campbell Street with construction traffic managed via Donald Street predominantly. The latest draft ESCP is included in **Appendix B** of my evidence. In my opinion, sedimentation and erosion effects will be appropriately managed.
- 14 I consider appropriate dust control on the Site can be achieved by limiting the area of earthworks exposed at any one time and using water (either via water tankers or a sprinkler / irrigation system) over the exposed areas of the Site. Monitoring on the Site will determine the required application rates to manage dust effectively.
- 15 The earthworks assessment prepared by Mr Davies agrees that standard industry methodologies will minimise any potential earthworks effects.¹

Stormwater

- 16 The existing public stormwater infrastructure within the Site includes a combination of pipes and a short section of open channel in the south-eastern corner. The public stormwater network within the Site will be upgraded and new infrastructure will be provided for stormwater bypass, stormwater network and a private flood attenuation device to store approximately 1,400 m³ of stormwater flow. This storage volume is in excess of required volume of 1,275 m³ suggested by our modelling work.
- 17 In more frequent, smaller rainfall events, the Proposed Village will increase the peak flows to Karori stream from 0.2m³/s to 0.3m³/s with a negligible increase in peak velocities (0.3m/s). All flows are

¹ Council Officer's Report, Appendix 8 – Earthworks – John Davies, paragraph 18.

contained with the stream banks. The harvesting of roof runoff for landscape irrigation will provide appropriate hydrological mitigation. In my opinion, stormwater quantity to the receiving environment will be appropriately mitigated.

- 18 Stormwater runoff from the Proposed Village has a very low risk of contamination. A Best Practicable Option (*BPO*) has been adopted with respect to management of water quality and treatment from the Proposed Village. Rain gardens are not practicable on this Site, but the proprietary treatment devices will comply with Wellington Water's Water Sensitive Design for Stormwater: Treatment Device Design Guideline. In my opinion, stormwater quality to the receiving environment will be appropriately treated to required standards.
- 19 Flood modelling was carried out using the Wellington Water flood model for the Karori Stormwater Catchment. The flood modelling was reviewed and accepted by Wellington Water, as noted in the evidence of Mr Wilson.² Based on the flood modelling, I consider there is no flood risk to the Proposed Village within the Site for all the scenarios modelled.
- 20 I also confirm the Proposed Village will not increase flood risk to properties upstream or downstream of the Site for all the scenarios modelled and will decrease flood risk at some properties. The stormwater design for the Site will provide significant benefits for properties along Donald Street and minor improvements for properties along Campbell Street and Scapa Terrace in terms of flood depth. This outcome is achieved through the flood storage solution attenuating flows such that there are no increased (and in some cases decreased) water levels or flood extents in neighbouring properties.
- 21 The evidence of Mr Wilson confirms the Proposed Village will achieve the necessary flood hazard management requirements.³

Wastewater

- 22 The existing wastewater network will be realigned within the Site to accommodate the Proposed Village buildings and other underground infrastructure. Private wastewater lines will be constructed within the Site as required to service the Proposed Village.
- 23 The peak wet weather flow calculated for the Proposed Village of 2 l/s is considerably less than the peak wet weather flow for the former Teachers' College of 5.08 l/s. In this regard, the Proposed

² Council Officer's Report, Appendix 12 – Wellington Water Limited – David Wilson, paragraphs 20.

³ Council Officer's Report, Appendix 12 – Wellington Water Limited – David Wilson, paragraphs 21-22.

Village will have less demand on the downstream network compared to the previous use of the Site. For those reasons, I consider it is not necessary to provide any wastewater storage onsite.

- 24 The evidence of Mr Wilson confirms that the local wastewater network has sufficient capacity for the Proposed Village and no storage is required.⁴

Potable water

- 25 There is sufficient capacity in the water supply network to accommodate the Proposed Village. The Proposed Village will meet the firefighting water supply requirements in SNZ PAS 4509:2008. The evidence of Mr Wilson confirms that the Site has access to water supplies sufficient for potable water and for firefighting.⁵

Other services

- 26 The Site will connect to the nearby electricity, telecommunications, and gas, and will therefore be appropriately serviced.

Response to submissions

- 27 I consider all of the infrastructure-related issues raised by submitters have been addressed in the design of the Proposed Village infrastructure and in discussions with Wellington Water.

Draft conditions

- 28 I have reviewed the Council's draft conditions and I consider a small number of amendments are required for the reasons set out in my evidence.

EARTHWORKS

Proposed earthworks

- 26 The Site is approximately 3.05 ha in size, irregular in shape and varying in topography. The ground levels range from 165 mRL to 177 mRL, with the highest point on the northeast of the Site and the lowest point on the northwest.
- 27 As noted in the Statement of Evidence of Mr Pierre Malan, the ground conditions at the Site consist of:

27.1 0 to 0.5 m of fill;

⁴ Council Officer's Report, Appendix 12 – Wellington Water Limited – David Wilson, paragraphs 85-86.

⁵ Council Officer's Report, Appendix 12 – Wellington Water Limited – David Wilson, paragraph 87.

- 27.2 Interbedded alluvial soils on the lower elevations (up a depth of 9.5 m) and outwash fan deposits on the elevated slopes; and
- 27.3 Greywacke bedrock at depths ranging from 5 m to greater than 29 m.
- 28 Groundwater levels ranged from 1.1 to 3.5 m below ground level. Mr Malan further addresses the geotechnical conditions of the Site in his evidence, including specific construction methodologies for the Proposed Village.
- 29 Earthworks on the Site are required to excavate basements, foundations, the stormwater storage tank and to install underground services and form road subgrades. From our preliminary design, I estimate earthworks volumes of approximately 37,000 m³ of cut and 2,500 m³ of fill. The earthworks will be required over approximately 2.5 ha of the Site.
- 30 The required earthworks on the Site will generate a surplus of material estimated at approximately 34,500 m³, which will be removed from the Site to an appropriate facility.
- 31 The maximum fill depth is 3.5 m and maximum cut depth is 7 m in a very isolated area internal to the Site, which relates to basement excavation under Building B01. The latest cut and fill plan has been included in Appendix A of my evidence.
- 32 The finished floor level (*FFL*) ranges between 165.57 mRL for Building B01B towards the north-western corner of the Site to 168.0 mRL for Buildings B02 – B06 along the southern boundary. The *FFL* is a compromise between minimising basement excavation, achieving accessible access gradients and tying into the existing levels at the Site boundary.
- 33 The common areas have been graded to direct overland flow paths to the internal road network, which will provide the necessary overland flow paths.
- Erosion and sediment control**
- 34 The potential for sedimentation and erosion effects to arise during the course of the earthworks will be managed in accordance with an ESCP, which will be submitted to the Council for certification prior to each stage of earthworks on the Site.
- 35 The ESCP will be prepared in accordance with 'Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Wellington Region (February 2021)' and 'Good Practice Guide for Assessing and Managing Dust' (Ministry for the Environment (2016)).

