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APPENDIX D

Infrastructure Assessment Report - Woods

INFRASTRUCTURE ASSESSMENT REPORT

Proposed Comprehensive Care Retirement Village

26 Donald Street and 37 Campbell Street, Karori, Wellington

Ryman Healthcare Limited

For Resource Consent

Document Control

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1. Introduction

Ryman Healthcare Limited (*Ryman*) is seeking resource consents to construct and operate a comprehensive care retirement village (*Proposed Village*) at 26 Donald Street and 37 Campbell Street, Karori, Wellington (*Site*).

This report details the proposed civil engineering works for the construction and operation of the Proposed Village and assesses the environmental effects of those works.

Preliminary design drawings for road access, earthworks, stormwater, water supply, wastewater and utilities are provided in Appendix A. The drawings are provided to illustrate the proposed concept designs to service the Proposed Village and to demonstrate that it can be adequately serviced to the requirements of Wellington City Council (WCC). Detailed engineering designs will be provided to WCC for approval with building consent applications following the resource consent process.

1.1. Proposed Village

A full description of the Proposed Village is contained in the Assessment of Environmental Effects. In summary, the Proposed Village will consist of the following buildings (see Figure 1):

a) Building B01A: Village Centre and Apartments. Building B01A will integrate the existing Tennant Block and Allen Ward VC Hall Buildings.

b) Building B01B: Care, Assisted Living Suites (ALS) and Apartments.

c) Buildings B02 – B07: Apartments.

d) Existing Oldershaw Octagon: Ryman use.

The Proposed Village will provide 180 apartments, 68 ALS and 60 care beds. It will also provide 230 car parking spaces.

Figure 1 Proposed Village site plan

1.2. Site Description

The Site is approximately 3.05 hectares in size, irregular in shape and varying in topography. The Site was previously the Victoria University Teachers' College which included many multi-storey buildings, most of which have now been demolished to make way for the Proposed Village.

The Site has road frontage to Campbell Street to the west and Donald Street to the east. The surrounding neighbourhood has a predominantly residential character. Development adjoining the southern boundary of the Site, and to the east of Donald Street, consists mostly of single and two storey detached dwellings. Whilst development to the west of Campbell Street is predominantly residential with single and two storey detached dwellings, there are also childcare / kindergarten businesses, including Karori Kids Inc which is located at 29 Campbell Street and adjoins the western boundary of the Site. Directly to the north of the Site is Karori Normal School and the Karori Swimming Pool complex.

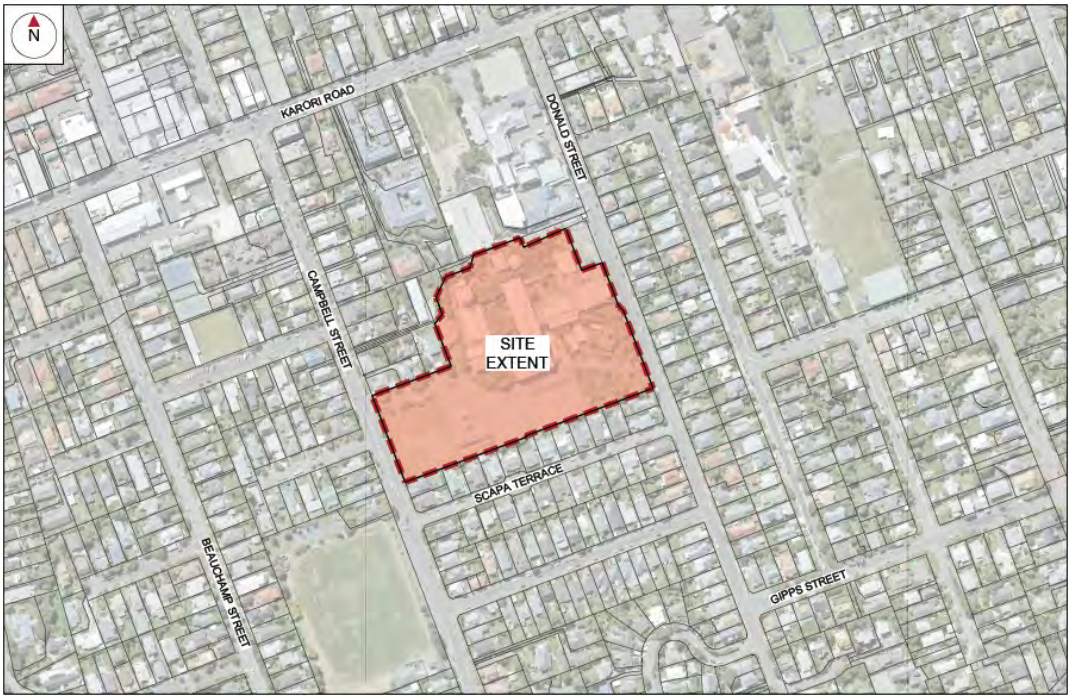


Figure 2 Site location plan

The ground levels range from 165m to 177m, with the highest point on the northeast of the Site and the lowest on the northwest. A small gully is present in the north eastern corner of the Site. There are existing public stormwater and wastewater pipe networks that cross the Site.

1.3. Planning Context

The construction and operation of the Proposed Village application is, overall, a non-complying activity under the Wellington District Plan ('District Plan'). Accordingly, this report assesses any actual and potential civil design effects of the Proposed Village.

This report has also taken into account the District Plan objectives, policies and rules relevant to civil design effects. Resource consent is also required for the Proposed Village earthworks under Rule 30.2.1 as the works will not comply with the permitted activity standards in Rule 30.1.1 (which limit works to an area of 250 m2). The matters of discretion for this rule are:

- Earthworks stability;
- Erosion, dust and sediment control;
- Visual amenity; and
- The transport of material where a volume of 200 m3 will be exceeded.

The relevant District Plan objectives and policies seek the following outcomes:

- Policy 29.2.1.1: The design and assessment of earthworks is coordinated with the proposed future development of the Site;
- Policies 29.2.1.3 and 29.2.1.4: Earthworks are designed to minimise the risk of instability, erosion, and the movement of dust and sediment beyond the area of work; and
- Policy 29.2.1.11: The transport of earth or construction fill material, to and from a site, is undertaken in a way that is safe and minimises adverse effects on surrounding amenity and the roading network.

The construction and operation of the Proposed Village application is, overall, a discretionary activity under the Regional Soil Plan, Regional Plan for Discharges to Land, and Regional Freshwater Plan ('Operative Plans') and Wellington Proposed Natural Resources Plan ('Proposed Plan'). Accordingly, this report assesses any actual and potential civil design effects of the Proposed Village.

This report has also taken into account the Regional Plan objectives, policies and rules relevant to civil design effects. Resource consent is required for the discharge of sediment from earthworks as the earthworks will exceed a total area of 3,000m^2 (Rule 101 of the Proposed Plan).

The relevant Regional Plan objectives and policies seek the following outcomes:

- Objective O44: The adverse effects of soil and water from land use activities are minimised;
- Objective O46: The runoff or leaching of contaminants to water from discharges to land is minimised;
- Objective O47: The amount of sediment-laden runoff entering water is minimised;
- Objective O48: The adverse quality and quantity effects of stormwater discharges from stormwater networks and urban land uses are improved over time.

1.4. References

The following reference documents have been considered in preparing this report:

- Wellington Water - Regional Specification for water services: May 2019 Version 2.0
- Wellington Water - Regional Standard for water services: May 2019 Version 2.0
- Wellington City Council - Water Sensitive Urban design - not dated
- Greater Wellington Regional Council - Erosion and Sediment Control Guidelines for the Wellington Region June 2006
- SNZ PAS 4509:2008 - New Zealand Fire Service firefighting water supplies code of practice: July 2008
- NZS 4541:2020 - Automatic fire sprinkler systems: May 2020
- Wellington Water - Reference Guide for Design Storm Hydrology; April 2019
- Wellington Water - Quick Reference Guide for Design Storm Hydrology, February 2016
- Wellington Water - Reference Guide for Design Storm Hydrology; April 2019
- Wellington Water - Quick Reference Guide for Design Storm Hydrology, February 2016

The following assessments have been reviewed in preparing this report:

- Tonkin + Taylor – Assessment of Geotechnical Effects, Care Retirement Village, 26 Donald Street and 37 Campbell Street, Karori, Wellington: Version 4, August 2020
- Tonkin + Taylor - Ground Contamination Assessment of Environmental Effects - Ryman Village, Karori, Wellington: Version 3, August 2020

2. Earthworks

2.1. Proposed Earthworks

Earthworks are required to excavate basements, foundations, and water storage tank and to install underground services and form road subgrades. From our preliminary design, we estimate earthworks volumes of 37,000m^3 of cut and 2,500m^3 of fill. The earthworks will be required over approximately 2.5ha of the Site. The earthworks operation will generate a surplus of material estimated at 34,500m^3 that will be removed from the Site to an appropriate facility. The proposed earthworks mainly consist of excavations to allow the building construction.

2.2. Geotechnical Investigation

Tonkin + Taylor have carried out a site-specific geotechnical investigation and have described the Site geological profile as follows:

- 0 to 0.5 m of fill;
- Interbedded alluvial soils on the lower elevations (up a depth of 9.5m) and outwash fan deposits on the elevated slopes;
- Greywacke bedrock at depths ranging from 5 to greater than 29m.

Groundwater levels were monitored at three locations across the Site and ranged from 1.1 to 3.5 m below ground level.

The Tonkin + Taylor Geotechnical report addresses specific construction methodology issues for the Proposed Village.

2.3. Contamination Assessment

The Tonkin + Taylor Ground Contamination Assessment sets out recommendations relating to ground contamination on the Site.

2.4. Earthworks Construction Methodology & Environment Management

2.4.1. Construction Methodology & Staging

The construction works on the Site will be managed to ensure potential dust, sediment and erosion environmental effects will be effectively mitigated. This management will include staging the construction, progressive stabilisation and employing appropriate erosion and sediment control measures. The construction staging will be confirmed in consultation with Ryman during the detailed design phase.

The erosion and sediment control measures will be designed, installed, maintained and decommissioned in accordance with Greater Wellington Regional Council (GWRC) - *Erosion and Sediment Control Guidelines for the Wellington Region* (2006). The below sections outline the general measures that are expected to be implemented as part of this project. Once a construction methodology is confirmed, an Erosion and Sediment Management Plan (ESMP) will be prepared, which will include details of the erosion and sediment measures to be implemented. The ESMP will be provided to Council for approval prior to commencing construction.

2.4.2. Erosion and Sediment Control

Erosion and sediment control measures to be employed on the Site are depicted on Woods Erosion and Sediment Control Plan 042-RCT_401_C0-180. The silt control measures will be implemented before commencing earthworks and will remain in place until the catchment is stabilised.

The proposed measures include:

- Stabilised entrance – the construction site access will be via the existing driveway to Campbell Street. There is an existing sealed driveway into the Site that will be utilised for as long as possible. Truck routes, turning areas and laydown areas will be hard filled to minimise soil being tracked offsite;
- Progressive stabilisation and staging of works to minimise open areas;
- Maintaining existing stormwater pipe network through the Site to convey clean water and utilise clean water diversions as necessary to direct clean water to these systems;
- Bunds and channels to control and direct dirty water to storage and treatment areas. A bund will be formed on the downslope areas of the Site to avoid uncontrolled discharge of dirty water to neighbouring properties;
- Silt fences in the area shown on the plan;
- Utilising the Building B01B basement excavation area as temporary stormwater retention area (3,500m^3);
- Dewatering treatment using a lamella clarifier or dewatering container for groundwater and surface water from excavations;
- Protection of drainage networks to avoid unclean water entering these systems.

2.4.3. Dust Control

The proposed works on Site have the potential to generate dust that may be regarded as nuisance to surrounding neighbours. Aspects of the works that may generate dust are;

- Topsoil stripping and stockpiling;
- Excavating, spreading and compaction of soil;
- Loading and unloading trucks and equipment;
- The movement of vehicles across areas of the Site that have been exposed, including stabilised access tracks, and haul roads between earthworks operations;
- Wind blowing across the Site picking up stockpile material and other exposed surfaces.

If wind conditions are such that dust cannot be controlled within the Site, then any works that generate dust will be stopped and additional resources assigned to dust control activities until the dust is brought under control.

Dust control using water can either be by 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.

2.4.4. Refuelling Protocol and Spill Procedures

All machinery on the Site shall be refuelled and any maintenance works undertaken, in such a manner as to prevent contamination of land and water. This will mean refuelling activities to be undertaken in defined areas that are protected by bunds. Spill kits shall be available onsite at all times. If a spill of 20 litres of fuel or other hazardous substance occurs, the contractor shall immediately notify the engineer and Council's environmental officer.

2.5.Monitoring & Maintenance

For the ESCP to be effective, monitoring and maintenance is an integral component.

All measures should be checked daily, with any remedial actions completed as soon as practicable, but within 24 hours. The devices should be inspected prior to any expected rainfall event and after any major

rainfall event (greater than 50mm in 24 hour period). Any problems shall be rectified within 24 hours. The consent holder shall keep a record of all inspections, problems encountered, remedial actions and complaints and responses. The records should be held onsite and made available to Council Compliance Officers if requested.

Additional inspections by the consent holder will be required following installation and prior to decommissioning of major sediment control devices.

During an extreme rainfall event, works shall cease apart from emergency works relating to controlling stormwater and sediment flows. The consent holder is required to have appropriate sediment control equipment including erosion protection matting and batter covers onsite to be used to minimise sedimentation problems from areas of exposed soil.

2.6. Conclusion

By implementing best practice environmental controls in accordance with GWRC Erosion and Sediment Control Guidelines for the Wellington Region, the environmental effects in terms of dust, sediment and erosion can be effectively mitigated.

3. Stormwater

3.1. Existing Stormwater Network

The Wellington City Council GIS and the Karori Stormwater model provided by Wellington Water shows the following existing public stormwater infrastructure within the Site and is shown in Figure 3.

Figure 3 Existing stormwater network from WCC GIS

The existing infrastructure consists of:

- A 900mm line entering the Site from Scapa Terrace traversing northwards
- A 600mm line entering the Site from Donald Street traversing westwards towards the stream (WCC_SWCH001684) along the northern boundary
- A 375mm line entering the Site from Donald Street traversing westwards
- A 1200mm line exiting the Site towards Campbell Street traversing westwards
- A 1200mm line exiting the Site to the stream (WCC_SWCH001684) along the northern boundary
- A short section of stormwater open channel (WCC_SWCH001695) located in the open space along south eastern corner
- A Parkvale / Campbell Stormwater Bypass (ID: SW03779) located off private road within the Site

The existing site stormwater enters the public stormwater network via two routes, primary flows within local private pipes and overland flows with sumps.

3.2. Proposed Stormwater Infrastructure

3.2.1. Primary Stormwater System

The public stormwater network within the Site will be upgraded as detailed below. The proposed reticulation system within the Site is shown on Woods Stormwater Drainage Layout Plan 042-RCT_401_C0-300 in Appendix A.

- Stormwater Bypass:
  - A new Stormwater Bypass located in open space around the proposed car park area with the same invert level as the existing Stormwater Bypass and flows controlled with pipe diameters with no sluice or orifice plates.
- Scapa Terrace line:
  - Pipes from Scapa Terrace to be upgraded from existing 900mm to 1500mm towards the proposed Stormwater Bypass. This line will pass under carpark with courtyard above.
  - First upstream manhole to have a 1800mm diameter scruffy dome.
- Donald Street:
  - Pipes downstream of the stormwater open channel located within the south eastern corner of the Site will be upgraded from existing 225mm to 900mm circular pipes towards the proposed 1500mm pipe discharging to the proposed Stormwater Bypass; a new 300mm line (approximately 30 m) to service the proposed buildings in the northern part of the Site will connect into this line.
  - The existing 375mm line located in the northern part of the Site is to be retained; a new 300mm line (approximately 60 m) to service the proposed buildings located on the northern part of the Site will connect into this existing line.
- Campbell Street:
  - The existing 1200mm pipe (WCC_SWP044508) is proposed to be retained with a new 1200mm pipe (bypass to Campbell Street) connection between this existing pipe and Stormwater Bypass. The existing 1200mm pipe will be located under proposed buildings B02 and B03. There is no feasible option to move this line clear of the new buildings.
  - A new 600mm pipe along the western boundary taking flows from a 1800mm scruffy dome located in the south-western corner that picks up overland flows from Campbell Street.
  - The pipe network discharging to the stormwater stream to the north of the Site (downstream of the Stormwater Bypass) is to be realigned and upgraded from existing 1200mm with orifice plate to a 900mm pipe network.

Where a proposed pipe conveys water from upstream of the Site, the pipe will be vested in WCC. Other pipes that only convey water from the Site will remain in Ryman ownership. The proposed storage device and the 450mm pipe that connects this device to the bypass will be owned and maintained by Ryman, as this system does not convey water from a piped system originating offsite.

Base flow to the stream will be maintained, therefore maintaining the ecology of the stream in its current condition.

3.2.2. Overland flows

Overland flows/ Secondary flow routes are unchanged at the boundaries and managed as below within the Site:

- Donald Street: Overland flows running down Donald Street and entering the Site at the main entrance to the Proposed Village will be unchanged when compared to the existing situation.

They will be stored within the depression in the green space adjacent to the internal road network, and then collected into the upgraded pipe network downstream.

- Campbell Street: Overland flows running northwards down Campbell Street entering the Site at the corner of Campbell Street and Scapa Terrace will be intercepted by the new Scruffy Dome and diverted into the new 600mm pipe and directed into the existing piped network (at manhole WCC_SW050965 for events in excess of 10-year with Climate Change).
- Scapa Terrace: It is proposed to build a weir structure as detailed in the next section to direct overland flows into the storage facility to ensure there are no increased water levels within upstream properties.

3.2.3. Flood Attenuation Device

The following Flood Attenuation/Storage Device is proposed to achieve hydraulic neutrality along the upstream and downstream boundaries:

- 45m long x 10.5m wide x 3m deep concrete detention tank is proposed under the car park and courtyard between Buildings B04 and B05 at an invert of 164mRL. The detention tank will provide approximate storage of 1,400 m^3.
- A 3m wide weir inlet structure with a crest level of 166.4mRL.
- One 450mm outlet pipe at an invert of 164mRL discharging controlled flows to the Stormwater Bypass.

This storage will be kept as a private asset and maintained by Ryman. The design details of the attenuation/storage device are as shown on Woods Stormwater Drawings 042-RCT_401_C0-300 and 042-RCT_401_C4-380 (Appendix A).

3.3. Stormwater Management Strategy

3.3.1. Stormwater Quality

There are currently no regulatory stormwater quality requirements for the Karori catchment, however the potential effects of the Proposed Village on stormwater quality have been considered in accordance with good design practice.

Stormwater runoff from the Proposed Village has a very low risk of contamination. The village is expected to generate low levels of stormwater contaminants for the following reasons:

- Though the traffic volume and speeds within the Site will be very low and there will be very few heavy vehicle movements, discharge of stormwater from the road and carparking areas will be treated to remove any suspended solids and gross pollutants. It is proposed that the sumps will drain these areas, and the proprietary treatment devices (Stormwater 360 EnviroPod or similar) will filter out any potential contamination prior to discharging into the network.
- Building materials will be carefully selected, so to ensure that the use of materials that have the potential to harm and/or pollute waterways is avoided (e.g. unpainted zinc or copper cladding or roofing).
- The grounds and landscape areas will be comprehensively maintained by Ryman. This will include the removal of any debris and litter and ensuring stormwater infrastructure is in good working order.

3.3.2. Stormwater Quantity

The Proposed Village will increase the total impervious area of the Site from 1.84ha to 2.16ha with an overall impervious area of approximately 70.6% of the Site. The increase in impervious area

(predevelopment to post- development) is approximately 17.5% which will result in an increase of runoff from the Site.

In finalising the proposed stormwater management approach, Woods and Ryman have worked closely with Wellington Water.

It was discussed and agreed with Wellington Water that any flood effects upstream or downstream of the Site will be managed with a practical on-site stormwater solution, that is capable of achieving neutrality for a 100 year Climate Change storm event (12 hour storm event with allowance for climate change uplift). The discussions with Wellington Water concluded that the on-site stormwater solution would:

- Not increase 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.
- Provide 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.

A copy of the meeting minutes can be found in Appendix B.

3.4. Stormwater Effects Assessment

Detailed 1D – 2D Flood modelling has been developed using the Wellington Water flood model for the Karori Stormwater catchment.

Wellington Water's flood modelling has been undertaken using the InfoWorks ICM developed by Innovyze. This is a dynamically coupled 1D-2D model of the Karori Stormwater catchment built in v7.5.9 which has been used for this assessment.

The one-dimensional river and pipe network uses a number of sources including survey and GIS data in the vicinity of the Site. The two-dimensional model has been developed using the LiDAR data (provided with the model database) converted into a 1 m grid to represent the terrain of the Site.

Wellington Water's model was updated in consultation with Wellington Water and the updated model used as the base to undertake an effects assessment in terms of flood risk. The post-development model has been developed to include the proposed terrain and landform/ land use changes proposed within the Site.

The overall purpose of the modelling exercise is to:

- Identify existing flood risk within the Site and on neighbouring properties;
- Provide model results and analysis for the proposed post-development situation;
- Provide assessment of development for the 10-year and 100-year ARI with climate change storm events and quantify if there are any adverse flooding effects on properties upstream or downstream of the Site in comparison to the pre-development/existing situation;
- To allow finished flood levels to be set out with adequate flood risk protection;
- To identify any flood mitigation options and test the options using the flood models to assess flood risk benefits within the Site and on properties upstream or downstream.

3.4.1. Modelling Inputs

3.4.1.1. Existing Karori Model inputs

The following data, sources and assumptions have been used for the Karori model – Base case scenario:

- Land use: Based on District Plan Zones.
- Stormwater pipe network: The stormwater network (manholes, pipes, culverts, inlets, outlets, river reaches, structures, etc) within the model is in line with the Wellington City Council GIS data.

- Topographical data: The model bathymetry is used for the predevelopment scenario with local updates within the Site based on topographical survey.
- Hydrological data: The hydrological parameters were unchanged from Wellington Water's base case scenario for the predevelopment scenario and updated as per the Reference Guide for Design Storm Hydrology; April 2019. Key parameters include –
    - Curve Numbers (CN)
    - Initial Abstractions (Ia)
    - Time of Concentration (tc)
- Energy losses: Energy losses in the pipe network, channels and 2D surface are unchanged.
- Building voids: The building voids within the base scenario are retained with further refinements as detailed in section 3.4.2.1.
- Boundary conditions: Rainfall depths for the 10 year and 100 year ARI with climate change storm events were extracted from the Karori model build report which are based on HIRDS v3 rainfall depths extracted for the catchment with a 20% uplift in rainfall depths to allow for Climate Change for 2120. These are documented in Table 1.

Table 1: Rainfall Depths (HIRDS v3 with climate change temperature increase)

ARI (y)	AEP	10m	20m	30m	60m	2h	6h	12h	24h
10	0.1	11.4	17.4	22.2	33.8	45.8	74.3	100.8	136.7
100	0.01	18.7	28.3	36.2	55.1	73.8	117.4	157.3	211

3.4.2. Modelling Approach

3.4.2.1. Pre-Development Scenario

The Karori Stormwater model was updated in consultation with Wellington Water to refine the model to incorporate the following changes, as recorded in the meeting minutes provided in Appendix B.

- All building footprints were modelled with high roughness values to restrict overland flow paths but majority of the houses upstream of the Site along Scapa Terrace, Firth Terrace and Donald Street sit on slab/ground which would halt any overland flow paths. These houses/garages were identified based on-site visits and Google Street views and modelled as building voids.
- Retaining walls along Scapa Terrace, Firth Terrace and Donald Street were identified based on-site visits and Google Street views and modelled as porous walls with wall heights.
- Fences were not included within the model as these are not permanent structures and may collapse with large flows.
- The model was updated to incorporate the topographical survey available for the Site.

A summary of this assessment along with the updated predevelopment scenario was issued to Wellington Water for review and feedback. Communication records can be found in Appendix B.

3.4.2.2. Post-Development Scenario

The post development scenario was developed using the updated predevelopment model incorporating the following changes to topography, hydrology, and pipe network.

- Topography: The model bathymetry was updated within the Site using the proposed design surface which was superimposed on top of the existing bathymetry.

- Hydrology: The subcatchments within the Site were delineated based on the discharge points to the proposed stormwater network. The following parameters were used as per the Wellington Water modelling guidelines –
    - Soil Depth of 0.08924324 for pervious surfaces (using a Curve Number of 74)
    - Soil Depth of 0.00518367 for impervious surfaces (using a Curve Number of 98)
    - Initial abstraction of 5mm for pervious surfaces
    - Initial abstraction of 0mm for impervious surfaces
    - Time of concentration of 10 minutes for all subcatchments
- Imperviousness: The imperviousness for each catchment was calculated based on the proposed layout and masterplan. These areas are provided in Table 2 below.
- Subcatchment loading: These subcatchments were loaded as shown in Figure 4 based on the design topography and private pipe connections.

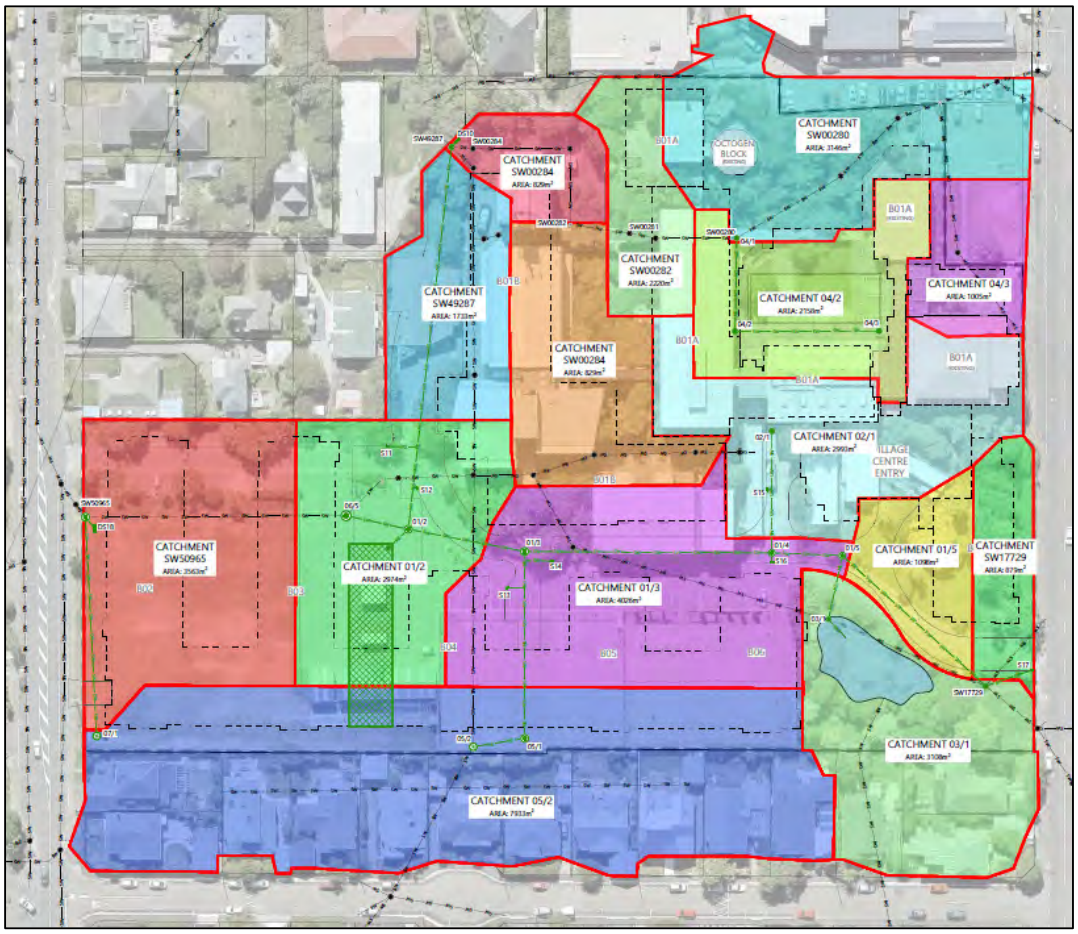


Figure 4 Subcatchments post development

Table 2: Hydrological parameters

Subcatchments	Total Area (ha)	Impervious Area (ha)	Pervious Area (ha)
Ryman_01/2	0.2974	0.2288	0.0686
Ryman_01/3	0.4026	0.3303	0.0723
Ryman_Ex01/6	0.1134	0.0714	0.042
Ryman_Ex01/3	0.0829	0.067	0.0159
Ryman_Ex01/1	0.1733	0.1584	0.0149
Ryman_Ex05/4	0.3563	0.2338	0.1225
Ryman_Ex01/5	0.222	0.1723	0.0497
Ryman_02/1	0.2993	0.2723	0.027
Ryman_04/3	0.1005	0.0536	0.0469
Ryman_01/5	0.1098	0.081	0.0288
Ryman_Ex4/5	0.0879	0.0565	0.0314
Ryman_Ex01/8	0.3146	0.1729	0.1417
Ryman_04/2	0.2158	0.208	0.0078
Ryman_05/1	0.7933	0.5289	0.2644
Ryman_03/1	0.3108	0.0936	0.2172

3.4.2.3. Modelling Results

The pre and post development models were simulated for the 10-year and 100-year ARI with climate change storm events, as discussed with Wellington Water. The model results were analysed to extract the flood extents, peak water levels and flood depths within the upstream and downstream properties for each scenario to understand the flood risk for the pre- and post-development situations.

Peak water level differences maps were generated to understand the differences in the flood impacts within and around the Site along with reviewing the performance of the storage facility to achieve hydraulic neutrality outside of the Site. These difference maps are provided in Appendix C.

The intention of this assessment was to understand if there is any increase in flood risk to properties upstream or downstream of the Site as a result of the loss in flood storage within the Site and the minor increases in flows associated with higher imperviousness within the Site.

Peak flood levels were extracted at key locations shown in Figure 5 below and tabulated in Table 3.

