

22nd February 2023

Attn: Mansion Rear Ltd
C/o: Junge Xu, Gary Gray

RE: **8 STEVENSONS CRESCENT, ALBANY**
**CIVIL ENGINEERING FEASIBILITY ASSESSMENT TO SUPPORT COVID-19 FAST
TRACK CONSENT PROCESS**

1. INTRODUCTION

DHC Consulting Group Ltd (DHC) has been engaged by the client, Mansion Rear Ltd, to prepare a Civil Feasibility Assessment for the proposed development at 8 Stevensons Crescent, Albany. This document presents a summary of the civil desktop assessment carried out to confirm that the proposed development can be serviced for all three waters and that during construction appropriate erosion and sediment control measures can be employed in order to support the COVID-19 Fast track consent process before the Minister of the Environment.

This assessment has been conducted based on the architectural concept prepared by OZAC Architects Ltd provided in February 2023 and Auckland Council Geomaps.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The subject site is currently located within a Future Urban Zone as per the Auckland Unitary Plan (AUP). The following information for the site has been taken from the Auckland Council Geomaps system (AC GIS):

- Legal Description: Pt Allot 27 Parish of PAREMOREMO, Pt Allot 299 Parish of PUKEATUA
- Record of Title: NA1B/809
- Area: 2.6848 Ha

The subject site is mostly greenfield, with two residential dwellings and ancillary buildings located within the site. The property has been identified as a Greenfield area for future urban development.

The proposed development consists of the design and construction of approximately 138 residential units with associated commercial/retail areas tenancies and subdivision. An architectural concept has been prepared by OZAC Architects Ltd.

3. THREE WATERS SERVICING ASSESSMENT

A civil desktop assessment has been carried out for the site based on the information provided on Auckland Council Geomaps system for the existing public network and the OLFP and flood models.

3.1. STORMWATER

3.1.1. Existing Public Network

DHC has identified existing public stormwater network at the front of the site along Stevenson Crescent. Refer to Appendix A for the existing stormwater layout as shown on Geomaps.

An existing public manhole is located at the eastern corner of the property within the public footpath. A 525mm dia. concrete pipe is connected to this manhole, discharging towards the existing natural stream to the north and the Wayside Stream to the east, ultimately joining Lucas Creek.

This network can be used to service part of the proposed development (southern). The most practical connection for the southern portion of the proposed development would be to this existing manhole.

DHC has carried out capacity calculations for the downstream 525 dia. pipes (refer to Appendix C). As part of this feasibility assessment, the calculations confirm that these pipes are likely to have sufficient capacity to service the southern portion of the development and other upstream catchment areas in a Maximum Probable Development Scenario (MPD). Further investigations will be required to confirm the gradients, diameter and condition of the existing pipes. The proposed development area discharging stormwater runoff to this network is to be confirmed at future design stages. In case the pipes do not have sufficient capacity, it is recommended that one of the below measures should be implemented:

- a) Upgrade of the existing lines to 600mm dia. Pipes;
- b) Re-align of the existing lines to a steeper gradient; and
- c) Stormwater mitigation (detention) for the proposed development such that the post- development peak flow matches the pre-development peak flow for the 10-year event.

The existing stormwater manhole will probably require upgrading depending on the existing diameter (to be confirmed on site) and the lot connection from the site as there currently are three large pipes connected to it.

3.1.2. Existing Wetlands

Existing wetlands have been identified along the toe slope on the north-eastern portion of the site. The extent of these wetlands has been shown in Appendix A and B and in the Ecology Report provided by RMA Ecology Ltd. The development scheme has been proposed to provide a 5.0m offset from the wetlands as described in the Ecology Report.

The northern portion of the development will discharge stormwater runoff to these wetlands as the site naturally falls towards these areas. The existing overland flows going to the wetlands will be maintained and will not be diverted by the proposed development. Stormwater mitigation and quality treatment is to be provided within the site prior discharging to the wetlands/environment in form of ponds, raingardens, bioretention devices, tanks, filters or any other GD01 guidelines accepted device. The proposed stormwater mitigation is to ensure no appreciable change to overall catchment area and flow rates currently discharging to these wetlands.

No bulk earthworks are to be carried out within the wetland areas, avoiding deposition of silt or soil within the wetlands. Proposed stormwater pipes and minor riprap may be proposed but will be designed in a manner where disturbance is minimised.

DHC concludes that the development can be serviced by the existing public stormwater network that exists within close proximity to the site and the existing wetlands. Further investigations will be required (and are recommended) to confirm the existing public infrastructure (diameter, grades, etc.) and for the analysis of any network upgrades are required. If needed, the upgrades can be undertaken without third party approvals (other than Auckland Council, Auckland Transport and Healthy Waters).

3.1.3. Stormwater Mitigation and Quality Treatment

DHC has also carried out a high-level assessment against Schedule 4 of the Regionwide Stormwater Network Discharge (NDC) requirements for Greenfield developments.

In accordance with this guideline, the development will require the below to mitigate impacts from climate change and flooding as well as provide protection for the downstream natural stream and wetlands:

a) Stormwater mitigation for the proposed impervious areas are required to provide:

- 5mm of retention
- 95th percentile detention

This can be achieved by proposing stormwater tanks, bio-retention devices, ponds or other devices as per GD01 guidelines.

b) Stormwater Quality treatment for the proposed paved areas:

- Treatment devices as per GD01 guidelines
- Gross pollutant traps for waste storage areas

This can be achieved by installing stormwater filters, raingardens and other devices as per GD01 guidelines.

It is recommended to provide the required stormwater mitigation measurements and quality treatments in accordance with the SW CoP, GD01 and NDC requirements.

3.1.4. Upstream Catchment (Future Urban Zone)

The subject site is located within a Future Urban Zone (FUZ) along with some other properties (west of the subject site). Some portions of these properties fall towards the subject site and are to be considered as upstream catchments for the stormwater design for the project.

The proposed public stormwater network within the site is to allow for upstream catchment areas of the FUZ and future development and connection from these areas. Capacity assessments for the existing and proposed stormwater network are to consider the stormwater runoff from the upstream catchment areas being developed. Stormwater quality treatment and mitigation for these FUZ properties are to be provided in site when developed complying with NDC, SW CoP and GD01 requirements.

In terms of overland flow paths and flooding, the proposed development will consider flows from the upstream catchment areas within the FUZ for the diversion of these flows within the site and proposed finished floor levels of the buildings. The entry points of the overland flow paths from upstream catchment areas are to be maintained (not blocked). The future development of these areas should maintain the exit point of the overland flow paths as per existing conditions.

3.2. WASTEWATER

DHC has assessed the existing public wastewater network in close vicinity to the site. Based on AC Geomaps, the closest public wastewater network is located approximately 150m from the southwest corner of the site. Refer to Appendix A for the existing wastewater layout.

The closest wastewater manhole is located at the street frontage of 2 Agnew Place, within the public berm. As per AC GIS information, this manhole invert level is +12.99. A high-level assessment confirms that a public wastewater network could be extended from this manhole up to the southern boundary of the site, with sufficient fall for a gravity line. Alignment options can be investigated at Resource Consent Design Stage (see Appendix A).

While a gravity system is envisaged for most of the site, any buildings within the lower areas of the site will probably require a private pump station system to discharge wastewater flows to this network. This is to be further investigated and confirmed at design stage based on the proposed levels for the development.

DHC have carried out capacity calculations for the existing downstream wastewater network. As part of this feasibility assessment, the calculations confirm that these lines will have sufficient capacity to service the proposed development and upstream catchment area without any upgrades. Refer to Appendix D for details.