- 36 The ESCP will include details of the proposed staging to limit the area of earthworks exposed, stabilisation details, sizing of the diversion bunds (cleanwater and dirty water), types and location of silt fences, protection of stormwater sumps, and methods to be employed to reduce tracking of material onto Campbell Street and Donald Street, management of dust and monitoring requirements.
- 37 The ESCP previously referred to construction traffic accessing the Site via Campbell Street. I understand that Donald Street will primarily be used for construction access in response to Ryman's construction staging requirements and Council feedback on this matter. The latest ESCP is attached to my evidence in Appendix B.
- 38 The ESCP will also identify when works must cease, apart from emergency works relating to controlling stormwater and sediment flows (e.g. during extreme rainfall events).
- 39 In my opinion, the implementation of the ESCP will ensure the potential for dust, sedimentation and erosion effects from the earthworks will be appropriately mitigated.

Dust control

- 40 The potential for generation of dust on the Site will be controlled by limiting the area of earthworks exposed at any one time and using water (either via water tankers or a sprinkler / irrigation system) over the exposed areas of the Site. Monitoring on the Site will determine the required application rates to manage dust effectively. If wind conditions mean that dust cannot be controlled within the Site, works that generate dust will be stopped and additional resources assigned to dust control.
- 41 In my opinion, the implementation of these measures will ensure the potential for dust effects from the earthworks will be appropriately mitigated.

STORMWATER

Existing infrastructure

- 42 The existing public infrastructure within the Site includes a combination of pipes and open channel in the south-eastern corner as shown in Figure 1. There are multiple stormwater lines entering the Site from Scapa Terrace traversing northwards and Donald Street traversing westwards towards the stormwater bypass located within the Site.
- 43 Primary flows discharge towards Karori Stream, which is located just outside of the Site near the northern boundary, via an existing 300 mm diameter orifice. Karori Stream heads northwards towards Karori Road. The orifice controls flow to the Karori Stream and flows in excess of its capacity get diverted towards the Campbell Street line. A high-level sluice also exists within the stormwater

bypass conveying high levels flows towards Karori Stream for larger storm events.



Figure 1: Existing stormwater network

- 44 There is an open stormwater channel that runs for approximately 18 m in the south-eastern corner of the Site, which takes piped flows from Scapa Terrace and discharges into the public stormwater pipe network within the Site.
- 45 Multiple overland flow paths enter the Site from Campbell Street, Donald Street and Scapa Terrace, which combine and traverse along the Site northwards into Karori Stream.
- 46 The Site is identified as being within the 1% Annual Exceedance Probability (*AEP*) flood hazard overlay in the Greater Wellington Regional Council's GIS (Flood Hazard Areas). The Proposed Wellington City District Plan (*Proposed Plan*) also identifies the Site to be within the Flood Hazard overlays associated with inundation areas, overland flow paths and stream corridors.

Proposed infrastructure

- 47 The stormwater strategy for the Site was discussed and agreed with Wellington Water.⁶ The strategy was to develop an onsite stormwater solution that would manage flood neutrality upstream or downstream of the Site for the 100-year Climate Change storm event (12-hour storm event with allowance for climate change uplift) by:
- 47.1 Not increasing flooding upstream or downstream along the overland flow paths/flood extents of the Site compared to base case in terms of flood levels and/or flood extents; and
 - 47.2 Providing for flows to the stormwater network that would not result in increased flooding downstream with manholes spilling more than base case in terms of flood levels and/or flood extents.
- 48 Water sensitive design has been adopted for the Site that takes into consideration inter-disciplinary planning and design, protects and enhances the values and functions of natural ecosystems, addresses stormwater effects within the Site and mimics natural processes for stormwater management.
- 49 The public stormwater network within the Site is proposed to be upgraded and includes the following new infrastructure (as illustrated on Drawing 042-RCT_401_C0-300 in Appendix A to the Infrastructure Assessment):
- 49.1 Stormwater bypass: A new stormwater bypass is proposed to control piped flows towards Karori Stream to the north and existing 1200 mm line towards Campbell Street. This bypass is proposed to be installed in open space around the proposed car park area by Building B03, which will have the same invert level as the existing stormwater bypass. Flows will be controlled by the pipe diameters with no orifice or sluice within the stormwater bypass.
 - 49.2 Scapa Terrace line: The line entering the Site from Scapa Terrace is proposed to be upgraded and realigned from an existing diameter of 900 mm to 1500 mm towards the proposed stormwater bypass that will pass under the Building B05 carpark. An 1800 mm diameter scruffy dome is also proposed at the upstream end of this proposed network.
 - 49.3 Donald Street lines: The line downstream of the open channel located within the south-eastern corner of the Site is proposed to be upgraded from the existing 225 mm diameter

⁶ Council Officer's Report, Appendix 12 – Wellington Water Limited – David Wilson, paragraph 18.

to 900 mm circular pipes. In addition, a new 300 mm line (approximately 30 m in length) to service Buildings B01A and B01B will connect into this line. The existing 375 mm line located in the northern part of the Site is to be retained and a new 300 mm line (approximately 60 m in length) will be established to service Buildings B01A and B01B – enabling them to connect into the existing 375 mm line; and

