THE NEIL GROUP

LAND AND PROPERTY DEVELOPER

WHENUAPAI GREEN

98-102 Totara Road, Whenuapai

Resource Consent – Infrastructure Report:

- Earthworks
- Roading
- Stormwater
- Wastewater
- Water supply
- Landscaping
- Utilities

14 December 2022

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INTRODUCTION

This Engineering Summary Report is to accompany Resource Consent applications for a comprehensive multi-stage residential development at 98-102 Totara Road, Whenuapai

The proposed Whenuapai Green development is located on existing properties at 98-100 and 102 Totara Road, Whenuapai and occupies a total area of 16.36 hectares. The site is currently predominantly in pasture and has been used for cattle farming. McCaw Avenue is on the southern boundary of the site, Totara Road to the west and northwest and the NZDF Whenuapai Air Force Base is to the east. There are recent new housing developments to the south of the site.
The site is currently zoned “future urban”. The proposed development will provide a total of 346 residential houses as part of a comprehensive consent for development of terrace units, duplex units, and standalone houses. An area of 2.79 ha (lot 800) has been set aside to be developed into a proposed primary school which will service the surrounding area.
The location of the site (from Auckland Council GeoMaps) with respect to the surrounding area is shown below:

Fig 1 Location Plan (AC GeoMaps)

STAGING

Design and resource consenting will be undertaken for the whole of the proposed development at the same time.
Construction will initially commence with bulk earthworks over the entire site as cut and fill areas are separated. This will include platforming and some retaining walls for the proposed dwelling blocks.

Civil construction of the subdivision will be split into three stages as shown on drawing 4520-00-RC-01-rev7.
Stage 1 will include the upgrading of Totara Road and the construction of Road 1, being the main road though the development. The two stormwater dry basins will also be constructed as part of stage 1.
Construction of the dwellings will also be done on a staged basis, with building consents obtained for smaller blocks of dwellings within each stage.

A copy of the above staging plan is included with the drawings submitted for resource consent.

EARTHWORKS

The existing site is gently sloping from the south to north with an average slope of 1.7 percent, although there is a low point on the western boundary adjacent to Totara Road to which the larger part of the site drains. Earthworks are proposed over 15.69 hectares of the site area to create roads, general building platforms and stormwater detention basins. The expected (net) earthworks volumes are in the order of:

Topsoil strip	34,000 m3
Topsoil respread	24,000 m3
Topsoil off-site	10,000 m3
Cut	68,500 m3
Fill	62,600 m3
Unsuitable material offsite	8,000 m3 (allowance)

Assumptions used in earthworks volumes:
- Average existing topsoil depth of 0.23m (from preliminary GIR).
- Average topsoil respread 0.15m
- Cut excludes recovery from trenches.

All earthworks will be monitored and tested by CMW Geosciences to ensure compliance with the compaction and voids requirements of the specification.
Earthworks will only be carried out during the period 1 October to 30 April the following year unless specific processes are approved for winter works by the Council Monitoring Officer.

Sediment and Erosion Control:

Sediment and erosion controls to mitigate the effects of stormwater runoff on the adjacent streams and downstream receiving environment will be implemented during earthworks operations. These will be in accordance with Auckland Council document GD05 “Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region”.
Typically, this would include:
- Stabilised vehicle entrance(s)
- Catchpit protection
- Sediment ponds
- Decanting earth bunds.
- Silt fences

- Clean water cutoff/diversion drains

The area of earthworks open at any one time will be limited where possible and the site will be progressively stabilised against erosion at all stages to minimise the discharge of sediment to surface water.
Details of the calculation of sediment yield, sediment pond design and typical details are shown on the Earthworks drawings EW-230 to EW-234.

Prior to works commencing an overall Construction Management Plan will be prepared.

Copies of the earthworks drawings are included with the resource consent drawings.

Retaining Walls:

Retaining walls will be provided as required to form flatter building pads.

Segmental concrete “Alan Block” retaining walls will be used for retaining adjacent to the road reserve. Elsewhere cantilever pole retaining walls will mainly be used with either galvanised steel or timber posts. Subsoil drainage will be installed behind all walls and will drain to the private stormwater connections.

In the Stage 3 area, retaining walls will be required on the site boundaries and on both sides of the existing stream (walls N1 and M5). There will also be a culverted stream crossing under Road 9, with reinforced earth embankments each side to support the filling required.

All retaining walls will be located in private properties and will require building consents.

Copies of the retaining wall drawings are included with the resource consent drawings.

Geotechnical Report:

CMW Geosciences have prepared Preliminary Geotechnical Assessments dated 18 May 2018 & 16 August 2019 which confirm that the site will be generally suitable for the development.

CMW Geosciences have now completed a final geotechnical investigation report:

Whenuapai Green Development,
98-102 Totara Road, Whenuapai
Geotechnical Investigation Report
AKL2018-0085AF Rev 1, dated 7 December 2022

The final report confirms the general suitability of the site for development and provides parameters for the design of building foundations and retaining walls, along with designs for slope reinforcement with geogrids.

CMW Geosciences will also be involved in the detailed design of the retaining structures, as well as to provide construction monitoring. At the completion of earthworks they will prepare a Geotechnical Completion Report.

A copy of the final Geotechnical Investigation Report has been submitted separately with the resource consent application.

Environmental Investigation

Geosciences Ltd have undertaken environmental site investigations and prepared Preliminary Site Investigation (PSI) reports for the development sites, plus a Site Management Plan (SMP) titled:

> Site Management Plan (SMP)
> 98-102 Totara Road, Whenuapai.
> Ref No REP-1685/SMP/Nov21,
> Dated 29 November 2021.

The SMP provides procedures for the handling of potentially contaminated excavated soil materials identified in the PSI reports. Proposed remedial works are provided for:

- Erosion and sediment control
- Dust control
- Lead based paint
- Septic tank and effluent disposal field removal.

The estimated impacted area is 462m2 and the volume is 138.6m2.

Geosciences Ltd will be engaged in the role of Contaminated Land adviser (CLA) to provide direction in relation to contamination / disposal issues for the project and to provide validation reports following remediation works.

Copies of the Preliminary Site Investigation (PSI) reports and the Site Management Plan (SMP) have been submitted separately with the resource consent application.

Archaeological Report

An archaeological assessment of the site has been undertaken by Clough and Associates Ltd, who have produced a report titled:

> 98-100 and 102-102A Totara Road, Whenuapai:
> Archaeological Assessment
> January 2021

The conclusion to the report states:

> Future development of the properties at 98-100 Totara Road and 102-102A Totara Road, Whenuapai will have no known effects on archaeological values, as no archaeological sites have been identified within the property boundaries and the potential for any unidentified subsurface remains to be exposed during development is very low. However, if previously unidentified archaeological remains are exposed by earthworks, they would have statutory protection under the HNZPTA and cannot be modified without authorisation from HNZ.

A copy of the full Archaeological Assessment has been submitted separately with the resource consent application.