Table 3: Model Results – Flood levels (mRL) in key locations

Scenario	Storm	Downstream - North	Downstream - West	Upstream - South	Upstream - East
		Open Ch	Campbell Street	Scapa Terrace	Donald Street
		SW15683	SW21597	SW10571	SW17728
Existing	10yr	162.0	162.7	166.7	169.7
	100yr	162.5	163.7	168.4	169.9
Proposed	10yr	162.2	162.6	166.7	169.4
	100yr	162.4	163.6	168.4	169.4
Change in Flood Level; Proposed to Existing	10yr	0.2	-0.1	0.0	-0.3
	100yr	-0.1	-0.1	0.0	-0.5

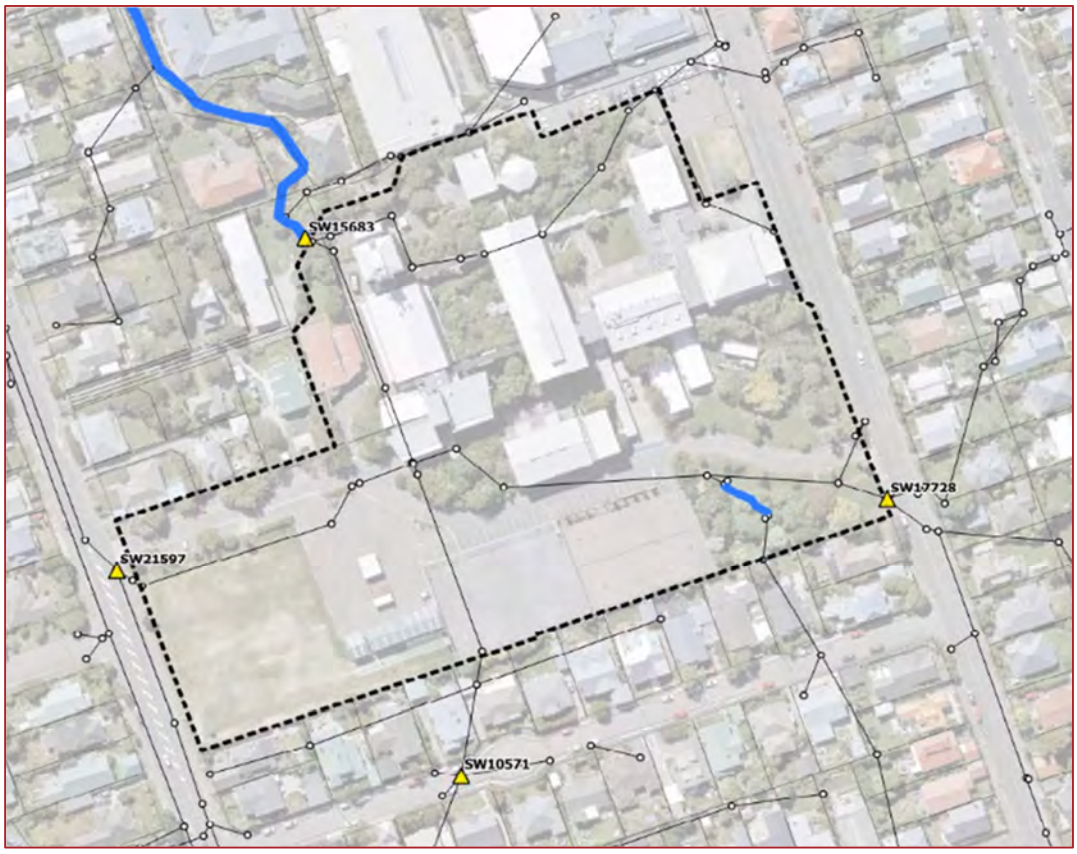


Figure 5 Key locations

The model results for the 100-year ARI with climate change storm event shows no increases in water levels outside the Site with major improvements identified within properties upstream of Donald Street and minor improvements identified downstream along Campbell Street and along the open stream to the north of the Site.

The model results for the 10-year ARI with CC storm event shows no increases in water levels outside the Site except within the open stream to the north of the Site where the flows are all contained within the stream banks with no overtopping of the banks. There are major improvements observed within properties upstream of Donald Street and minor improvements downstream along Campbell Street.

There are no increases in water levels within properties on Scapa Terrace.

The increased water level observed along Campbell Street is confined to the swale proposed within the Site.

3.4.2.4. Flood Attenuation Device and Blockage assessment

The storage device was modelled as three box culverts with dimensions of 3.5m x 3m. Each culvert has a 1m weir inlet set at a crest level of 166.4mRL to capture the overland flows from Scapa Terrace. This represents the proposed 45m long x 10.5m wide x 3m deep concrete detention tank. The outlet from the storage was modelled as a 450mm diameter pipe discharging to the Stormwater Bypass.

The required flood flows can be conveyed to the storage device with a 3m weir structure operating at a peak head of 0.3m with no increases in water levels or flood extents on neighbouring properties.

We have also assessed a blockage scenario for the weir and can confirm that with 50% of the weir structure blocked, the weir will operate at a peak head of 0.61m with no increases in water levels or flood extents on neighbouring properties.

The modelling undertaken confirms that flood storage of approximately 1,275m^3 is required for mitigation for the 100-year with CC 12-hour duration storm event. However, the volume of the configuration proposed is 1,500m^3, which is exceeds the required flood storage.

It is important to note that the storage is proposed to be utilised for large storm events (100-year with CC) as storage for smaller storm events (up to the 10-year with CC) is not required.

The proposed weir inlet for the storage facility is 3m in width, with a 0.7m high opening to provide higher resilience.

A summary of the proposed configuration is detailed in Table 4.

Table 4: Storage device performance (100 year with CC)

	Units	Peak Results
Peak Water Level within storage device	mRL	166.7
Invert Level	mRL	164
Ground Level	mRL	168
Peak Flood Depth within storage device	mRL	2.7
Width of storage device	mRL	10.5
Length of storage device	mRL	45
Flood Volume required	m^3	1,275.75
Proposed Flood Volume provided	m^3	1500
Inlet Weir length	m	3
Inlet weir crest	mRL	166.4
Peak water level over the inlet weir	mRL	166.7
Peak head over the crest of the inlet weir	m	0.3
Outlet Diameter	m	0.45
Outlet pipe invert	mRL	164
Minimum Weir Width Results – Blockage Assessment		
Inlet Weir length	m	1.5
Inlet weir crest	mRL	166.4
Peak water level over the inlet weir	mRL	167.01
Peak head over the crest of the inlet weir	m	0.61

3.5. Conclusion

Through the implementation of the proposed stormwater management system, the stormwater requirements of the Proposed Village can be met, and any potential adverse stormwater effects can be appropriately managed. This includes ensuring no increase in flooding to upstream and downstream properties and mitigating adverse water quality effects on the receiving environment.

Base flow to the stream will be maintained, therefore maintaining the ecology of the stream in its current condition.

Flood modelling concluded that:

- There is no flood risk to the Proposed Village within the Site for all the scenarios modelled;
- There is no increased flood risk to properties upstream or downstream of the Site for all the scenarios modelled;

- The flood storage solution works as expected resulting in no increased water levels or flood extents in neighbouring properties with significant benefits along Donald Street and minor improvements along Campbell Street;
- The modelling undertaken confirms that flood storage of approximately 1,275m^3 is required for mitigation for the 100-year with climate change 12-hour duration storm event. However, the volume of the configuration proposed is 1,400m^3, which exceeds the required flood storage.
- The modelling has shown that the proposed solution will achieve hydraulic neutrality for the 10-year and 100-year events, therefore there will be no offsite adverse quantity effects. This includes all offsite infrastructure such as culverts, bridges and private property, roads and reserves.

The proposed layout of stormwater infrastructure has been designed to avoid buildings where possible, however there are several areas where it is not possible to entirely avoid passing under buildings, including:

- The existing 1200mm pipe that will remain under Buildings B02 and B03 as there is no other feasible route for this pipe;
- The new 1500mm diversion of the line entering the Site from Scapa Terrace that will pass under a carpark and courtyard located between Buildings B04 and B05, we believe this is the most appropriate option to avoid crossing under a main building;
- The existing 375mm pipe at the northern end of the Site currently passes under an existing building. The existing building is to be demolished and replaced with Building B01A. It is not feasible to realign this pipe to avoid the proposed building, therefore it will be lowered to provide clearance to foundations.

4. Wastewater

4.1. Existing Wastewater Infrastructure

Wellington City Council GIS shows the following existing gravity sewer infrastructure within the Site (see Figure 6):

Pipeline 1

This is a 150mm diameter gravity line from Donald Street at the northeast corner of the Site running down a gully then under two existing buildings. A 150mm earthenware pipe from the swimming pool area runs south to join this line in the area between the two existing buildings. This system conveys wastewater from a small catchment to the north of Site including a small number of houses (approximately 14), and it possibly also includes part of Karori Normal School in the catchment, but this is not clear from the GIS.

Pipeline 2

This gravity line enters the Site from Donald Street to the south of the Site and runs to the west across the Site and discharges to a sewer main on Campbell Street. The GIS shows this pipe as 250mm diameter increasing to 300mm where Pipeline 3 joins. This pipe conveys the wastewater from a residential catchment to the east and south, with an estimated area of 16.3ha.

Pipeline 3

This is a 150mm diameter pipe that enters the Site on the south boundary and flows north to connect into pipeline 2 within the Site. This system conveys wastewater from a small residential catchment from the south of Scapa Terrace.

Pipeline 4

This pipe connects into pipeline 1 within the Site, the top section of this pipe is shown as “abandoned” and the bottom section only services existing buildings within the Site.

Private lines

In addition to the above public pipelines there are various private wastewater pipes servicing the existing buildings, according to the GIS, all these pipes discharge to Pipeline 1.

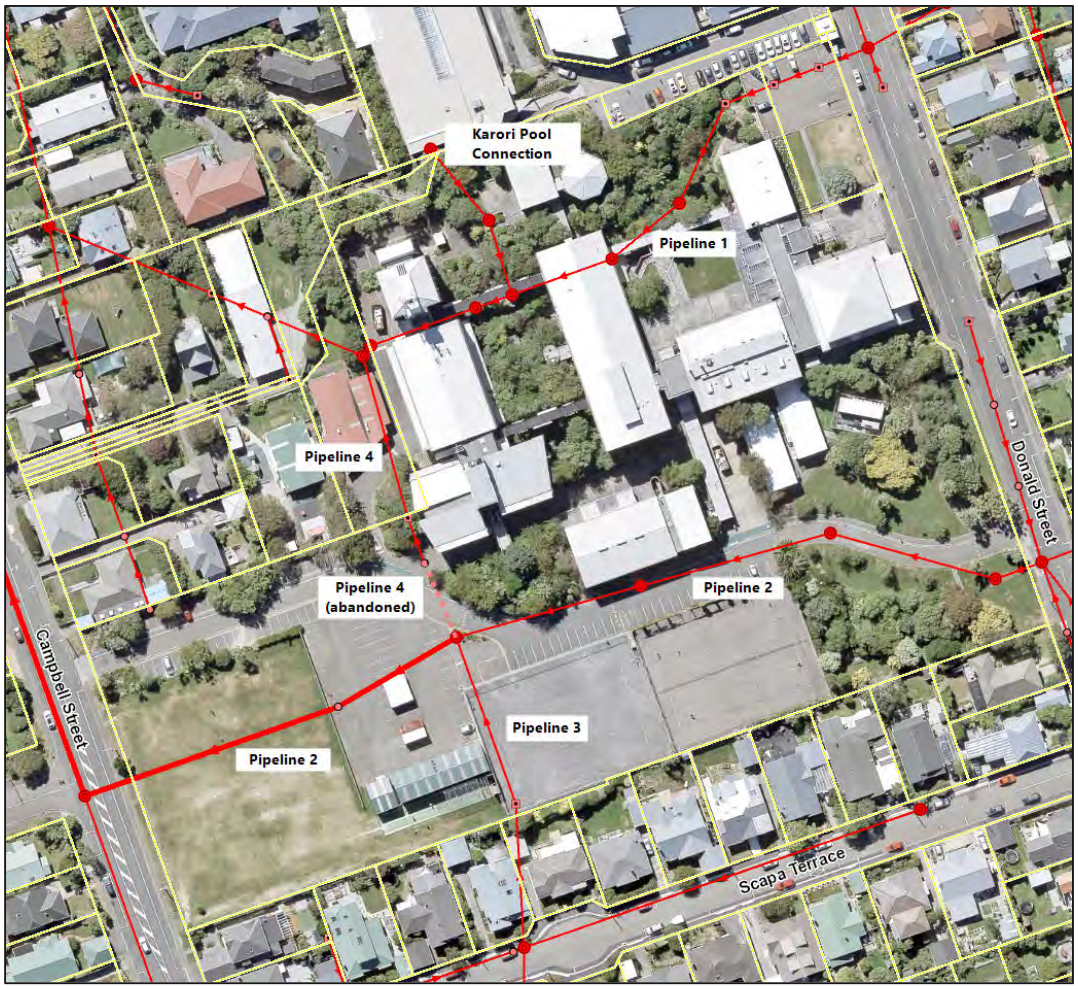


Figure 6 Existing wastewater infrastructure from WCC GIS

4.2. Proposed Wastewater System

The existing wastewater network will be realigned within the site as necessary to accommodate the Proposed Village buildings and other underground infrastructure:

- Pipeline 1 will be realigned to go around Building B01B, however due to the site topography it will not be feasible to avoid crossing under Building B01A, so the line will be vertically realigned to ensure enough cover under the foundations. Note that the existing pipe passes under an existing building in this location. The new pipe alignment will be more favourable than the old as it will pass under one building instead of the existing two. The proposed new section of this line is shown as Line C on Woods Wastewater Drainage Layout Plan.
- Pipeline 2 will be realigned through the Site to avoid buildings, underground infrastructure and retaining walls. The proposed line is shown as Line A on Woods Wastewater Drainage Layout Plan. The design includes realignment of the downstream end of this line to the north to avoid B02 and B03. 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 250mm diameter, as this as a non-standard size for PVC pipe, we propose to use a 300mm diameter pipe right through to Donald Street.
- Pipeline 3 will be realigned to avoid Building B04 and will pass under a carpark with courtyard above between Building B04 and B05. This pipe must cross above a 1500mm stormwater pipe, to achieve this crossing, the pipe must be laid at a grade flatter than what is allowable for a

150mm pipe in the Wellington Water Regional Standard for Water Services. We therefore propose to increase the diameter of this pipe to 225mm so that it can be laid at a flatter grade of 0.69% in accordance with the Regional Standard.

- Pipeline 4 will be surplus to requirements and will be abandoned or removed.
- Private wastewater lines will be constructed within the Site as required to service the new Proposed Village; this detail will be provided at building consent stage.

4.3. Wastewater Hydraulic Analysis

4.3.1. Design Wastewater Flows

Ryman are experienced operators of comprehensive care retirement villages and have collected historic information on occupancy rates, water demands, and sewer loads for this type of village. This information has been used in calculating wastewater design loading for the village.

Domestic sewer loads are on average 160 litres/resident/day, with a peaking factor of 3, based on information that has been collected by Ryman on sewer loads for its operational comprehensive care retirement villages. This includes allowance for all core functions such as kitchens, common rooms and staff usage. The village occupancy for design purposes is provided in Table 5 and wastewater flow calculations are provided in Table 6.

Table 5 Village Occupancy

Village Occupancy			
Unit Type	**Number of Units**	**Occupancy per Unit**	**Peak Occupancy**
Care Beds	60	1	60
Assisted Living Suites	68	1	68
Apartments	180	1.3	234
Total	308		362

Table 6 Wastewater peak flow calculations for the Proposed Village.

Village Wastewater Flow Calculations		
Total occupancy	362	
Daily flow per person	160	l/day/person
Daily sewage volume	57,920	l
Average dry weather flow	0.67	l/s
Peak factor	3	
Peak wet weather flow	2.0	l/s

Daily flow per person and peak factor from historic Ryman data.

4.3.2. Existing Wastewater Flows

Wellington Water provided flow data from their Karori WWTP 2017 (current) model for the 1-year Long Time Series (LTS) design event. Please refer to correspondence in Appendix B.

The data provided included peak flows from the former Teachers' College buildings on the Site (refer to Table 7) as well as those entering the Site from the upstream network (refer to Table 8). The "North Main" represents Pipeline 1 and the "South Main" includes the flows from Pipelines 2 and 3.

Table 7 – Wellington Water model data for flows originating from existing Site.

Connection	Area (ha)	Flow from Sub-catchments (litres/sec)					
		Dry Weather Flow			1-year ARI Wet Weather Flow		
		Min	Average	Max	Min	Average	Max
North Main	1.16	0.00	0.00	0.00	0.00	0.27	2.07
South Main	1.41	0.14	0.14	0.14	0.14	0.62	3.01
Total	2.57	0.14	0.14	0.14	0.14	0.89	5.08

Table 8 Wellington Water model data for upstream flows entering the Site.

Network	Flow from Upstream Sub-catchments (litres/sec)					
	Dry Weather Flow			1-year ARI Wet Weather Flow		
	Min	Average	Max	Min	Average	Max
North Main	0.04	0.14	0.45	0.05	0.39	1.84
South Main	2.23	3.52	7.42	2.37	8.94	32.48
Total	2.27	3.66	7.87	2.42	9.33	34.32

4.4. Wastewater Assessment of Effects

4.4.1. Wastewater Flow Reduction

The peak wet weather flow calculated for the Proposed Village of 2.0 l/s (refer to Table 6) is considerably less than the peak wet weather flow for the Teachers' College of 5.08 l/s (refer to Table 7). The Proposed Village will have less demand on the downstream network compared to the previous use of the Site and therefore there is no requirement to provide any wastewater storage onsite.

4.4.2. Capacity of Network Within the Site

Wellington Water requires that public wastewater networks are designed to convey Peak Wet Weather Flow (PWWF) as determined for a fully developed catchment. This will apply to the public lines that are proposed to be realigned within the Site.

Using the methodology as provided in Wellington Water Regional Standards for Water Services (2019) section 5.3.1, we have determined PWWF in each of the public pipe networks within the site. The calculations are provided on Table 9.

We have created a 3D model of the proposed (and existing where it is to remain) gravity pipe network using 12d Model software and have applied the calculated PWWF to the network to confirm that the public wastewater lines have sufficient capacity. Wellington Water standards require gravity wastewater pipelines to be designed to flow at 85% or less of the full capacity flow. Our modelling determined that the peak flow was 52% or less than the full capacity flow for all pipes in the network and therefore the proposed gravity reticulation meets Wellington Water design requirements. The full flow from the Proposed Village could be accommodated on either Pipeline 1 or Pipeline 2 and the network will continue to have surplus capacity.

Table 9 Upstream peak wet weather flow

Upstream Design Wastewater Flows			
Pipeline 1			Notes
Catchment Area	1.34	ha	North Catchment area provided by Wellington Water (1.07ha) plus allowance for Karori Pool (0.27ha)
Flow per person	0.0023	l/s/person	
Population Density	140	people per ha	
Average dry weather flow	0.43	l/s	
Peak factor	6.82		
Peak dry weather flow	2.94		
Pipe length	0.20	km	Length provided by Wellington Water
Direct inflow per m pipe length	0.55	l/s/km	
Direct inflow	0.11	l/s	
Infiltration per km pipe length	0.06	l/s/km	
Infiltration	0.01	l/s	
Peak flow	3.1	l/s	
Pipeline 2			
Catchment Area	17.2	ha	Area provided by Wellington Water
Flow per person	0.0023	l/s/person	
Population Density	140	people per ha	
Average dry weather flow	5.54	l/s	
Peak factor	4.09		
Peak dry weather flow	22.67		
Pipe length	2.80	km	Length provided by Wellington Water
Direct inflow per m pipe length	0.55	l/s/km	
Direct inflow	1.54	l/s	
Infiltration per km pipe length	0.06	l/s/km	
Infiltration	0.17	l/s	
Peak flow	24.4	l/s	
Pipeline 3			
Catchment Area	4.8	ha	Area measured from GIS - note this is conservative as it ignores several bypasses within catchment
Flow per person	0.0023	l/s/person	
Population Density	140	people per ha	
Average dry weather flow	1.55	l/s	
Peak factor	5.28		
Peak dry weather flow	8.17		
Pipe length	1.00	km	Length measured from GIS
Direct inflow per m pipe length	0.55	l/s/km	
Direct inflow	0.55	l/s	
Infiltration per km pipe length	0.06	l/s/km	
Infiltration	0.06	l/s	
Peak flow	8.8	l/s	

4.5. Conclusion

The Site has existing gravity sewer lines that convey wastewater from upstream catchments through the Site. These lines also convey the wastewater from the existing buildings on the Site. The existing lines will need to be realigned through the Site to avoid buildings and underground services where possible.

There is no feasible option to divert pipeline 1 around Building B01A, therefore the line will be lowered to avoid the foundations of this building. This is an improvement over the existing scenario where the line passes under two existing buildings.

Pipeline 3 will be realigned to avoid the new Building B04, this will involve passing below a carpark with a courtyard above. This is the best practical solution to avoid the building.

The realigned gravity pipelines have the capacity to convey PWWF from the upstream catchment as well as the Proposed Village to meet the requirements of Wellington Water.

Comparing flow data from the Wellington Water wastewater model and the calculated flows for the Proposed Village, it can be confirmed that flows from the Proposed Village are less than the former Teachers' College on the Site and therefore there will be a positive effect on the downstream infrastructure. The realigned pipes have the capacity to convey the existing peak flow and the Proposed Village peak flow. As the peak flow discharging from the Site will be less than the former Teachers' College scenario, there is no requirement for storage.

5. Water Supply

5.1. Existing Water Infrastructure

Wellington City Council GIS shows:

- No public water mains within the Site
- 150mm main on Donald Street
- 100mm main on Campbell Street
- Existing 100mm connection into the Site from Campbell Street opposite 34 Campbell Street
- Existing 100mm connection into the Site from Donald Street main opposite 33 Donald Street

5.2. Proposed Reticulation

It is proposed to provide two new connections to the Site from the 150mm main on Donald Street. The first connection will provide the potable supply and fire hydrants within the Site. The second connection will be a dedicated supply for fire protection sprinklers. 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.

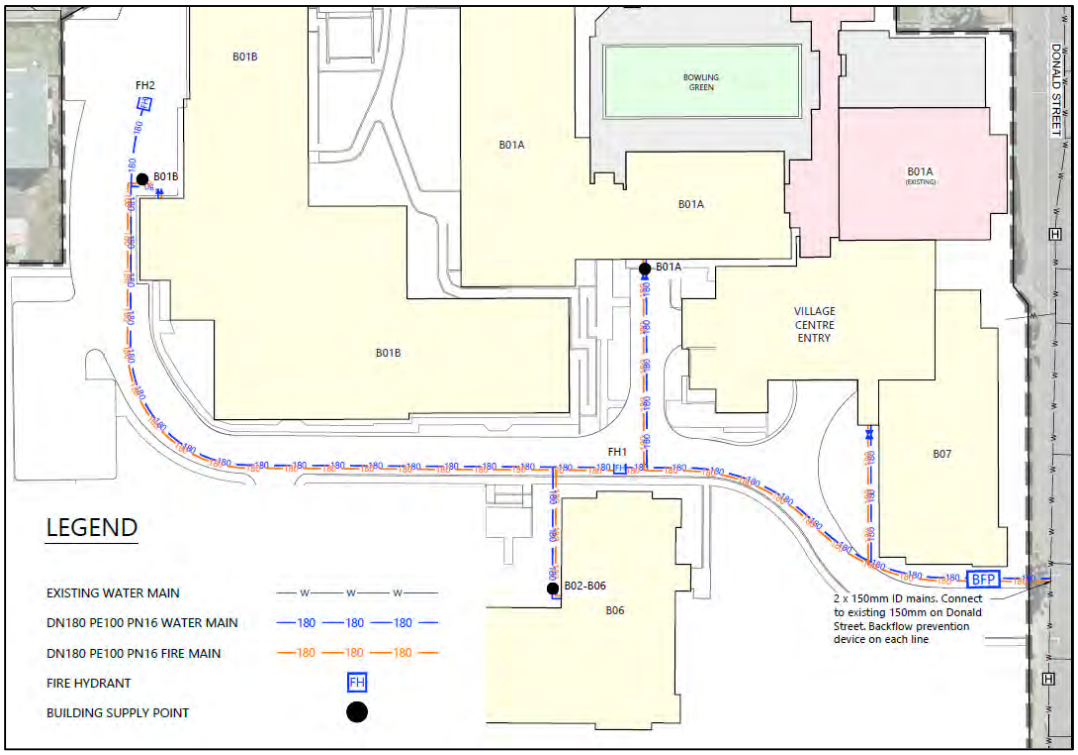


Figure 7 Proposed reticulation layout

5.3. Water Demand

5.3.1. Residential Demand

Ryman are experienced operators of comprehensive care retirement villages and have collected historic data on occupancy rates, water demands, and sewer loads for this type of village. This information has been used in calculating water demands for the Proposed Village.

Domestic water requirements are 200 litres / resident / day based on information Ryman has collected for water demand for its comprehensive care retirement villages. This covers all core functions such as kitchens, common rooms and staff usage. 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. Refer to Table 5 for occupancy data used to calculate residential demand. The daily residential water demand is provided in Table 10.

Table 10 Village Water Demand Calculations

Village Water Residential Demand Calculations		
Total occupancy	362	
Daily water demand per person	200	l/day/person
Total daily water demand	72,400	l
Average water flow	0.84	l/s
Peak factor	3	
Peak flow	2.5	l/s

5.3.2. Firefighting Requirements

Firefighting water supply requirements have been determined in accordance with SNZ PAS 4509:2008. All main buildings within in the Proposed Village will be sprinkler protected, which will be provided from a separate fire main. Fire water requirements will therefore be provided from sprinkler flows, in addition to hydrant flows from the separate potable main.

5.3.2.1. Potable Main Fire Flow Requirement

With sprinklered buildings, the potable network will need to meet water supply classification Firefighting Water Supply - FW2. The reticulated water supply will need to provide 12.5 l/s from a hydrant within 135 metres of any building and an additional 12.5 l/s from a second hydrant within 270m of any building. Fire hydrants will be installed on the potable water supply network to meet these requirements.

5.3.2.2. Sprinkler design

The buildings will be classified mainly as Extra Light Hazard, with some sections classified as being Ordinary Hazard in accordance with NZS 4541:2020. Assuming Ordinary Hazard as a worst case, SNZ PAS 4509:2008 (Table C1) suggests 25 l/s would be expected to meet sprinkler flow requirements for any one fire event. The total design fire water requirement including sprinklers, fire hydrants and 60% of peak domestic flow is provided on Table 11. The minimum residual head required for this flow is 10m (100kPa) as required by SNZ PAS 4509:2008 section 5. Pumping of the sprinkler flows may be required to supply the internal pressure requirements. This will be considered at the detailed design stage for the sprinkler system. The analysis reported herein considers whether the sprinkler flowrate (25 l/s) can be provided.

Table 11 Firefighting design flow

Firefighting Design Flow		
Estimated sprinkler flow (Ordinary Hazard)	25	l/s
Fire hydrant (2 hydrants @ 12.5 l/s)	25	l/s
60% peak domestic flow	1.5	l/s
Total design fire flow	51.5	l/s

5.4.Hydraulic Analysis

5.4.1. Hydrant Flow Test

ADR Water carried out pressure and flow testing on fire hydrants on Donald Street adjacent to the Site in July 2019. A summary of the testing results is provided on Table 12.

Table 12 Donald Street pressure and flow test results

Flow (l/s)	Residual Pressure (m)
0	50
40	44
50	41
64 (max)	38

5.4.2. Hydraulic Modelling

Woods have modelled the proposed water supply network using EPANET to confirm that the solution will meet the flow and pressure requirements. Three scenarios have been assessed:

1. Peak residential demand in each building
2. Hydrant fire flow at 60% peak demand
3. Sprinkler demand, tested at each building at 60% peak demand

Boundary conditions

The modelled source Hydraulic Grade Line (HGL) has been calculated from hydrant flow test results carried out on Donald Street opposite the Site boundary and detailed in section 5.4.1. Source HGL for the different model scenarios are shown in Table 13 below. Figure 8 shows the hydrant flow test results and the system pressure for the different demand scenarios shown in Table 14.

Table 13 Boundary HGL for modelled scenarios

Demand Scenario	Flow (l/s)	Residual Pressure in Donald Street (m)	Ground elevation at site boundary (mRL)	Modelled HGL (m)
Peak residential	2.5	50	169.5	219.5
Hydrant flow at 60% peak demand	26.5	47.5	169.5	217
Total design fire flow. Scenario 2+3	51.5	42.5	169.5	211

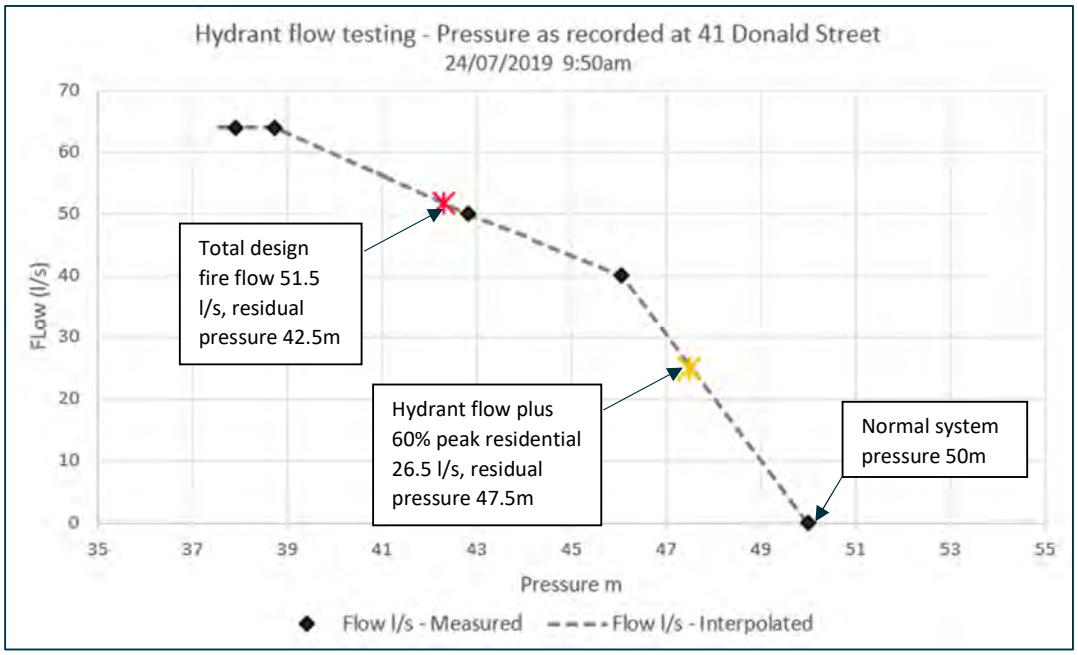


Figure 8 Hydrant flow test results for 41 Donald Street

Network losses

Pipe losses have been calculated using the Darcy Weisbach formula, and the roughness coefficient for all pipes has been set in the model at 0.15mm, in accordance with Table 6.4 in of the Regional Standard for Water Services (Nov 2012).