- 49.4 Campbell Street lines: The existing 1200 mm line under proposed Buildings B02 and B03 is proposed to be retained, with a new 1200mm pipe connection from the proposed stormwater bypass. In addition, a new 600 mm pipe along the western boundary will intercept overland flows from Campbell Street via an 1800 mm new scruffy dome located in the south-western corner.
 - 49.5 The existing 1200mm pipe network discharging to the Karori Stream to the north of the Site including the 300 mm diameter orifice along with the existing stormwater bypass is proposed to be realigned and replaced with a 900 mm pipe network.
- 50 The entry points of existing overland flow paths into the Site from Campbell Street, Donald Street and Scapa Terrace and exiting at Karori Stream will remain unchanged at property boundary locations. The overland flows will be managed as follows:
- 50.1 Overland flows from Campbell Street are intercepted by a proposed swale to discharge flows to the proposed stormwater network.
 - 50.2 Overland flows from Scapa Terrace are captured by the proposed scruffy domes and flood storage inlet structures.
 - 50.3 Overland flows from Donald Street continue discharging to the open channel and flows in excess of the channel and downstream infrastructure are conveyed with proposed swale along the southern boundary towards the flood storage device.
 - 50.4 All overland flows within the Site (local runoff) is contained within the open spaces and internal road corridors.
- 51 A flood attenuation device is proposed to provide flood storage within the Site to achieve the stormwater strategy outlined at paragraph 47 above. The flood attenuation device will consist of a 45 m long x 10.5 m wide x 3 m deep detention tank under the car park and courtyard between Buildings B04 and B05 at an invert of 164 mRL. This tank will provide approximate storage of 1,400 m³ with a 3 m wide weir inlet structure and a crest level of 166.4 mRL. The tank will also have a 450 mm outlet pipe at an invert of 164

mRL, allowing the discharge of controlled flows to the stormwater bypass.

- 52 Where a new pipe conveys water from upstream of the Site, the pipe will be vested in the Council. Other pipes that only convey water from the Site and the proposed storage tank, will be owned and maintained by Ryman, as this system does not convey water from a piped system originating offsite.

Stormwater quality effects

- 53 There are currently no regulatory stormwater quality requirements for the Karori catchment in the Operative or Proposed Plan.

- 54 The Proposed Village is expected to generate low levels of stormwater contaminants because:

54.1 There will be low traffic volumes and vehicle speeds within the Site;

54.2 Inert building materials will be selected; and

54.3 The grounds will be maintained by Ryman, including the removal of any debris and litter.

- 55 A BPO has been identified to manage stormwater quality from the Proposed Village. The BPO consists of installing appropriate proprietary treatment devices to provide water quality treatment for roads and uncovered car parks (maximum of 40 car parks spread across the Site) prior to the discharge of stormwater to the receiving environment. Rain gardens are not practicable on this Site, Nevertheless, as detailed in my response to the Officer's Report, I consider proprietary treatment devices that comply with Wellington Water's Water Sensitive Design for Stormwater: Treatment Device Design Guideline can be provided.

- 56 In my opinion, appropriate proprietary treatment devices can be installed to manage quality of stormwater prior to being discharged from the Site to the receiving environment.

Stormwater quantity effects

- 57 The Proposed Village will increase the total impervious area of the Site by approximately 17.5%, which will result in an increase of runoff from the Site.

- 58 I have assessed the changes in flows that will result from the Proposed Village in line with Wellington Water's 'Water Sensitive Design for Stormwater: Treatment Device Design Guideline' in discussion with Wellington Water.

- 59 I used the flood model to run smaller higher frequency rain events. My assessment confirmed that the baseflows to the Karori stream

along the northern boundary of the Site will increase by 0.1 m³/s (from 0.2m³/s to 0.3m³/s) as a result of the proposed upgrades to the stormwater bypass with negligible increase in peak velocities (0.3m/s). All flows are contained with the stream banks.

- 60 This information was provided to Wellington Water in 2020 as part of the Further Information Response. Wellington Water did not suggest any need for retention or detention at that time.
- 61 The harvesting of roof runoff for landscape irrigation will provide hydrological mitigation. The reuse tanks proposed within the Site for irrigation purposes will provide a combined storage of approximately 45 m³. These tanks will perform a retention and detention function. Using the stormwater device sizing tool provided by Auckland Council,⁷ I have confirmed that 43 m³ of retention/detention is sufficient to manage the stormwater quantity effects from the 3200 m² increase in imperviousness within the Site.
- 62 In my opinion, the Proposed Village will not result in adverse water quantity effects in more frequent smaller rainfall events. I address the potential for flooding in larger events below.

Flooding effects

- 63 Wellington Water's flood model for the Karori Stormwater catchment was used for 1D – 2D flood modelling to assess flooding effects of the Proposed Village.
- 64 The predevelopment scenario provided by Wellington Water was updated with more recent stormwater network in the vicinity of the Site in consultation with Wellington Water. The updates included the pipe network, retaining walls, and buildings on slab that would affect overland flow paths and topographical survey information within the Site.
- 65 In order to assess the potential flooding effects from the Proposed Village, I undertook flood modelling as follows:
- 65.1 The post-development scenario was developed based on the updated predevelopment model in consultation with Wellington Water with the proposed terrain/landform and land use changes proposed within the Site.
- 65.2 The pre and post development models were simulated for the 10-year and 100-year *ARI* with climate change storm events, as agreed with Wellington Water.

⁷ I explain in my response to the Officer's Report why this tool is considered to be appropriate in the absence of any similar tool for Wellington.

- 65.3 An additional blockage scenario was modelled assuming 50% of inlets to the flood attenuation device are blocked to understand flood risk to upstream properties and revise inlet design to avoid any increases to upstream properties as a result of blockage.
- 65.4 The flood modelling assumed that flood storage of 1,400 m³ would be provided within the Site.
- 66 Further details on the modelling inputs and approach are set out in Section 3.4 of the Infrastructure Report.
- 67 Based on the flood modelling, I conclude that:
- 67.1 There is no flood risk to the Proposed Village within the Site for all the scenarios modelled;
- 67.2 The Proposed Village does not increase flood risk to properties upstream or downstream of the Site for all the scenarios modelled (i.e., there are no increased water levels or flood extents in neighbouring properties) and a decrease in flood risk is observed at some properties. The Proposed Village stormwater solution provides significant benefits for properties along Donald Street, Campbell Street and Scapa Terrace and minor improvements at Campbell Street properties in terms of flood risk; and
- 67.3 The Proposed Village will not increase flood risk to offsite infrastructure, such as culverts, bridges, roads and reserves.
- 68 The modelling confirms that flood storage of approximately 1,275 m³ ensures there will be no increase in flood risk to properties upstream and downstream of the Proposed Village in the 100-year ARI with a climate change 12-hour duration storm event. However, the volume of the proposed tank is 1,400 m³, which exceeds the flood storage required to achieve hydraulic neutrality.
- 69 Accordingly, I consider the Proposed Village will not result in any offsite adverse flooding effects.