TRAFFIC

Abley Limited have been commissioned by The Neil Group Limited to prepare an Integrated Transportation Assessment (ITA) report to evaluate the potential transportation related effects of the development on the future receiving environment. The ITA includes the estimated traffic volumes associated with the likely yield of dwellings in order to understand how the proposal may affect the transport network.

The report conclusions are as follows:

- The transportation assessment of the proposed development of 98-102 Totara Road has focussed on the likely impacts of establishing a residential development. It is concluded that the site is appropriate for this activity from a transport perspective as:
- the proposed development will be well served by public transport, walking and cycling connections in the near future which are currently being planned by Te Tupu Ngātahi Supporting Growth Alliance and Waka Kotahi through the North West Auckland transport upgrades and SH16 Brigham Creek to Waimauku Safety Improvements respectively;
- there is the potential for new bus stops along Totara Road and a number of pedestrian crossing points to be included in the site frontage to maximise public transport opportunities and further improve pedestrian access to public transport;
- there is excellent accessibility to key activities and services by all modes; and
- the site is well-served by SH16 and SH18 resulting in negligible increases in traffic across the wide network.
- the traffic modelling results demonstrates that the Totara Road / Dale Road / McCaw Avenue intersection will operate in free-flowing conditions with the additional generated traffic. The Totara Road / Brigham Creek Road / Mamari Road intersection will operate well within in capacity of the intersection with minimal changes in delays.

The recommendations of the ITA have been adopted into the roading design, including the provision of bus stops on Totara Road.

A full copy of the report titled “Whenuapai Green Integrated Transport Assessment” is included with the resource consent application.

Abley have also prepared an Intersection Assessment, dated 19 August 2022, for the Totara Road / Dale Road / McCaw Avenue intersection.
The conclusion states:

> “With the anticipated background growth, the intersection has sufficient capacity to accommodate the traffic associated with the proposal. The intersection will continue to operate with excellent LoS (LoS A) and experience delays no more than 10 seconds within the next 10 years. The intersection modelling demonstrates that there is ample capacity going forwards in its current configuration.”

ROADING

Totara Road is the main arterial route in the area providing part of a link between Whenuapai Village and Herald Island as well as to the Upper Harbour Motorway via Kauri Road and Brigham Creek Road. The section of Totara Road adjacent to the site will be upgraded as part of the proposed development and will include a new cycle lane and footpath on the eastern side.

The proposed site roading layout and includes three connections to Totara Road, one connection to integrate the site with the adjacent residential development area at McCaw Avenue and the potential for future connections to the Whenuapai Air Base and 94 Totara Road. The location of the potential future school is in the northwest of the site and is well served with vehicle connections to proposed internal roads (Road 1 and Road 2) as well as Totara Road, if required. Totara Road is an existing bus route and bus stops will be provided outside the school on each side of the road. A crossing point with central refuge island will also be provided.
Refer to drawing RD-349 rev A.

It is proposed that the speed limit on Totara Road will be reduced to 50 Kph adjacent to the site, with internal roads having a 30 Kph speed limit. The proposed 50 Kph limit on Totara Road will provide a continuation of the existing limit to the south of the site. At the northern end of the side a Speed Management Threshold treatment will be provided.
Refer to drawing RD-351 rev A for details.

There will be no vehicle access to lots from Totara Road, with access provided from internal roads and Common Owned Access Lots (COALs). COALs are also used to reduce vehicle access to Road 1, which is the main internal road, and throughout the development.

Road cross sections are based on recommendations provided by Team Traffic and are shown on drawings RD-330 to RD-334.
Team Traffic and Abley have also provided advice on site distances, vehicles entrances and parking requirements.

Copies of the roading drawings are included with the resource consent drawings.

STORMWATER

Existing Stormwater

Currently the site has no built stormwater infrastructure. Drainage within the existing site is primarily by way of overland flow paths and streams conforming to the natural contours of the site.

Auckland Council GeoMaps Data and the Bioresearches Memorandum – Watercourse Classification 9 Nov 2020 provide information on the existing drainage features and stormwater infrastructure. GeoMaps gives the stream names as Rarawaru Creek on the eastern side of the site and Ratara Stream on the western side, although tributaries are unnamed, along with overland flow paths and watercourses within and adjacent to the site.

The western side of the site flows by way of several minor overland flow paths, including ephemeral overland flow paths (labelled “C.1 and C.2 on Bioresearches Fig 3 – see below) and the table drains beside Totara Road. These combine at a low point adjacent to the western boundary. This corresponds to a sag point in Totara Road where there is a 450mm diameter stormwater pipe beneath the road carriageway. This discharges into a stream / overland flow path on the western side of Totara Road which is a tributary of the Ratara Stream.

On the eastern side of the site there is an intermittent stream (labelled ‘A’ on Fig 3) which originates from a stormwater detention basin at the end of McCaw Road that serves a housing development immediately to the south of the site. This flows through the south-eastern corner of the site before going into the neighbouring NZDF airbase where it is piped. It emerges again (labelled ‘B’ on Fig 3) to flow through the eastern “panhandle” of the site, before again re-entering NZDF land.
Several smaller overland flow paths from the eastern part of the site also flow to this stream, some by way of the neighbouring property at 94 Totara Road.
All these overland flow paths and streams discharge into the Rarawaru Creek which then flows through a 2300mm diameter culvert under Totara Road approximately 140m from the north-eastern corner of the site. The culvert outlet has been surveyed as having an invert level of RL1.41m. This level is similar to the existing Mean High Water Springs (MHWS) tide level of RL 1.39 and below the MHWS tide level of RL 1.89 to be used for MPD (maximum probable development) as required by the Auckland Council Stormwater Flood Modelling Specifications November 2011.

There are also three 300mm diameter stormwater culverts under Totara Road to the west of the site which connect the table drains on each side of the road.