Backflow prevention devices will be installed on both lines near the Site boundary and have been included in the model. The head loss for various backflow prevention devices have been analysed against the expected peak domestic and firefighting flows. A Wilkins 375 6" Reduced Pressure Zone (RPZ) device is recommended for both the potable and sprinkler main as it provides the lowest losses at fire flow demand (25 l/s). Refer to Figure 9.

Minor losses associated with the meters, strainers and sluice valves that may be installed at the Site boundary have not been included in the model.

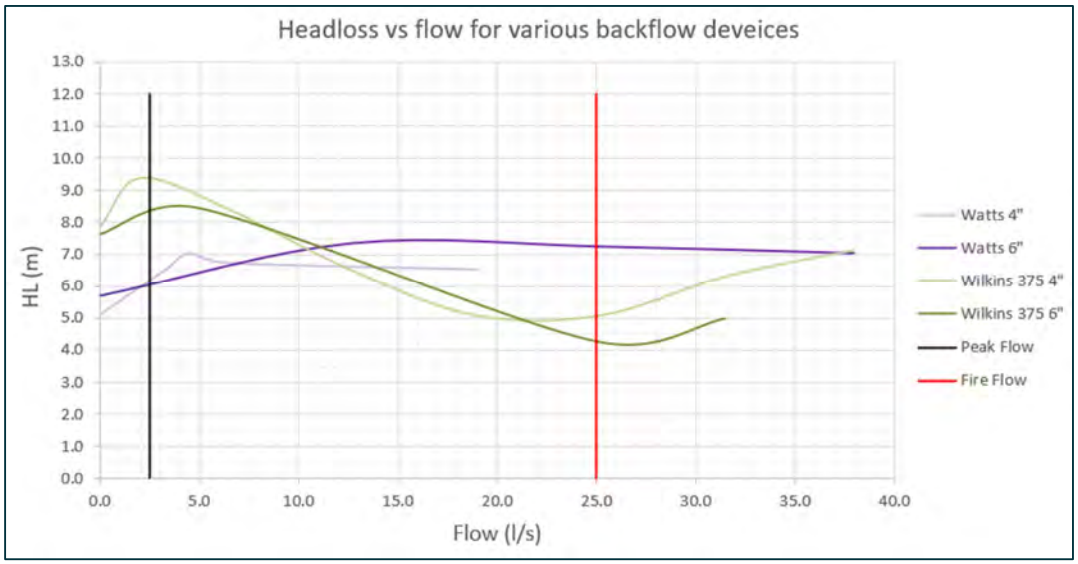


Figure 9 Head loss vs flow for various backflow prevention devices.

5.4.3. Results

The model has been run using the parameters described in the section above. Pressure results for residential and fire flow are shown in Table 14 Peak residential demand flow and pressure and Table 15 below. Maximum head loss in the potable main for peak residential demand is shown in Figure 10.

Table 14 Peak residential demand flow and pressure

ID	Peak Occupancy	Daily Water Demand (l)	Average Water Flow (l/s)	Peak Water Flow (l/s)	Max Floor Level (m)	Min Pressure (m)
		200 l/person/day		*Peak Factor = 3*		
B01A	57.2	11,440	0.132	0.397	181	30.7
B01B	159.2	31,840	0.369	1.106	184	27.5
B02-B06	124.8	24,960	0.289	0.867	174	37.0
B07	20.8	4,160	0.048	0.144	177	34.4
Total	362	72,400	0.838	2.514		

Min pressure is shown for maximum floor level

Table 15 Available fire flow at sprinkler and hydrant sites

ID	Fire Flow Supplied (l/s)	Residual Pressure at Supplied Fire Flow (m)
Sprinkler Demand		
Sprinkler B01A	25	31.2
Sprinkler B01B	25	36.8
Sprinkler B02-B07	25	35.0
Sprinkler B07	25	32.3
Sprinkler Demand		
FH01	25	44.3
FH02	25	46.2

- *The buildings require a total of 50 l/s fire flow, 25 l/s for the sprinkler and an additional 25l/s from a hydrant. As the two fire flow demands are on separate mains they have been reported separately, however would occur simultaneously.*
- *Fire flow analysis has been undertaken at 60% peak demand.*
- *Sprinkler pressure shown is the ground level pressure.*

The results show that the minimum pressure at the top floor of the proposed buildings is greater than the WCC requirements during peak flows, and the head losses are lower than the maximum allowed.
The residual pressures during fire flow is greater than the NZS 4509 requirement.

Overall, the analysis shows the proposed reticulation will meet WCC requirements for pressure, head loss and fire flow.

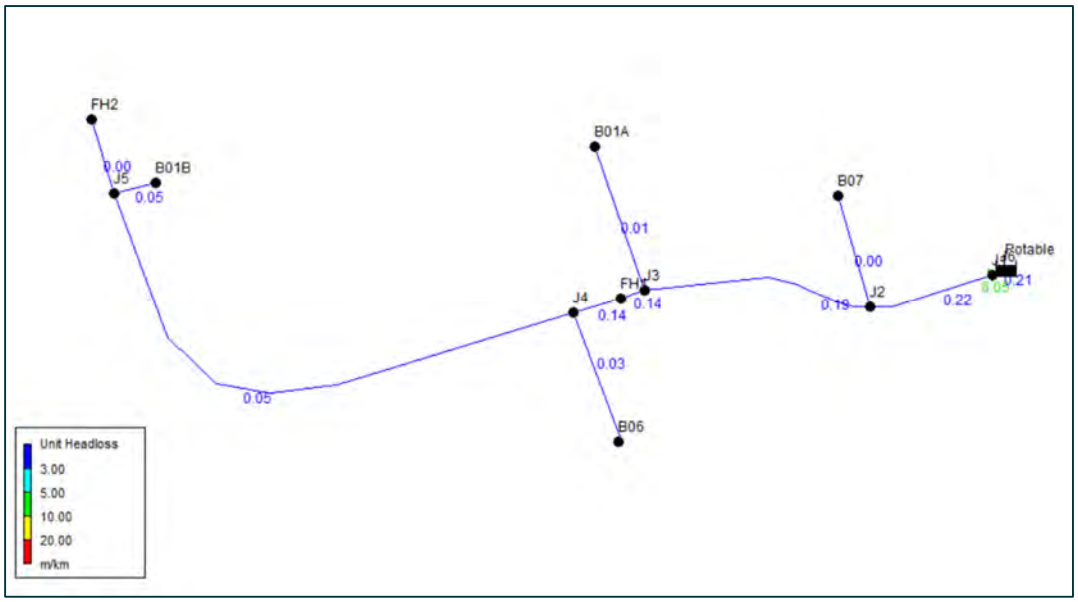


Figure 10 Head loss (m/km) for peak residential demand

5.5. Conclusions and Recommendations

A separate main should be installed for sprinkler and potable demand. A 180OD PE100 PN16 (146mm 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 as described in this report meets the following standards:

Compliance with the Regional Standard for Water Services (Nov 2012):

- Minimum residential pressures for peak demand >25m
- Maximum pipe head loss for peak residential demand <5m/km

Compliance with the SNZ PAS 4509:2008:

- 25l/s available from the two hydrants within the Proposed Village and minimum residual pressure >10m.
- Sufficient flow available from a hydrant within 135m, with a second hydrant located within 270m.

Installation of a Wilkins 375 6" backflow prevention device on both the potable and sprinkler main is recommended as it has a better high flow performance (lower high flow head loss). Final confirmation of devices, including backflow prevention devices, and setup configuration for the connection to the Proposed Village will be confirmed with water connection application.

The allowance for the fire protection sprinkler system has been assumed from SNZ PAS 4509:2008. This assumption will be confirmed during detailed design of the sprinkler system.

7. Electrical, Communications & Gas Supply

7.1. Electrical Power

7.1.1. Existing Electrical Network

There are existing overhead lines adjacent to the Site in the berm along Campbell Street and in the berm on the opposite side of Donald Street. Plans obtained show an underground supply leading from the overhead lines on Donald Street to an existing substation on the east side of the Site.

7.1.2. Proposed Electrical Network

The existing substation and electrical lines on-site will be removed, and new substations will be installed.

Cosgroves Limited has recommended that a 1MVA transformer be installed to service Buildings B01A, B01B and B07 and a second 500kVA transformer be installed to service Buildings B02, B03, B04, B05 and B06. It is proposed to locate the two transformers in a service compound alongside a 500kVA containerised, central standby generator, housed in an acoustic enclosure and service building locate to the south of the Buildings B01A and west of Building B07. This generator will be utilised for emergency support during transformer or network failure only. This standby generator will not be paralleled with the network supply.

We understand that Wellington Electricity have been contacted regarding network capacity, however we are awaiting their response and agreement of a final design configuration.

7.2. Gas Supply

7.2.1. Existing Gas Network

Powerco gas reticulation maps show a 50mm mains along Campbell Street and Donald Street and 25mm mains along Scapa Terrace. The map indicates that there is a 50mm supply pipe leading from Donald Street to the existing buildings on the Site and an inactive 100mm supply pipe running across the Site in an east-west direction.

7.2.2. Natural Gas Demand

The natural gas network may supply the commercial kitchen, space heating, and domestic hot water plant for the main building (Building B01). The demand and supply capacity will be confirmed at detailed design stage.

7.3. Communications

Chorus Ltd has confirmed that the Proposed Village can be serviced from the existing network surrounding the Site.

8. Recommendations

The following measures are recommended to mitigate the potential environmental effects from the earthworks and civil infrastructure for the Proposed Village:

- A site-specific Erosion and Sediment Control Plan shall be prepared in accordance with the Erosion and Sediment Control Guidelines and provided for approval by Council prior to commencing earthworks;

9. Conclusion

The Proposed Village can be adequately serviced for water supply, wastewater, stormwater, power, gas and communications from existing infrastructure that surrounds the Site.

The proposal includes earthworks to excavate for new building foundations and underground infrastructure. This will produce an excess of material that will be removed from Site. Erosion and sediment and dust effects can be effectively mitigated through implementation of a site-specific Erosion and Sediment Control Plan. A detailed Erosion and Sediment Control Plan will be provided to Council for approval prior to commencing earthworks.

Water supply will be provided from the existing 150mm watermain on Donald Street. The proposal includes separate mains for the potable supply (which will include fire hydrants) and the building fire protection sprinkler system. Both of these supplies will include backflow prevention. Our modelling has shown that adequate flow and pressure is available to meet the Proposed Village demands.

The wastewater proposal involves realigning existing public mains through the Site to avoid buildings, retaining walls and underground infrastructure where practical. One building cannot be avoided and the existing line will need to pass under this building (as is the current scenario). New connections will be provided to the public mains to service the Proposed Village buildings. The Proposed Village will discharge less than the modelled peak flow for the former Teachers' College use, and therefore the proposal will have a positive effect on the downstream infrastructure and no storage is required.

The stormwater proposal includes realignment and upgrading of some of the existing stormwater infrastructure within the Site. An underground storage device will be installed to ensure that offsite flooding effects are not worsened by the proposal. The stormwater proposal will reduce flood risks to some neighbouring properties. Stormwater quality effects will be mitigated through source control and installation of Stormwater 360 Enviropods or similar devices in sumps.

The Site can be serviced for electrical power, gas and telecommunication by utilising existing network infrastructure surrounding the Site. The demand and servicing details will be confirmed during detailed design.

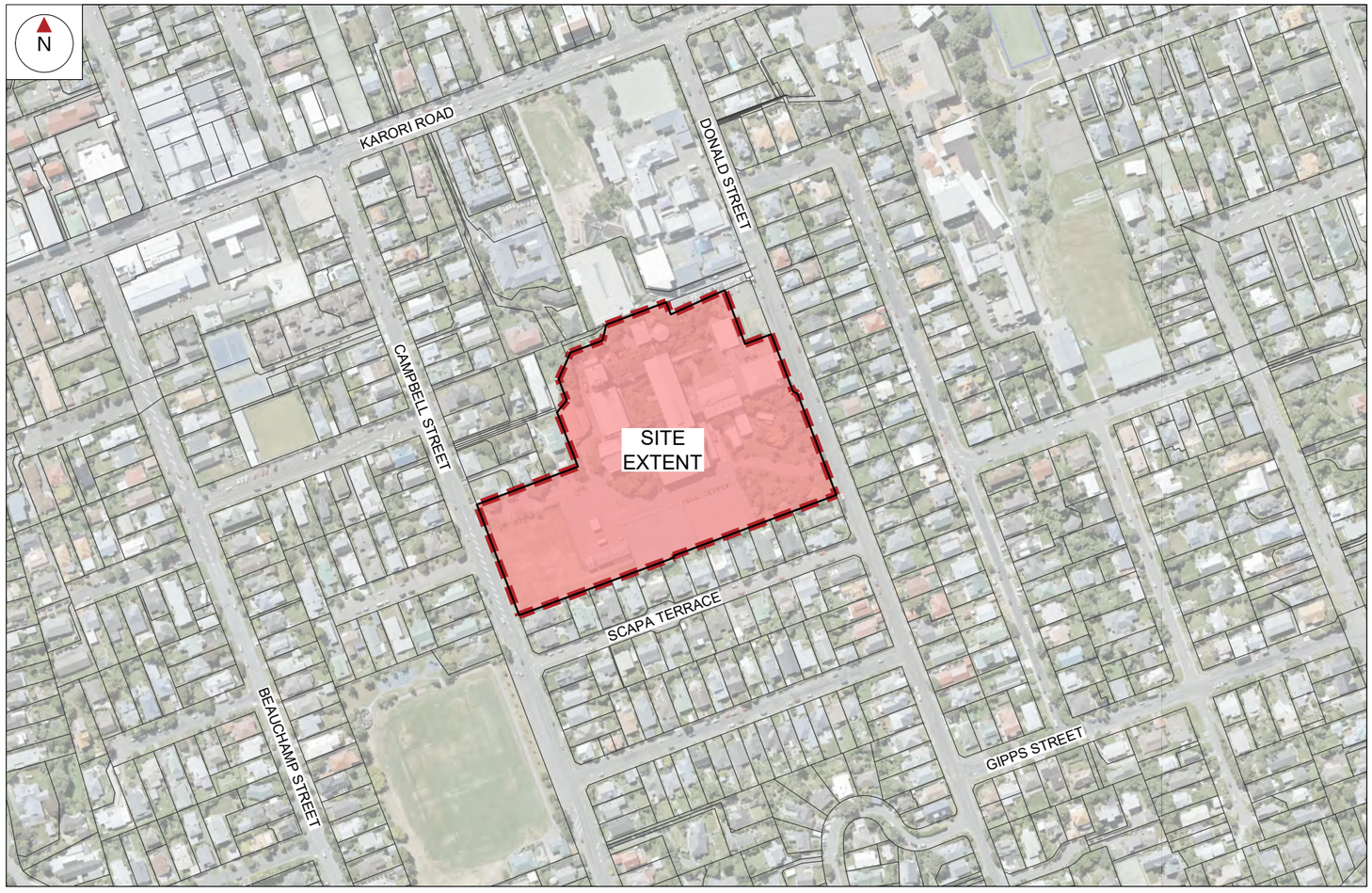
In conclusion, the Site is suitable for the Proposed Village from a civil engineering perspective provided the Civil Design drawings and recommendations in Section 9 are implemented.

A. Civil Engineering Drawings

B. Correspondence

C. Stormwater Modelling Maps

SHEET NO.		SHEET TITLE
042-RCT_401_C0-	000	CONTENT INDEX AND LOCALITY PLAN
042-RCT_401_C0-	001	PROPOSED SITE LAYOUT
502720-0000-DRG-UU-	0001-003	AURECON - TOPO SURVEY
042-RCT_401_C0-	110	FINAL CONTOURS
042-RCT_401_C0-	120	DEPTH (CUT/FILL) CONTOURS
042-RCT_401_C0-	180	EROSION AND SEDIMENT CONTROL PLAN
042-RCT_401_C0-	200	ROAD LAYOUT PLAN
042-RCT_401_C0-	220	ROAD TYPICAL CROSS SECTIONS
042-RCT_401_C0-	250-251	ROAD LONGITUDINAL SECTIONS
042-RCT_401_C0-	300	STORMWATER DRAINAGE LAYOUT
042-RCT_401_C0-	320	STORMWATER CATCHMENTS
042-RCT_401_C0-	325-326	PRE & POST PERVIOUS/IMPERVIOUS SURFACES
042-RCT_401_C4-	380	STORMWATER DETAILS
042-RCT_401_C0-	400	WASTEWATER DRAINAGE LAYOUT
042-RCT_401_C0-	600	WATER RETICULATION PLAN



LOCATION PLAN
NOT TO SCALE

WOODS
EST.1970

RYMAN HEALTHCARE

RYMAN KARORI
RETIREMENT VILLAGE

FOR RESOURCE CONSENT
14 AUGUST 2020

29 DONALD STREET
KARORI
WELLINGTON 6012

WELLINGTON CITY COUNCIL

CONTENT INDEX AND LOCALITY PLAN

WOODS
EST.1970

LEGEND

SITE BOUNDARY

EXISTING BOUNDARIES

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	WMV	14/08/20

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

N

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

PROPOSED SITE LAYOUT

STATUS	ISSUED FOR CONSENT	REV
SCALE	1:1000 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C0-001	

LEGEND

Symbol	Description
167.28	SPOT HEIGHT
169.92	GROUND LEVEL (FROM LIDAR DATA)
FL=173.88	FLOOR LEVEL (FROM SCAN DATA)
FL=177.53	FLOOR LEVEL
180.65EA	EAVE HEIGHT (FROM SCAN DATA)
	BUILDING OUTLINE
	SITE BOUNDARY
	PROPERTY BOUNDARY (XML)
LP	LAMP POST
	MANHOLE (UNKNOWN)
	VEGETATION DRIPLINE
SW — SW	WCC STORMWATER (INDICATIVE)
	STORMWATER MANHOLE
	SUMP
	LAMP HOLE CLEANING EYE
S — S — S	WCC SEWER (INDICATIVE)
	SEWER MANHOLE
W — W — W	WCC WATERMAIN (INDICATIVE)
FH	FIRE HYDRANT
175.37RR 175.32RR	RIDGE HEIGHT
	SERVICES COVER
	WALL
	KERB AND CHANNEL
	ROAD CENTRELINE
	POWER POLE
	MONITORING POINT
	FENCE
	SIGNAGE
	POWER PILLAR
	TOBY
	SURVEY CONTROL MARK
	SCAN AREA
	VALVE

NOTES

1. THIS SURVEY HAS NOT INCLUDED SITE MARKING OF THE BOUNDARY POSITIONS UNLESS OTHERWISE INDICATED.
2. UNDERGROUND SERVICES SHOWN ON THIS PLAN ARE COMPILED FROM WCC AND UTILITY SERVICES PROVIDERS RECORDS AND ARE INDICATIVE ONLY. WHERE SERVICES HAVE FEATURES VISIBLE AT GROUND LEVEL THEY HAVE BEEN VERIFIED BY FIELD SURVEY. THE LOCATION OF ALL SERVICES MUST BE CONFIRMED WITH RESPECTIVE PROVIDERS PRIOR TO ANY GROUND DISTURBANCE.
3. THE SITE DATUM FOR THIS SURVEY IS: IR 2 R.L.= 166.85
   ORIGIN OF LEVELS : SP DP 82474
   REDUCED LEVEL : 162.56 (SOURCE: DP 82474)
   DATUM: M.S.L. - WELLINGTON DATUM 1953
4. ORIGIN OF SURVEY: SS 17K24 SO 30955
   COORDINATES: 801579.521mN, 396967.337mE
   COORDINATE SYSTEM:NZGD 2000 WELLINGTON CIRCUIT
   COORDINATE SOURCED: 3rd MAY 2018
   DATE OF SURVEY: 5 MAY - 16 JUNE 2018
5. "SPOT HEIGHT" POSITIONS ARE SHOWN IN THE FOLLOWING FORMAT X 166.24 AND ARE EXPRESSED IN METRES IN TERMS OF THE SITE DATUM FOR THE SURVEY. THE HEIGHTS OF THESE POSITIONS HAVE AN ACCURACY RELATIVE TO THE SITE DATUM AS FOLLOWS:
   HARD SURFACES EG CONCRETE, ASPHALT +/ -0.030m @ 95% CONFIDENCE LEVEL.
   SOFT SURFACES EG GRASS +/ -0.050m @ 95% CONFIDENCE LEVEL.
6. CONTOURS SHOWN ON THIS SURVEY ARE INTERPOLATED FROM SURVEYED "SPOT HEIGHT" POSITIONS. THEREFORE THE LOCATION AND VALUES OF THE CONTOUR MODEL IS DEPENDENT ON THE DENSITY OF THE SURVEYED SPOT HEIGHTS. THIS SURVEY DEPICTS A CONTOUR INTERVAL OF 0.5m WITH AN ACCURACY RELATIVE TO THE HEIGHT DATUM OF +/ 0.25m AT A 95% CONFIDENCE LEVEL.
7. IF STRUCTURES ARE DESIGNED SO THAT THEY WILL EXTEND TO THE MAXIMUM LIMITS OF SUNLIGHT ACCESS ENVELOPES, IT IS RECOMMENDED THAT SPOT HEIGHTS ONLY, SPECIFICALLY TAKEN AT THE CORRESPONDING POSITION ON THE BOUNDARY, BE USED TO DETERMINE COMPLIANCE. NOTE: THIS MAY REQUIRE ADDITIONAL SURVEY WORK.
8. NEIGHBOURING CADASTRAL BOUNDARIES SOURCED FROM LANDONLINE (LINZ) MAY 2018. SITE CADASTRAL BOUNDARIES HAVE BEEN CALCULATED FROM UNDERLYING SURVEY PLANS
9. LIDAR DATA FROM SEPTEMBER 2013 WITH A HEIGHT ACCURACY OF +/- 0.15m
10. POINTS EXTRACTED FROM SCAN DATA HAVE AN ACCURACY RELATIVE TO THE SITE DATUM OF +/- 0.030m @ 95% CONFIDENCE LEVEL

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CLIENT: RYMAN HEALTHCARE

REV	DATE	REVISION DETAILS	APPROVED
A	27/06/18	ISSUE FOR INFORMATION	
B	25/07/18	MANHOLE INFORMATION ADDED	
C	10/08/18	PLANS ROTATED & SCALE REVISED, FLOOR & ROOF HEIGHTS ADDED	B.TOMS

SCALE	1:250
SIZE	A1
DRAWN	I.HOLMES
DESIGNED	R.KEITH
REVIEWED	L.KEATS
APPROVED	B.TOMS (DATE 10/08/18)

FOR INFORMATION
NOT FOR CONSTRUCTION

PROJECT: RYMAN KARORI

TITLE: TOPOGRAPHICAL SURVEY MAY 2018 SHEET 1 OF 3

DRAWING No.	PROJECT No.	WBS	TYPE	DISC	NUMBER	REV
	502720	0000	DRG	UU	0001	C

NOTES

1. THIS SURVEY HAS NOT INCLUDED SITE MARKING OF THE BOUNDARY POSITIONS UNLESS OTHERWISE INDICATED.
2. UNDERGROUND SERVICES SHOWN ON THIS PLAN ARE COMPILED FROM WCC AND UTILITY SERVICES PROVIDERS RECORDS AND ARE INDICATIVE ONLY. WHERE SERVICES HAVE FEATURES VISIBLE AT GROUND LEVEL THEY HAVE BEEN VERIFIED BY FIELD SURVEY. THE LOCATION OF ALL SERVICES MUST BE CONFIRMED WITH RESPECTIVE PROVIDERS PRIOR TO ANY GROUND DISTURBANCE.
3. THE SITE DATUM FOR THIS SURVEY IS: IR 2 R.L.= 166.85
   ORIGIN OF LEVELS : SP DP 82474
   REDUCED LEVEL : 162.56 (SOURCE: DP 82474)
   DATUM: M.S.L. - WELLINGTON DATUM 1953
4. ORIGIN OF SURVEY: SS 17K24 SO 30955
   COORDINATES: 801579.521mN, 396967.337mE
   COORDINATE SYSTEM:NZGD 2000 WELLINGTON CIRCUIT
   COORDINATE SOURCED: 3rd MAY 2018
   DATE OF SURVEY: 5 MAY - 16 JUNE 2018
5. "SPOT HEIGHT" POSITIONS ARE SHOWN IN THE FOLLOWING FORMAT X 166.24 AND ARE EXPRESSED IN METRES IN TERMS OF THE SITE DATUM FOR THE SURVEY. THE HEIGHTS OF THESE POSITIONS HAVE AN ACCURACY RELATIVE TO THE SITE DATUM AS FOLLOWS:
   HARD SURFACES EG CONCRETE, ASPHALT +/ -0.030m @ 95% CONFIDENCE LEVEL.
   SOFT SURFACES EG GRASS +/ -0.050m @ 95% CONFIDENCE LEVEL.
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7. IF STRUCTURES ARE DESIGNED SO THAT THEY WILL EXTEND TO THE MAXIMUM LIMITS OF SUNLIGHT ACCESS ENVELOPES, IT IS RECOMMENDED THAT SPOT HEIGHTS ONLY, SPECIFICALLY TAKEN AT THE CORRESPONDING POSITION ON THE BOUNDARY, BE USED TO DETERMINE COMPLIANCE. NOTE: THIS MAY REQUIRE ADDITIONAL SURVEY WORK.
8. NEIGHBOURING CADASTRAL BOUNDARIES SOURCED FROM LANDONLINE (LINZ) MAY 2018. SITE CADASTRAL BOUNDARIES HAVE BEEN CALCULATED FROM UNDERLYING SURVEY PLANS
9. LIDAR DATA FROM SEPTEMBER 2013 WITH A HEIGHT ACCURACY OF +/- 0.15m
10. POINTS EXTRACTED FROM SCAN DATA HAVE AN ACCURACY RELATIVE TO THE SITE DATUM OF +/- 0.030m @ 95% CONFIDENCE LEVEL

LEGEND

- SPOT HEIGHT
- GROUND LEVEL (FROM LIDAR DATA)
- FL=173.88 — FLOOR LEVEL (FROM SCAN DATA)
- FL=177,53 — FLOOR LEVEL
- 180.65EA — EAVE HEIGHT (FROM SCAN DATA)
- BUILDING OUTLINE
- SITE BOUNDARY
- PROPERTY BOUNDARY (XML)
- LAMP POST
- MANHOLE (UNKNOWN)
- VEGETATION DRIPLINE
- WCC STORMWATER (INDICATIVE)
- STORMWATER MANHOLE
- SUMP
- LAMP HOLE CLEANING EYE
- WCC SEWER (INDICATIVE)
- SEWER MANHOLE
- WCC WATERMAIN (INDICATIVE)
- FIRE HYDRANT
- 175.37RR 175.32RR — RIDGE HEIGHT
- SERVICES COVER
- WALL
- KERB AND CHANNEL
- ROAD CENTRELINE
- POWER POLE
- MONITORING POINT
- FENCE
- SIGNAGE
- POWER PILLAR
- TOBY
- SURVEY CONTROL MARK
- SCAN AREA
- VALVE

AERIAL SOURCED FROM WELLINGTON CITY COUNCIL GIS VIEWER - HTTPS://GIS.WCC.GOVT.NZ/LOCALMAPS/VIEWER/

TO BE READ IN CONJUNCTION WITH SHEETS 1 AND 3

SCALE 1:250

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www.aurecongroup.com

CLIENT: RYMAN HEALTHCARE

REV	DATE	REVISION DETAILS	APPROVED
A	27/06/18	ISSUE FOR INFORMATION	
B	25/07/18	FLOOR & EAVES LEVELS ADDED	
C	10/08/18	PLANS ROTATED & SCALE REVISED, FLOOR & ROOF HEIGHTS ADDED	B.TOMS

SCALE	1:250
SIZE	A1
DRAWN	I.HOLMES
DESIGNED	R.KEITH
REVIEWED	L.KEATS

FOR INFORMATION
NOT FOR CONSTRUCTION

APPROVED DATE 10/08/18 B.TOMS B.TOMS

PROJECT	RYMAN KARORI
TITLE	TOPOGRAPHICAL SURVEY MAY 2018 SHEET 2 OF 3

DRAWING No.	PROJECT No.	WBS	TYPE	DISC	NUMBER	REV
	502720	0000	DRG	UU	0002	C

Plot Date: 10/08/2018 08:19 AM Office: NZWLG Filename: P:\502720\15.0\LIVE\DESIGN\03.CAD\DRAWINGS\SURVEY\502720-0000-DRG-UU-0002.DWG

NOTES

1. THIS SURVEY HAS NOT INCLUDED SITE MARKING OF THE BOUNDARY POSITIONS UNLESS OTHERWISE INDICATED.
2. UNDERGROUND SERVICES SHOWN ON THIS PLAN ARE COMPILED FROM WCC AND UTILITY SERVICES PROVIDERS RECORDS AND ARE INDICATIVE ONLY. WHERE SERVICES HAVE FEATURES VISIBLE AT GROUND LEVEL THEY HAVE BEEN VERIFIED BY FIELD SURVEY. THE LOCATION OF ALL SERVICES MUST BE CONFIRMED WITH RESPECTIVE PROVIDERS PRIOR TO ANY GROUND DISTURBANCE.
3. THE SITE DATUM FOR THIS SURVEY IS: IR 2 R.L.= 166.85
   ORIGIN OF LEVELS : SP DP 82474
   REDUCED LEVEL : 162.56 (SOURCE: DP 82474)
   DATUM: M.S.L. - WELLINGTON DATUM 1953
4. ORIGIN OF SURVEY: SS 17K24 SO 30955
   COORDINATES: 801579.521mN, 396967.337mE
   COORDINATE SYSTEM:NZGD 2000 WELLINGTON CIRCUIT
   COORDINATE SOURCED: 3rd MAY 2018
   DATE OF SURVEY: 5 MAY - 16 JUNE 2018
5. "SPOT HEIGHT" POSITIONS ARE SHOWN IN THE FOLLOWING FORMAT X 166.24 AND ARE EXPRESSED IN METRES IN TERMS OF THE SITE DATUM FOR THE SURVEY. THE HEIGHTS OF THESE POSITIONS HAVE AN ACCURACY RELATIVE TO THE SITE DATUM AS FOLLOWS:
   HARD SURFACES EG CONCRETE, ASPHALT +/ -0.030m @ 95% CONFIDENCE LEVEL.
   SOFT SURFACES EG GRASS +/ -0.050m @ 95% CONFIDENCE LEVEL.
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7. IF STRUCTURES ARE DESIGNED SO THAT THEY WILL EXTEND TO THE MAXIMUM LIMITS OF SUNLIGHT ACCESS ENVELOPES, IT IS RECOMMENDED THAT SPOT HEIGHTS ONLY, SPECIFICALLY TAKEN AT THE CORRESPONDING POSITION ON THE BOUNDARY, BE USED TO DETERMINE COMPLIANCE. NOTE: THIS MAY REQUIRE ADDITIONAL SURVEY WORK.
8. NEIGHBOURING CADASTRAL BOUNDARIES SOURCED FROM LANDONLINE (LINZ) MAY 2018. SITE CADASTRAL BOUNDARIES HAVE BEEN CALCULATED FROM UNDERLYING SURVEY PLANS
9. LIDAR DATA FROM SEPTEMBER 2013 WITH A HEIGHT ACCURACY OF +/- 0.15m
10. POINTS EXTRACTED FROM SCAN DATA HAVE AN ACCURACY RELATIVE TO THE SITE DATUM OF +/- 0.030m @ 95% CONFIDENCE LEVEL