WASTEWATER

Existing infrastructure

- 70 The Wellington City Council GIS shows the following existing gravity sewer infrastructure within the Site, as shown in Figure 2.



Figure 2: Existing wastewater network

- 71 There are a total of four wastewater pipes traversing through the Site, being:
- 71.1 A 150 mm diameter gravity line (pipeline 1) from Donald Street at the northeast corner of the Site;
 - 71.2 A 225 mm/300 mm pipe (pipeline 2) that runs from Donald Street at the southeast corner of the Site and discharges to a sewer main on Campbell Street;
 - 71.3 A 150 mm pipe (pipeline 3) that enters the Site from the south; and
 - 71.4 A 150 mm pipe (pipeline 4) that initiates within the Site and previously serviced the former Teachers' College buildings within the Site.
- 72 In addition to the above public pipelines, there are various wastewater pipes that discharge to pipeline 1. These pipes service some neighbouring sites (and used to service the, now demolished, former Teachers' College buildings within the Site).

Proposed infrastructure

- 73 The existing wastewater network will be realigned within the Site as necessary to accommodate the Proposed Village buildings and other underground infrastructure.
- 74 There is no feasible option to divert pipeline 1 around Building B01A, and therefore the line will be lowered to avoid the foundations of this building. This approach is an improvement over the previous scenario, where the line passed under two former Teachers' College buildings. Pipeline 1 will otherwise be realigned around Building B01B.
- 75 Pipeline 2 will be realigned through the Site to avoid buildings, underground infrastructure and retaining walls. This realignment will require a new connection to the sewer main on Campbell Street at a new manhole. The top section of this existing pipe is shown on the GIS as 250 mm diameter. As this as a non-standard size for PVC pipe, a 300 mm diameter pipe will be provided through to Donald Street.
- 76 Pipeline 3 will be realigned to avoid Building B04 and will pass below the proposed undercroft carpark with a courtyard above. This approach is the best practical solution to avoid the proposed building. This pipe must cross above a 1500 mm stormwater pipe. To achieve this crossing, the pipe must be laid at a grade flatter than what is allowable for a 150 mm pipe in the Wellington Water Regional Standard for Water Services. Accordingly, the diameter of this pipe will be increased to 225 mm so that it can be laid at a flatter grade of 0.69% in accordance with the Regional Standards.
- 77 Pipeline 4 will be surplus to requirements and will be abandoned or removed.
- 78 Private wastewater lines will be constructed within the Site as required to service the new Proposed Village.
- 79 Ryman have collected historic information on occupancy rates and sewer loads from its retirement villages. This information has been used in calculating wastewater design loading for this Site. This information has been shared with Wellington Water as part of the Further Information Response. Domestic sewer loads are based on average 160 litres/resident/day, with a peaking factor of 3. The loads and peaking factor have been accepted by Wellington Water.⁸
- 80 Wellington Water provided flow data from its Karori Wastewater Treatment Plant 2017 (current) model for the 1-year Long Time Series (*LTS*) design event. The data provided included peak flows

⁸ Council Officer's Report, Appendix 12 – Wellington Water Limited – David Wilson, paragraph 37-38.

from the former Teachers' College buildings on the Site, as well as those entering the Site from the upstream network. The peak wet weather flow for the Teachers' College was 5.08 l/s which is considerably higher than peak wet weather flow calculated for the Proposed Village of 2.0 l/s. The Proposed Village will therefore have less demand on the downstream network compared to the previous use of the Site.

- 81 In addition, the Peak Wet Weather Flow for the Proposed Village was calculated to be 3.1 l/s (using Peak Dry Weather Flow (*PDWF*) with a peaking factor of 2.5 and Inflow & Infiltration (*I&I*) of 0.55 l/s/km for the new network proposed within the Site based on Regional Standard for Water Services (*RSWS*)). These flows are below the peak flow allowances within the Wellington Water model for the Site.
- 82 Accordingly, I consider there is no need to provide wastewater storage onsite.
- 83 The realigned gravity pipelines have the capacity to convey the peak wet weather flows from the upstream catchment as well as the Proposed Village to meet the requirements of Wellington Water.
- 84 Overall, in my opinion, there is sufficient capacity in the local wastewater network to accommodate the Proposed Village.

WATER SUPPLY

Existing infrastructure

- 85 Wellington City Council's GIS shows no public water mains within the Site. There is a 150 mm main located on Donald Street and a 100 mm main located on Campbell Street. There is also an existing 100 mm private connection into the Site from Campbell Street (opposite 34 Campbell Street) and a 100 mm private connection into the Site from the Donald Street main (opposite 33 Donald Street).

Proposed infrastructure

- 86 I understand that the establishment of water connections for the Proposed Village is a permitted activity under the Operative Wellington City District Plan.
- 87 It is proposed to provide two new connections to the Site from the 150 mm main on Donald Street. The first connection will provide the potable supply and supply the fire hydrants within the Site. The second connection will be a dedicated supply for fire protection sprinklers.
- 88 Both connections will be provided with backflow preventors near the Donald Street boundary and all reticulation within the Site will be privately owned by Ryman.

- 89 Ryman have collected historic information on occupancy rates and water demands from its retirement villages. This information has been used in calculating water demands for this Site. This information has been shared with Wellington Water in the Further Information Response. Domestic water requirements are 200 litres / resident / day. Comprehensive care retirement villages have a more even demand graph, than that of typical residential demands, with peak demand periods later in the morning and earlier in the evening. For on-site pipeline design, a peaking factor of 3 has been applied. The demands and peaking factor have been accepted by Wellington Water.⁹
- 90 Modelling has been undertaken using EPANET to confirm that the proposed infrastructure solution will meet the flow and pressure requirements for this Site. Pressure and flow testing on fire hydrants along Donald Street adjacent to the Site were carried out in July 2019 to support the water supply assessment.
- 91 Overall, in my opinion, there is sufficient capacity in the water supply network to accommodate the Proposed Village.
- 92 Firefighting water supply requirements have been determined in accordance with SNZ PAS 4509:2008. Each building block within the Proposed Village will be sprinkler protected. Separate mains will be installed for the sprinkler and potable demand. A 180OD PE100 PN16 (146 mm ID) pipe for each of the potable and sprinkler mains is sufficient to meet minimum pressure requirements during fire flow / sprinkler demand. The proposed water reticulation meets the required standards noted in Regional Standard for Water Services (Nov 2021) for minimum residential pressures and maximum pipe head losses. Accordingly, I consider compliance with SNZ PAS 4509:2008 for firefighting water supply requirements is achieved.