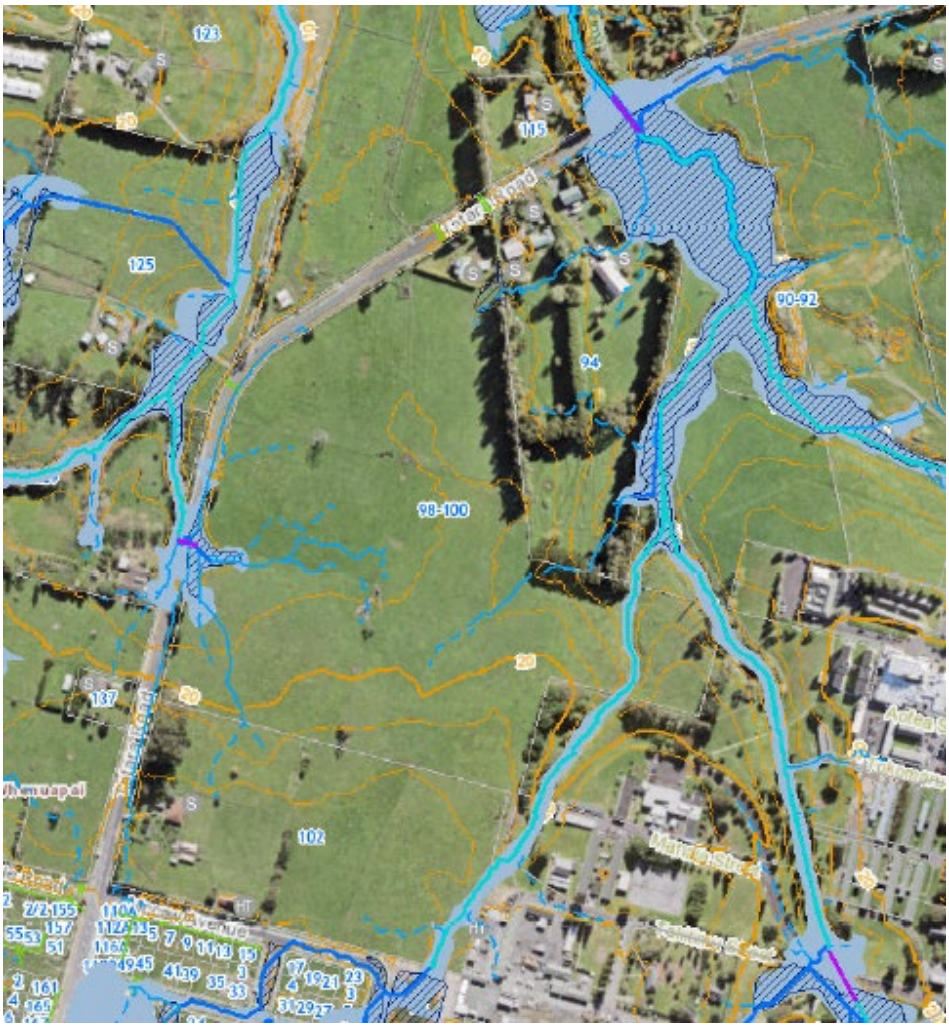

Fig 2 Overland Flow Paths (AC GeoMaps)

Figure 3. Classified and ground-truthed watercourses at 98 and 100-102 Totara Road.

Stormwater Management Plan

A site-specific stormwater management plan has been prepared for the proposed development. This provides a detailed assessment of the proposed stormwater management for the site, including:

- AUP SMAF 1 requirements for retention/reuse and detention.
- SW quality treatment for high use roads and carparks.
- SW dry basins for extended detention and attenuation.
- Overland flow paths
- Assessment of downstream effects, including flooding.

Design rainfall data (24hr from TP108 with 2.1 deg. climate change as AC SWCoP):

10 % AEP	152.8mm
1% AEP	227.8mm
95th percentile	35mm

A copy of the Site-Specific Stormwater Management Plan is separately included with the full resource consent application.

Proposed Stormwater Reticulation

Stormwater runoff from the lots will be collected from all impervious surfaces by private drainage pipelines. The runoff from roofs will initially be directed to an on-site private storage tank which will provide stormwater retention for non-potable on-site reuse requirements, for example toilet flushing, gardens, etc. In Stage 3 some lots and COALs will also require private on-site storage to meet extended detention requirements as they will discharge directly to the stream since the topography prevents reticulation to a SW basin.

Stormwater runoff from roads and public footpaths will be captured by catchpits and conveyed by a public stormwater pipe network to the stormwater dry basins. A public connection will be provided to connect with the on-site private drainage on all lots and COALs.

The public pipe network will have a design capacity to transport runoff from the 10% AEP rainfall event, including allowance for climate change.
Where possible, the public stormwater pipe network will discharge into one of the two stormwater basins which will provide extended detention for most lots.

Outflows from the stormwater basins will again be through the new public stormwater pipe system with discharge either to the Ratara Stream or the Rawawaru Creek. Discharge locations will have concrete and rock rip-rap outfalls to prevent localised stream erosion. These sections of the public network will require pipes under or along Totara Road and will be designed to cater for at least the runoff from the 10% AEP rainfall event.
Flows exceeding the pipe capacity of the public network will be conveyed as overland flows down the public roads. The public road network will be designed, where possible, so that overland flows from runoff up to the 1% AEP rainfall event will be conveyed to the stormwater basins.

Copies of the stormwater drawings are included with the resource consent drawings.

WASTEWATER

Currently the site has no built wastewater infrastructure. A new public wastewater pipe network will be constructed to service the proposed development. This will generally follow the existing contour of the site and drain to the north. The existing subdivision south of the site does have a public wastewater network, but as this drains southward it is not possible to directly connect the proposed development into this network.

Discussions have been held with Watercare (Lars Fog, Program Lead, Major Developments) regarding the conveyance of wastewater beyond the site boundaries. These have indicated that the preferred option is for wastewater to be drained northwards by gravity to a new pump station at the end of McKean Road. This would also serve other future development sites in the area. A suitable route from the development has been identified along Totara Road and through the esplanade reserve on the eastern side of the Rarawaru Creek. The pump station could be sited on unused road reserve at the end of McKean Road, subject to Auckland Transport approval. An alternative location would be on adjacent land at 9 McKean Road, on which The Neil Group Ltd has a sale and purchase agreement.

The Neil Group Limited has engaged Robert White of consultancy 'Water Acumen' to investigate the options for the design of the pump station and the rising main.
Wastewater will be pumped by rising main to an existing wastewater manhole (GIS ID 2698803) on the north-eastern corner of the Totara Road / Dale Road intersection. From here it can drain by way of the existing 225 diameter public sewer to the existing Whenuapai Village Pump Station in Tamiro Road (GIS ID 2694931). The capacity of the existing network has been checked and confirmed as being capable of taking the flows from the proposed Whenuapai Green development.

The design of the proposed pipe network and pump station will be in accordance with current Watercare requirements.

Copies of the wastewater drawings are included with the resource consent drawings.

Also included is a report on the proposed pump station and rising main prepared by Robert White of Acumen Water.

WATER SUPPLY

Auckland Council GeoMaps shows an existing 150 AC watermain opposite the site on the western side of Totara Road. There is also a 315 PE watermain on the western side and a 180 PE watermain on the eastern side of Totara Road which service the recent subdivisions to the south of the proposed development. The 315 PE main finishes at the corner of Totara Road and Dale Road while the 180 PE main extends across McCaw Avenue to immediately outside of the southern boundary of the proposed subdivision. There is also a 125 PE main on the southern side of McCaw Ave.

Hydrant fire flow testing has been carried out by Detection Services on the 315 PE main outside 169 Totara Road and on the 125 PE main outside 9 McCaw Ave. Both tests were successful and confirmed flow rates of 25 litres per minute were available as is required to meet a FW2 water supply classification.

A public water supply network will be provided throughout the proposed subdivision utilising principal and rider mains with connections to each lot, in accordance with Watercare's Code of Practice for Land Development and Subdivision – Chapter 6: Water.