LEGEND

- SPOT HEIGHT
- GROUND LEVEL (FROM LIDAR DATA)
- FLOOR LEVEL (FROM SCAN DATA)
- FLOOR LEVEL
- EAVE HEIGHT (FROM SCAN DATA)
- BUILDING OUTLINE
- SITE BOUNDARY
- PROPERTY BOUNDARY (XML)
- LAMP POST
- MANHOLE (UNKNOWN)
- VEGETATION DRIPLINE
- WCC STORMWATER (INDICATIVE)
- STORMWATER MANHOLE
- SUMP
- LAMP HOLE CLEANING EYE
- WCC SEWER (INDICATIVE)
- SEWER MANHOLE
- WCC WATERMAIN (INDICATIVE)
- FIRE HYDRANT
- RIDGE HEIGHT
- SERVICES COVER
- WALL
- KERB AND CHANNEL
- ROAD CENTRELINE
- POWER POLE
- MONITORING POINT
- FENCE
- SIGNAGE
- POWER PILLAR
- TOBY
- SURVEY CONTROL MARK
- SCAN AREA
- VALVE

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CLIENT
RYMAN HEALTHCARE

REV	DATE	REVISION DETAILS	APPROVED
A	27/06/18	ISSUE FOR INFORMATION	
B	25/07/18	FLOOR & EAVES LEVELS ADDED	
C	10/08/18	PLANS ROTATED & SCALE REVISED, FLOOR & ROOF HEIGHTS ADDED	B.TOMS

SCALE	1:250
SIZE	A1
DRAWN	I.HOLMES
DESIGNED	R.KEITH
REVIEWED	L.KEATS

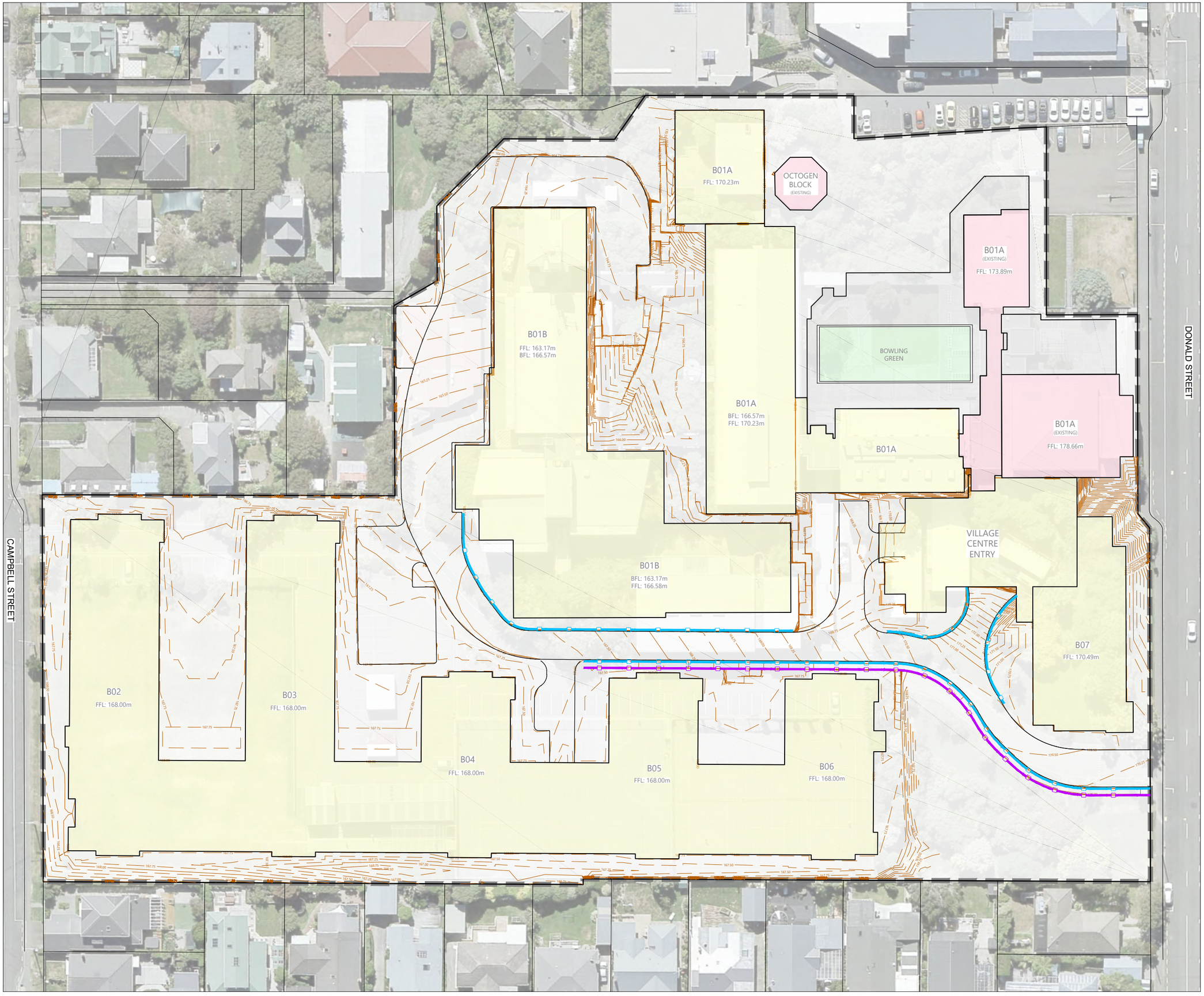
FOR INFORMATION
NOT FOR CONSTRUCTION

APPROVED
DATE 10/08/18
B.TOMS
B.TOMS

PROJECT	RYMAN KARORI
TITLE	TOPOGRAPHICAL SURVEY MAY 2018 SHEET 3 OF 3

DRAWING No. 502720 – 0000 – DRG – UU – 0003 – C
(PROJECT No. – WBS – TYPE – DISC – NUMBER – REV)

Print Date: 10/08/2018 9:08:36 AM Office: NZWLG Filename: P:\502720\LIDEL\WIP\DESIGN\03 CAD\DRAWINGS\SURVEY\502720-0000-DRG-UU-0003.DWG



WOODS
Est.1970

LEGEND

- SITE BOUNDARY
- PROPOSED BOUNDARY
- EXISTING BOUNDARY
- PROPOSED CONTOURS MAJOR (0.5m INTERVAL) — 19.0
- PROPOSED CONTOURS MINOR (0.1m INTERVAL)
- PROPOSED RETAINING WALL

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
2. 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.
3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND PROTECT EXISTING SERVICES DURING WORKS.
4. CONTRACTOR TO CONFIRM ALL INVERT LEVELS OF EXISTING SERVICES BEING CONNECTED INTO PRIOR TO COMMENCEMENT OF WORKS. ANY DISCREPANCY WITH THE LEVELS SHOWN ON THE DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS IMMEDIATELY.
5. ALL UNSUITABLE MATERIAL BE REMOVED AND THE STRIPPED AREAS INSPECTED BY THE ENGINEER BEFORE FILLING COMMENCES.
6. EARTHWORKS ARE NOT TO BE EXTENDED INTO ADJOINING PROPERTIES UNLESS THE ENGINEER HAS ISSUED SPECIFIC INSTRUCTIONS.
7. UNDERFILL DRAINAGE IS TO BE INSTALLED AT THE DIRECTION OF THE ENGINEER. IF THE CONTRACTOR ENCOUNTERS NATURAL SPRINGS OR OTHER SOURCES OF WATER HE/SHE IS TO NOTIFY THE ENGINEER.

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	WMV	14/08/20

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

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

FINAL CONTOUR PLAN

STATUS	ISSUED FOR CONSENT	REV
SCALE	1:750 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C0-110	

WOODS
EST.1970

LEGEND

STAGE BOUNDARY

PROPOSED BOUNDARY

EXISTING BOUNDARY

CUT/FILL DEPTH CONTOUR (0.5m INTERVAL)

CUT HATCH	FILL HATCH
>3.5m	0.0 to 0.5m
3.0 to 3.5m	0.5 to 1.0m
2.5 to 3.0m	1.0 to 1.5m
2.0 to 2.5m	1.5 to 2.0m
1.5 to 2.0m	2.0 to 2.5m
1.0 to 1.5m	2.5 to 3.0m
0.5 to 1.0m	3.0 to 3.5m
0.0 to 0.5m	>4.0m

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

ASSUMPTIONS:

ROAD PAVEMENT	350mm
FOUNDATION DEPTH	1000mm
OTHER AREAS	300mm

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
2. 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.
3. 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

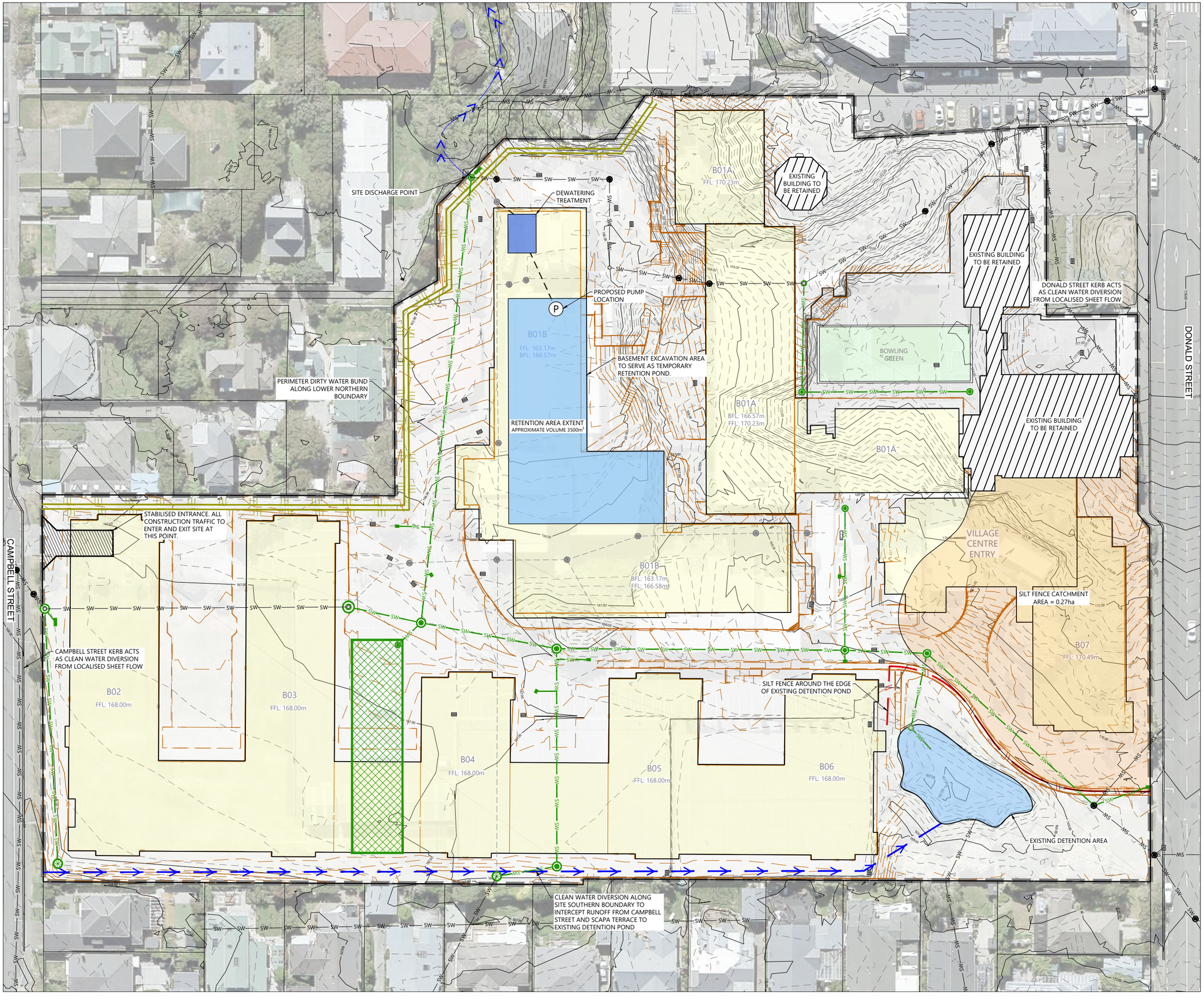
SURVEYED	-	29 DONALD STREET KARORI WELLINGTON 6012
DESIGNED	JLS	
DRAWN	JLS	
CHECKED	MC	
APPROVED	MC	WOODS.CO.NZ

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

DEPTH (CUT/FILL) CONTOUR PLAN

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



WOODS
Est.1970

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 — SW
- EXISTING STORMWATER TO REMAIN — SW
- 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

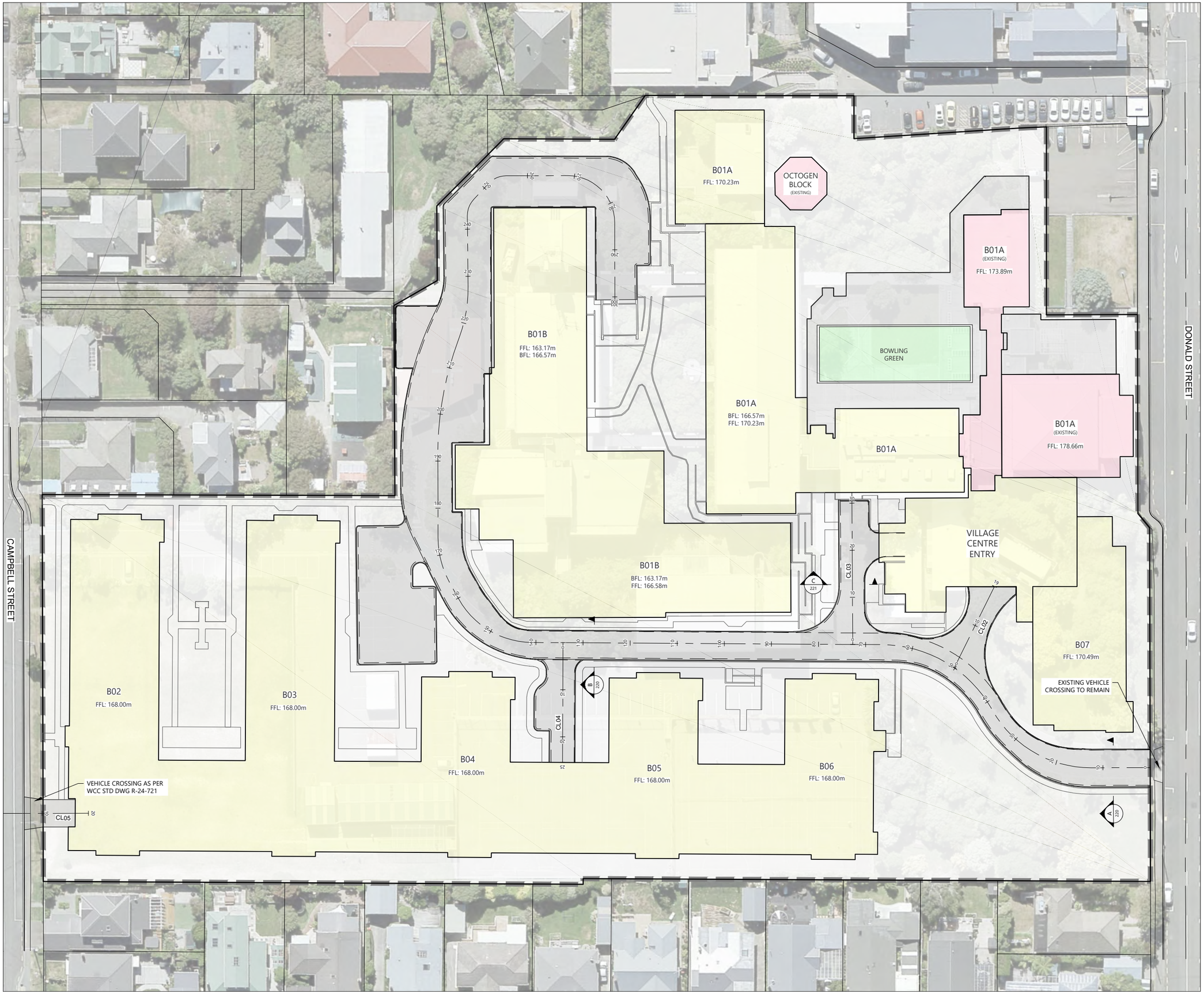
SURVEYED	-	29 DONALD STREET KARORI WELLINGTON 6012
DESIGNED	JLS	
DRAWN	WMV	
CHECKED	MC	
APPROVED	MC	WOODS.CO.NZ

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

EROSION & SEDIMENT CONTROL PLAN

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



WOODS
EST.1970

LEGEND

STAGE BOUNDARY	
PROPOSED BOUNDARY	
EXISTING BOUNDARY	
PROPOSED CONTOURS MAJOR (0.5m INTERVAL)	19.0
PROPOSED CONTOURS MINOR (0.1m INTERVAL)	

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
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3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND PROTECT EXISTING SERVICES DURING WORKS.

ROADING

1. KERB & CHANNEL AND KERB & NIB TO BE SLIP FORMED AS PER WCC DRAWING SD R-22-700
2. ROAD BERM AND FOOTPATHS TO BE CONSTRUCTED AS PER DETAILS ON THE TYPICAL CROSS SECTION DRAWINGS 042-RCT-401_C3-220. COMPLYING WITH NZS:3114.
3. ALL ROAD MARKING AND ROAD SIGNAGE IS TO BE CONSTRUCTED AS PER NEW ZEALAND TRANSPORT AGENCY MANUAL OF TRAFFIC SIGNS AND MARKING (MOTSAM).
4. ROAD CONSTRUCTION TO COMPLY WITH NZS:4431.
5. BENKELMAN BEAM TESTING FOR ALL ROADS TO COMPLY WITH THE TNZ TESTING PROCEDURES AND ACHIEVE MAX DEFLECTIONS SPECIFIED IN WCC CODE OF PRACTICE FOR LAND DEVELOPMENT.
6. TRAFFIC MANAGEMENT PLANS TO BE APPROVED AND IN PLACE FOR ANY WORKS WITHIN THE EXISTING ROAD RESERVE.

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	WMV	14/08/20

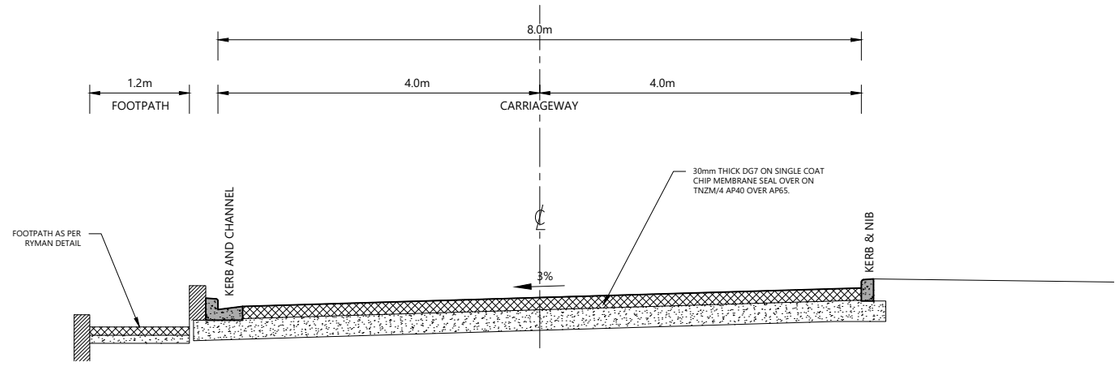
SURVEYED	-	29 DONALD STREET KARORI WELLINGTON 6012
DESIGNED	JLS	
DRAWN	JLS	
CHECKED	MC	
APPROVED	MC	WOODS.CO.NZ

RYMAN HEALTHCARE

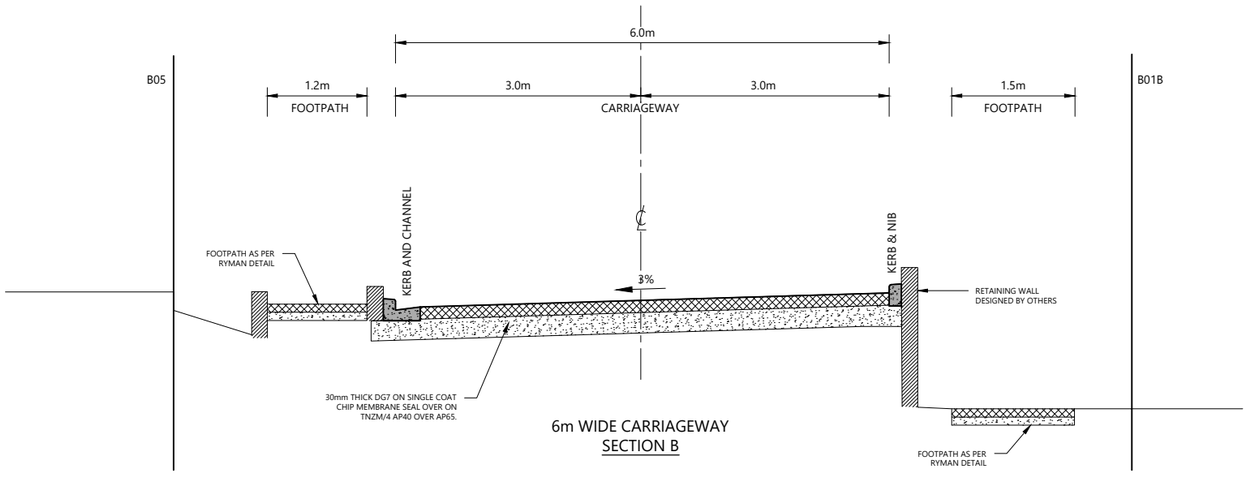
KARORI
RETIREMENT VILLAGE

ROAD LAYOUT PLAN

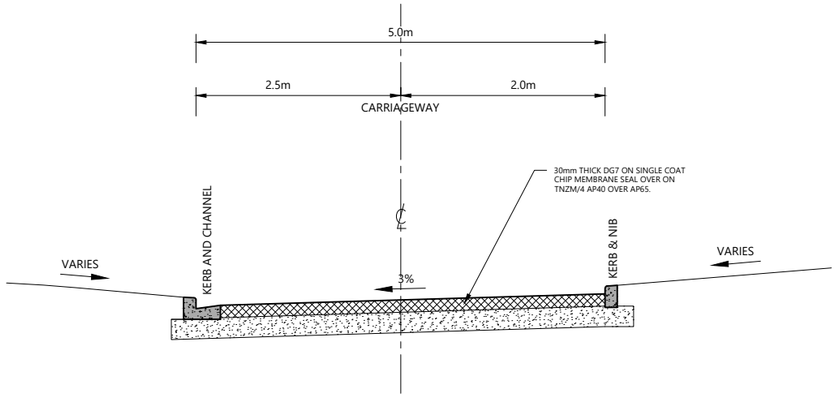
STATUS	ISSUED FOR CONSENT	REV
SCALE	1:750 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C0-200	



8m WIDE CARRIAGEWAY
SECTION A



6m WIDE CARRIAGEWAY
SECTION B



5.5m WIDE CARRIAGEWAY
SECTION C

NOTES

1. REFER TO DRAWING 042-RCT_401-C0-200 FOR FURTHER NOTES AND SECTION LOCATIONS.
2. CONCRETE STRENGTH TO BE 20MPa AT 28 DAYS.
3. CONCRETE FINISH TO CONFORM WITH CLASS U3 OF NZS3114.

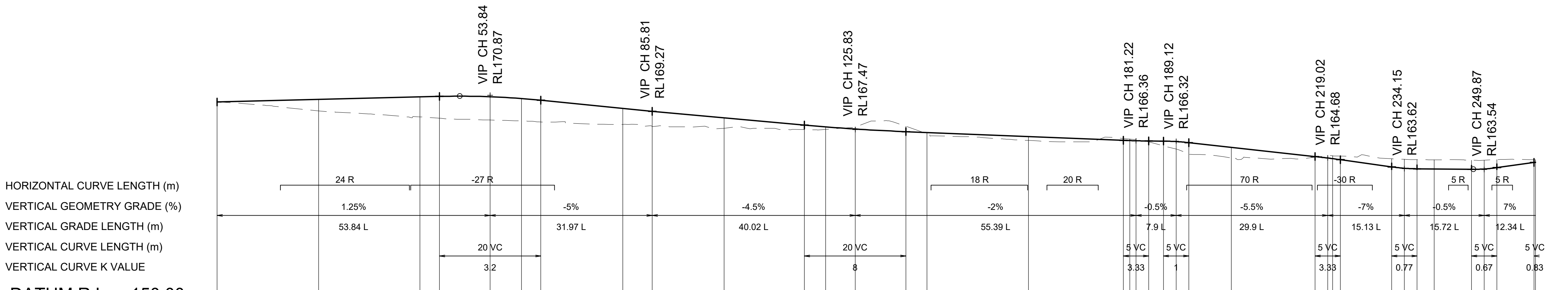
REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	WMV	14/08/20

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

KARORI
RETIREMENT VILLAGE

ROAD TYPICAL CROSS SECTIONS

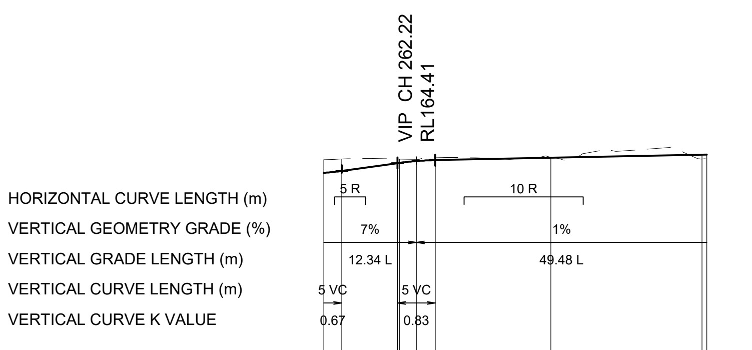
STATUS	ISSUED FOR CONSENT	REV
SCALE	1:75 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C3-220	



DATUM R.L. = 150.00

CHAINAGE	EXISTING SURFACE	CUT / FILL DEPTH	CL DESIGN LEVELS
0.00	170.20	-0.00	170.20
20.00	169.32	1.12	170.45
40.00	168.73	1.97	170.70
43.84	168.59	2.15	170.74
53.84	168.42	2.30	170.71
60.00	168.33	2.21	170.54
63.84	168.22	2.15	170.37
80.00	167.99	1.57	169.56
85.81	167.78	1.50	169.27
100.00	167.60	1.03	168.63
115.83	167.47	0.45	167.92
120.00	167.50	0.25	167.74
125.83	167.72	-0.19	167.53
135.83	167.80	-0.52	167.27
140.00	167.07	0.12	167.19
160.00	166.41	0.38	166.79
178.72	166.60	-0.19	166.41
180.00	166.54	-0.15	166.39
181.22	166.49	-0.11	166.37
183.72	166.27	0.08	166.35
186.62	165.87	0.46	166.34
189.12	165.56	0.74	166.29
191.62	165.01	1.17	166.19
200.00	164.68	1.05	165.72
216.52	164.75	0.07	164.82
219.02	164.90	-0.23	164.67
220.00	164.89	-0.29	164.61
221.52	164.86	-0.36	164.50
231.65	164.59	-0.80	163.79
234.15	164.54	-0.88	163.66
236.65	164.51	-0.90	163.61
240.00	164.50	-0.91	163.59
247.37	164.44	-0.88	163.55
249.87	164.45	-0.87	163.59
252.37	164.51	-0.79	163.72
259.72	164.50	-0.27	164.23
260.00	164.50	-0.25	164.25

ROADING LONG SECTION CL01



DATUM R.L. = 150.00

CHAINAGE	EXISTING SURFACE	CUT / FILL DEPTH	CL DESIGN LEVELS
250.00	164.46	-0.87	163.59
252.37	164.51	-0.79	163.72
259.72	164.50	-0.27	164.23
260.00	164.50	-0.25	164.25
262.22	164.48	-0.11	164.37
264.72	164.62	-0.19	164.43
280.00	164.64	-0.05	164.58
300.00	164.51	0.28	164.78
300.64	164.49	0.30	164.79

ROADING LONG SECTION CL01

WOODS
Est.1970

NOTES

1. REFER TO DRAWING 042-RCT_401-C0-200 FOR FURTHER NOTES AND SECTION LOCATIONS.
2. CONTRACTOR TO CONFIRM TO ENGINEER INSITU SUBGRADE CBR PRIOR TO TRIMMING TO FINAL SUBGRADE LEVEL.
3. 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

LEGEND

EXISTING GROUND LEVEL — — — —

FINISHED GROUND LEVEL ————

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	WMV	14/08/20

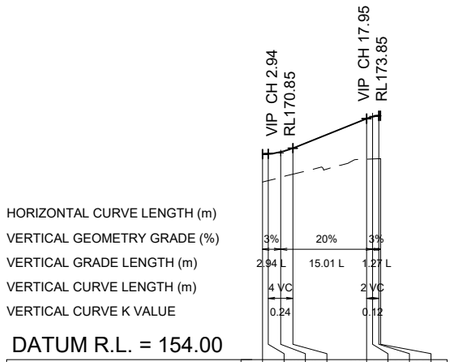
SURVEYED		29 DONALD STREET KARORI WELLINGTON 6012
DESIGNED	JLS	
DRAWN	JLS	
CHECKED	MC	
APPROVED	MC	WOODS.CO.NZ