As DHC do not have visibility on any adjacent developments, DHC reached out to Watercare for assistance with this capacity assessment. This capacity assessment has been confirmed by Watercare as per Assessment Report under CON150015 in Appendix F, advising that no upgrades would be required for the existing public network to service the development. At the time of the consultation request and the Watercare assessment, the proposal was for 220 residential dwellings, an early childhood centre, a café and other convenience retails. The current proposal has reduced the number of residential units to 138 and does not include the early childhood centre or café, improving the existing capacity network situation. Therefore proposed flows are reduced, and we have certainty from Watercare that the lot and development is serviceable.

DHC confirms that the proposed development can be serviced by the existing wastewater network by providing a gravity extension of the public system and private pump stations.

3.3. WATER SUPPLY

A desktop study of AC Geomaps has identified 150 PE public water pipes within 100 to 200m from the southern corner of the site.

A 150mm dia. extension of the water supply public network will be required along the public footpaths of Dairy Flat Highway (refer to Appendix A for layout). New water meters for water supply, and fire hydrants for firefighting will need to be installed as required.

A hydrant test is recommended to be carried out at design stage to confirm existing network pressure. Capacity and flows of the existing network have been confirmed by Watercare as per Assessment Report under CON150015 in Appendix F, advising that no upgrades would be

required for the existing public network. Again, this report was prepared for a development comprising with 220 dwellings; the proposal has now been altered to 138 residential units, we are confident that there is sufficient water flow and pressure.

3.4. OVERLAND FLOW PATH, FLOOD PLAIN AND STREAMS

Auckland Geomaps shows major and minor overland flowpaths (OLFPs) within the subject site travelling from the western boundary to the eastern boundary. Two of these OLFPs have been identified as intermittent streams, one running along the north-western boundary and other at the southern portion of the site. A 10.0 m offset will be provided from the bank of these streams to any proposed structure within the site. Refer to Appendix B for proposed site scheme. A culvert or bridge structure is to be proposed to allow for the stream crossing at the south of the site. Details and design of this structure are to be confirmed at future design stages in conjunction with structural engineers. This can be designed in order to provide for fish passage (if required).

Where required, the OLFPs will be conveyed within the proposed paved/road areas within the site, maintaining their entry and exit points and providing a 500mm freeboard (in accordance with the SWCOP) from the top of the water to the proposed units finished floor level. The levels will be designed such that the flows can be accommodated within the roads, and the proposed lots and the proposed FFLs are higher (providing the required freeboard).

Refer to Appendix A and B for details.

A 100-year event floodplain is also shown within the site (mainly at the southern and northern portions, following the OLFP alignments). A floodplain assessment is recommended at design stage to confirm flood depths and extents. Minimum finished floor levels (in accordance with the SWCOP) shall be provided to all buildings to safeguard against the 1% AEP floodplain.

As per Healthy Waters modelling (shown in Geomaps), the 1% AEP flood level (based on future land use and future rainfall 2.1deg increase) varies between RL 15.5 and RL 19.9. It is recommended that detailed investigations should be undertaken at design stage to confirm the flood levels and subsequently determine the minimum finished floor levels for the proposed buildings.

Earthworks (fill) within the floodplain will not be proposed as they can result on the displacement of water/increase of flooding at downstream areas. However, if this is required, an offset (cut) volume for flood displacement can be provided as compensation within other areas of the site to avoid any downstream effects to neighbouring properties.

As long as the flood plain, streams and OLFPs are considered as part of the design development, DHC do not see this as a high risk.

4. CONCLUSIONS

Part of the site can be serviced by the existing public stormwater network. It is recommended that further investigations be carried out to confirm if the existing network requires any upgrades (i.e., a check of its existing condition).

Part of the site will discharge to the existing wetlands at the north-eastern periphery of the site. Existing flows going to the wetlands are to be maintained so as to not water short these wetlands and to provide for their ongoing hydrological function.

No earthworks are to be carried out within the wetlands areas. An offset of 5.0m is to be provided from the wetlands to any proposed structure.

Earthworks can be managed in accordance with GD05 standards, deploying standard erosion and sediment control techniques includes cleanwater diversions, decanting earth bunds and sediment retention ponds (including flocculation).

It is recommended that stormwater mitigation and quality treatment are provided in accordance with the SW CoP and GD01 requirements for Greenfield developments. A subsequent Stormwater Management Plan (SMP) will also be required, along with a stormwater discharge consent.

The site can be serviced by the existing public wastewater network as this has sufficient capacity to receive flows from the development and the upstream catchment. An extension of the public network (approximately 150m) is required to connect the proposed development. Confirmation by Watercare has been provided and attached to this letter.

Buildings located in the lower areas of the site will likely require a private pump station to discharge wastewater into the proposed network. This is dependent on the building locations, earthworks, Watercare coordination, and additional site investigations. A detailed analysis is recommended to be undertaken at design stage.

The site can be serviced by the existing public water supply network. A 150mm dia. extension of the water supply pipeline of approximately 100 to 200m will be required. Capacity and flow rate of the existing network have been confirmed by Watercare as per assessment report attached to this letter.

Overland flowpaths (OLFP's) within the site can be diverted and conveyed within the proposed paved/road areas (where required), while maintaining the entry and exit points as per existing conditions. A 500mm freeboard from the top of water to the proposed buildings finished floor levels is to be provided as per the Stormwater code of practice standards.

A 10m offset is to be provided from the bank of the existing streams to any proposed structure. A culvert/bridge structure is to be proposed to allow for the stream crossing the south of the site. This can be designed in order to provide for fish passage (if required).

It is recommended that minimum freeboard should be provided to all buildings in accordance with the SWCOP requirements, therefore addressing known flood constraints associated with the OLFPs and the floodplain of Lucas Creek.

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APPENDICES:

- A. Stormwater, Wastewater, Water Supply and OLFP Layout
- B. Stormwater Calculations
- C. Wastewater Calculations
- D. Water Supply/Wastewater Planning Assessment

Yours faithfully,

Nigel Fernando

Director/ Civil Engineer

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APPENDIX A

Stormwater, Wastewater, Water Supply and OLFP Layout

SCHEDULE 4 NDC REQUIREMENTS:

THE BELOW IS TO BE PROVIDED WITHIN THE SITE BEFORE DISCHARGING STORMWATER RUNOFF TO THE PUBLIC NETWORK/EXISTING STREAM:

1. STORMWATER MITIGATION (TANKS, PONDS, RAINGARDENS, ETC) TO PROVIDE:

- 5mm RETENTION FOR THE IMPERVIOUS AREAS
- 95th PERCENTILE DETENTION FOR THE IMPERVIOUS AREAS

2. STORMWATER QUALITY TREATMENT:

- TREATMENT DEVICES AS PER GD01 FOR THE PROPOSED PAVED AREAS (SUCH AS FILTERS, RAINGARDENS, ETC)
- GROSS POLUTANT TRAPS FOR WASTE STORAGE AREAS

NOTES (UPSTREAM CATCHMENT FUZ):

- THE STORMWATER NETWORK DESIGN FOR THE PROJECT IS TO ALLOW FOR THE UPSTREAM CATCHMENT WITHIN THE FUTURE URBAN ZONE (WEST) THAT FALLS TOWARDS THE SUBJECT SITE. CAPACITY ASSESSMENTS SHOULD CONSIDER AND INCLUDE THE UPSTREAM CATCHMENT AREAS FOR THE PROPOSED PIPES SIZING.