Modelling of the water supply network for the proposed subdivision was undertaken using the EPANET water modelling software assuming no cross connections between the two networks in the area, being the old AC mains and the new PE mains.

Recent discussions with Watercare (Lalrs Fog) have revealed that upgrade works will be required to the water supply network in Brigham Creek Road before any further development will be allowed in the Whenuapai area. The upgrade works relate to a 250m length of existing 150 AC pipe near Hobsonville Road. Indications are that this will need to be replaced or supplemented by a 355 PE watermain.

See Appendix A for report "Water Supply – EPANET Analysis" for details and results.
Copies of the water reticulation drawings are included with the resource consent drawings.

LANDSCAPING

Streetscape Planting

Street trees are to be located in specific locations along the proposed internal roads, as well as the upgraded Totara Road so that they do not conflict with sightlines, streetlights or underground services as per the Council standards.

Detailed landscape plans have been prepared by Greenwood Associates.

Stormwater Reserves

The two stormwater dry basins are located in proposed Drainage Reserves which will be vested in Auckland Council at completion of Stage 1 of the development.
The SW basins and the drainage reserves will be planted to enhance the area and provide some treatment of the stormwater runoff using appropriate species.

Detailed landscape plans of the planting in the drainage reserves have been prepared by Greenwood Associates.

Esplanade Reserve

Cato Bolam Ltd, with the help of Bioresearches, have undertaken a survey of the existing stream bed widths to determine the Esplanade Qualifying Status of the watercourses on the on the development site. They have produced a report which concludes that " the watercourses located on 98-100 and 102 Totara Road are not qualifying in terms of the requirements for the vesting of Esplanade Reserve under section 230 of the Resource Management Act 1991."

A full copy of the report titled "Survey of Stream Beds, 98-10 and 102 Totara Road" dated 7 July 2022" is included with the resource consent application.

Riparian Planting

The existing streams on the site (see A, B and E on Bioresearches' Figure 3 above) will be enhanced by removing the existing culverted farm crossings and reinstating the stream to match adjacent reaches. Riparian planting, with appropriate native species, will be undertaken to at least 10m either side of all existing streams.

Approval of the proposed landscaping will be obtained from the local Te Kawarau Iwi Tiaki Trust.

Copies of all landscape plans prepared by Greenwood Associates, including for the streetscape, drainage reserve and riparian planting are included separately included with the resource consent application.

UTILITIES

Street Lighting

A preliminary street lighting design and plans have been prepared by Advanced Lighting Technologies Ltd.

Copies of all street lighting design and plans are included separately included with the resource consent application.

Electrical Supply:

Discussions have been had with Vector and they have confirmed they are able to service the proposed development, including the relocation and undergrounding of an existing overhead 11kV cable to NZDF.

See Appendix B for a letter from Vector confirming that the proposed development can be serviced.

Copies of the electrical reticulation drawings are included with the resource consent drawings.

Telecommunications:

Discussions have been held with Chorus and they have confirmed they are able to provide a fibre network to service the proposed development.

See Appendix B for a letter from Chorus confirming that the proposed development can be serviced.
Preliminary reticulation plans are not yet available.

Gas Supply

No reticulated gas supply will be provided to the development.

CONCLUSION

The purpose of this report is to accompany a consent application for the Whenuapai Green development in Totara Road, Whenuapai.

As detailed above, Earthworks, Roading, Stormwater, Wastewater, Water supply and Utility works can be provided to service the proposed development.

Report prepared by:

Brian Jones
Group Engineering Manager
The Neil Group Ltd.

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APPENDIX A – WATER SUPPLY - EPANET ANALYSIS

APPENDIX B – UTILITIES

Vector

Chorus

APPENDIX A – WATER SUPPLY - EPANET ANALYSIS

NEIL CONSTRUCTION LTD

PROPOSED SUBDIVISION
98-100, 102 Totara Road, Whenuapai

WHENUAPAI GREEN – FULL SITE

WATER SUPPLY

EPANET ANALYSIS

August 2022

Supply Modelling Notes, Assumptions and Details:

GENERAL:

- EPANET version 2.2 used.
- Watercare Water Code of Practice 2021 V2.4 used for flow allocations.
- Metric (LPS) flow units used, modelled with Hazen-Williams Formula.
- Pipe roughness values set at a universal rate of 140.
- Pipe lengths and diameters have been entered into model.
- Detection Services Ltd site testing used to set reservoir values.

SITE SPECIFIC:

- Reservoir of 66m total head used (test location static pressure (40m) plus test location RL (26mRL))
- Site elevations range from 14mRL to 26mRL.
- Residential demand based on 353 additional lots (@ 3persons / dwelling and 220l/p/d), added at multiple nodes throughout the model. Resulting in an un-peaked demand flow of 2.70l/s.
- School demand based on 700 students (@ 25l/d) and a staffing ratio of 1:14 (@ 50l/d). Resulting in an un-peaked demand flow of 0.231l/s.
- As per other developments in the area, no cross connections between the two networks in the area, being the old AC mains and the new PE mains.
- Full site totals:
    - Residential Peak Daily Flow Rate: 5.39l/s
    - Residential Peak Hourly Flow Rate: 13.48l/s
    - School Daily Flow Rate: 0.231l/s
    - Peak Daily Flow Rate with School: 5.62l/s
    - Peak Hourly Flow Rate with School: 13.71l/s

EPANET Model / Scenario Tests undertaken:

As per above Watercare code:

1. Average Daily Water Demand plus Fire Flow at two (2) Hydrants:

- Peak Daily Demand:
    - Average Daily Demand, residential lots with a peaking factor of 2, plus school demand.
- Firefighting Demand:
    - Above Peak Daily Demand plus FW2 Classification of 12.5 l/s applied at two hydrants simultaneously. Several fire hydrant nodes checked for model sensitivity.

2. Peak Hourly Demand:

    - Peak Daily Demand x Peaking Factor of 2.5 applied to all residential lots and school demands.

Preferable Model Assessment Criteria.

- Design Pressure to be between 250kPa and 800kPa (25-80m)
- Design Normal velocities at hourly peak less than 3.0 m/s

Location of Models:

- Synergy12d://NGSQL01/Projects/Whenuapai Green - 4520/Reports/Water/EPA NET 08 2022

RESULTS

1. Full Development – Peak Daily Demand plus Fire Flow

   Several combinations of fire hydrants were considered, attached is an output from one scenario:

   Results gave a minimum pressure of 39.87m at node J19 (highest point on site), maximum pressure of 50.78m J58 (lowest point on site), and a maximum velocity of 1.45m/s in pipe link P73, leading to a fire flow test hydrant.

2. Full Development - Peak Hourly Demand

   Attached is the output for the peak hourly demand.

   Results gave a minimum pressure of 39.96m at node J19 (highest point on site), maximum pressure of 50.96m at node J58 (lowest point on the site), and a maximum velocity of 0.26m/s in pipe link P1, leading from one reservoir point and the existing 315mmdia connection pipe.