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

ROAD LONGITUDINAL SECTIONS

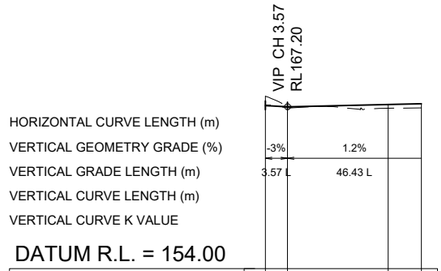
STATUS	ISSUED FOR CONSENT	REV
SCALE	H: 1:1000 V: 1:500 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C3-250	



DATUM R.L. = 154.00

EXISTING SURFACE	168.49	168.61	168.86	169.12	170.35	170.37	170.39	170.39	
CUT / FILL DEPTH	2.27	2.18	2.07	2.13	3.30	3.44	3.50		
CL DESIGN LEVELS	170.76	170.79	170.93	171.25	173.65	173.81	173.88		
CHAINAGE	0.00	0.94	2.94	4.94	16.95	17.95	18.95	19.26	

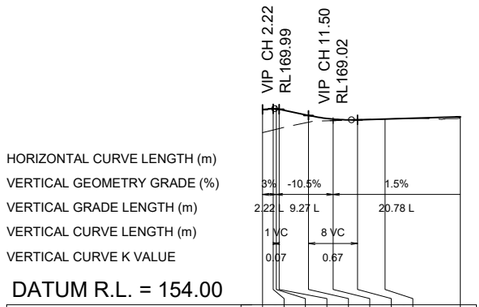
ROADING LONG SECTION CL02



DATUM R.L. = 154.00

EXISTING SURFACE	168.07	167.24		167.07	167.11
CUT / FILL DEPTH	-0.77	-0.05		0.32	0.35
CL DESIGN LEVELS	167.30	167.20		167.39	167.46
CHAINAGE	0.00	3.57		20.00	25.43

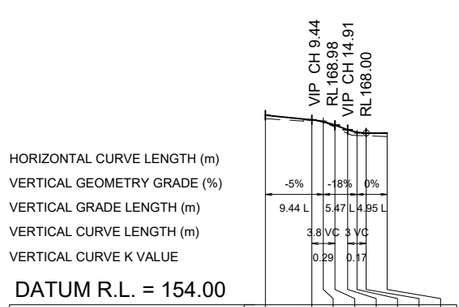
ROADING LONG SECTION CL04



DATUM R.L. = 154.00

EXISTING SURFACE	168.04	168.25	168.31	168.37	168.88	169.02	169.08	169.15	169.24
CUT / FILL DEPTH	1.88	1.73	1.66	1.57	0.56	0.12	-0.01	-0.00	0.09
CL DESIGN LEVELS	169.93	169.98	169.98	169.94	169.44	169.14	169.08	169.15	169.33
CHAINAGE	0.00	1.72	2.22	2.72	7.50	11.50	15.50	20.00	32.27

ROADING LONG SECTION CL03



DATUM R.L. = 154.00

EXISTING SURFACE	169.18	169.08	168.88	168.47	167.97	167.80	167.77	167.71
CUT / FILL DEPTH	0.28	0.00	0.04	0.17	0.30	0.27	0.23	0.29
CL DESIGN LEVELS	169.46	169.08	168.92	168.64	168.27	168.07	168.00	168.00
CHAINAGE	0.00	7.54	9.44	11.34	13.41	14.91	16.41	19.86

ROADING LONG SECTION CL05

WOODS
Est.1970

NOTES

1. REFER TO DRAWING 042-RCT_401-C0-200 FOR FURTHER NOTES AND SECTION LOCATIONS.
2. CONTRACTOR TO CONFIRM TO ENGINEER INSITU SUBGRADE CBR PRIOR TO TRIMMING TO FINAL SUBGRADE LEVEL.
3. 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

LEGEND

EXISTING GROUND LEVEL — — — — —

FINISHED GROUND LEVEL ———————

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	WMV	14/08/20

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

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

ROAD LONGITUDINAL SECTIONS

STATUS	ISSUED FOR CONSENT	REV
SCALE	H: 1:1000 V: 1:500 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C3-251	

WOODS
EST.1970

LEGEND

- SITE BOUNDARY
- EXISTING BOUNDARY
- PROPOSED STORMWATER
- STORMWATER MANHOLE
- STORMWATER SUMP
- SECONDARY FLOWPATH
- EXISTING STORMWATER TO REMAIN
- EXISTING STORMWATER TO BE REMOVED

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
2. 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.
3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND PROTECT EXISTING SERVICES DURING WORKS.
4. ALL STORMWATER PIPES TO BE uPVC SN8 OR RCRRJ CLASS 4 TO AS/NZS:1260.

REVISION DETAILS		BY	DATE
1	FOR DISCUSSION	WMV	11/08/20
2	ISSUED FOR CONSENT	WMV	14/08/20

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

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

STORMWATER DRAINAGE LAYOUT

STATUS	ISSUED FOR CONSENT	REV
SCALE	1:750 @ A3	2
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C0-300	

WOODS
EST.1970

LEGEND

- SITE BOUNDARY
- BUILDING OUTLINE
- EXISTING BOUNDARY
- PROPOSED STORMWATER NETWORK
- EXISTING STORMWATER NETWORK

CATCHMENT SW00284 AREA: 829m²
CATCHMENT SW00280 AREA: 3146m²
CATCHMENT SW49287 AREA: 1733m²
CATCHMENT SW00282 AREA: 2220m²
CATCHMENT 04/2 AREA: 2158m²
CATCHMENT 04/3 AREA: 1005m²
CATCHMENT SW00284 AREA: 829m²
CATCHMENT 02/1 AREA: 2993m²
CATCHMENT SW50965 AREA: 3563m²
CATCHMENT 01/2 AREA: 2974m²
CATCHMENT 01/3 AREA: 4026m²
CATCHMENT 01/5 AREA: 1098m²
CATCHMENT SW17729 AREA: 879m²
CATCHMENT 03/1 AREA: 3108m²
CATCHMENT 05/2 AREA: 7933m²

B01A
B01B
B02
B03
B04
B05
B06
OCTOGEN BLOCK (EXISTING)
B01A (EXISTING)
VILLAGE CENTRE ENTRY
DONALD STREET
CAMPBELL STREET

REVISION DETAILS		BY	DATE
1			

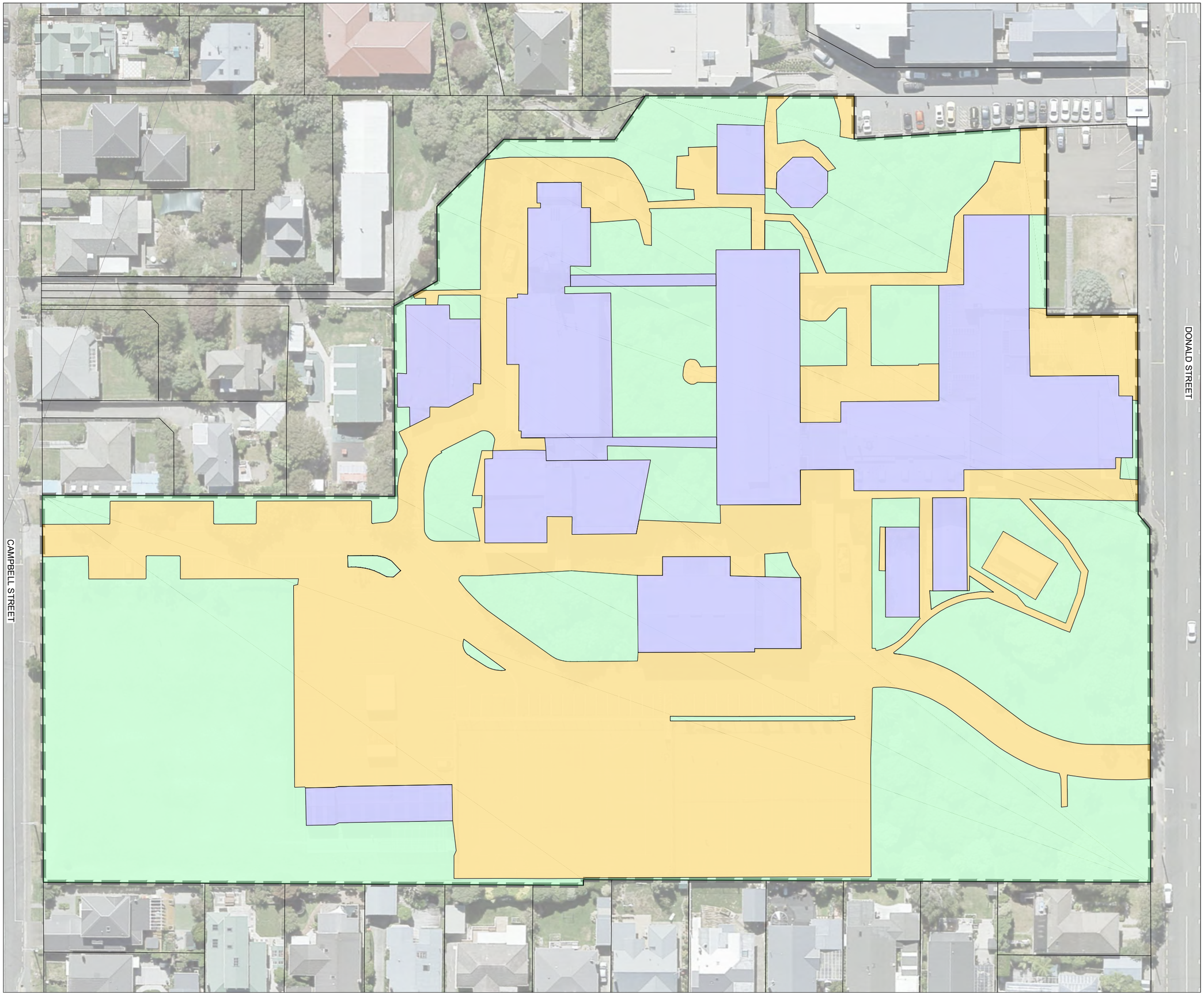
SURVEYED	-	29 DONALD STREET KARORI WELLINGTON 6012
DESIGNED	WMV	
DRAWN	WMV	
CHECKED	MC	
APPROVED	MC	WOODS.CO.NZ

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

STORMWATER CATCHMENTS

STATUS	ISSUED FOR CONSENT	REV
SCALE	1:1000 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C0-320	



WOODS
EST.1970

LEGEND

SITE EXTENTS

PROPOSED BOUNDARY

EXISTING BOUNDARY

ROOF

PAVED

LANDSCAPING

IMPERVIOUS AREA SCHEDULE

ROOF/BALCONY	6192 m²	20.3%
PAVED	11690 m²	38.2%
LANDSCAPING	12695 m²	41.5%
TOTAL	**30577 m²**	**100.0%**

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	WMV	14/08/20

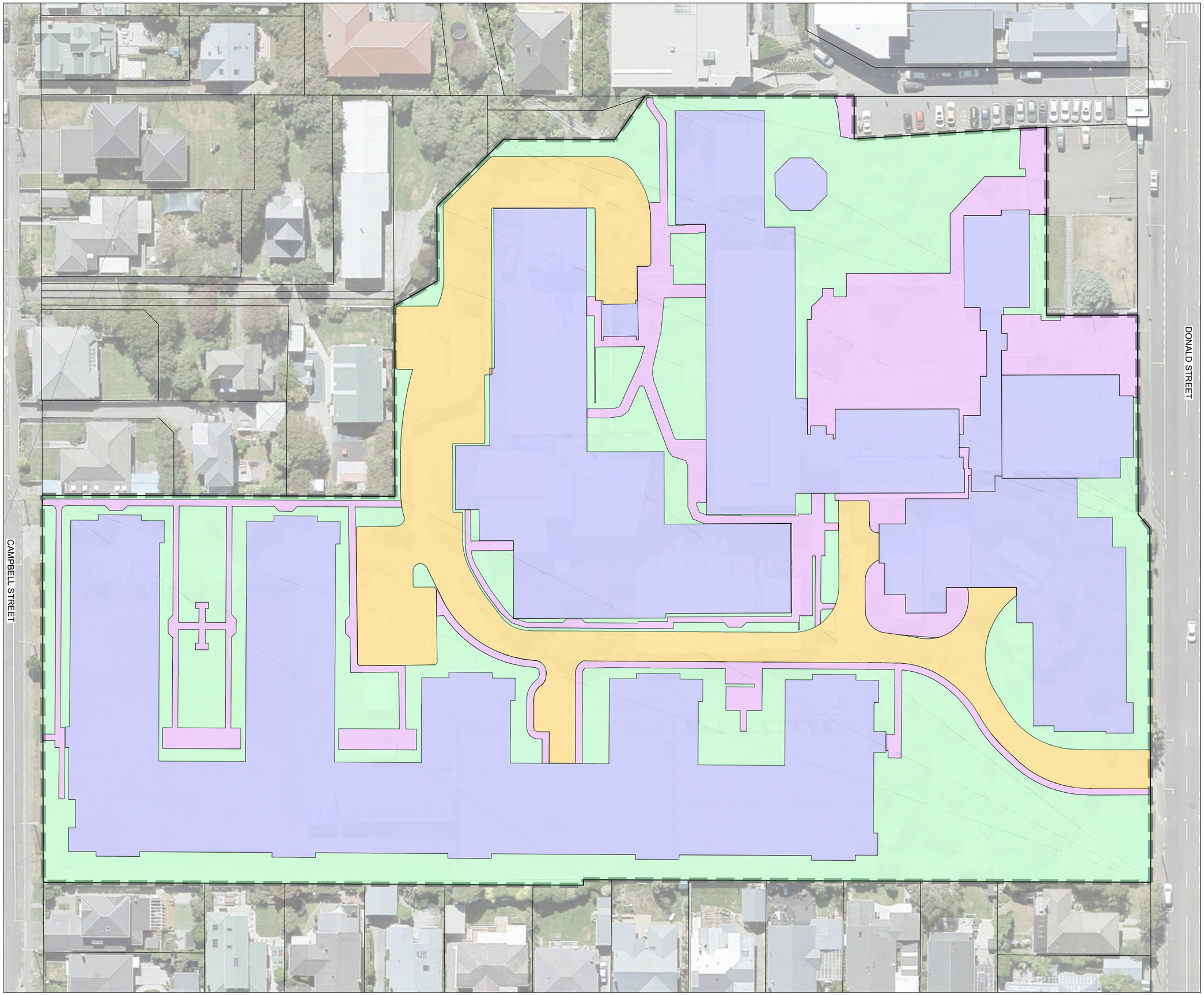
SURVEYED	-	29 DONALD STREET KARORI WELLINGTON 6012
DESIGNED	CC	
DRAWN	CC	
CHECKED	MC	
APPROVED	MC	WOODS.CO.NZ

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

PRE-DEVELOPMENT IMPERVIOUS SURFACES

STATUS	ISSUED FOR CONSENT	REV
SCALE	1:750 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C0-325	



WOODS
EST.1970

LEGEND

SITE EXTENTS

PROPOSED BOUNDARY

EXISTING BOUNDARY

ROOF

PAVED - ROADING

PAVED - PEDESTRIAN

LANDSCAPING

IMPERVIOUS AREA SCHEDULE

ROOF/BALCONY	14396 m²	47.1%
PAVED	7390 m²	24.2%
LANDSCAPING	8791 m²	28.8%
TOTAL	**30577 m²**	**100.0%**

REVISION DETAILS		BY	DATE
1	EXTENDED CATCHMENTS	CC	27/07/20
2	ISSUED FOR CONSENT	WMV	14/08/20

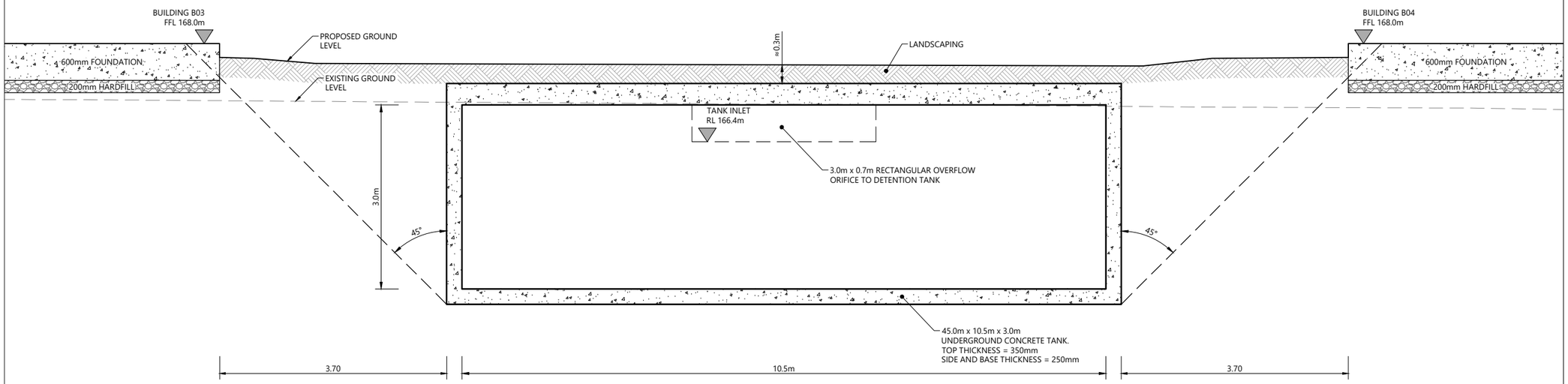
SURVEYED	-	29 DONALD STREET KARORI WELLINGTON 6012
DESIGNED	CC	
DRAWN	CC	
CHECKED	MC	
APPROVED	MC	WOODS.CO.NZ

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

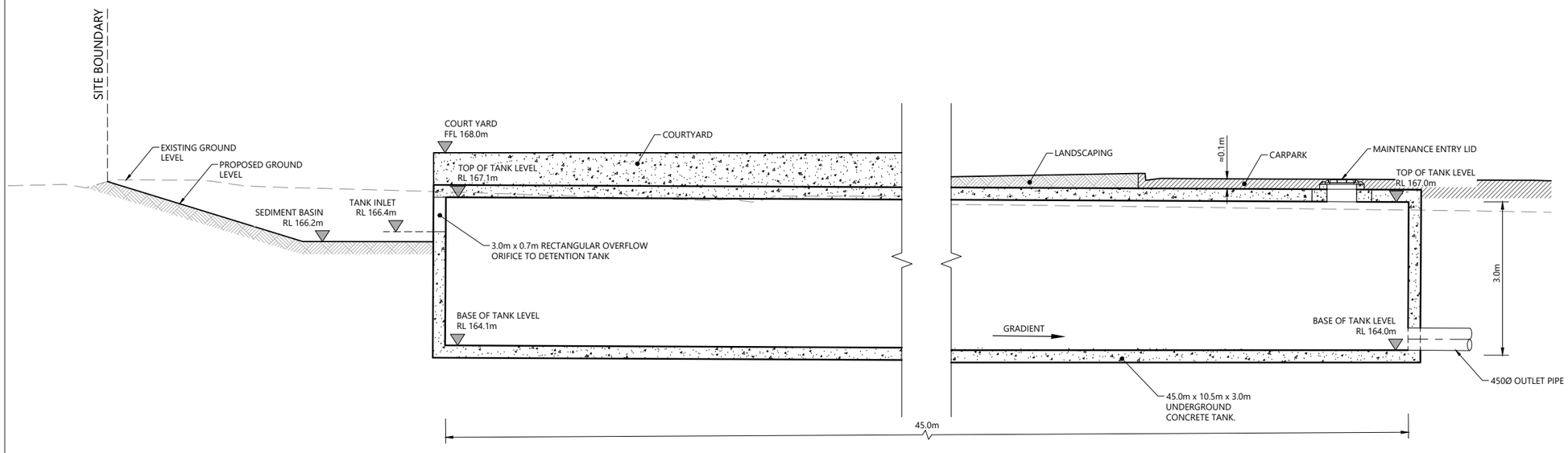
POST-DEVELOPMENT IMPERVIOUS SURFACES

STATUS	ISSUED FOR CONSENT	REV
SCALE	1:750 @ A3	2
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C0-326	



STORMWATER DETENTION TANK SECTION A

SCALE 1 : 75 @ A3



STORMWATER DETENTION TANK SECTION B

SCALE 1 : 100 @ A3

REVISION DETAILS		BY	DATE
1	FOR DISCUSSION	WMV	11/08/20
2	ISSUED FOR CONSENT	WMV	14/08/20

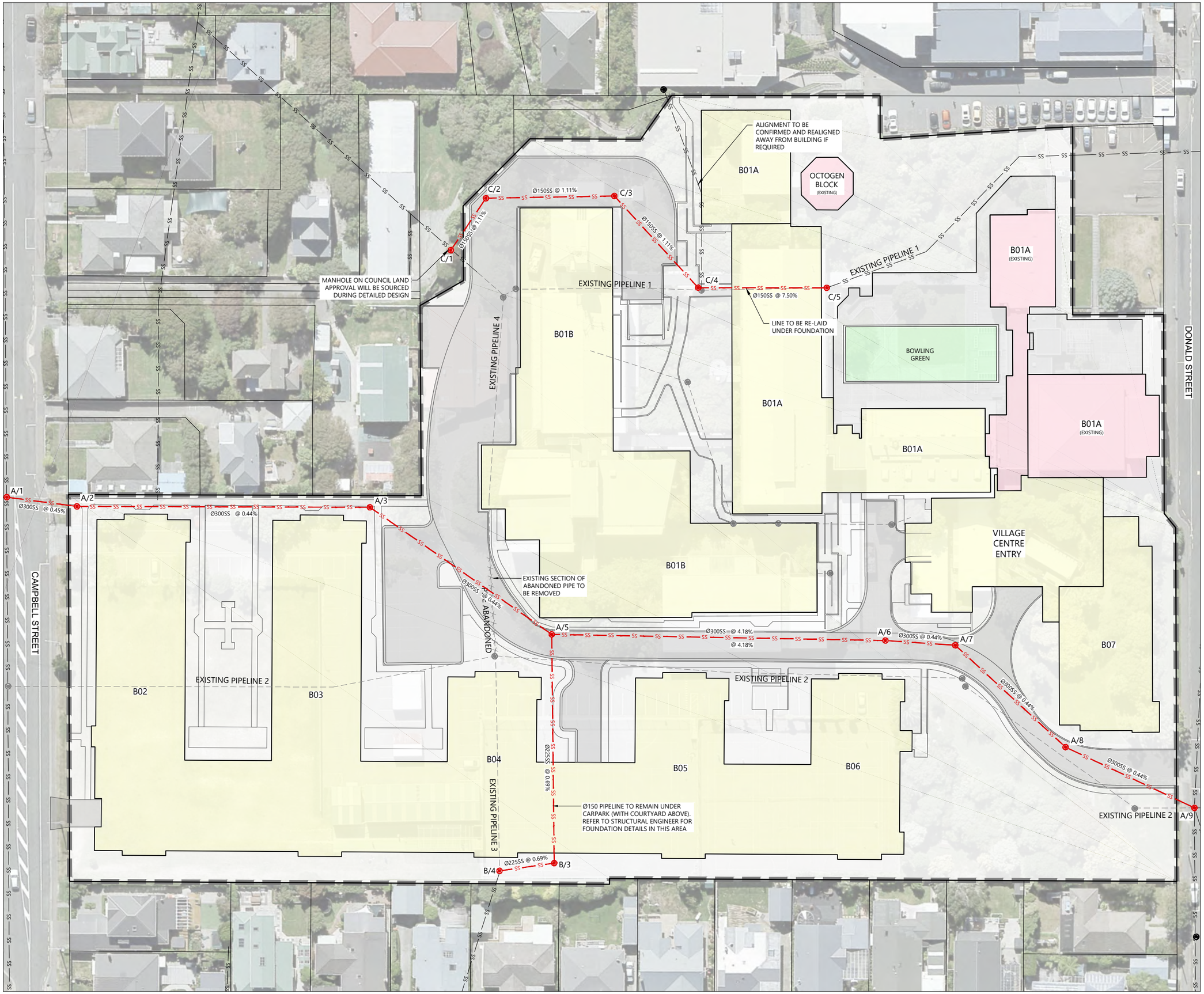
SURVEYED	-	29 DONALD STREET KARORI WELLINGTON 6012
DESIGNED	JLS	
DRAWN	WMV	
CHECKED	MC	
APPROVED	MC	WOODS.CO.NZ

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

STORMWATER DETAILS

STATUS	ISSUED FOR CONSENT	REV
SCALE	AS SHOWN	2
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C4-380	



WOODS
EST.1970

LEGEND

- STAGE BOUNDARY
- PROPOSED BOUNDARY
- EXISTING BOUNDARY
- EXISTING WASTEWATER TO REMAIN
- PROPOSED WASTEWATER
- EXISTING WASTEWATER TO BE REMOVED

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
2. 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.
3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND PROTECT EXISTING SERVICES DURING WORKS.
4. ALL PVC PIPES TO BE uPVC SN8 TO AS/NZS:1260

REVISION DETAILS		BY	DATE
1	FOR DISCUSSION	JLS	30/07/20
2	ISSUED FOR CONSENT	WMV	14/08/20

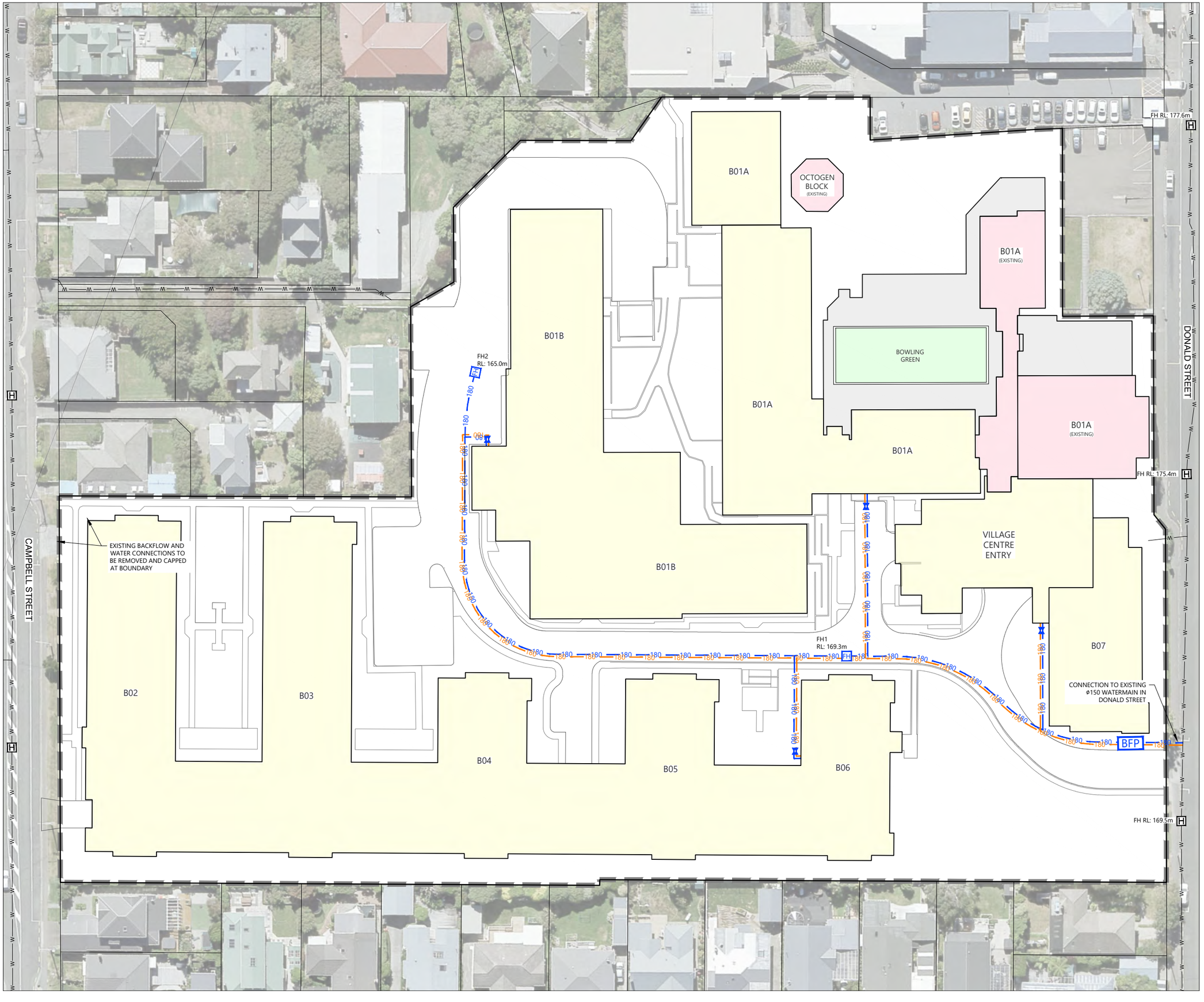
SURVEYED	-	29 DONALD STREET KARORI WELLINGTON 6012
DESIGNED	JLS	
DRAWN	JLS	
CHECKED	MC	
APPROVED	MC	WOODS.CO.NZ

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

WASTEWATER DRAINAGE LAYOUT

STATUS	ISSUED FOR CONSENT	REV
SCALE	1:750 @ A3	2
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C0-400	



WOODS
Est.1970

LEGEND

- SITE BOUNDARY
- EXISTING BOUNDARIES
- EXISTING WATER MAIN — W — W — W —
- DN180 PE100 PN16 WATER MAIN — 180 — 180 — 180 —
- DN180 PE100 PN16 FIRE MAIN — 180 — 180 — 180 —
- FIRE HYDRANT FH
- VALVE
- END CAP
- BACK FLOW PREVENTER BFP

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
2. 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.
3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND PROTECT EXISTING SERVICES DURING WORKS.