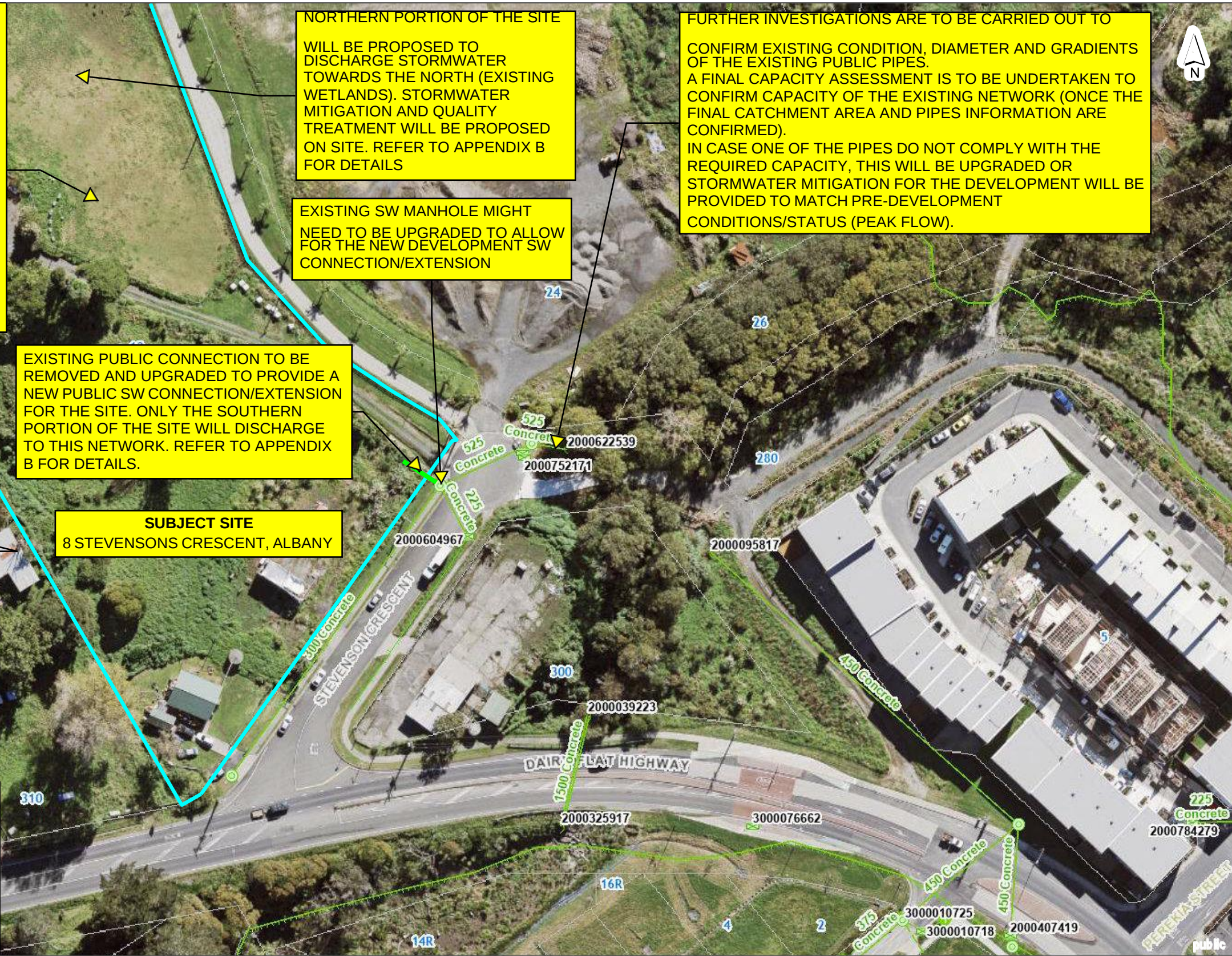
- FUTURE DEVELOPMENTS WITHIN THIS UPSTREAM CATCHMENT AREA TO PROVIDE STORMWATER QUALITY TREATMENT AND MITIGATION (RETENTION/DETENTION) WITHIN THEIR SITE TO COMPLY WITH STORMWATER REQUIREMENTS AND CAPACITY OF PROPOSED LINES.

- OVERLAND FLOW PATHS AND FLOOD ASSESSMENT TO CONSIDER UPSTREAM CATCHMENT AREA WITHIN THE FUTURE URBAN ZONE TO ESTIMATE PEAK FLOWS AND FINISHED FLOOR LEVEL OF THE PROPOSED BUILDINGS. EXISTING ENTRY POINTS OF FLOWS FROM THE UPSTREAM CATCHMENT ARE TO BE MAINTAINED (NOT BLOCKED). FUTURE DEVELOPMENTS WITHIN THE UPSTREAM CATCHMENT AREAS ARE TO MAINTAIN THE EXISTING EXIT POINTS OF THE OVERLAND FLOW PATHS.

CONCLUSION:

THE PROPOSED DEVELOPMENT CAN BE SERVICED BY THE EXISTING PUBLIC STORMWATER NETWORK AT THE EASTERN CORNER AND EXISTING WETLANDS AT THE NORTH.

STORMWATER MITIGATION, QUALITY TREATMENT AND UPGRADES OF THE EXISTING NETWORK WILL BE PROPOSED AS REQUIRED.