CONCLUSION

Watercare Code of Practice velocity and pressure limits are not exceeded when this development is serviced from the South, as modelled and defined above.

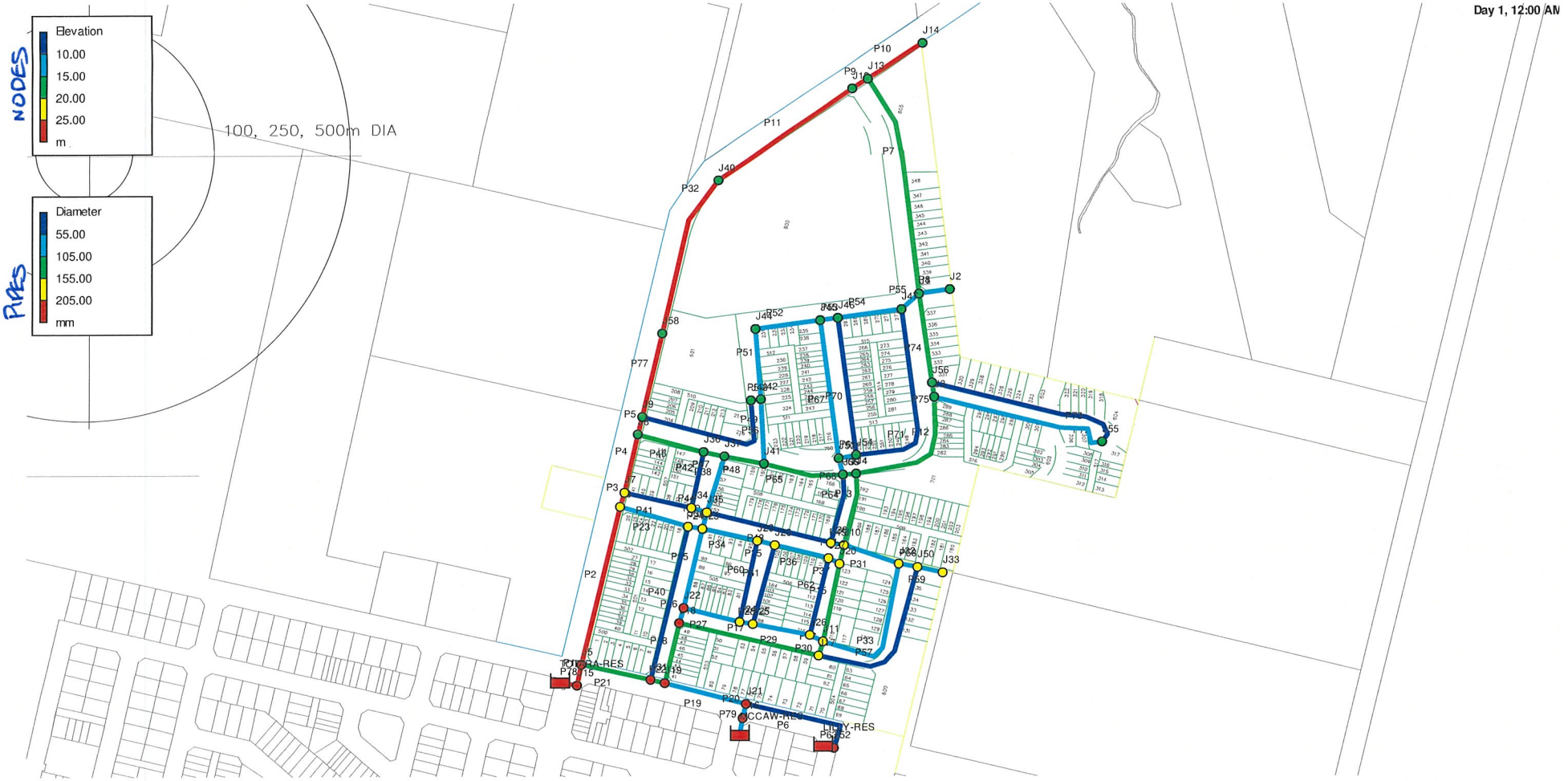
Prepared by:

Chris Kennedy
Civil Design Manager
The Neil Group Ltd

August 2022

Attached: Hydrant testing and EPANet scenario outputs

WHENUAPAI GREEN WATER SUPPLY



MODELED PIPE SIZES

(250|150|100|50)

WHENUAPAI GREEN WATER SUPPLY

WHENUAPAI GREEN WATER SUPPLY

Network Table - Nodes

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc J5	26	0	0.00	65.95	39.95
Junc J6	21	0	0.00	65.84	44.84
Junc J7	21	0	0.00	65.83	44.83
Junc J8	17	0	0.00	65.80	48.80
Junc J9	17	0	0.00	65.80	48.80
Junc J12	16	0	0.00	65.73	49.73
Junc J13	16	0	0.00	65.73	49.73
Junc J14	15	0	0.00	65.73	50.73
Junc J15	26	0	0.00	65.98	39.98
Junc J16	26	0	0.00	65.98	39.98
Junc J1	18	0.168	0.17	65.32	47.32
Junc J2	18	0	0.00	65.32	47.32
Junc J3	19	0.122	0.12	65.28	46.28
Junc J4	19	0	0.00	65.52	46.52
Junc J10	20	0	0.00	65.61	45.61
Junc J11	24	0.214	0.21	65.66	41.66
Junc J17	24	0.306	0.31	65.67	41.67
Junc J18	25	0.306	0.31	65.77	40.77
Junc J19	26	0	0.00	65.87	39.87
Junc J20	21	0	0.00	65.63	44.63
Junc J21	26	0	0.00	65.97	39.97
Junc J22	25	0.260	0.26	65.74	40.74
Junc J23	21	0	0.00	65.72	44.72
Junc J24	24	0	0.00	65.70	41.70
Junc J25	24	0.290	0.29	65.69	41.69
Junc J26	24	0	0.00	65.67	41.67
Junc J27	21	0	0.00	65.64	44.64
Junc J28	21	0	0.00	65.68	44.68
Junc J29	21	0	0.00	65.69	44.69
Junc J30	21	0.306	0.31	65.74	44.74
Junc J31	26	0.306	0.31	65.88	39.88
Junc J32	22	0.367	0.37	65.62	43.62
Junc J33	23	0	0.00	65.62	42.62
Junc J34	21	0	0.00	65.71	44.71
Junc J35	21	0.275	0.28	65.71	44.71
Junc J36	19	0.244	0.24	65.70	46.70
Junc J37	19	0	0.00	65.67	46.67
Junc J38	20	0	0.00	65.61	45.61
Junc J39	19	0.153	0.15	65.52	46.52
Junc J41	19	0	0.00	65.59	46.59
Junc J42	17	0	0.00	65.46	48.46
Junc J43	17	0.183	0.18	65.46	48.46
Junc J44	17	0	0.00	65.29	48.29
Junc J45	18	0.214	0.21	65.13	47.13
Junc J46	18	12.5	12.50	64.99	46.99