ELECTRICAL, GAS AND COMMUNICATIONS

- 93 I understand the establishment of electricity, gas and telecommunications connections for the Proposed Village is a permitted activity. For completeness, I note that the Proposed Village will be serviced from existing electricity, gas and communications services in the surrounding streets. The relevant utility providers have indicated there is sufficient capacity to accommodate the Proposed Village.

⁹ Council Officer's Report, Appendix 12 – Wellington Water Limited – David Wilson, paragraph 54.

RESPONSES TO SUBMISSIONS

- 94 I have reviewed all the submissions and have responded to the infrastructure-related issues raised by submitters below.
- 95 A number of submitters¹⁰ highlight capacity issues with the current three waters network in the vicinity of the Site. Capacity assessments have been completed in discussion with Wellington Water, which have confirmed that the Site can be serviced by the existing reticulation network outside of the Site and proposed upgrades within the Site. The Wellington Water evidence confirms there is capacity to service the Proposed Village.
- 96 Some submitters raised concerns about stormwater quality.¹¹ The proposed upgrades will provide for water quality treatment of high contaminants generating surfaces prior to the discharge of stormwater to the Karori Stream, hence improving the stream health.
- 97 Some submitters raised concerns about the data used in the Infrastructure Report.¹² The data has been reviewed and accepted by Wellington Water's Chief Advisor for Wastewater, as confirmed in the evidence of Mr Wilson.
- 98 Some submitters raised concerns about stormwater and flooding effects.¹³ I consider appropriate stormwater management and flood management has been proposed for the Site. Base flows to the Karori Stream will be maintained (ie no lowering of flows) with hydrological mitigation provided through the harvesting of roof runoff for landscape irrigation. With the proposed stormwater solution, a number of neighbouring properties will benefit from reduced flooding in the 10-year and 100-year storm events (including climate change considerations).
- 99 The stormwater attenuation device has been designed with storage of 1,400 m³ which is in excess of the required volume of 1,275 m³. This storage volume also exceeds the storage available within the Site in the existing situation. Accordingly, the Proposed Village will reduce flood risk to neighbouring properties on Donald Street, Campbell Street and Scapa Terrace. In addition, the inlet structure

¹⁰ Submission 1 (Hu), 21 (Marshall), 22 (Powell), 36 (Finny), 39 (McArdle), 43 (Wallace), 50 (van Amelsfort), 65 (Responsible Development Karori), 73 (King), 46 (Mattlin), 55 (Eyles), 63 (Jacomb) and 49 (Gestro).

¹¹ Submission 36 (Finny).

¹² Submission 43 (Wallace), 56 (Cooper), 49 (Gestro), 50 (van Amelsfort), 65 (Responsible Development Karori) and 72 (Ingham).

¹³ Submission 40 (Minson), 49 (Gestro), 57 (Leikis & Porter), 58 (Moran), 60 (Sprott), 66 (Jupp), 36 (Finny), 45 (Hamilton) and 49 (Gestro).

designed is oversized for 50% blockage to avoid any effects on upstream properties on Scapa Terrace.

- 100 The flooding benefits can be seen in the following flood modelling outputs showing water level differences (afflux plots) between the post-development and pre-development scenarios for the 10-year and 100-year events with climate change:

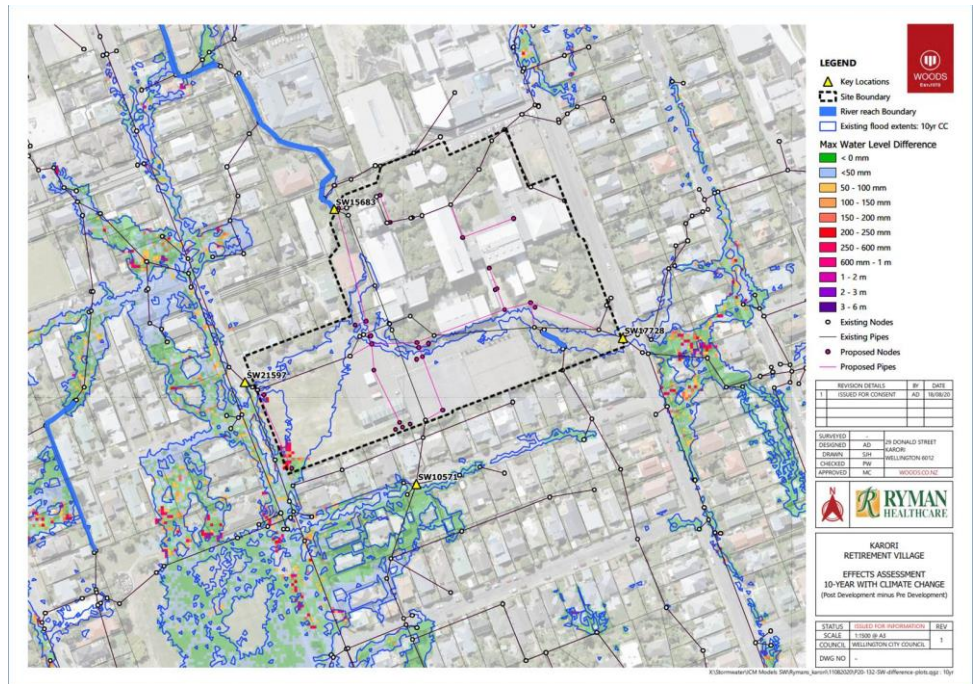


Figure 3 – Water level difference in the 10-year event with climate change

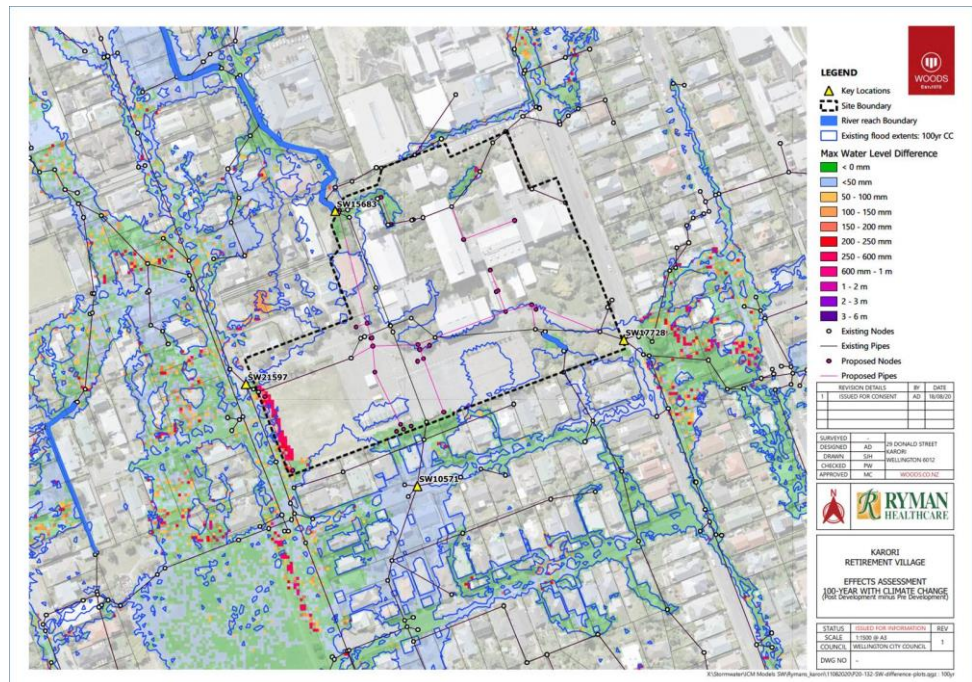


Figure 4 – Water level difference in the 100-year event with climate change

- 101 In response to the submission from Fire and Emergency New Zealand¹⁴ (FENZ), I can confirm that the network has sufficient capacity for firefighting purposes. The firefighting water supply requirements are defined by NZS PAS 4509:2008. The Infrastructure Report confirms these requirements will be met and the evidence of Mr Wilson confirms this assessment. In my experience the details of firefighting water supply are covered in future processes, especially the Building Consent process. The Statement of Evidence of Mr Brady Cosgrove addresses other elements of the FENZ submission.
- 102 One submitter¹⁵ says the Infrastructure Report refers to an out-of-date version of the RSWS. The Infrastructure Report was prepared based on the specifications and guidelines available at the time of writing. I address the RSWS 2021 in my response to the Officer’s Report below.
- 103 One submitter¹⁶ says that modelling a 1 in 100-year event is too conservative given climate change. In accordance with normal practice, the rainfall events (frequency, duration) and climate change considerations included in the modelling were based on

¹⁴ Submission 51 (FENZ).

¹⁵ Submission 55 (Eyles).

¹⁶ Submission 75 (King).

published guidelines and discussed and agreed with Wellington Water.

RESPONSE TO COUNCIL OFFICER'S REPORT

- 104 I agree with Mr Wilson that the RSWS 2019 has been superseded by the RSWS 2021 and the latter document will apply to any engineering approval and public drainage permit processes.¹⁷

Stormwater quality

- 105 The Further Information Response provided details of the proposed proprietary treatment devices (Stormwater 360 EnviroPod or similar). Wellington Water raised no issues with the proposed devices at that time. The evidence of Mr Wilson however says the proposed devices will not provide the level of treatment required.¹⁸ I have considered options to achieve compliance with Wellington Water's Water Sensitive Design for Stormwater: Treatment Device Design Guideline. Raingardens are not feasible for the Site due to the high groundwater table, slope constraints, topography and space constraints. Proprietary devices that meet the requirements of the Guideline can however be provided (Stormwater 360 StormFilter or similar).

Stormwater quantity

- 106 The evidence of Mr Wilson acknowledges that hydrological mitigation is required to address the increase in impervious area resulting from the development of the Proposed Village. He acknowledges the harvesting of roof runoff for landscape irrigation will provide hydrological mitigation, but notes that an assessment of the reduction in runoff frequency and volume has not been provided.¹⁹
- 107 I have calculated the required retention/detention volume using stormwater device sizing tool provided by Auckland Council in the absence of any tool made available by Wellington Water. I consider this tool is appropriate because it provides indicative sizing for designing devices to mitigate stormwater volumes based on Unitary Plan rules for Auckland as well as Wellington Water's Water Sensitive Design for Stormwater: Treatment Device Design Guideline.
- 108 Using that tool, I have determined that a 43 m³ retention/detention volume would be sufficient to manage effects associated with the 3,200 m² increase in impervious area within the Site. Accordingly, I

¹⁷ Council Officer's Report, Appendix 12 – Wellington Water Limited – David Wilson, paragraph 11.

¹⁸ Council Officer's Report, Appendix 12 – Wellington Water Limited – David Wilson, paragraph 31.

¹⁹ Council Officer's Report, Appendix 12 – Wellington Water Limited – David Wilson, paragraph 32.

consider the proposed reuse tanks (which have a combined storage of approximately 45 m³) will provide adequate hydrological mitigation for the Site.

Public pipes under buildings

- 109 I agree with Mr Wilson that the RSWS 2021 requires alternatives to building in close proximity to public pipes to be considered. However, the pipes that are proposed to pass in proximity to or under the Proposed Village buildings have already gone through a robust optioneering process, which Wellington Water has been involved in. The current proposal is the preferred alternative. Accordingly, I consider it is unnecessary to require another assessment of alternatives at the Engineering Approval phase, which will create uncertainty.