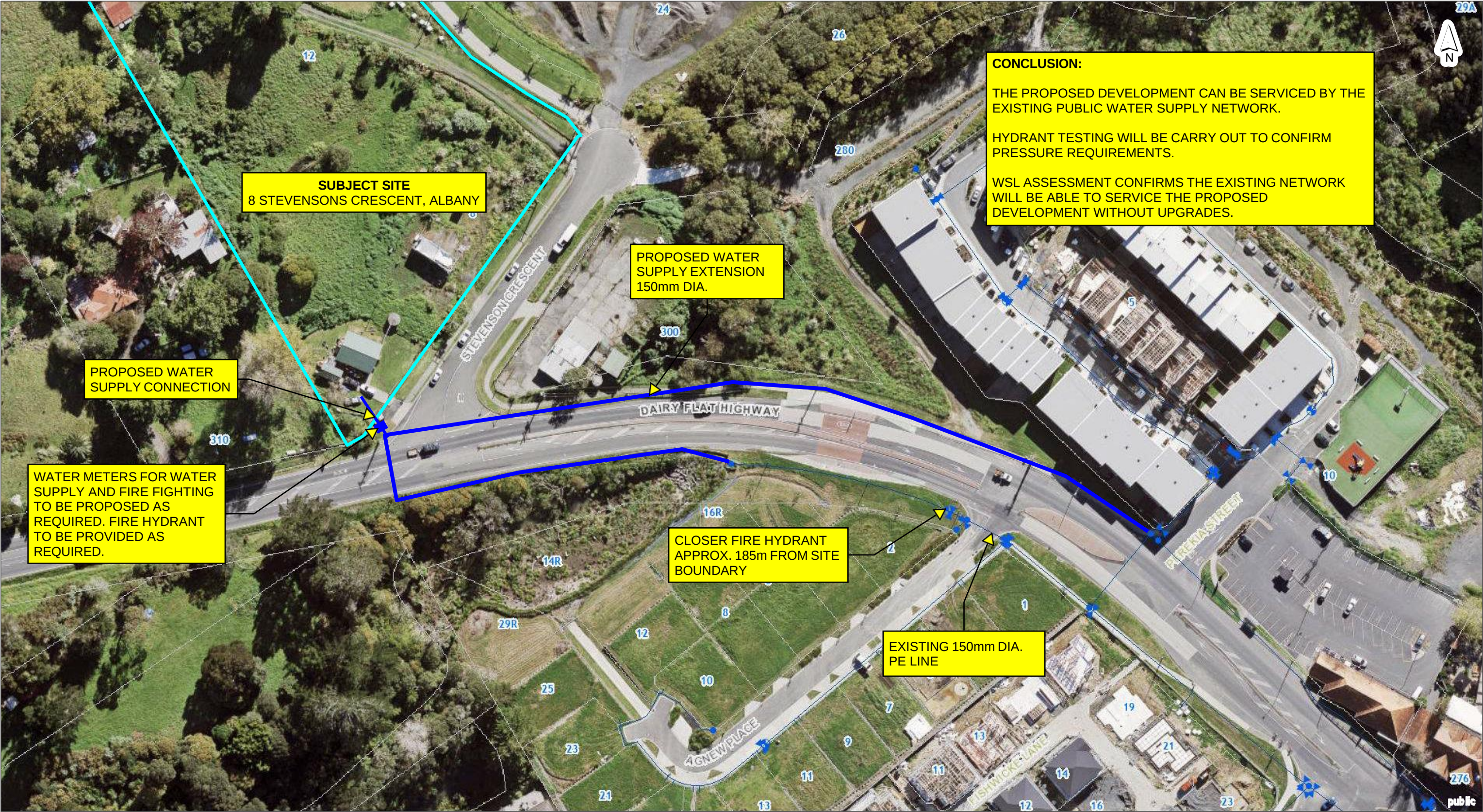


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Height datum: Auckland 1946.

PROPOSED STORMWATER CONNECTION FOR THE DEVELOPMENT PRELIMINARY

0 10 20 30
Meters
Scale @ A3
= 1:1,000
Date Printed:
22/07/2022



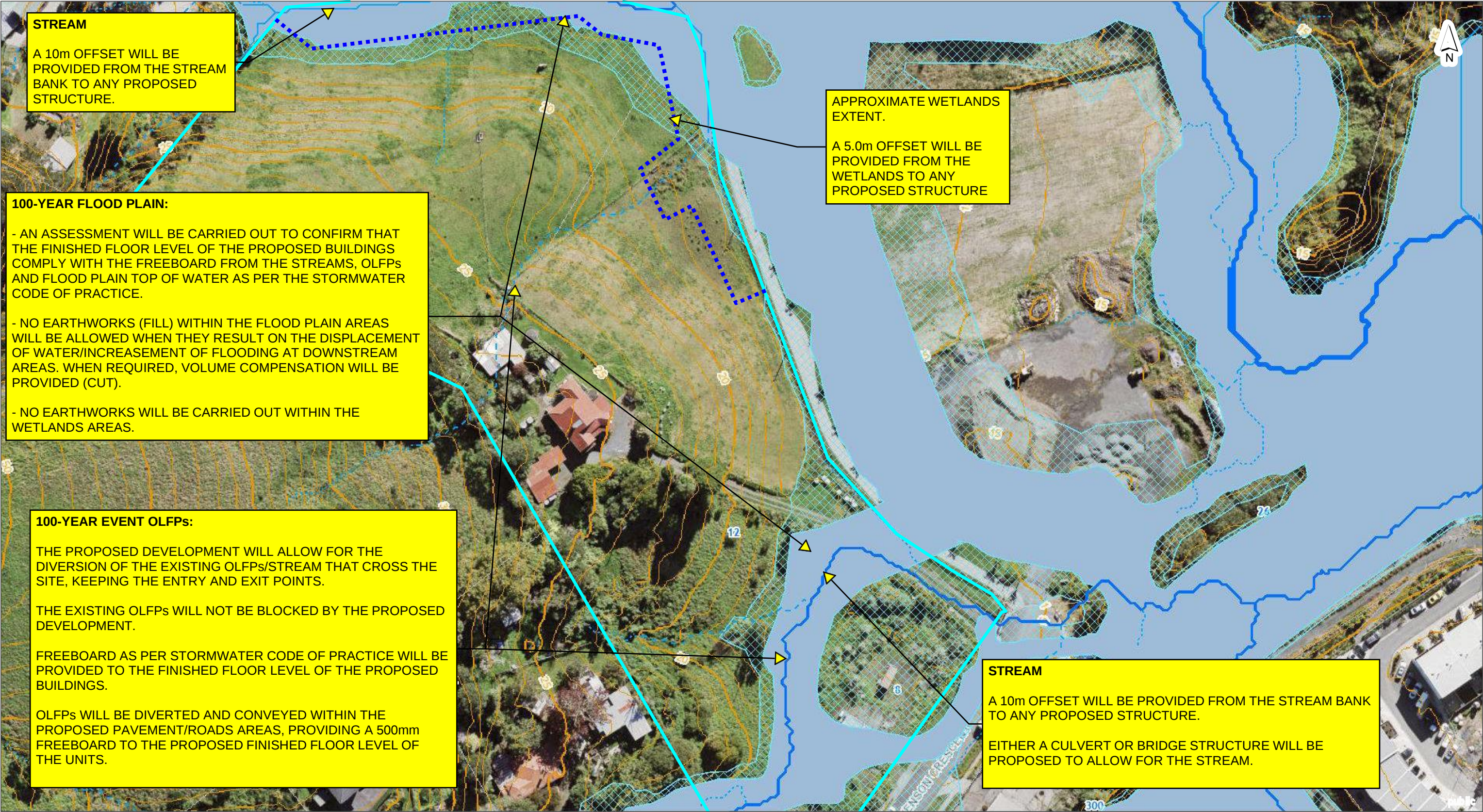


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Height datum: Auckland 1946.

PROPOSED WATER SUPPLY CONNECTION FOR THE DEVELOPMENT PRELIMINARY

0 10 20 30
Meters
Scale @ A3
= 1:1,000
Date Printed:
22/07/2022





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Height datum: Auckland 1946.

**OLFP AND FLOOD PLAIN REQUIREMENTS
PRELIMINARY**

0 10 20 30
Meters
Scale @ A3
= 1:1,000
Date Printed:
25/07/2022



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APPENDIX B

Site Scheme and Stormwater Comments



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APPENDIX C

Stormwater Calculations

STORMWATER CALCULATIONS

RAINFALL DATA

Project : 8 Stevensons Crescent, Albany
 Client: Junge Xu
 Calculation by: ZA
 Checked by: NF