LOWEST PRESSURE 7.25m VV

FH

WHENUAPAI GREEN WATER SUPPLY

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc J47	18	0.229	0.23	65.24	47.24
Junc J50	23	0.076	0.08	65.62	42.62
Junc J52	26	0	0.00	66.00	40.00
Junc J53	19	0.275	0.28	65.44	46.44
Junc J54	19	0.290	0.29	65.43	46.43
Junc J55	17	13.126	13.13	61.76	44.76
Junc J56	19	0.092	0.09	65.28	46.28
Junc J58	15	0	0.00	65.78	50.78
Junc J40	16	0.231	0.23	65.76	49.76
Resvr TOTARA-RES	66	#N/A	-28.00	66.00	0.00
Resvr MCCAW-RES	66	#N/A	-2.35	66.00	0.00
Resvr LILLY-RES	66	#N/A	-0.19	66.00	0.00

FH

HIGHEST PRESSURE < 80m VV

SCENARIO N°1 (SEE PLAN)

FIRE - HYDRANTS J55/ J46. VV

WHENUAPAI GREEN WATER SUPPLY

Network Table - Links

Link ID	Diameter mm	Flow LPS	Velocity m/s
Pipe P1	250	28.00	0.57
Pipe P2	250	21.22	0.43
Pipe P3	250	18.51	0.38
Pipe P4	250	18.01	0.37
Pipe P5	250	9.95	0.20
Pipe P9	250	9.16	0.19
Pipe P10	250	0.00	0.00
Pipe P7	150	9.16	0.52
Pipe P8	100	0.00	0.00
Pipe P12	150	-9.00	0.51
Pipe P13	150	-7.50	0.42
Pipe P14	150	-6.65	0.38
Pipe P15	150	-4.48	0.25
Pipe P16	150	-4.77	0.27
Pipe P17	150	-5.27	0.30
Pipe P18	150	-8.67	0.49
Pipe P19	100	-2.54	0.32
Pipe P20	100	-2.35	0.30
Pipe P21	150	6.78	0.38
Pipe P22	150	6.13	0.35
Pipe P23	100	2.71	0.34
Pipe P24	100	2.74	0.35
Pipe P25	100	-0.95	0.12
Pipe P26	100	-3.09	0.39
Pipe P27	100	1.88	0.24
Pipe P28	100	1.77	0.22
Pipe P29	100	1.35	0.17
Pipe P30	100	1.13	0.14
Pipe P31	100	-0.96	0.12
Pipe P33	100	-1.20	0.15
Pipe P34	100	1.70	0.22
Pipe P35	100	1.81	0.23
Pipe P36	100	1.94	0.25
Pipe P37	100	2.17	0.28
Pipe P38	100	-1.76	0.22
Pipe P39	100	-1.99	0.25
Pipe P40	50	0.34	0.18
Pipe P41	50	0.50	0.25
Pipe P42	50	0.13	0.06
Pipe P43	50	0.33	0.17
Pipe P44	100	-0.37	0.05
Pipe P45	100	-0.10	0.01
Pipe P46	150	8.07	0.46
Pipe P47	150	7.95	0.45
Pipe P48	150	9.71	0.55