RESPONSE TO DRAFT CONDITIONS

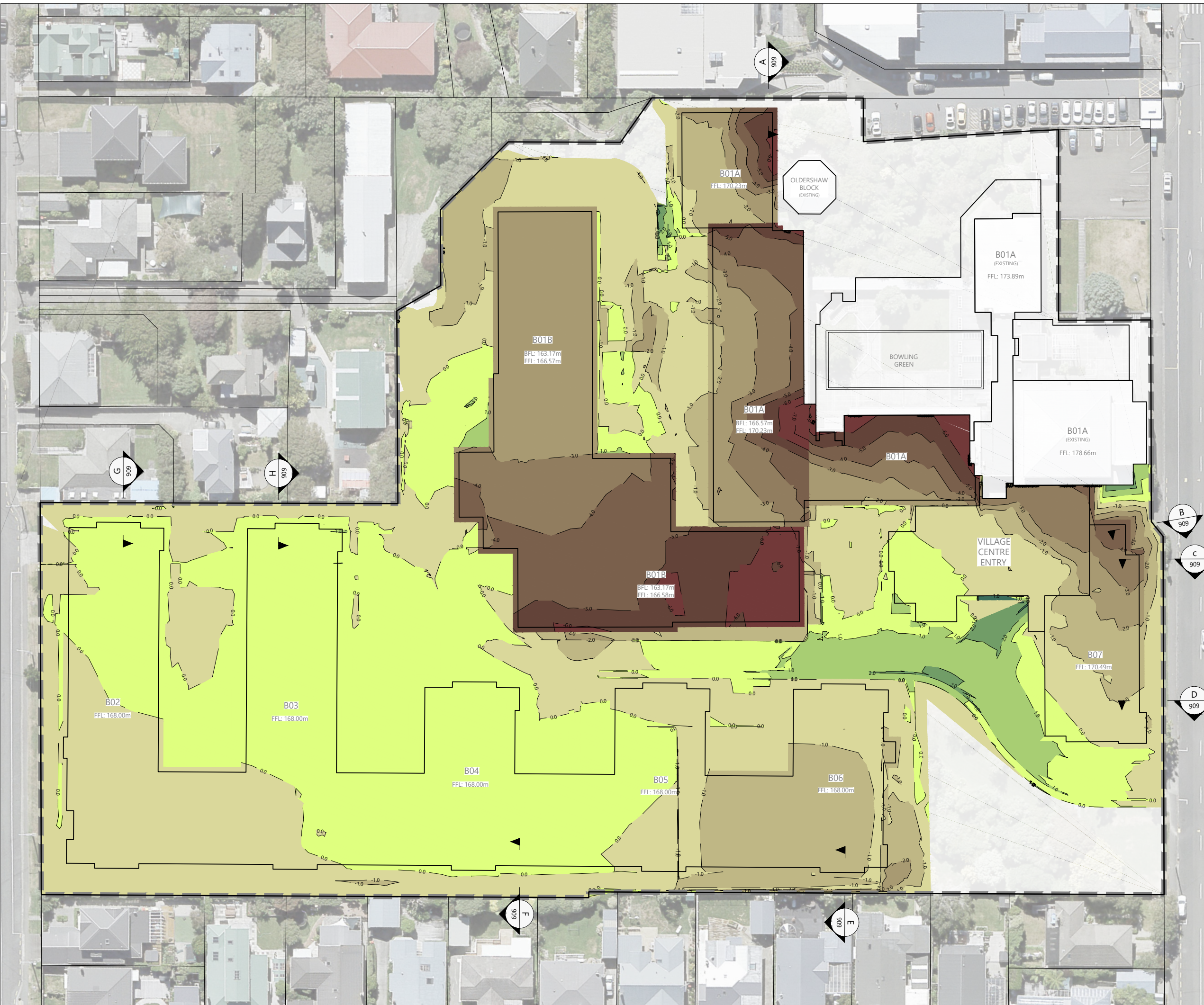
- 110 I provide the following comments on the Council's draft conditions (based on the reasons set out in my evidence above). I consider that:
- 110.1 Draft Conditions 70 and 72 need to accurately acknowledge the stormwater strategy agreed with Wellington Water (see paragraph 47 above);
 - 110.2 Draft Condition 73 needs to be amended to apply to uncovered carpark areas only, as there is no runoff from covered carpark areas;
 - 110.3 Draft Condition 74 needs to be amended to refer to proprietary devices that I have specified, as rain gardens are not a practicable option for the Site; and
 - 110.4 Draft Condition 80 needs to be amended to remove the requirement to assess alternatives, as the optioneering process has already been completed;
 - 110.5 Proposed Condition 82 needs to be amended to delete the reference to the Code of Practice for Land Development, as that document relates to infrastructure that will be vested in Council rather than firefighting requirements.

CONCLUSION

- 111 I conclude that there are no civil engineering issues that would preclude the granting of consent for the Proposed Village on the basis of the conditions discussed in this evidence.

Ajay Anilrao Desai
29 August 2022

APPENDIX A: CUT AND FILL PLAN



LEGEND

STAGE BOUNDARY:

PROPOSED BOUNDARY:

EXISTING BOUNDARY:

CUT/FILL DEPTH CONTOUR (0.5m INTERVAL):

CUT HATCH	FILL HATCH
>6.0m	0.0 to 1.0m
5.0 to 6.0m	1.0 to 2.0m
4.0 to 5.0m	2.0 to 3.0m
3.0 to 4.0m	3.0 to 4.0m
2.0 to 3.0m	>4.0m
1.0 to 2.0m	
0.0 to 1.0m	

DEPTHS SHOWN ARE BETWEEN THE EXISTING SURFACE AND THE FINAL SUBGRADE SURFACE

ASSUMPTIONS:
 ROAD PAVEMENT: 350mm
 FOUNDATION DEPTH: VARIES BETWEEN 700-1300mm
 OTHER AREAS: 300mm

- NOTES**
- SURVEY INFORMATION SUPPLIED BY AURECON:
 LEVELS IN TERMS OF WELLINGTON 1953 DATUM (MSL)
 SITE BENCHMARK IR2, RL=166.85
 COORDINATES IN TERMS OF NZGD 2000 WELLINGTON CIRCUIT
 ORIGIN - SS 17K24 50 30955
 801579.521mN
 396967.337mE
 - ALL WORKS AND MATERIALS TO COMPLY WITH THE WCC STANDARDS, NZBC AND WOODS SPECIFICATIONS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS SHALL BE REPORTED TO THE ENGINEER FOR CLARIFICATION.
 - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND PROTECT EXISTING SERVICES DURING WORKS.