WATER

1. ALL MAINS TO BE PE100 SDR 11 TO THE SIZE NOTED.
2. ALL SUBMAINS TO BE DN63 PE80B PN12.5.
3. ALL FITTINGS TO BE PN16

REVISION DETAILS		BY	DATE
1	FOR DISCUSSION	MRM	29/07/20
2	ISSUED FOR INFORMATION	JLS	4/08/20
3	ISSUED FOR CONSENT	WMV	14/08/20

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

RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

WATER RETICULATION PLAN

STATUS	ISSUED FOR CONSENT	REV
SCALE	1:750 @ A3	3
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	042-RCT_401_C0-600	

To	From
Nadia Nitsche, Olena Chan *Wellington Water*	*Ajay Desai* *Senior Technical Specialist – 3 Waters* *Woods*
Circulation: EXTERNAL	*W-REF: P18-158* *13 July 2020*

Meeting Minutes - 8/07/2020

Ryman Healthcare - Karori Retirement Village proposal: Modelling meeting

Location	Wellington Water office			
Time & Date	11AM	8/07/2020	**Taken by**	Ajay Desai
Attendees	**Initials**	**Name**		**Company**
	NN	Nadia Nitsche		Wellington Water
	OC	Olena Chan		Wellington Water
	MC	Mark Cochran		Woods
	AD	Ajay Desai		Woods
	MB	Matthew Brown		Rymans
	PW	Pranil Wadan		Woods
	RM	Rhyann McCoy		AWA
Apologies	**Initials**	**Name**		**Company**
	DW	David Wilson		The Urban Engineers

Description

Discuss the findings of peer review of Stormwater Modelling undertaken by Woods for the 'Ryman Healthcare - Karori Retirement Village proposal' completed by Beca and agree on the way forward for updating the latest Karori Stormwater model built by Wellington Water to be used for effects assessment of the propose Karori Retirement Village development.

Minutes

BACKGROUND

1) MC gave a brief introduction of the proposed development and the peer review undertaken by Woods. He confirmed that Woods would be working with Wellington Water to find an acceptable Stormwater solution to achieve flood neutrality based on a revised flood effects assessment using the latest Wellington Water Council models and working in collaboration with the modelling and Land Development teams. OC clarified that Wellington Water can advice and review the proposal under the RMA and LGA framework for 3-waters. The design responsibility lies completely with the applicant and their consultants only. Wellington Water can provide necessary information in terms of network data and hydraulic models on request by the applicant or their consultants.

KEY PEER REVIEW FINDINGS OF STORMWATER MODELLING UNDERTAKEN BY BECA

2) AD highlighted the issues identified with the peer review of Stormwater modelling work undertaken by Beca provided along with the consent documents. Following points were briefly discussed and closed –

    a. The stormwater solution identified by Beca had baseflows diverted through the proposed storage tank which could be avoided by having a high-level overflow/bypass to storage for larger event flows only

    b. HiRDSv4 rainfall was used by Beca whereas HiRDSv3 is used by Wellington Water for this model

    c. The 20% rainfall uplift by Beca seems to be applied to rainfall intensities and not rainfall depths, there were no rainfall depths reported to check

    d. AD noted that the Wellington Water Modelling (WWM) guidelines (Cardno, 2019) require Climate change uplift to be applied by adding 20% to HiRDS historic rainfall depths). However, MFE guidelines (Ministry for the Environment September 2018 publication (Climate Change Projections for New Zealand: Atmosphere Projections Based on Simulations from the IPCC Fifth Assessment, 2nd edition)) Table 11 gives an increase of maximum of 13% for Wellington region for 2100 and 11% for 2110 (Table 12). 20% increase is noted for South west of South Island only in Table 1 of the report. NN confirmed that the approach has been set by Greater Wellington Council Regional Council and will provide the background information.

    e. The reported volume is based on model outputs and has not been verified or reviewed by Beca prior to identifying stormwater solutions to achieve flood neutrality with the proposed development.

CONSULTATION WITH WELLINGTON WATER BY BECA

3) OC confirmed that Beca have consulted with Wellington Water in the past to discuss onsite and off-site stormwater mitigations, but the option presented in the consent documents was not discussed or tabled prior to lodgement.

4) OC/NN/RM confirmed that there has been no advice given by Wellington Water to Beca to restrict flows to a certain rate to the public stormwater network along Campbell Street or to the open stream to the north of the site. The only advice was to have baseflows discharging to the stream and piped flows to the Stormwater network in a manner that it does not results in increased flooding downstream with the proposed development.

REVISED STORMWATER MANAGEMENT APPROACH (to be undertaken by Woods)

5) All: It was agreed that Wellington Water's Karori Stormwater model is a catchment level model built as per the Wellington Water modelling specification for Council planning purposes. It is the best available tool to assess flood effects for the proposed development with refinements in the vicinity of the site to understand the real flood risk to the current site and undertake an effects assessment with the proposed development.

6) NN/RM confirmed that the Karori Stormwater model and model build report is now finalised and will be provided to Rymans/Woods to undertake effects assessment of the proposed development.

7) AD suggested that, to get a more realistic scenario of flood risk in and around the proposed development (in existing and proposed conditions) the model needs to be refined locally around the site. The followings points were discussed and agreed to have a revised Base case scenario model:

    a. All building footprints/structures are currently modelled with high roughness values to restrict overland flow paths but majority of the houses upstream of the project site along Scapa terrace, Firth Terrace and Donald Street are sitting on slab/ground and would halt any overland flow paths. These houses/garages are to be identified based on-site visits and Google Street views and modelled as voids.

b. Retaining walls are permanent structures but not included in the model. These are to be identified and modelled based on-site visits and Google Street views and modelled as linear features with wall heights.

c. Fences are not included within the model as these are not permanent structures and may collapse with large flows. Fences not to modelled as these do not require a consent for removal/addition and can have flows overtopping them.

d. The model will be updated to incorporate the topographical survey available for the site.

e. The revised model schematisation will be discussed and agreed between AD/NN/RM prior to updating the model.

8) NN confirmed that the effects assessment should be completed using the rainfall data available within the model database and does not need to be updated from HiRDSv3 to HiRDSv4 as the purpose is understand the flood risk differences between the base case and proposed development case.

9) The post development scenario to be modelled using the updated Base model by incorporating the proposed design surface, buildings and Stormwater reticulation system within the site.

10) The base case and post development scenario to be run for the 100yr Climate Change 12hour storm event with allowance for climate change uplift as per WWM guidelines and results to be compared to understand if there are any flood effects as a result of the proposed development.

11) Any flood effects upstream or downstream of the proposed development site be managed with a practical on-site Stormwater solutions identified to achieve neutrality for 100yr Climate Change storm event (12hour storm event with allowance for climate change uplift) in terms of flood effects as per following –

a. No increased flooding upstream or downstream along the overland flow paths/flood extents of the proposed site compared to base case in terms of flood levels and/or flood extents

b. Flows to the Stormwater network to not result in increased flooding downstream with manholes spilling more than base case in terms of flood levels and/or flood extents

c. Provide detention tank (based on the flood results) to restrict flows to have no increased flooding with the proposed development upstream or downstream

d. Discuss the proposed Stormwater solution identified

OTHER DISCUSSIONS

12) MC: The Stormwater pipe alignment (that discharges towards Campbell Street) within the site differs from that shown by Beca in their report. RM confirmed this and also noted that there is a CCTV survey undertaken along with an as built of the diversion chamber which can be provided.

13) MC/AD: Local diversions will be necessary to the existing Stormwater network within the site will be finalised based on the outputs from modelling exercise. The diverted pipe network would vest in council however it is WWL understanding that any detention structure would be owned and maintained by Ryman

14) MC: Some of the local wastewater pipes with the site may need to be realigned/upgraded. Some existing Council mains run under existing buildings (i.e. northern line). There are no real alternatives to divert these within the site and may ned to be retained under the new proposed building. OC noted Council policy is to have no new lines under buildings, however if there is an existing line this would be allowed). RM suggested that a wastewater pipe could be built along the centre line of Donald Street to divert northern line. RM to check Council Model and confirm if this is an option.

15) NN confirmed that there is a wastewater and water supply model for this area and is happy to provide the models or data as needed. MC noted that Wastewater requires 24hrs storage during

rain events (WWL requirement). It was agreed that this storage is only required for the increased flows with the proposed development above the existing development flows. NN to obtain flow data from model confirming flows into the site via the existing pipe network and the University flows allowed for in the model.

16) MC: Wellington Water has requested (Via RFI) for a revised design with public main through site connected at Campbell Street and Donald Street. MC noted that most Ryman Village developments are serviced via one connection point and would only require one connection off Donald Street. OC to follow up and confirm.

Action Items	Responsibility	Date
a) Provide latest Karori Stormwater model and associated model build report	RM	Completed
b) Provide latest Karori Wastewater model and associated model build report	NN	17/07/2020
c) Provide as built data and CCTV for the public Stormwater pipe within the site	RM	Completed
d) Provide revised model schematisation with building, retaining walls, other key features to be included in the model	AD	17/07/2020
e) Arrange meeting between Wellington Water and Woods post updates to base model to discuss possible stormwater options	AD	21/07/2020

Ajay Desai

Senior Technical Specialist – 3 Waters

Approved as true and accurate record of meeting

From: Ajay Desai
Sent: Wednesday, 22 July 2020 9:18 am
To: Nadia Nitsche ; Rhyann McCoy; Olena Chan; david@theurbanengineers.co.nz
Cc: Matthew Brown; Mark Cochran; Pranil Wadan
Subject: RE: Ryman Retirement village proposal - meeting minutes

Hi All,

We have managed to make some progress since we last met and updated the base model as discussed in the meeting. We have looked at the properties along the following roads and identified which retaining walls and houses (building footprints representing houses and garages) would obstruct flows –

- Campbell Road
- Donald Street
- Firth Terrace
- Scapa Terrace

The shapefiles for the building footprints checked along with street views captured are provided in the OneDrive link along with the updated icmt file with a new network representing the revised Base scenario model –
https://woodandpartner-my.sharepoint.com/:f:/g/personal/ajay_desai_woods_co_nz/Ep_iHypisORCopQUe43Q8E8BJSP271V98W2JSLdu4JukIA?e=R5gbko

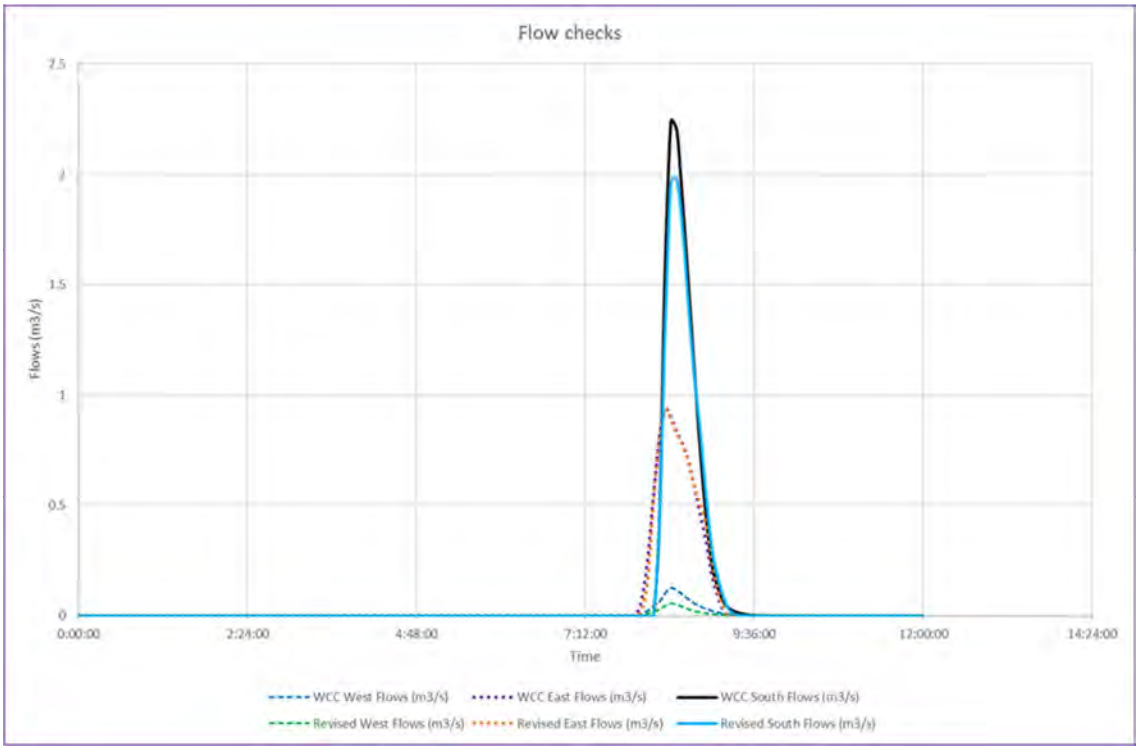
A revised base case scenario modelled with following refinements –

1. Latest topographical survey for the Rymans site has been superimposed on top of the bathymetry file available in the model database
2. All building footprints identified above are modelled as mesh zones
3. Buildings to be blocked are raised by 10m
4. The retaining walls identified were modelled as porous walls with estimated heights

The updated based model was run for the 100yr CC and 10yr CC scenarios and flood results were reviewed to understand the differences. The flood extents within the site are generally similar within the Rymans site with following differences in overland peak flows for the 100yr CC (no overland flows for 10yr with CC – for existing base and with recent updates) –

Flow locations	WCC Base model (m^3/s)	WCC Base model + recent refinements (m^3/s)
Western Boundary	0.13	0.06
Eastern Boundary	0.94	0.93
Southern Boundary	2.24	1.98
TOTAL	**3.30**	**2.97**

See timeseries plot below –



The results show minor differences in peak flows and volumes but nothing significantly different. Based on these revised results, we are currently working on the post development scenario to incorporate the proposed design surface, hydrology and pipe network alignment changes. Our aim is to have some high level options to be discussed with Wellington Water in the next 2 – 3 weeks possibly with Nadia, Rhyann and David.

@Nadia - When can we expect to get a copy of the wastewater network model so as to proceed with wastewater modelling?

We are having separate discussion with David for water supply query. Please let us know if anything is unclear and we can discuss further.

Kind Regards,
Ajay

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From: Ajay Desai <ajay.desai@woods.co.nz>
Sent: Monday, 13 July 2020 9:23 am
To: Rhyann McCoy <rhyann.mccoy@awa.kiwi>; Olena Chan <Olena.Chan@wellingtonwater.co.nz>; Nadia Nitsche <Nadia.Nitsche@wellingtonwater.co.nz>; david@theurbanengineers.co.nz
Cc: Matthew Brown <matthew.brown@rymanhealthcare.com>; Mark Cochran <mark.cochran@woods.co.nz>; Pranil Wadan <pranil.wadan@woods.co.nz>
Subject: RE: Ryman Retirement village proposal - meeting minutes

Hi Rhyaan,

Hope you had a nice weekend! Thanks for sending the data links below, have downloaded the Wellington City Council dataset at this point but may move to LINZ dataset if this needs too much manual editing to remove additional vertices. Agree with your thought, there would be refining needed to avoid small elements within the 2D mesh.

Our aim to include buildings (which would alter overland flow paths) in the model is to get a realistic flood risk for the site and thereafter complete an effects assessment rather than assuming there are no existing buildings/retaining walls upstream and the flows are unobstructed. The revised base model would include the buildings and retaining walls which would affect the flow paths entering and exiting the site (along with documentation of the approach). We can then look at the revised model results together prior to any Optioneering.

Kind Regards,

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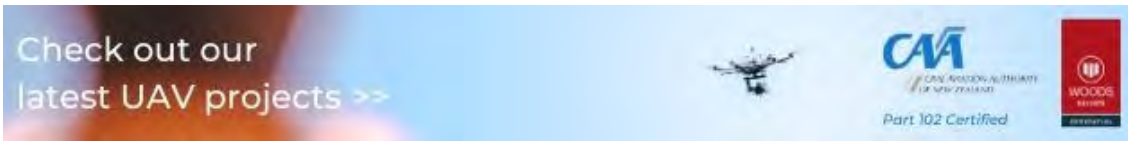

From: Rhyann McCoy <rhyann.mccoy@awa.kiwi>
Sent: Friday, 10 July 2020 2:05 pm
To: Olena Chan <Olena.Chan@wellingtonwater.co.nz>; Ajay Desai <ajay.desai@woods.co.nz>; Nadia Nitsche <Nadia.Nitsche@wellingtonwater.co.nz>; Pranil Wadan <pranil.wadan@woods.co.nz>; Mark Cochran <mark.cochran@woods.co.nz>; Matthew Brown <matthew.brown@rymanhealthcare.com>
Cc: david@theurbanengineers.co.nz
Subject: RE: Ryman Retirement village proposal - meeting minutes

Hi Ajay,

The updated minutes look good to me, however there may still be an outstanding question regarding point 7a in terms of the representation of buildings as voids. I see that you have allowed for a further discussion and agreement prior to updating the model and we may have to confirm this with Ben Fountain (Stormwater Chief Advisor) who returns from annual leave on Tuesday.

In any case, for this data there is a layer of building footprints which Wellington City Council maintain here:
https://data-wcc.opendata.arcgis.com/datasets/wellington-buildings?geometry=173.445%2C-41.435%2C176.059%2C-41.074

More recently LINZ has started producing a national buildings footprint layer which we have generally found to be slightly less accurate than the council layers but more up to date in some cases:
https://data.linz.govt.nz/layer/101290-nz-building-outlines/

Either source may be suitable depending on alignment with other information (site visit, street view etc), though some form of simplification is likely to be required in order to avoid issues with the 2d mesh. I appreciate that timeframes are quite tight so if you would like to move ahead and update the model with voids we can review the updated results and confirm the approach afterwards, though I will note that historically we would not void buildings of this size even when updating the models for site specific assessments.

Thanks,

Rhyann

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From: Olena Chan <Olena.Chan@wellingtonwater.co.nz>
Sent: Friday, 10 July 2020 11:47 AM
To: Ajay Desai <ajay.desai@woods.co.nz>; Rhyann McCoy <rhyann.mccoy@awa.kiwi>; Nadia Nitsche <Nadia.Nitsche@wellingtonwater.co.nz>; Pranil Wadan <pranil.wadan@woods.co.nz>; Mark Cochran <mark.cochran@woods.co.nz>; Matthew Brown <matthew.brown@rymanhealthcare.com>
Cc: david@theurbanengineers.co.nz
Subject: RE: Ryman Retirement village proposal - meeting minutes

Thanks.

I have attached the pre-app meeting notes from our discussion with Beca in Jan this year as requested. Note that there have been several other interactions since.

- Olena

From: Ajay Desai <ajay.desai@woods.co.nz>
Sent: Friday, 10 July 2020 11:37 AM
To: Olena Chan <Olena.Chan@wellingtonwater.co.nz>; Rhyann McCoy <rhyann.mccoy@awa.kiwi>; Nadia Nitsche <Nadia.Nitsche@wellingtonwater.co.nz>; Pranil Wadan <pranil.wadan@woods.co.nz>; Mark Cochran <mark.cochran@woods.co.nz>; Matthew Brown <matthew.brown@rymanhealthcare.com>
Cc: david@theurbanengineers.co.nz
Subject: RE: Ryman Retirement village proposal - meeting minutes

Thanks Olena. Agree with your comments, have incorporated in attached version.

Kind Regards,

Ajay Desai
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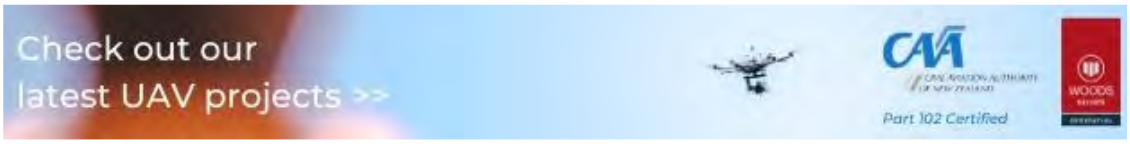

From: Olena Chan <Olena.Chan@wellingtonwater.co.nz>
Sent: Friday, 10 July 2020 10:37 am
To: Ajay Desai <ajay.desai@woods.co.nz>; Rhyann McCoy <rhyann.mccoy@awa.kiwi>; Nadia Nitsche <Nadia.Nitsche@wellingtonwater.co.nz>; Pranil Wadan <pranil.wadan@woods.co.nz>; Mark Cochran <mark.cochran@woods.co.nz>; Matthew Brown <matthew.brown@rymanhealthcare.com>
Cc: david@theurbanengineers.co.nz
Subject: RE: Ryman Retirement village proposal - meeting minutes

Thanks Ajay.

Looks good to me.

I have attached a couple of minor edits but the main thing is to be clearer that Wellington Water's role is to advise Council in the consenting process. We are unable to co-design as we are reviewing the proposal for assessment under the RMA on behalf of Council. In saying that, we aim to give useful feedback on your proposal and have no issues with providing you with the latest and up to date information we hold in order to inform your design.

David W – are you able to follow up on the RFI question on the water supply for me, please?

Thanks
Olena

Olena Chan **Manager Land Development**

Wellington Water

Email: olena.chan@wellingtonwater.co.nz

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We manage their drinking water, wastewater and stormwater services.

From: Ajay Desai <ajay.desai@woods.co.nz>
Sent: Friday, 10 July 2020 9:41 AM
To: Rhyann McCoy <rhyann.mccoy@awa.kiwi>; Nadia Nitsche

<Nadia.Nitsche@wellingtonwater.co.nz>; Olena Chan <Olena.Chan@wellingtonwater.co.nz>; Pranil Wadan <pranil.wadan@woods.co.nz>; Mark Cochran <mark.cochran@woods.co.nz>; Matthew Brown <matthew.brown@rymanhealthcare.com>
Cc: david@theurbanengineers.co.nz
Subject: Ryman Retirement village proposal - meeting minutes

Hi All,

Firstly I would like to thank everyone for catching up on such a short notice and secondly for the fruitful discussion where we managed to discuss all the concerns/queries everyone had. Please find the draft minutes for the meeting with actions listed with some tentative dates for completion. I am confident that we can resolve all the outstanding issues working collaboratively in this timeframe.

Thanks @Rhyann for a quick response and providing the model, survey data and email below, that is really useful! We will have a look at the model and come back if there is anything missing, assuming DEM data is within the icmt and we can use that.

In addition, are we able to get the building footprints layer which we can use for updating the models? I can see these on the ArcGIS portal but not sure how to download these, couldn't find building footprints layer under the open data portal.

Please feel free to amend as necessary and we can finalise by end of Wednesday. We will continue working on the model schematisation in the meanwhile as discussed in our meeting.

Kind Regards,

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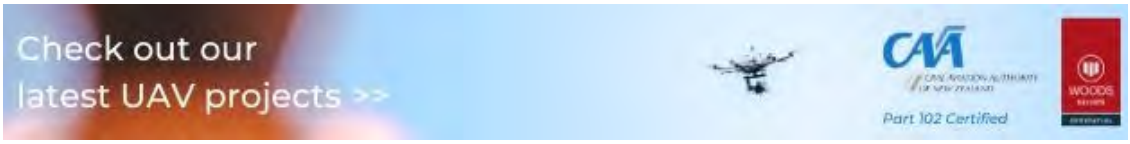

From: Rhyann McCoy <rhyann.mccoy@awa.kiwi>
Sent: Thursday, 9 July 2020 5:37 PM
To: Ajay Desai <ajay.desai@woods.co.nz>
Subject: RE: Rhymann Retirement village

Hi Ajay,

That's no problem, I was glad to help and remain involved with this site as it does have a bit of history. It certainly helped to have the discussion in person and hopefully everything is on the right track now!

I was just in the process of pulling a few things together when you e-mailed so I've uploaded the Karori model and report straight to the one drive folder. The model has been through external review and final approvals, meaning this will be the finalised catchment model for Karori and no further changes to the model itself are anticipated. Just for future reference I will note that some file naming and metadata conventions for WWL are being reviewed currently so there may be some cosmetic variations in the final model delivered to WWL (this is likely to be completed in the next few weeks).

There are some design events in this model that may not have been present in the previous model provided to Beca. However for the purpose of assessing the site it will remain just the impacts of the development during the 10 year and 100 year plus climate change events that will need to be evaluated (I confirmed this with Nadia).

Regarding the bypass pipeline, I've found some previous information including CCTV footage and the weir chamber plan which I've uploaded to the folder as well. Below is a plan that indicates which direction and distance each CCTV run corresponds to and the location of the weir chamber.

There was also a screenshot provided by the WWL data team (below) which shows what appears to be a trench line in Wellington City Councils 1996 aerial imagery that aligns with the CCTV. Therefore the current alignment should be fairly representative of reality, though only as accurate as the aerial and CCTV distances.

Sorry if that's a bit of information to sift through but please let me know if you've got any questions or if there are any issues with the files.

Thanks,

Rhyann

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From: Ajay Desai <ajay.desai@woods.co.nz>
Sent: Thursday, 9 July 2020 4:48 PM
To: Rhyann McCoy <rhyann.mccoy@awa.kiwi>
Subject: RE: Rhymann Retirement village

Hi Rhyaan

Thanks for coming along for the meeting yesterday, it was to good to have someone with full knowledge of the area and meet in person! Nadia always speak highly of you..

I am drafting the minutes for our meeting, would it be possible to pass on the models at the earliest for us to start looking at it. I am sharing a OneDrive link here to upload the data –

https://woodandpartner-my.sharepoint.com/:f:/g/personal/ajay_desai_woods_co_nz/ErqPQGc31ZpNv7IHksB6-DYBjAfL_7_odCH_6xB86tRWeA?e=YsYmAO

Kind Regards,

Ajay Desai
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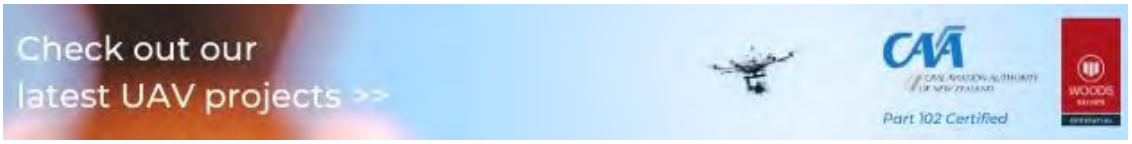

From: Ajay Desai <ajay.desai@woods.co.nz>
Sent: Thursday, 9 July 2020 4:29 PM
To: Nadia Nitsche <Nadia.Nitsche@wellingtonwater.co.nz>; Rhyann McCoy <rhyann.mccoy@awa.kiwi>
Subject: RE: Rhymann Retirement village

Thanks Nadia 😊

Ajay Desai
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ajay.desai@woods.co.nz
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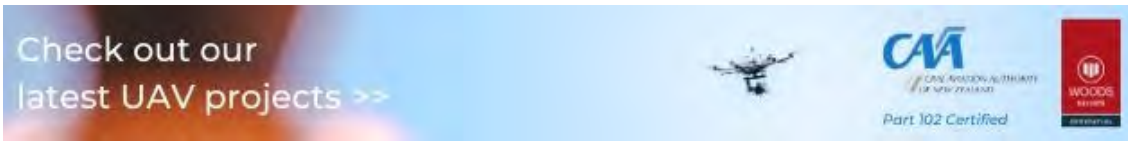

From: Nadia Nitsche <Nadia.Nitsche@wellingtonwater.co.nz>
Sent: Thursday, 9 July 2020 4:23 PM
To: Ajay Desai <ajay.desai@woods.co.nz>; Rhyann McCoy <rhyann.mccoy@awa.kiwi>
Subject: Rhymann Retirement village

Hi both

Just connecting the two of you ☺
Thanks
N

Nadia Nitsche **Modelling Manager**

Wellington Water

Tel +64 4 471 8361 **DDI** **Mob** 021 576 134

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Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt

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We manage their drinking water, wastewater and stormwater services.

Manu Miskell

From: David Wilson <david@theurbanengineers.co.nz>
Sent: Monday, 10 August 2020 10:23 am
To: Mark Cochran
Cc: Olena Chan; Nadia Nitsche; Hywel Lewis; Kos Maas
Subject: RE: Rymans Retirement Village Wastewater Assessment
Attachments: WW_WCC_2020-07-24_26 Donald St, Karori.pdf

Hi Mark,

Further to our discussion this last week please find attached Wellington Water's assessment of the network capacity of the mains that could service the property.

I have also provided below and e-mail from the modelling team regarding existing flows from the site. Keep in mind that the model is for the entire Karori catchment and not site-specific to the site.

I trust that the attached gives you sufficient insight into the local networks that could be used to service the property.

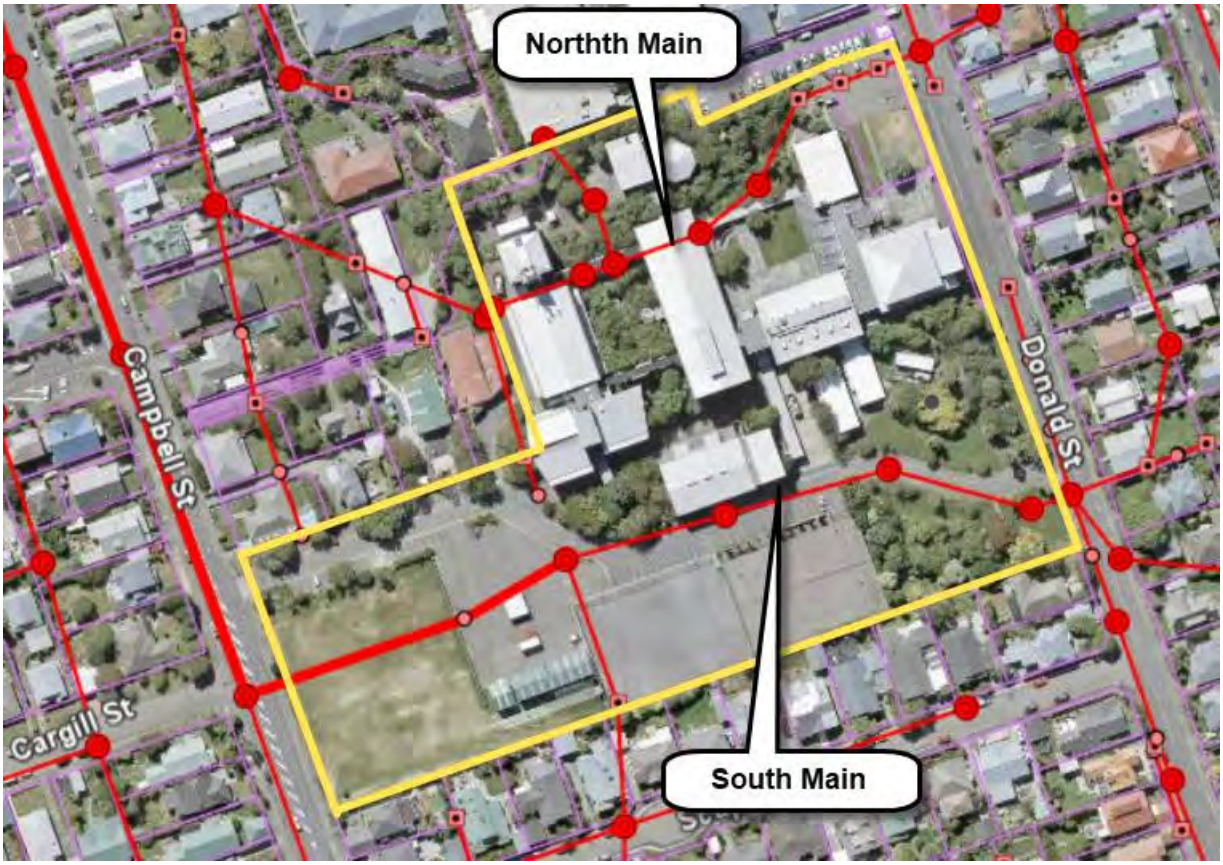
David Wilson
Principal Engineer/Director
The Urban Engineers
m 022 012 8828

From: Kos Maas <Kos.Maas@wellingtonwater.co.nz>
Sent: Friday, 31 July 2020 4:48 PM
To: David Wilson <david@theurbanengineers.co.nz>
Cc: Olena Chan <Olena.Chan@wellingtonwater.co.nz>; Nadia Nitsche <Nadia.Nitsche@wellingtonwater.co.nz>; Hywel Lewis <Hywel.Lewis@wellingtonwater.co.nz>
Subject: RE: Rymans Retirement Village Wastewater Assessment

Hi David,

Thanks for your email. Having discussed it with Olena I now understand that you are acting on behalf of WWL.