Job No: 10178
 Date: 17/02/2023



Existing Situation- No Climate Change Allowances

24-hour rainfall depth **140** mm from Figure A.3- 10 year ARI

Climate Change Allowances

Table 4.1: Percentage Increase in 24-hour Design Rainfall Depth

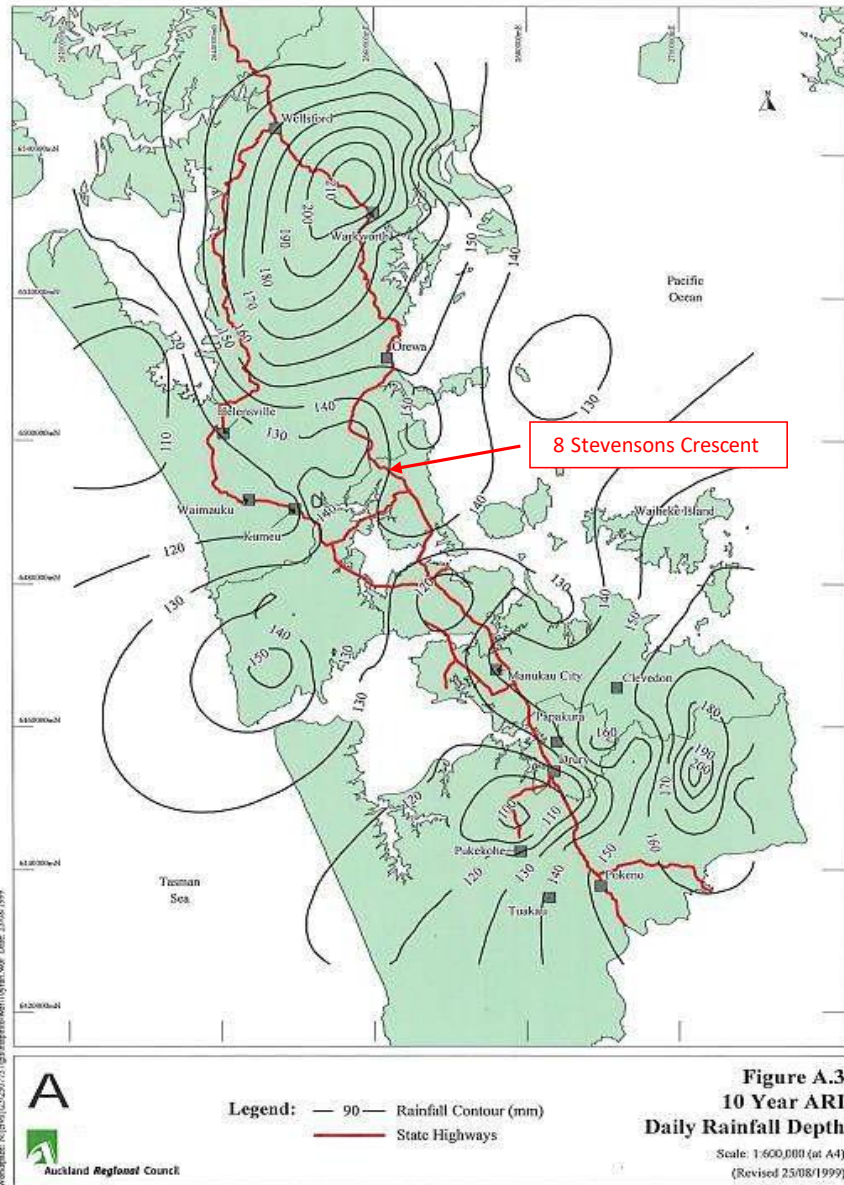
ARI (Year)	AEP	Percentage increase in 24 hour design rainfall depth due to future climate change
2	50%	9.0%
5	20%	11.3%
10	10%	13.2%
20	5%	15.1%
50	2%	16.8%
100	1%	16.8%

ARI (Year) **10**
 24-hour rainfall depth 158.5 mm

Table 2: Ratio to Convert 24-hour Rainfall Depth to Intensities

Duration	Ratio to convert the existing 24-hour design rainfall depth (in mm) into rainfall intensities (in mm/hr) without Climate Change	Ratio to convert the future 24-hour design rainfall depth (in mm) into rainfall Intensities (in mm/hr) with Climate Change allowances
10 min	67.5%	69.4%
20 min	51.9%	53.2%
30 min	42.8%	43.7%
1 hr	30.3%	30.8%
2 hr	20.5%	20.8%
6 hr	10.5%	10.6%
12 hr	6.8%	6.8%
24 hr	4.2%	4.2%

Duration **10**
 24-hour rainfall intensity 110 mm/h



STORMWATER CALCULATIONS
SUMMARY OF CAPACITY CALCULATIONS- EXISTING PUBLIC PIPES

Project : 8 Stevensons Crescent, Albany
Client: Junge Xu
Calculation by: ZA
Checked by: NF

Job No: 10178
Date: 17/02/2023



LOCATION OF EXISTING PUBLIC PIPES



WW Pipe ID	Diameter (mm)	IL (upst)	IL (downst)	Length (m)	Gradient (%)	Material	Pipe Capacity (l/s)	Peak Design Flow (l/s)
2000810213	525	13.86	12.4	23.45	6.2%	Concrete	1077.55	345.28
2000834622	525	12.4	-	8.12	0.7%	Concrete	360.44	356.38

The capacity calculations have assumed that the southern portion of the site will discharge to the public network. Final catchment area to be confirmed at future design stages. Further investigations are to be carried out to confirm gradients and diameters of the existing pipes. In case any of the pipes do not have sufficient capacity to service the proposed development, upgrades of the network or stormwater mitigation will be proposed.

STORMWATER CALCULATIONS

EXISTING SW PIPE CAPACITY CHECK

Project : 8 Stevensons Crescent, Albany
Client: Junge Xu
Calculation by: ZA
Checked by: NF

Job No: 10178

Date: 17/02/2023



ID 2000810213: Ex. public 525 mm dia. Concrete SW Pipe

Rational Method - MPD scenario

AUP Zone- Subject Site: Future Urban Zone

AUP Zone Catchment: Residential - Mixed Housing Urban Zone

Catchment Plan



Total Catchment Area	31,603 m²	
Subject Site Area	10,500 m ²	(Assumed as THAB Zone)
Catchment Area	3,196 m ²	(Mixed Housing Urban Zone)
Road Area	1,559 m ²	

Max allowable Impervious Area = 70% (From Unitary Plan) For Terrace Housing and Apartment Buildings Zone
 Max allowable Building Area = 50% (From Unitary Plan) For Terrace Housing and Apartment Buildings Zone
 Min allowable Pervious Area = 30% (From Unitary Plan) For Terrace Housing and Apartment Buildings Zone

Max allowable Impervious Area = 60% (From Unitary Plan) For Mixed Housing Urban Zone
 Max allowable Building Area = 40% (From Unitary Plan) For Mixed Housing Urban Zone
 Min allowable Pervious Area = 40% (From Unitary Plan) For Mixed Housing Urban Zone

Subject Site

Max allowable Building Coverage Area	5,250 m ²	50%
Max allowable Imp. Area(no building cover)	2,100 m ²	20%
Min allowable Pervious Area	3,150 m ²	30%

Catchment Area

Max allowable Building Coverage Area	1,278 m ²	40%
Max allowable Imp. Area(no building cover)	639 m ²	20%
Min allowable Pervious Area	1,278 m ²	40%

Road Area 1,559 m²

Total Building Coverage Area	6,528 m²
Total Road Area	4,298 m²
Total Pervious Area	4,428 m²

I (Rainfall Intensity)	110 mm/hr
Tc	10 min
C	0.9 (Roof)
	0.85 (Impervious)
	0.40 (Pervious)

Q=CIA

Q from catchment area 345.3 l/s

Pipe information taken from AC Geomaps system

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)	Check
ID 2000810213: Ex. public 525 mm dia. Concrete SW Pipe	525	13.86	12.4	23.45	1.5	6.2%	4.98	1077.55	OK

The capacity calculations have assumed that the southern portion of the site will discharge to the public network. Final catchment area to be confirmed at future design stages. Further investigations are to be carried out to confirm gradients and diameters of the existing pipes. In case any of the pipes do not have sufficient capacity to service the proposed development, upgrades of the network or stormwater mitigation will be proposed.