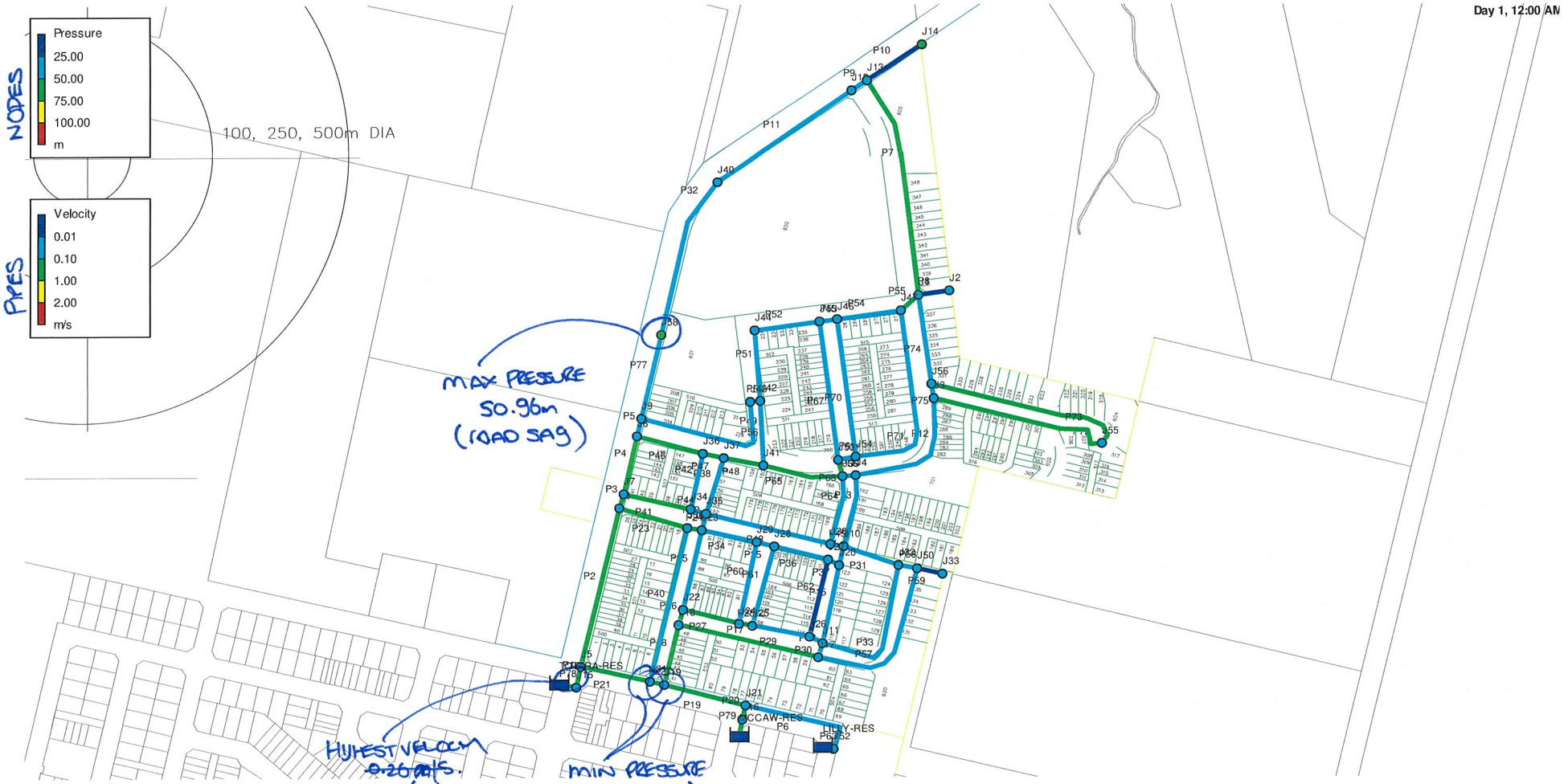
WHENUAPAI GREEN WATER SUPPLY

Link ID	Diameter mm	Flow LPS	Velocity m/s
Pipe P49	100	3.34	0.42
Pipe P50	100	-0.38	0.05
Pipe P51	100	3.71	0.47
Pipe P52	100	3.71	0.47
Pipe P53	100	7.03	0.90
Pipe P54	100	-4.78	0.61
Pipe P55	100	-4.64	0.59
Pipe P56	50	0.56	0.28
Pipe P57	50	0.20	0.10
Pipe P58	100	-0.12	0.02
Pipe P59	100	0.00	0.00
Pipe P60	50	-0.11	0.06
Pipe P61	50	-0.13	0.07
Pipe P62	50	-0.22	0.11
Pipe P64	50	-0.43	0.22
Pipe P65	150	6.37	0.36
Pipe P66	150	-1.49	0.08
Pipe P67	100	-3.53	0.45
Pipe P68	100	-5.15	0.66
Pipe P69	100	1.35	0.17
Pipe P70	50	-0.69	0.35
Pipe P71	50	0.36	0.18
Pipe P72	50	1.76	0.90
Pipe P73	100	11.37	1.45
Pipe P74	150	4.34	0.25
Pipe P75	150	2.49	0.14
Pipe P77	250	-9.39	0.19
Pipe P78	250	-28.00	0.57
Pipe P79	100	-2.35	0.30
Pipe P11	250	-9.16	0.19
Pipe P32	250	-9.39	0.19
Pipe P6	50	-0.19	0.09
Pipe P63	100	0.19	0.02

HIGHEST VELOCITY vv < 3.0m/s (LEADS TO FH FLOW)

SCENARIO NO 1 (see PLAN)

WHENUAPAI GREEN WATER SUPPLY



WHENUAPAI GREEN WATER SUPPLY

Network Table - Nodes

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc J5	26	0	0.00	65.99	39.99
Junc J6	21	0	0.00	65.97	44.97
Junc J7	21	0	0.00	65.97	44.97
Junc J8	17	0	0.00	65.96	48.96
Junc J9	17	0	0.00	65.96	48.96
Junc J12	16	0	0.00	65.95	49.95
Junc J13	16	0	0.00	65.95	49.95
Junc J14	15	0	0.00	65.95	50.95
Junc J15	26	0	0.00	66.00	40.00
Junc J16	26	0	0.00	65.99	39.99
Junc J1	18	0.168	0.42	65.92	47.92
Junc J2	18	0	0.00	65.92	47.92
Junc J3	19	0.122	0.31	65.91	46.91
Junc J4	19	0	0.00	65.92	46.92
Junc J10	20	0	0.00	65.92	45.92
Junc J11	24	0.214	0.53	65.92	41.92
Junc J17	24	0.306	0.77	65.92	41.92
Junc J18	25	0.306	0.77	65.94	40.94
Junc J19	26	0	0.00	65.96	39.96
Junc J20	21	0	0.00	65.92	44.92
Junc J21	26	0	0.00	65.99	39.99
Junc J22	25	0.260	0.65	65.93	40.93
Junc J23	21	0	0.00	65.93	44.93
Junc J24	24	0	0.00	65.92	41.92
Junc J25	24	0.290	0.73	65.92	41.92
Junc J26	24	0	0.00	65.92	41.92
Junc J27	21	0	0.00	65.92	44.92
Junc J28	21	0	0.00	65.92	44.92
Junc J29	21	0	0.00	65.92	44.92
Junc J30	21	0.306	0.77	65.93	44.93
Junc J31	26	0.306	0.77	65.96	39.96
Junc J32	22	0.367	0.92	65.91	43.91
Junc J33	23	0	0.00	65.91	42.91
Junc J34	21	0	0.00	65.93	44.93
Junc J35	21	0.275	0.69	65.93	44.93
Junc J36	19	0.244	0.61	65.94	46.94
Junc J37	19	0	0.00	65.93	46.93
Junc J38	20	0	0.00	65.92	45.92
Junc J39	19	0.153	0.38	65.92	46.92
Junc J41	19	0	0.00	65.92	46.92
Junc J42	17	0	0.00	65.92	48.92
Junc J43	17	0.183	0.46	65.92	48.92
Junc J44	17	0	0.00	65.91	48.91
Junc J45	18	0.214	0.53	65.91	47.91
Junc J46	18	0	0.00	65.91	47.91

MIN PRESSURE >25 m VV

MIN PRESSURE >25 m VV

WHENUAPAI GREEN WATER SUPPLY

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc J47	18	0.229	0.57	65.91	47.91
Junc J50	23	0.076	0.19	65.91	42.91
Junc J52	26	0	0.00	66.00	40.00
Junc J53	19	0.275	0.69	65.91	46.91
Junc J54	19	0.290	0.73	65.91	46.91
Junc J55	17	0.626	1.57	65.84	48.84
Junc J56	19	0.092	0.23	65.91	46.91
Junc J58	15	0	0.00	65.96	50.96
Junc J40	16	0.231	0.58	65.95	49.95
Resvr TOTARA-RES	66	#N/A	-12.54	66.00	0.00
Resvr MCCAW-RES	66	#N/A	-1.20	66.00	0.00
Resvr LILLY-RES	66	#N/A	-0.09	66.00	0.00

MAX PRESSURE VV < 80m

SCENARIO Nº2 (SEE PLAN)

EPANET 2.2

8/22

WHENUAPAI GREEN WATER SUPPLY

Network Table - Links

Link ID	Diameter mm	Flow LPS	Velocity m/s
Pipe P1	250	12.54	0.26
Pipe P2	250	8.76	0.18
Pipe P3	250	7.22	0.15
Pipe P4	250	6.97	0.14
Pipe P5	250	3.23	0.07
Pipe P9	250	2.47	0.05
Pipe P10	250	0.00	0.00
Pipe P7	150	2.47	0.14
Pipe P8	100	0.00	0.00
Pipe P12	150	-0.93	0.05
Pipe P13	150	-0.53	0.03
Pipe P14	150	-1.07	0.06
Pipe P15	150	-0.51	0.03
Pipe P16	150	-1.25	0.07
Pipe P17	150	-2.08	0.12
Pipe P18	150	-4.15	0.23
Pipe P19	100	-1.30	0.17
Pipe P20	100	-1.20	0.15
Pipe P21	150	3.77	0.21
Pipe P22	150	2.85	0.16
Pipe P23	100	1.54	0.20
Pipe P24	100	0.93	0.12
Pipe P25	100	0.15	0.02
Pipe P26	100	-1.31	0.17
Pipe P27	100	0.81	0.10
Pipe P28	100	0.87	0.11
Pipe P29	100	0.22	0.03
Pipe P30	100	0.22	0.03
Pipe P31	100	0.62	0.08
Pipe P33	100	-0.42	0.05
Pipe P34	100	0.69	0.09
Pipe P35	100	0.63	0.08
Pipe P36	100	0.57	0.07
Pipe P37	100	0.56	0.07
Pipe P38	100	0.35	0.04
Pipe P39	100	-0.08	0.01
Pipe P40	50	0.16	0.08
Pipe P41	50	0.25	0.13
Pipe P42	50	-0.11	0.06
Pipe P43	50	0.11	0.06
Pipe P44	100	-0.36	0.05
Pipe P45	100	0.08	0.01
Pipe P46	150	3.73	0.21
Pipe P47	150	3.01	0.17
Pipe P48	150	2.66	0.15