I have outlined the approximate extent of the subcatchments covering the site in the below image:



The subcatchments as represented in the model can be summarised as follows:

Connection	Area (ha)	Flow from Subcatchments (litres/sec)					
		Dry Weather Flow			1-yr ARI Wet Weather Flow		
		Min	Average	Max	Min	Average	Max
North Main	1.16	0.00	0.00	0.00	0.00	0.27	2.07
South Main	1.41	0.14	0.14	0.14	0.14	0.62	3.01
Total	2.57	0.14	0.14	0.14	0.14	0.89	5.08

The flows coming onto the site via the pipes is as follows:

Network	Flow in pipes from upstream subcatchments (litres/sec)					
	Dry Weather Flow			1-yr ARI Wet Weather Flow		
	Min	Average	Max	Min	Average	Max
North Main	0.04	0.14	0.45	0.05	0.39	1.84
South Main	2.23	3.52	7.42	2.37	8.94	32.48
Total	2.27	3.66	7.87	2.42	9.33	34.32

In theory the model could be used to evaluate the options for the current flows. I believe that there may be a separate modelling exercise (for which I don't currently have the results) for the MPD of the catchment.

I am still investigating the possibility of releasing the model (and the disclaimers, requirements, conditions, etc. under which this can be done)

Regards,

Kos

(Kos) Franciscus Maas Senior Engineer Modelling

Wellington Water

Tel 04 471 7159 **Mob** 027 671 9389

Private Bag 39804, Wellington Mail Centre 5045
Level 4, IBM House, 25 Victoria Street, Petone, Lower Hutt

www.wellingtonwater.co.nz

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Wellington Water

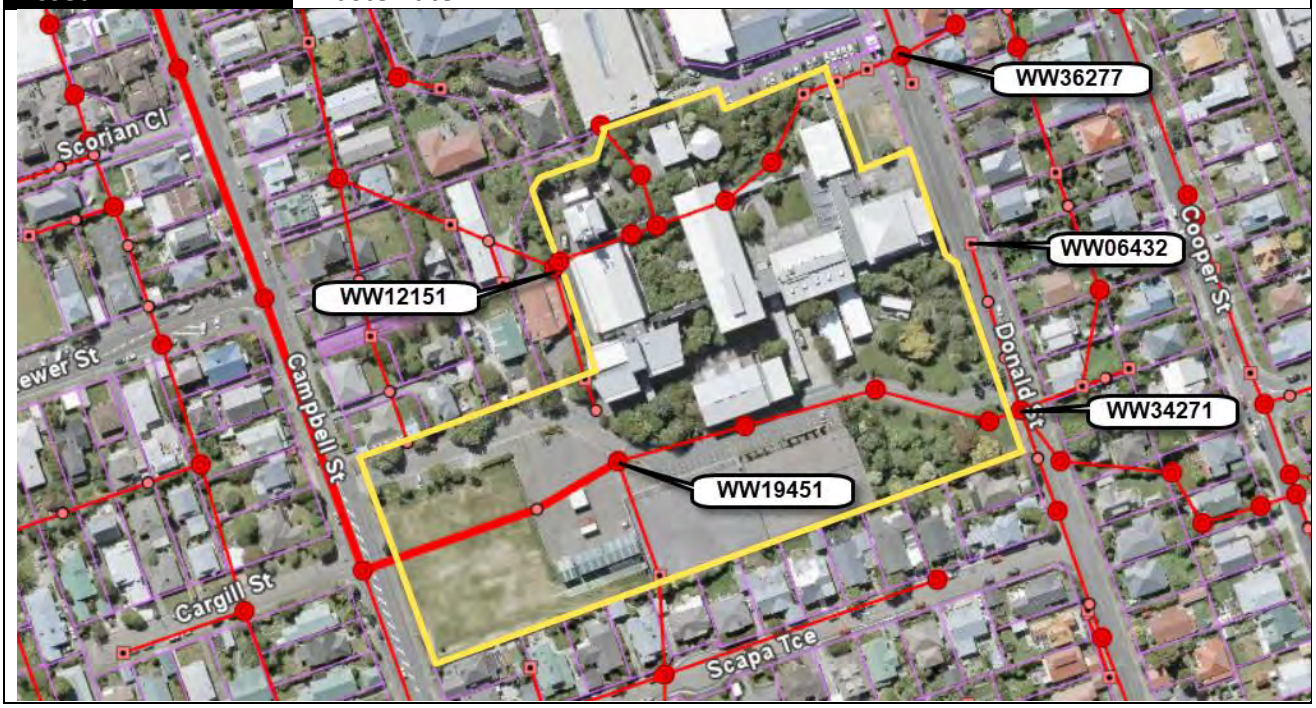
MEMO

TO	Rhyann McCoy (AWA)
COPIED TO	Hywel Lewis, Land Development Team
FROM	(Kos) Franciscus Maas
DATE	24 July 2020
SUBJECT	Wastewater development impact assessment for 26 Donald St, Karori

FOR YOUR INFORMATION

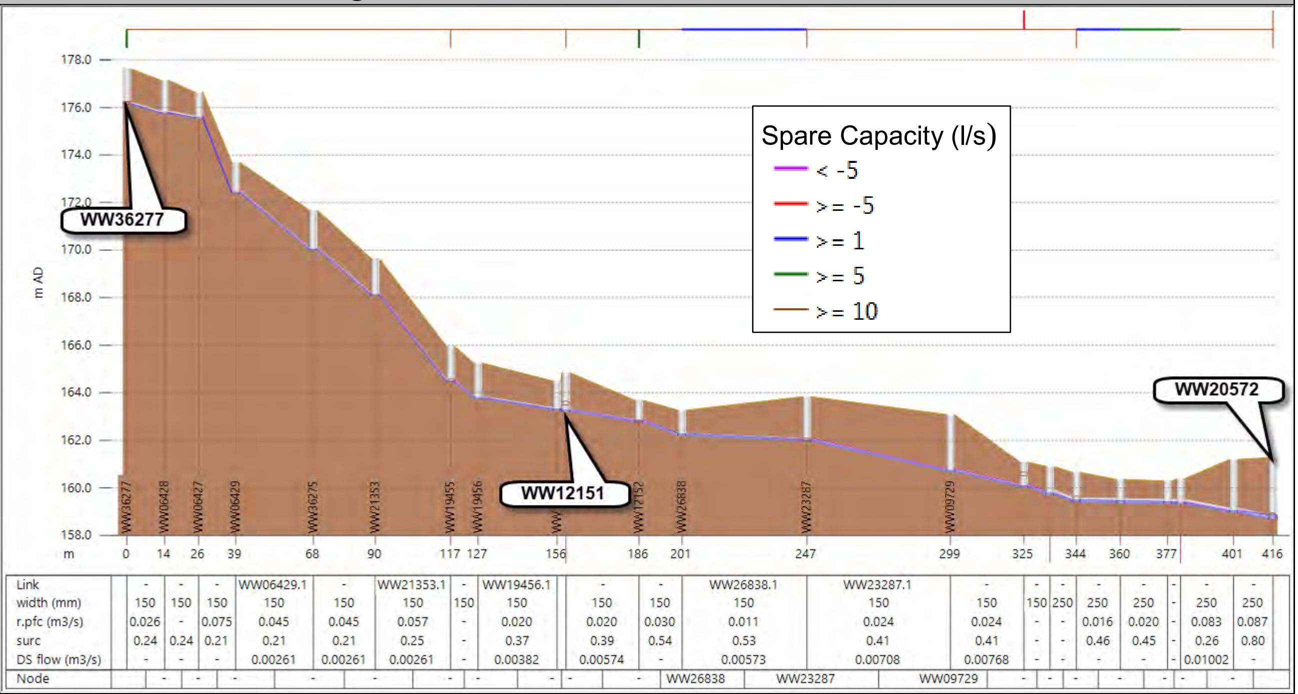
Asset impact assessment

DETAILS	
Address	26 Donald St, Karori, Wellington
Source	Email dated 23 July 2020
Type	Development enquiry
Reference	
Asset	Wastewater



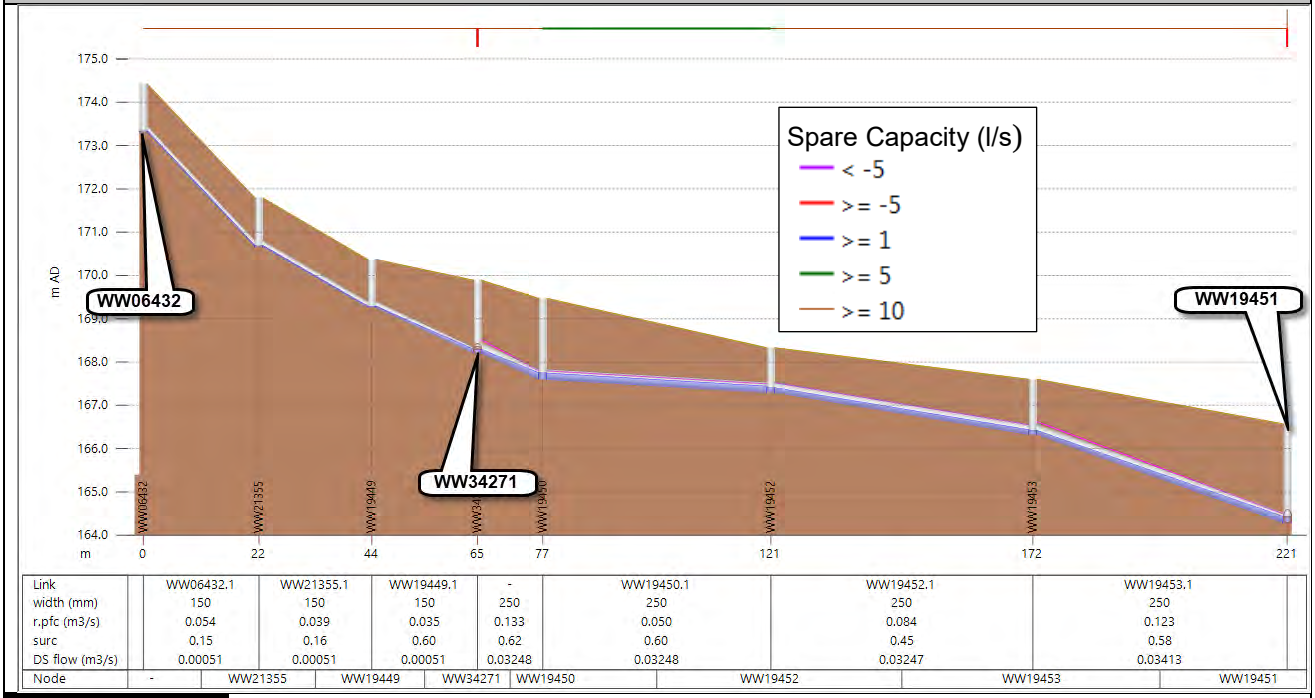
MODEL			
Software	InfoWorks ICM	Version	9.0
Model Name	Karori WwTP	Version	3
Base Year	2017 (current)		
Design Event	1-year LTS (Karori 1Y > Kelburn with evap)		

LOCAL NETWORK
The existing buildings on the property is connected to the local network between manholes WW36277 and WW12151. The property could also be connected to the local network between lamphole cleaning eye WW06432 and manhole WW19451.
LOCAL NETWORK – existing connection



Current Capacity	The existing buildings on the property is connected to the local network between manholes WW36277 and WW12151. This system discharges into the Campbell St trunk network at manhole WW20572. The capacity of this part of the local network varies though there are at least two sections downstream of manhole WW12151 that appear to have only about 1 litre/sec of spare design capacity during a 1-year LTS design event for further development of this property.

LOCAL NETWORK – alternative connection



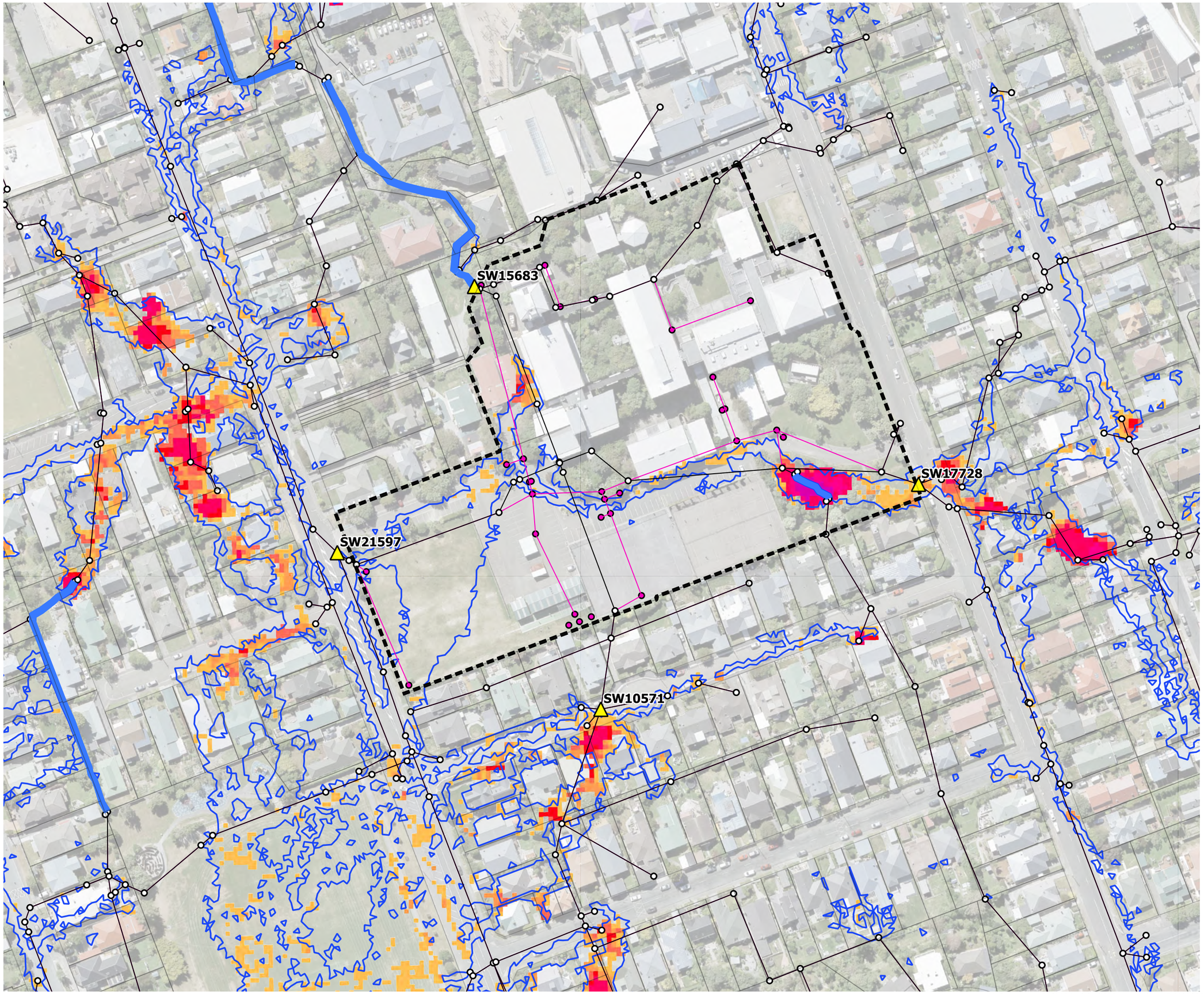
Link	WW06432.1	WW21355.1	WW19449.1	-	WW19450.1	WW19452.1	WW19453.1
width (mm)	150	150	150	250	250	250	250
r.pfc (m3/s)	0.054	0.039	0.035	0.133	0.050	0.084	0.123
surc	0.15	0.16	0.60	0.62	0.60	0.45	0.58
DS flow (m3/s)	0.00051	0.00051	0.00051	0.03248	0.03248	0.03247	0.03413
Node	-	WW21355	WW19449	WW34271	WW19450	WW19452	WW19453	WW19451

Current Capacity	The property could also be connected to the local network between lamphole cleaning eye WW06432 and manhole WW19451. This system discharges into the Campbell St trunk network at manhole WW19451. This local network has at least 5 litres/sec of spare design capacity during a 1-year LTS design event.

TRUNK NETWORK (pipes 300mm dia and above)

Current Capacity	The trunk network downstream of manholes WW20572 and WW19451 discharges into the Karori wastewater treatment plant (WWTP). There are sections of this network that are already over their design capacity during a 1-year LTS design event with overflows of over 50m^3 and 500m^3 occurring into the Karori Stream at engineered overflows. Hence there is no spare capacity in the trunk network for further development of this property without upgrades.

SUMMARY
While the local network has at least 3 or 5 litres/sec (depending on the connection point) of spare design capacity during a 1-year LTS design event, the trunk network servicing this property is to be already over its design capacity during a 1-year LTS design event with overflows occurring into the Karori Stream at engineered overflow points. Further development of this property will exacerbate this.
DISCLAIMER
This assessment is based on the results from WWL hydraulic models as defined in this memorandum. It does not take into account the impact on the spare design capacity of other developments that have occurred since then, are currently underway, or possible future developments. Non-hydraulic parameters like pipe age, conditions and likelihood of their failure have not been assessed. Flow monitoring may be required to verify these results. This development may impact on the spare design capacity available for possible future developments along the downstream network.



LEGEND

- Key Locations
- Site Boundary
- River reach Boundary
- Existing Nodes
- Existing Pipes
- Proposed Nodes
- Proposed Pipes
- Scenario flood extents

Peak Flood Depth

- <50 mm
- 50 - 100 mm
- 100 - 150 mm
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- 250 - 600 mm
- 600 mm - 1 m
- 1 - 2 m
- 2 - 3 m
- 3 - 6 m

REVISION DETAILS		BY	DATE
1	ISSUED FOR CONSENT	AD	18/08/20

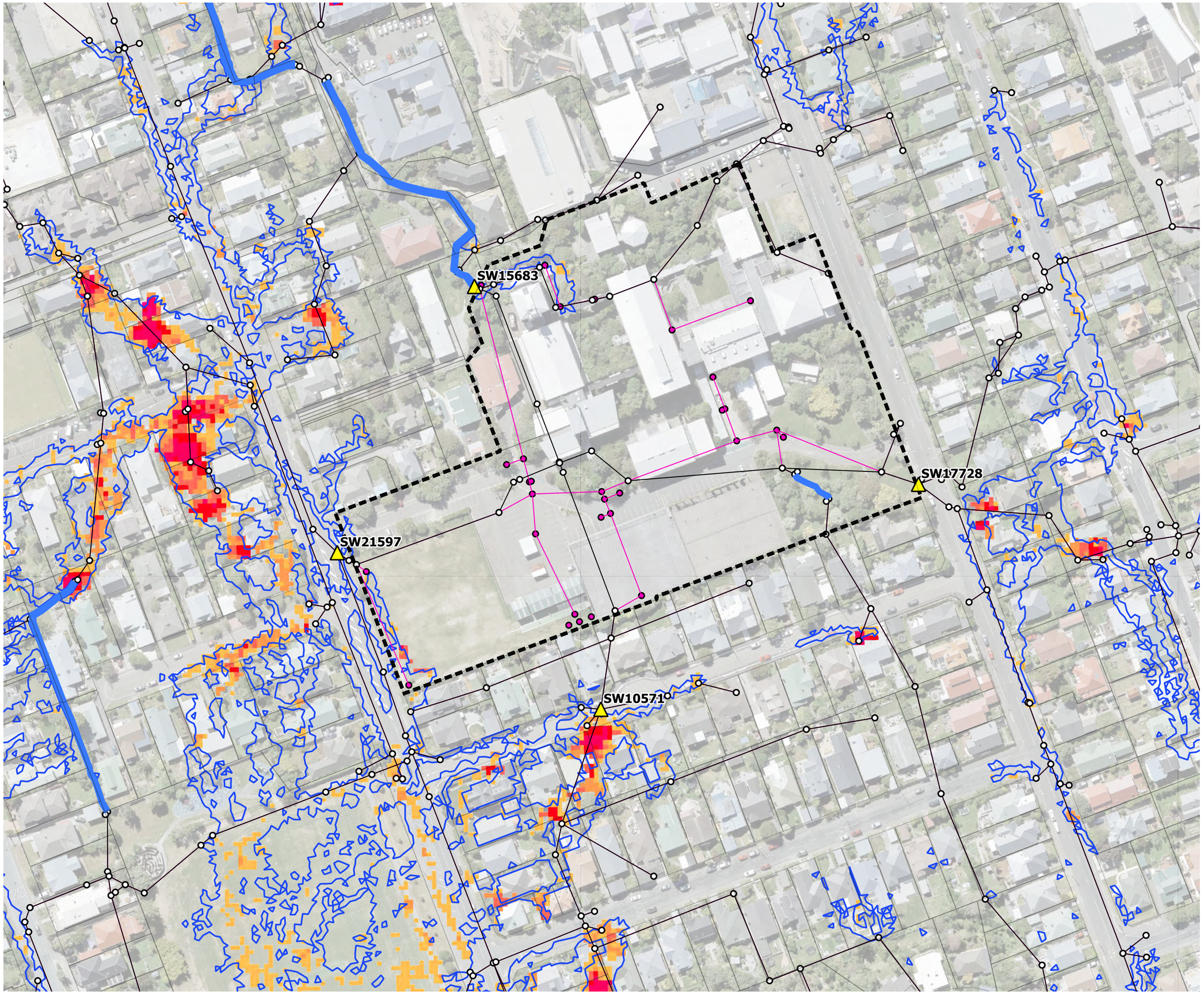
SURVEYED	-	29 DONALD STREET KARORI WELLINGTON 6012
DESIGNED	AD	
DRAWN	SJH	
CHECKED	PW	
APPROVED	MC	WOODS.CO.NZ

KARORI
RETIREMENT VILLAGE

PRE DEVELOPMENT SCENARIO
10-YEAR WITH CLIMATE CHANGE
PEAK FLOOD DEPTH

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1500 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	-	

X:\Stormwater\ICM Models SW\Rymans_karori\11082020\P20-132-SW-difference-plots.qgz : 10yr Depths Existing



WOODS
EST.1970

LEGEND

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APPROVED	MC	WOODS.CO.NZ

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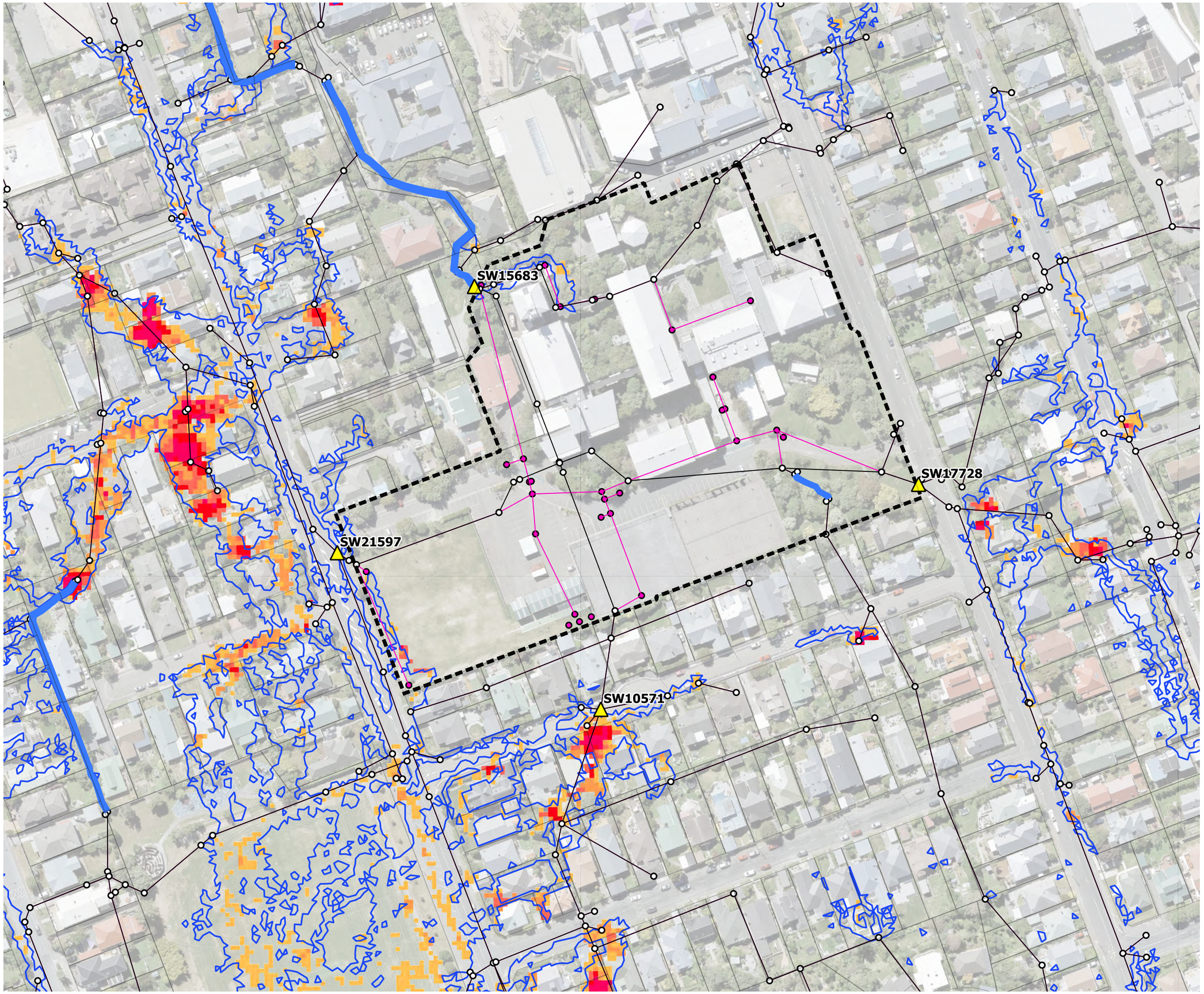
RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

POST DEVELOPMENT SCENARIO
10-YEAR WITH CLIMATE CHANGE
PEAK FLOOD DEPTH

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1500 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	-	

X:\Stormwater\ICM Models SW\Rymans_karori\11082020\P20-132-SW-difference-plots.qgz : 10yr Depths Design



WOODS
EST.1970

LEGEND

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RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

POST DEVELOPMENT SCENARIO
BLOCKAGE ASSESSMENT
10-YEAR WITH CLIMATE CHANGE
PEAK FLOOD DEPTH

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1500 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	-	

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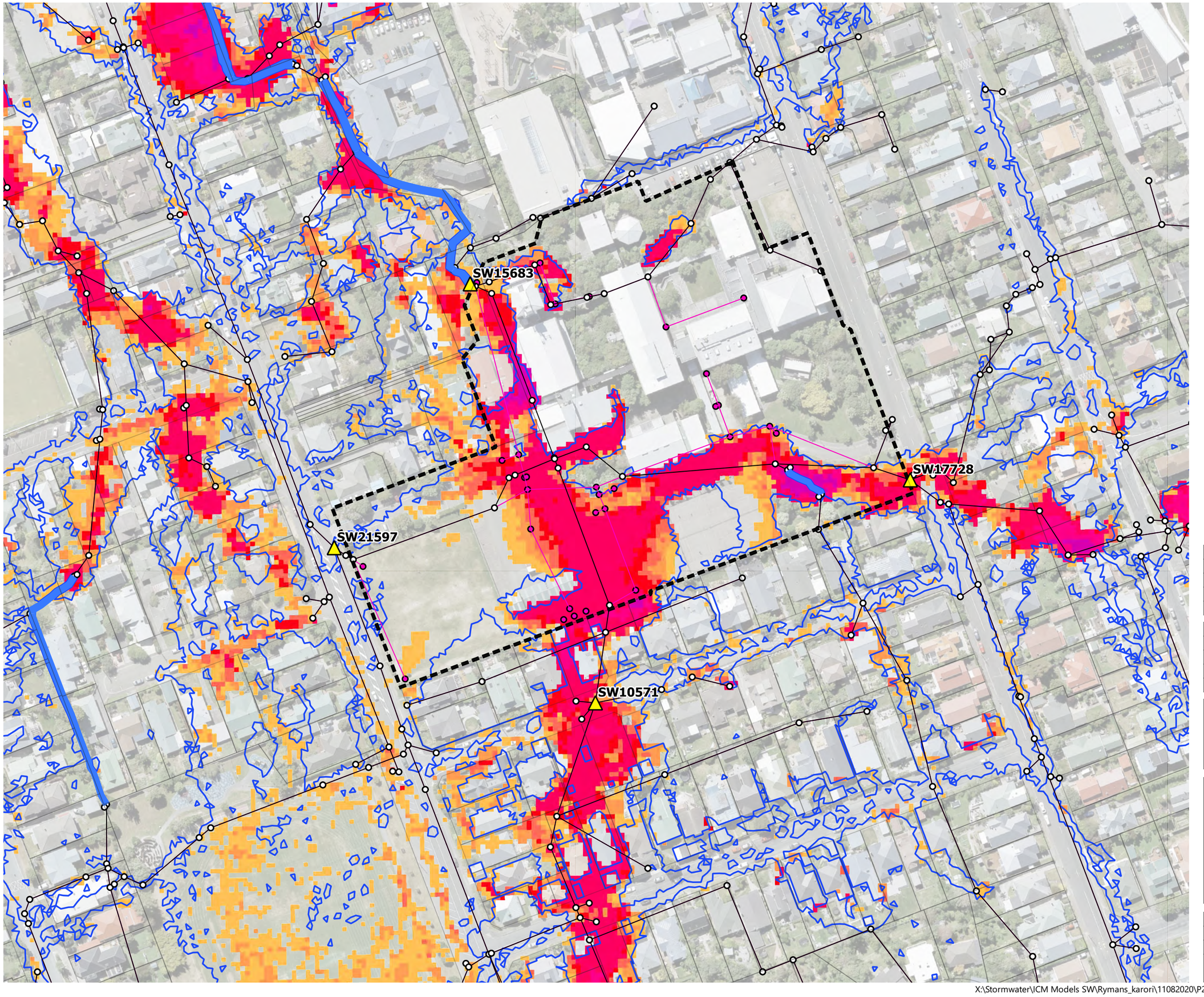