STORMWATER CALCULATIONS

EXISTING SW PIPE CAPACITY CHECK

Project : 8 Stevensons Crescent, Albany
 Client: Junge Xu
 Calculation by: ZA
 Checked by: NF

Job No: 10178
 Date: 17/02/2023



ID 2000834622: Ex. public 525 mm dia. Concrete SW Pipe

Rational Method - MPD scenario

AUP Zone- Subject Site: Future Urban Zone

AUP Zone Catchment: Residential - Mixed Housing Urban Zone
 Catchment Plan



Total Catchment Area	32,030 m ²	
Subject Site Area	10,500 m ²	(Assumed as THAB Zone)
Catchment Area	3,196	(Mixed Housing Urban Zone)
Road Area	1,986 m ²	
Max allowable Impervious Area = 70%	(From Unitary Plan)	For Terrace Housing and Apartment Buildings Zone
Max allowable Building Area = 50%	(From Unitary Plan)	For Terrace Housing and Apartment Buildings Zone
Min allowable Pervious Area = 30%	(From Unitary Plan)	For Terrace Housing and Apartment Buildings Zone
Max allowable Impervious Area = 60%	(From Unitary Plan)	For Mixed Housing Urban Zone
Max allowable Building Area = 40%	(From Unitary Plan)	For Mixed Housing Urban Zone
Min allowable Pervious Area = 40%	(From Unitary Plan)	For Mixed Housing Urban Zone
Subject Site		
Max allowable Building Coverage Area	5,250 m ²	50%
Max allowable Imp. Area(no building cover)	2,100 m ²	20%
Min allowable Pervious Area	3,150 m ²	30%
Catchment Area		
Max allowable Building Coverage Area	1,278 m ²	40%
Max allowable Imp. Area(no building cover)	639 m ²	20%
Min allowable Pervious Area	1,278 m ²	40%
Road Area	1,986 m ²	
Total Building Coverage Area	6,528 m ²	
Total Road Area	4,725 m ²	
Total Pervious Area	4,428 m ²	
I (Rainfall Intensity)	110 mm/hr	
Tc	10 min	
C	0.9 (Roof)	
	0.85 (Impervious)	
	0.40 (Pervious)	
Q=CIA		
Q from catchment area	356.4 l/s	

Pipe information taken from AC Geomaps system. Gradient conservatively assumed

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)	Check
ID 2000834622: Ex. public 525 mm dia. Concrete SW Pipe	525	12.4	-	8.12	1.5	0.7%	1.67	360.44	OK

The capacity calculations have assumed that the southern portion of the site will discharge to the public network. Final catchment area to be confirmed at future design stages. Further investigations are to be carried out to confirm gradients and diameters of the existing pipes. In case any of the pipes do not have sufficient capacity to service the proposed development, upgrades of the network or stormwater mitigation will be proposed.

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APPENDIX D

Wastewater Calculations

WASTEWATER CALCULATIONS- REV B

SUMMARY CAPACITY CALCULATIONS

Project: 8 Stevensons Crescent, Albany
Client: Gary Gray
Calculation by: ZA
Checked by: NF

Job No: 10178

Date: 17/02/2023



LOCATION OF THE PIPES

[illegible]

WASTEWATER CALCULATIONS-REV B**PROPOSED DEVELOPMENT WW FLOWS**

Project : 8 Stevensons Crescent, Albany
Client: Gary Gray
Calculation by: ZA
Checked by: NF

Job No: 10178
Date: 17/02/2023

**A. RESIDENTIAL**

Number of Proposed Units 138 112 Terrace houses + 26 Apartments
Number of people per dwelling 3
Total of occupants 414

Average Dry Weather Flow 180.00 l/p/d From WaterCare code of practice
Peaking Factor (self cleansing) 3.00

Total PDWF	223560.00 l/d
Total PDWF	2.59 l/s

Peak Wet Weather Flow 180.00 l/p/d From WaterCare code of practice
Peaking Factor (peak design) 6.700

Total PWWF	499284.00 l/d
Total PWWF	5.78 l/s

C. COMMERCIAL/RETAIL

Design Wastewater Flow Allowance 15 l/d/m2 From WaterCare code of practice

Area 550 m2
Total Flows 8250 l/d
Total Flows 0.095 l/s

Peaking Factor (self cleansing) 2
Peaking Factor (peak design) 6.7

Total PDWF (C)	0.19 l/s
Total PWWF (C)	0.64 l/s

Total PDWF- DEVELOPMENT 2.8 l/s
Total PWWF- DEVELOPMENT 6.4 l/s

WASTEWATER CALCULATIONS-REV B
EXISTING WASTEWATER PIPE CAPACITY CHECK

Project : 8 Stevensons Crescent, Albany
Client: Gary Gray
Calculation by: ZA
Checked by: NF

Job No: 10178
Date: 17/02/2023



ID926888: Ex. Public 225mm PVC WW Pipe

CATCHMENT PLAN



A. EXISTING SCENARIO FLOWS

Number of Existing Dwellings 95
 Number of people per dwelling 3
Total of occupants 285

Average Dry Weather Flow	180.00	l/p/d	From WaterCare code of practice
Peaking Factor	3.00		
Total average dry weather flow	153900.00	l/d	
Total average dry weather flow	1.78	l/s	

Peak Wet Weather Flow	180.00	l/p/d	From WaterCare code of practice
Peaking Factor	6.700		
Total PWWF	343710.00	l/d	
Total PWWF	3.98	l/s	

B. PROPOSED DEVELOPMENT FLOWS

PWWF 6.42 l/s

TOTAL PWWF (A & B) 10.397 l/s

Pipe information taken from AC Geomaps system

DESCRIPTION	Pipe diameter (mm)	Upstream m	Downstream m	Pipe Length m	Corebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)	Check
ID926888: Ex. Public 225mm PVC WW Pipe	225	12.99	12.82	22.5	1.5	0.8%	1.00	39.6	OK

Therefore, the existing wastewater pipe has capacity to accommodate additional flows from the proposed development.

WASTEWATER CALCULATIONS-REV B									
EXISTING WASTEWATER PIPE CAPACITY CHECK									
Project : 8 Stevensons Crescent, Albany					Job No: 10178				
Client: Gary Gray									
Calculation by: ZA					Date: 17/02/2023				
Checked by: NF									
ID2664181: Ex. Public 225mm PE WW Pipe									
CATCHMENT PLAN									
									
A. EXISTING SCENARIO FLOWS									
Number of Existing Dwellings					95				
Number of people per dwelling					3				
Total of occupants					285				
Average Dry Weather Flow					180.00 l/p/d		From WaterCare code of practice		
Peaking Factor					3.00				
Total average dry weather flow					153900.00 l/d				
Total average dry weather flow					1.78 l/s				
Peak Wet Weather Flow					180.00 l/p/d		From WaterCare code of practice		
Peaking Factor					6.700				
Total PWWF					343710.00 l/d				
Total PWWF					3.978 l/s				
B. PROPOSED DEVELOPMENT FLOWS									
PWWF					6.42 l/s				
TOTAL PWWF (A & B)					10.397 l/s				
Pipe information taken from AC Geomaps system. Pipe gradient assumed.									
DESCRIPTION	Pipe diameter (mm)	Upstream (l/s)	Downstream (l/s)	Pipe Length (m)	Corlebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)	Check
ID2664181: Ex. Public 225mm PE WW Pipe	225	12.82	-	28.8	1.5	1.0%	1.15	45.6	OK
Therefore, the existing wastewater pipe has capacity to accommodate additional flows from the proposed development.									