REVISION DETAILS	BY	DATE
1 ISSUED FOR CONSENT	WMV	14/08/20
2 DEPTH CONTOURS UPDATED	JLS	27/10/20
3 FOUND' DEPTHS REVISED	JLS	28/06/22

SURVEYED	-	29 DONALD STREET
DESIGNED	JLS	KARORI
DRAWN	JLS	WELLINGTON 6012
CHECKED	MC	
APPROVED	MC	WOODS.CO.NZ

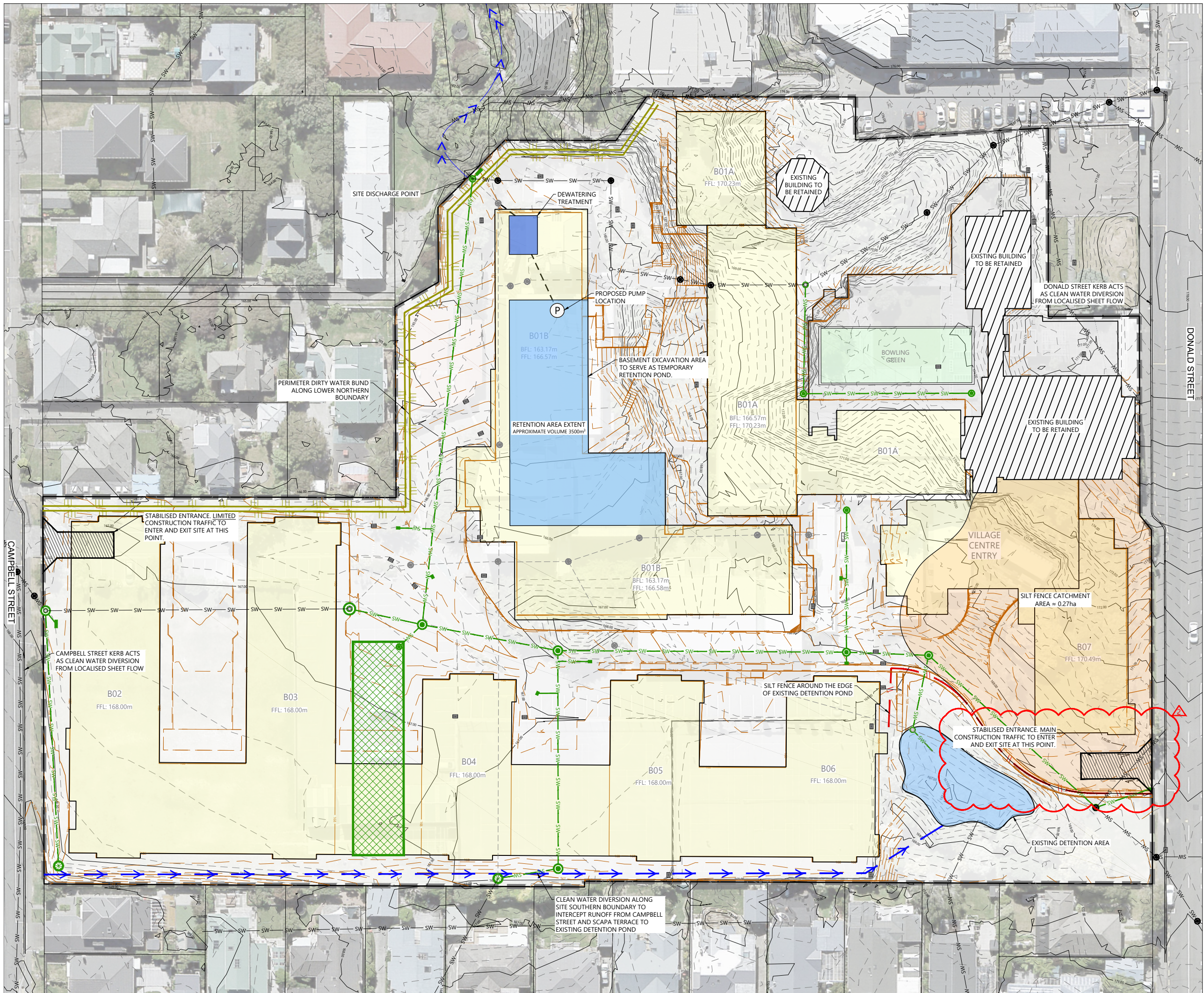


KARORI RETIREMENT VILLAGE

DEPTH (CUT/FILL) CONTOUR PLAN

STATUS	ISSUED FOR CONSENT	REV
SCALE	1:750 @ A3	3
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C0-120	

APPENDIX B: EROSION AND SEDIMENT CONTROL PLAN



LEGEND

- SITE BOUNDARY
- EXISTING BOUNDARY
- EXISTING CONTOURS MAJOR (1.0m INTERVAL) 8.0
- EXISTING CONTOURS MINOR (0.25m INTERVAL)
- PROPOSED CONTOURS MAJOR (1.0m INTERVAL) 8.0
- PROPOSED CONTOURS MINOR (0.25m INTERVAL)
- EARTH BUND
- EXISTING STREAM
- CLEAN WATER DIVERSION
- SILT FENCE
- PROPOSED STORMWATER NETWORK
- EXISTING STORMWATER TO REMAIN
- EXISTING STORMWATER TO BE REMOVED
- PROPOSED SITE STABILISED ACCESS

NOTES

1. SURVEY INFORMATION SUPPLIED BY AURECON:
 LEVELS IN TERMS OF WELLINGTON 1953 DATUM (MSL)
 SITE BENCHMARK IR2, RL=166.85
 COORDINATES IN TERMS OF NZGD 2000 WELLINGTON CIRCUIT
 ORIGIN - SS 17K24 SO 30955
 801579.521mN
 396967.337mE

EROSION AND SEDIMENT CONTROL

1. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE CONSTRUCTED IN ACCORDANCE WITH GWRC EROSION & SEDIMENT CONTROL GUIDELINES.

REVISION DETAILS	BY	DATE
1 ISSUED FOR CONSENT	WMV	14/08/20
2 STABILISED ENTRANCE ADDED	JLS	11/08/22

SURVEYED	-	29 DONALD STREET
DESIGNED	JLS	KARORI
DRAWN	WMV	WELLINGTON 6012
CHECKED	MC	
APPROVED	MC	WOODS.CO.NZ

**KARORI
RETIREMENT VILLAGE**

**EROSION & SEDIMENT
CONTROL PLAN**

STATUS	ISSUED FOR CONSENT	REV
SCALE	1:750 @ A3	2
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C0-180	