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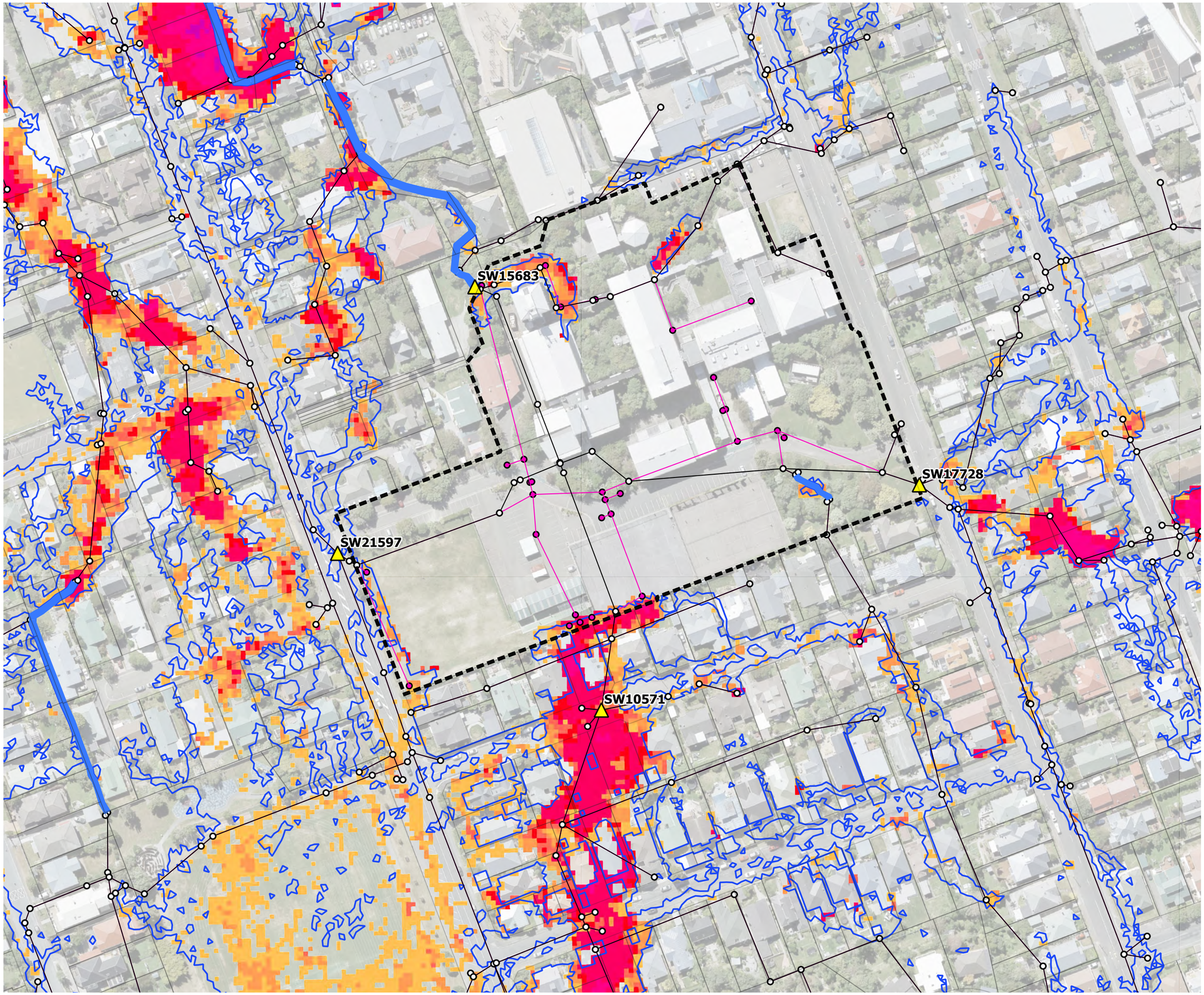
KARORI
RETIREMENT VILLAGE

PRE DEVELOPMENT SCENARIO
100-YEAR WITH CLIMATE CHANGE
PEAK FLOOD DEPTH

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1500 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	-	

X:\Stormwater\ICM Models SW\Rymans_karori\11082020\P20-132-SW-difference-plots.qgz : 100yr Depths Existing



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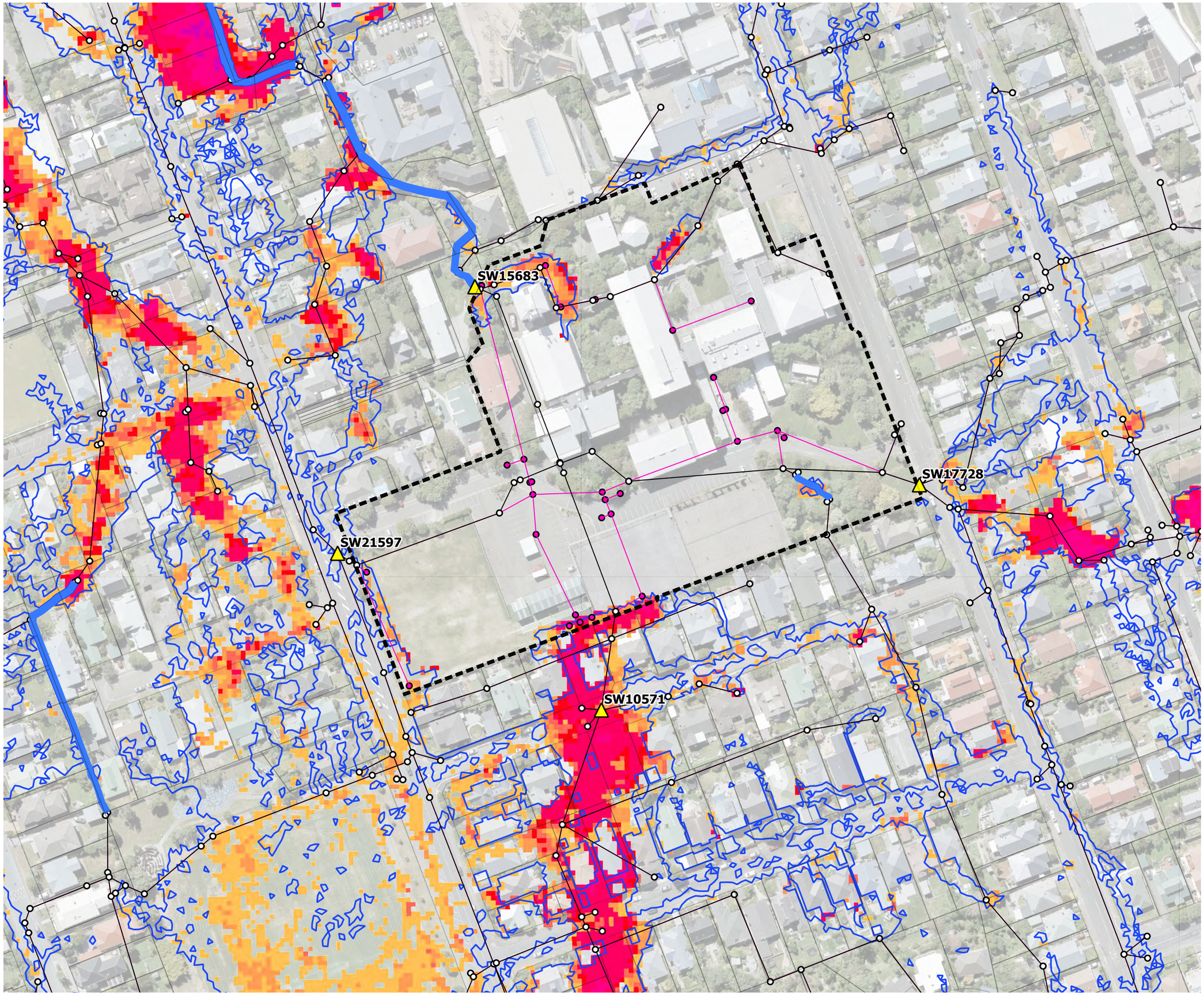
KARORI
RETIREMENT VILLAGE

POST DEVELOPMENT SCENARIO
100-YEAR WITH CLIMATE CHANGE
PEAK FLOOD DEPTH

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1500 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	-	

X:\Stormwater\ICM Models SW\Rymans_karori\11082020\P20-132-SW-difference-plots.qgz : 100yr Depths Design



WOODS
EST.1970

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RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

POST DEVELOPMENT SCENARIO
BLOCKAGE ASSESSMENT
100-YEAR WITH CLIMATE CHANGE
PEAK FLOOD DEPTH

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1500 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	-	

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SW15683

SW21597

SW10571

SW17728

LEGEND

- Key Locations
- Site Boundary
- River reach Boundary
- Existing flood extents: 10yr CC

Max Water Level Difference

- < 0 mm
- <50 mm
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RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

EFFECTS ASSESSMENT
10-YEAR WITH CLIMATE CHANGE
(Post Development minus Pre Development)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1500 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	-	

X:\Stormwater\ICM Models SW\Rymans_karori\11082020\P20-132-SW-difference-plots.qgz : 10yr

LEGEND

- Key Locations
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KARORI
RETIREMENT VILLAGE

BLOCKAGE ASSESSMENT
10-YEAR WITH CLIMATE CHANGE
(Blockage Scenario minus Existing Scenario)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1500 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	-	

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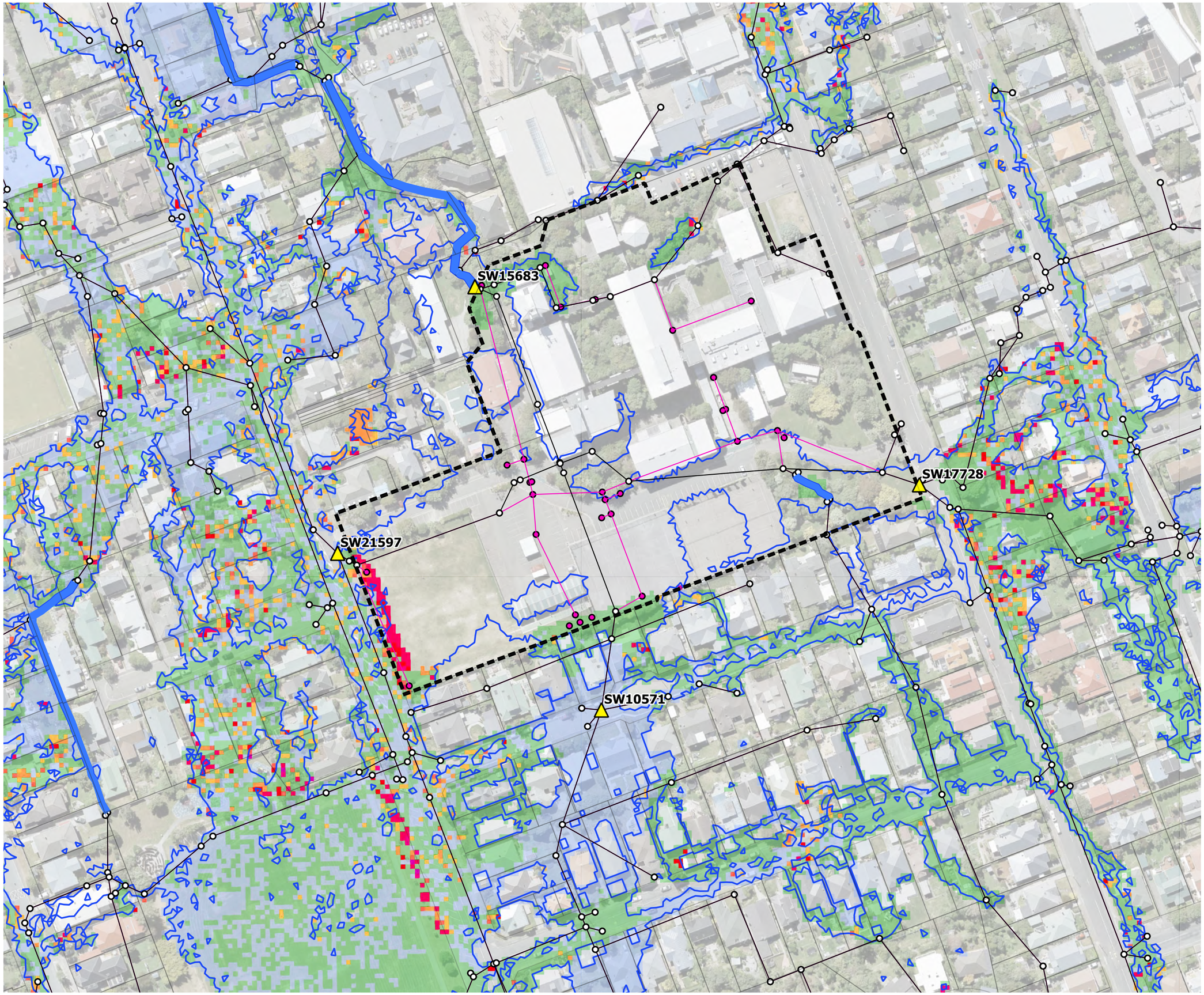

WOODS
EST.1970

LEGEND

- Key Locations
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RYMAN HEALTHCARE

KARORI
RETIREMENT VILLAGE

EFFECTS ASSESSMENT
100-YEAR WITH CLIMATE CHANGE
(Post Development minus Pre Development)

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DWG NO	-	

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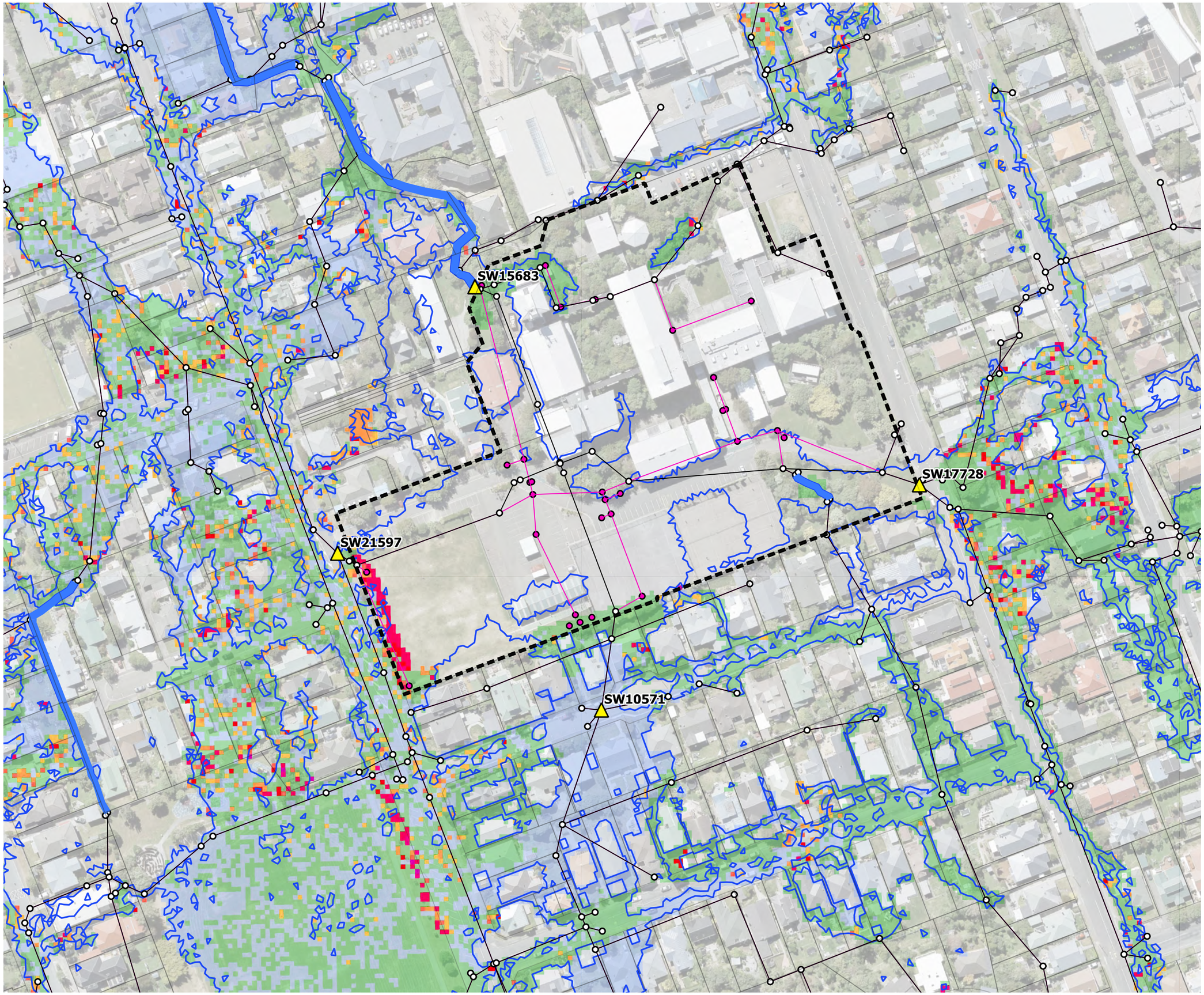

LEGEND

- Key Locations
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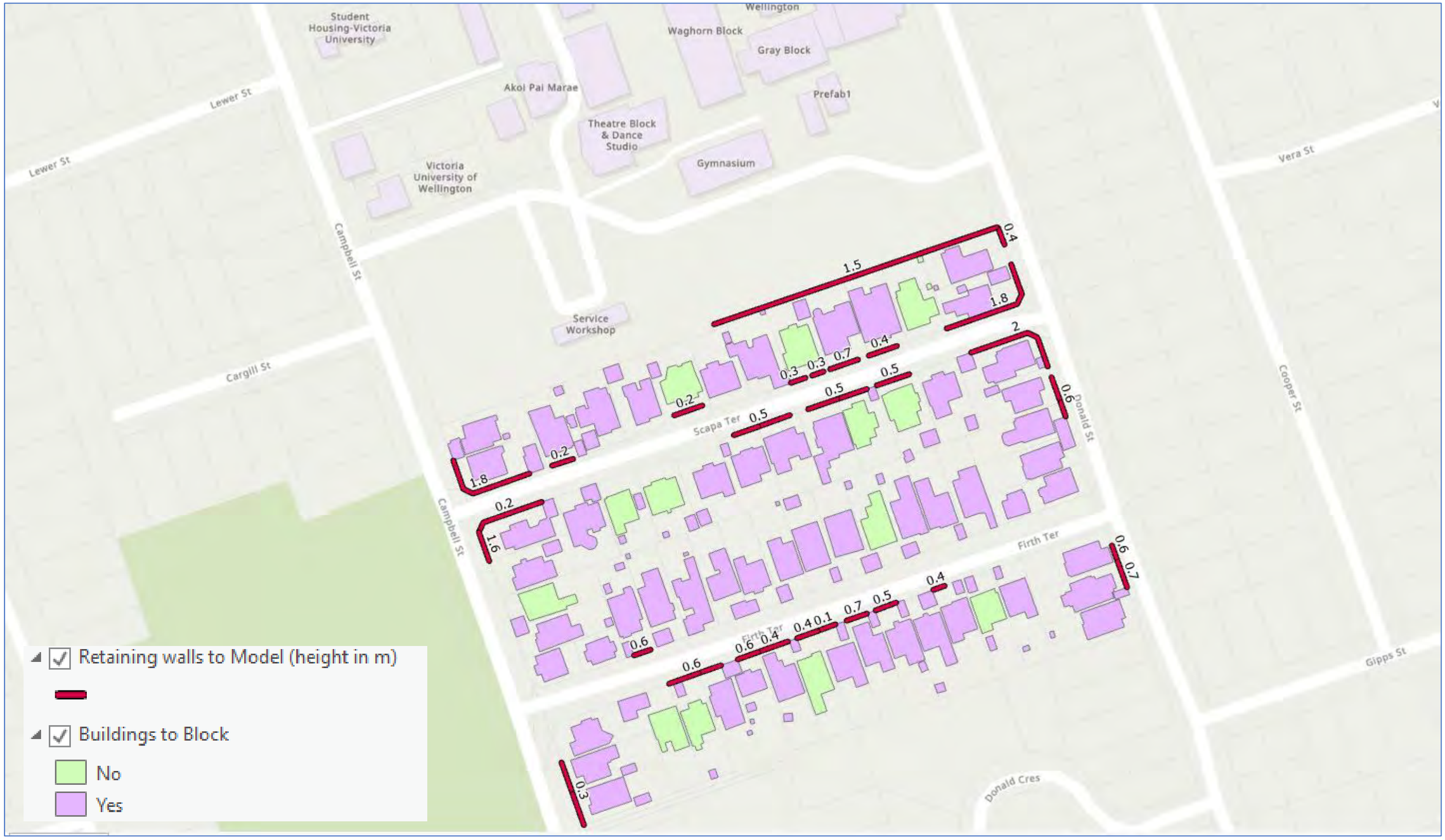
KARORI
RETIREMENT VILLAGE

BLOCKAGE ASSESSMENT
100-YEAR WITH CLIMAGE CHANGE
(Blockage Scenario minus Existing Scenario)

STATUS	ISSUED FOR INFORMATION	REV
SCALE	1:1500 @ A3	1
COUNCIL	WELLINGTON CITY COUNCIL	
DWG NO	-	

X:\Stormwater\ICM Models SW\Rymans_karori\11082020\P20-132-SW-difference-plots.qgz : 100yr Sens MaxWLDiff copy

Modelling Process:



Address	Street View
Scapa Terrace	
5 SCAPA TERRACE, Karori - House blocked (Entrance of the house sits below the road level)	
7 SCAPA TERRACE, Karori – House not blocked, garage blocked (Floor level above ground level. Ground level at same height as the wall) Wall = 0.5m	
9 SCAPA TERRACE, Karori - House not blocked, garage blocked Wall = 0.5m	
11 SCAPA TERRACE, Karori - House and garage blocked (House on concrete slab) Wall = 0.5m	

13 SCAPA TERRACE, Karori - House blocked (house on concrete slab, elevated from ground level at the same height as the wall) Wall : 0.5m	
15 SCAPA TERRACE, Karori – House and garage blocked (Elevated from ground level at the same height as the wall) Wall: 0.5m	
17 SCAPA TERRACE, Karori – House and garage blocked (House on concrete slab, elevated from ground level)	

19 SCAPA TERRACE, Karori – House not blocked, garage blocked	
21 SCAPA TERRACE, Karori - House not blocked, garage blocked	
23 SCAPA TERRACE, Karori – House and garage blocked (house on concrete slab, elevated from ground level)	

6 SCAPA TERRACE, Karori – House not Blocked	
8 SCAPA TERRACE, Karori – House and garage blocked (House on concrete slab) Wall: 0.4m	
10 SCAPA TERRACE, Karori – House and garage blocked (House on concrete slab) Wall: 0.7m	
12 SCAPA TERRACE, Karori – House not blocked, garage blocked Wall : 0.3m	

14 SCAPA TERRACE, Karori - House and garage blocked (House on concrete slab)	
16 SCAPA TERRACE, Karori – House and garage blocked (House on concrete slab)	
18 SCAPA TERRACE, Karori - House not blocked, garage blocked Wall: 0.2m	
20 SCAPA TERRACE, Karori - House and garage blocked	

22 SCAPA TERRACE, Karori - House and garage blocked	
24 SCAPA TERRACE, Karori – House and garage blocked Wall: 0.2m	
<u>Campbell Street</u>	
49 CAMPBELL STREET, Karori – House and garage blocked Fence: 1m (not modelled)	
51 CAMPBELL STREET, Karori – House blocked Fence: 1.8m (not modelled)	

51 CAMPBELL STREET, Karori – House blocked Wall: 0.2m Fence: 1.6m (not modelled)	
55 CAMPBELL STREET, Karori – House blocked	
57 CAMPBELL STREET, Karori – House not blocked, garage blocked	
59 CAMPBELL STREET, Karori – House blocked	

61 CAMPBELL STREET, Karori – House blocked	
65 CAMPBELL STREET, Karori – House blocked Wall: 0.3m	
67 CAMPBELL STREET, Karori – House blocked Wall: 0.3m	
<u>Donald Street</u>	
42 Donald Street - House blocked Wall: 0.4m	

44 Donald Street - House blocked Fence: 1.8m (not modelled)	
46 Donald Street – House blocked Wall/Fence: 2m	
52 Donald Street – House and garage blocked Wall: 0.6m	
54 Donald Street – House and garage blocked Wall: 0.6m	

56 Donald Street – House and garage blocked	
58 Donald Street – House blocked	
60 Donald Street – House blocked Wall: 0.6m	
62 Donald Street – House and garage blocked Wall: 0.7m	

64 Donald Street – House not blocked	
Firth Terrace	
4 FIRTH TERRACE, Karori – House blocked (house is at road/ground level)	
6 FIRTH TERRACE, Karori - House blocked (house is at road/ground level)	
8 FIRTH TERRACE, Karori - House blocked (house is at road/ground level)	

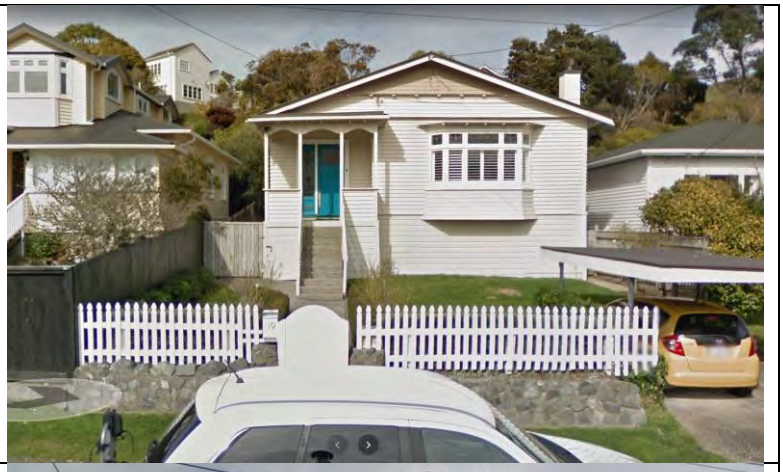
10 FIRTH TERRACE, Karori - House blocked (house is at road/ground level)	
12 FIRTH TERRACE, Karori – House not blocked, garage blocked (Floor elevated)	
14 FIRTH TERRACE, Karori – House and garage blocked	

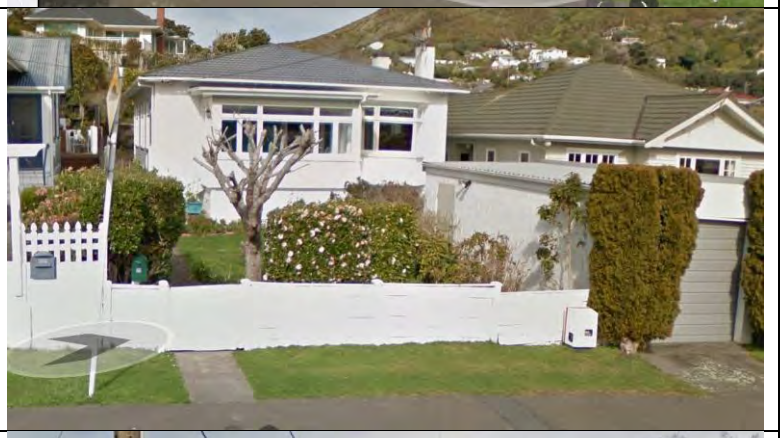
16 FIRTH TERRACE, Karori – House and garage blocked	
18 FIRTH TERRACE, Karori – House blocked	
20 FIRTH TERRACE, Karori - House blocked	
22 FIRTH TERRACE, Karori - House and garage blocked	

26 FIRTH TERRACE, Karori – House and garage blocked	
28 FIRTH TERRACE, Karori – House and garage blocked Wall: 0.6m	
30 - 32 FIRTH TERRACE, Karori, Houses blocked	

5 FIRTH TERRACE, Karori - House and garage blocked	
7 FIRTH TERRACE, Karori – House not blocked, garage blocked	
9 FIRTH TERRACE, Karori – House not blocked, garage blocked (House at the same level as the wall) Wall: 0.4 m	

11 FIRTH TERRACE, Karori – House and garage blocked	
13 FIRTH TERRACE, Karori – House and garage blocked (house at same level as wall) Wall: 0.5m	
15 FIRTH TERRACE, Karori – House and garage blocked Wall: 0.7m	
17 FIRTH TERRACE, Karori - House and garage blocked Wall: 0.1m	

19 FIRTH TERRACE, Karori – House not, garage blocked (house at he same level as the wall) Wall: 0.4m	
21 FIRTH TERRACE, Karori – House blocked Wall: 0.4m	
23 FIRTH TERRACE, Karori – House blocked Wall: 0.6m	

25 FIRTH TERRACE, Karori – House blocked Wall: 0.6 m	
27 FIRTH TERRACE, Karori – House not blocked, garage blocked Wall: 0.6m	
29 FIRTH TERRACE, Karori - House not blocked, garage blocked	

33 FIRTH TERRACE, Karori – House blocked