WASTEWATER CALCULATIONS-REV B

EXISTING WASTEWATER PIPE CAPACITY CHECK

Project : 8 Stevensons Crescent, Albany
Client: Gary Gray
Calculation by: ZA
Checked by: NF

Job No: 10178

Date: 17/02/2023



ID926887: Ex. Public 250mm PE WW Pipe

CATCHMENT PLAN



A. EXISTING SCENARIO FLOWS

Number of Existing Dwellings 95
 Number of people per dwelling 3
Total of occupants 285

Average Dry Weather Flow	180.00	l/p/d
Peaking Factor	3.00	
Total average dry weather flow	153900.00	l/d
Total average dry weather flow	1.78	l/s

From WaterCare code of practice

Peak Wet Weather Flow	180.00	l/p/d
Peaking Factor	6.700	
Total PWWF	343710.00	l/d
Total PWWF	3.978	l/s

From WaterCare code of practice

B. PROPOSED DEVELOPMENT FLOWS

PWWF 6.42 l/s

TOTAL PWWF (A & B) 10.397 l/s

Pipe information taken from AC Geomaps system. Pipe gradient assumed.

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)	Check
ID926887: Ex. Public 250mm PE WW Pipe	250	-	12.2	31.1	1.5	1.0%	1.23	60.4	OK

Therefore, the existing wastewater pipe has capacity to accommodate additional flows from the proposed development.

WASTEWATER CALCULATIONS-REV B

EXISTING WASTEWATER PIPE CAPACITY CHECK

Project : 8 Stevensons Crescent, Albany
Client: Gary Gray
Calculation by: ZA
Checked by: NF

Job No: 10178
Date: 17/02/2023



ID926891: Ex. Public 225mm PVC WW Pipe

CATCHMENT PLAN



A. EXISTING SCENARIO FLOWS

Number of Existing Dwellings 95
 Number of people per dwelling 3
 Total of occupants 285

Average Dry Weather Flow	180.00	l/p/d
Peaking Factor	3.00	
Total average dry weather flow	153900.00	l/d
Total average dry weather flow	1.78	l/s

From WaterCare code of practice

Peak Wet Weather Flow	180.00	l/p/d
Peaking Factor	6.700	
Total PWWF	343710.00	l/d
Total PWWF	3.978	l/s

From WaterCare code of practice

B. PROPOSED DEVELOPMENT FLOWS

PWWF 6.42 l/s

TOTAL PWWF (A & B) 10.397 l/s

Pipe information taken from AC Geomaps system

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)	Check
ID926891: Ex. Public 225mm PVC WW Pipe	225	12.2	11.52	61.9	1.5	1.1%	1.20	47.8	OK

Therefore, the existing wastewater pipe has capacity to accommodate additional flows from the proposed development.

WASTEWATER CALCULATIONS-REV B

EXISTING WASTEWATER PIPE CAPACITY CHECK

Project : 8 Stevensons Crescent, Albany
 Client: Gary Gray
 Calculation by: ZA
 Checked by: NF

Job No: 10178
 Date: 17/02/2023



ID924107: Ex. Public 225mm UPVC WW Pipe

CATCHMENT PLAN



A. EXISTING SCENARIO FLOWS

Number of Existing Dwellings 350
 Number of people per dwelling 3
 Total of occupants 1050

Average Dry Weather Flow	180.00	l/p/d
Peaking Factor	3.00	
Total average dry weather flow	567000.00	l/d
Total average dry weather flow	6.56	l/s

From WaterCare code of practice

Peak Wet Weather Flow	180.00	l/p/d
Peaking Factor	6.700	
Total PWWF	1266300.00	l/d
Total PWWF	14.656	l/s

From WaterCare code of practice

B. PROPOSED DEVELOPMENT FLOWS

PWWF 6.42 l/s

TOTAL PWWF (A & B) 21.075 l/s

Gradient conservatively assumed

DESCRIPTION	Pipe diameter (mm)	Upstream (IL)	Downstream (IL)	Pipe Length (m)	Corlebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)	Check
ID924107: Ex. Public 225mm UPVC WW Pipe	225			16.8	1.5	0.5%	0.81	32.2	OK

Therefore, the existing wastewater pipe has capacity to accommodate additional flows from the proposed development.

WASTEWATER CALCULATIONS-REV B
PROPOSED WASTEWATER PIPE CAPACITY CHECK

Project : 8 Stevenson **Job No:** 10178
Client: Gary Gray
Calculation by: ZA **Date:** 17/02/2023
Checked by: NF



Proposed Public WW pipes



PROPOSED DEVELOPMENT FLOWS
PWWF 6.42 l/s

Required diameter and gradient for the proposed public WW pipes

DESCRIPTION	Pipe diameter (mm)	Colebrook-White K (mm)	Pipe gradient	Flow velocity (m/s)	Pipe capacity (l/s)	Check
Proposed Public WW pipes	150	1.5	0.5%	0.62	10.9	OK

DHC CONSULTING GROUP LTD
PO Box 9848, Newmarket
Auckland 1149
26 Patey Street, Newmarket
New Zealand



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APPENDIX E

Water Supply/Wastewater Planning Assessment

Development Application Form – Water Supply/Wastewater Planning Assessment

Date of Application	17/02/2023	
Address of Development	8 Stevensons Crescent, Albany	
Layout Plan of Proposed Development clearly showing: • Aerial photograph • Road names • Boundary of development • Preferred point of connection to existing water supply and wastewater asset		
	Description	Comment
Current Land Use	Greenfield/Rural	Residential (Single family dwellings) / Residential (Multi-unit dwellings) / Residential (Multi-storey apartment blocks) / Commercial / Industrial / Other (Please Specify)
Proposed Land Use	Mixed Use: 138 Residential Dwellings Commercial/Retails	
Total Development Area (Ha.)	2.6848	
Number of Residential Households (Consent & Ultimate)	138 Residential Dwellings	E.g. 12- storey apartment building with 4 units per storey is 48 residential households.

Refer to Water and Wastewater Code of Practice for Land Development and Subdivision Section 6 Water Supply

Water Supply Development Assessment		
Average and Peak Residential Demand (L/s)	Proposed Development: Design Population=138 dwellings x 3= 414 people Average daily demand=414 x 220=91,080 L/d Peak Day demand= 91,080 x 2= 182,160 L/d Peak hourly demand=(182,160/24) x 2.5= 18,975 L/h = 18,975/3600=5.27 L/s	
Average and Peak Non-Residential Demand (L/s)	Commercial/Retails WS CoP Standard: 15L per day per net m2 - Area= 550m2 - 15 x 550= 8,250L/d - 8,250/86400=0.095	Show calculations based on Watcare CoP

Non Residential Demand Typical Daily Consumption Profile / Trend	10 hr (9am – 5pm)	E.g. 24 hr operation / 10 hr (9am – 5pm) / Filling on-site storage at certain frequency)
Fire- fighting Classification required by the proposed site	TBC	Refer to New Zealand Standard SNZ PAS 4509:2008
Hydrant Flow Test Results	☐ Yes ☒ No	Attach hydrant flow test layout plan and results showing test date & time; location of hydrants tested and pressure logged; static pressure; flow; residual pressure
Sprinkler System in building?	☐ Yes ☐ No TBC	Sprinkler design should consider Watercare Level of Service: minimum pressure at 200kPa and minimum flow at 25 l/min. The building owner shall conduct periodic review of sprinkler design.
Further Water Supply comments		

Refer to Water and Wastewater Code of Practice for Land Development and Subdivision Section 5 Wastewater

Wastewater Development Assessment		
Peak DWF and WWF Residential Design Flows (L/s)	Consent PDWF= 2.59 L/s Consent PWWF= 5.78 L/s	Show calculations based on Watercare CoP. If relevant for ultimate development scenario include No. of Potential Units/ lots for calculations.
Peak DWF and WWF Non- Residential Design Flows (L/s)	Consent PDWF = 0.19L/s Consent PWWF =0.64L/s	Show calculations based on Watercare CoP.
Non-Residential Discharge Profile / Trend (i.e. Operations)	10 hr (9am – 5pm)	E.g. 24 hr operation / 10 hr (9am – 5pm) / Other

New Assets Required for Development	Pumps/Raising Mains	<i>If applicable please provide supporting calculations and indicative design parameters (ie. Pump Station and rising main or storage)</i>
Sewer Capacity Check	OK Capacity calculations have been carried out for the downstream network, confirming capacity for the upstream catchment.	<i>Capacity assessment at proposed connection point and impact on network</i>
Further Wastewater comments Refer to Initial WW calculations attached		

For internal Watercare use only

Date Application Received	
Application Ref No.	
Assigned Connections Engineer	
Prior Developer Correspondence with Watercare	
Neighbouring developments to consider in capacity assessment	

DHC CONSULTING GROUP LTD
PO Box 9848, Newmarket
Auckland 1149
26 Patey Street, Newmarket
New Zealand



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F: 64 9 520 0335
E: info@dhc.nz

APPENDIX F

Wastewater and Water Capacity Assessment by Watercare (CON 150015)

Watercare Services Limited

Private Bag 94010

Auckland 2241

www.watercare.co.nz

Customer service line

Mon to Fri 7.30 to 6pm

09 442 2222

info@water.co.nz



Fault line

24 hours

09 442 2222

Free text 3130

faults@water.co.nz

09/08/2022

Zorany Agudelo
DHC Consulting Group Ltd
26 Patey Street
Epsom 1051

Dear Zorany,

Re: Your request for an assessment of water and wastewater capacity

Address: 8 Stevensons Crescent, Albany

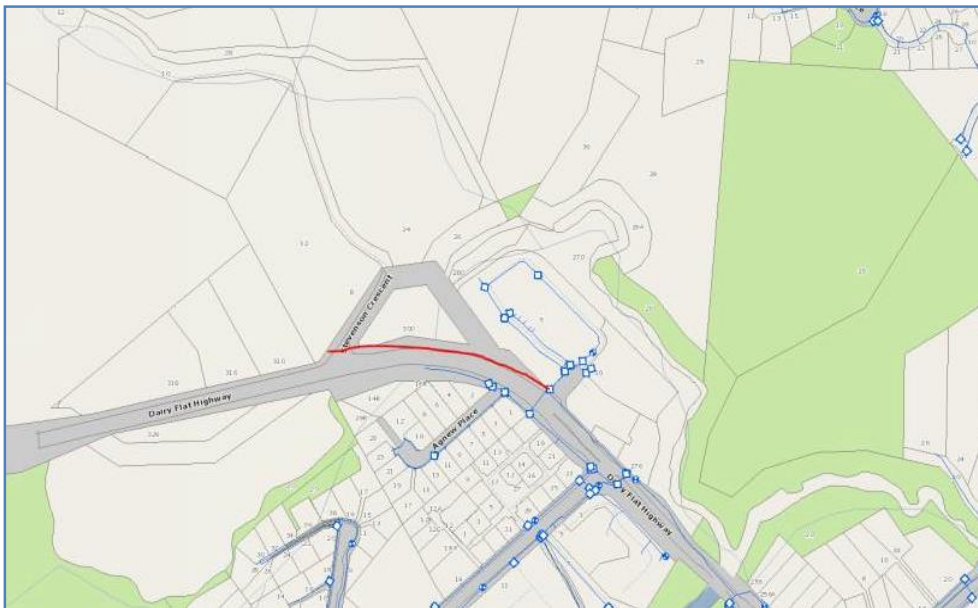
Watercare application number **CON 150015**

This assessment is independent of the Auckland Council consenting process. This letter does not constitute a pre-approval from Watercare, and the assessment is valid for two years from the date of this letter.

Watercare has undertaken an initial high-level assessment of the proposal for this **development, 220** residential dwellings, early childhood centre, café and 10 convenience retails to be constructed at 8 Stevenson's Crescent, Albany. Based on the information provided at this stage, in particular, to the assessment form as appropriate, we confirm the following.

Water supply: We have assessed the development, and it can proceed without any upgrades required to the network. A new 150mm ID pipe needs to be extended up to the development (approximately 250m of pipe).

See the sketch below.



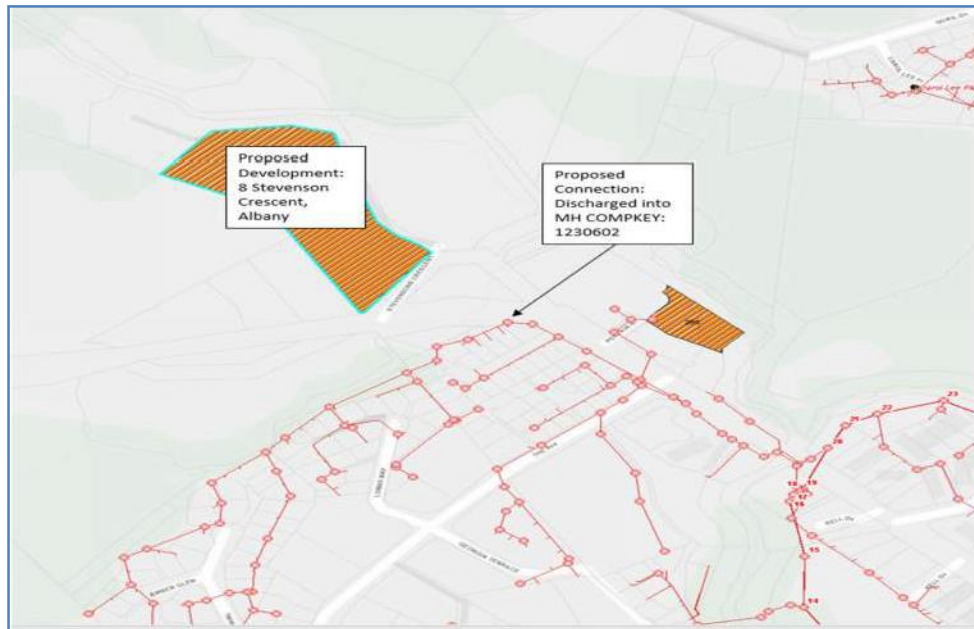
Wastewater:

This site is a part of the Future Urban zone. The developer also proposes to discharge the wastewater generated by the development into the existing 225mm pipe network at MH COMPKEY: 1230602, which is approximately 400m from Oteha Valley Branch.

Based on the information available, including the static capacity assessment undertaken by the developer, the additional design flow of 9.75 l/s from the proposed development site is not expected to significantly affect the system performance of the connecting downstream network and can be approved. Hence, the developer is not required to carry out upgrade of the wastewater network outside the development site.

This wastewater capacity assessment excludes information and impact on any recently consented neighbouring developments other than those considered by the developer.

The proposed development and the discharge point are both shown in the figure below.



Yours Sincerely,

Nita Dharmadhikari
Snr. Developments Engineer (North/West),
Developer Services
Watercare Services Limited