WHENUAPAI GREEN WATER SUPPLY

Link ID	Diameter mm	Flow LPS	Velocity m/s
Pipe P49	100	0.70	0.09
Pipe P50	100	0.27	0.03
Pipe P51	100	0.43	0.05
Pipe P52	100	0.43	0.05
Pipe P53	100	-0.22	0.03
Pipe P54	100	-0.26	0.03
Pipe P55	100	-0.88	0.11
Pipe P56	50	0.18	0.09
Pipe P57	50	0.07	0.03
Pipe P58	100	0.12	0.02
Pipe P59	100	0.00	0.00
Pipe P60	50	0.06	0.03
Pipe P61	50	0.07	0.03
Pipe P62	50	0.01	0.00
Pipe P64	50	-0.03	0.01
Pipe P65	150	1.96	0.11
Pipe P66	150	-0.40	0.02
Pipe P67	100	0.11	0.01
Pipe P68	100	-1.21	0.15
Pipe P69	100	0.64	0.08
Pipe P70	50	0.04	0.02
Pipe P71	50	-0.05	0.02
Pipe P72	50	0.21	0.11
Pipe P73	100	1.36	0.17
Pipe P74	150	1.17	0.07
Pipe P75	150	0.73	0.04
Pipe P77	250	-3.05	0.06
Pipe P78	250	-12.54	0.26
Pipe P79	100	-1.20	0.15
Pipe P11	250	-2.47	0.05
Pipe P32	250	-3.05	0.06
Pipe P6	50	-0.09	0.05
Pipe P63	100	0.09	0.01

MAX VELOCITY VV < 3.0m/s.

SCENARIO N°2 (SEE PLAN)

DETECTION SERVICES
WATER LOSS MANAGEMENT

New Zealand: Auckland • Wellington • Christchurch • Queenstown
Australia: Sydney • Melbourne • Brisbane • Adelaide
Head Office: s 9(2)(a)
Website: www.detectionservices.co.nz

Mr Chris Kennedy
Engineering Design Manager
s 9(2)(a)

5 July 2022

RESULTS OF A FURTHER FIRE FLOW TEST FOR 98 - 100 AND 102 TOTARA ROAD, WHENUAPAI.

Wednesday 29 June 2022
Ross Ollerenshaw

Background

The proposed development at 98 - 100 Totara Road, Whenuapai, includes #102 Totara Road, all of which requires adequate fire protection that meets the Fire Service Code of Practice.

To confirm adequate fire services to the development, Neil Group requested that the new mains in the area also be tested at 9 McCaw Avenue and 169 Totara Road

Neil Construction Ltd advised that this development is classified FW2.

The Fire Service Code of Practice stipulates that for a FW2 development, 25 l/s is required using a maximum of 2 hydrants, with one hydrant supplying at least 12.5 l/s within 135m of the development, and a second 12.5l/s is required from an additional hydrant within a distance of 270m. WaterCare require a minimum residual pressure of 200 kPa, measured at the next nearest FH.

Detection Services are competent to undertake such testing.

Procedure Test 1: 9 McCaw Avenue

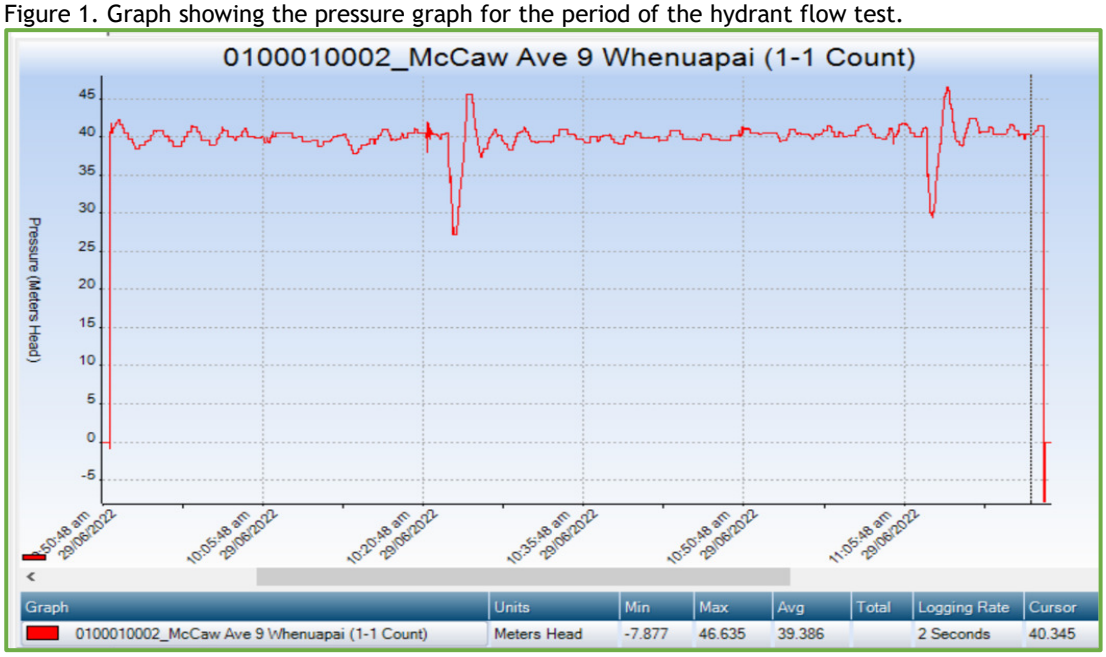
A single fire hydrant outside 9 McCaw Avenue, was specified to undertake the flow test. This hydrant alone could achieve the required flowrate,

A pressure logger was installed on the hydrant outside 19 McCaw Avenue, to record the pressure during the time the flow test was done. This Pressure gauge was installed for the duration of both flow tests.

Fire Flow	Test Start time	Test End Time	Test Flow rate ℓ/sec	Static pressure (before test)	Residual Pressure
9 McCaw Ave	10h22	10h24	25.0	40m	
19 McCaw Ave	9h51	11h18	Pressure	40m	27m

The hydrant at 9 McCaw Avenue was only partially opened and achieved a flow rate of 25 l/s.

Figure 1. Graph showing the pressure graph for the period of the hydrant flow test.



Procedure Test 2: 169 Totara Road

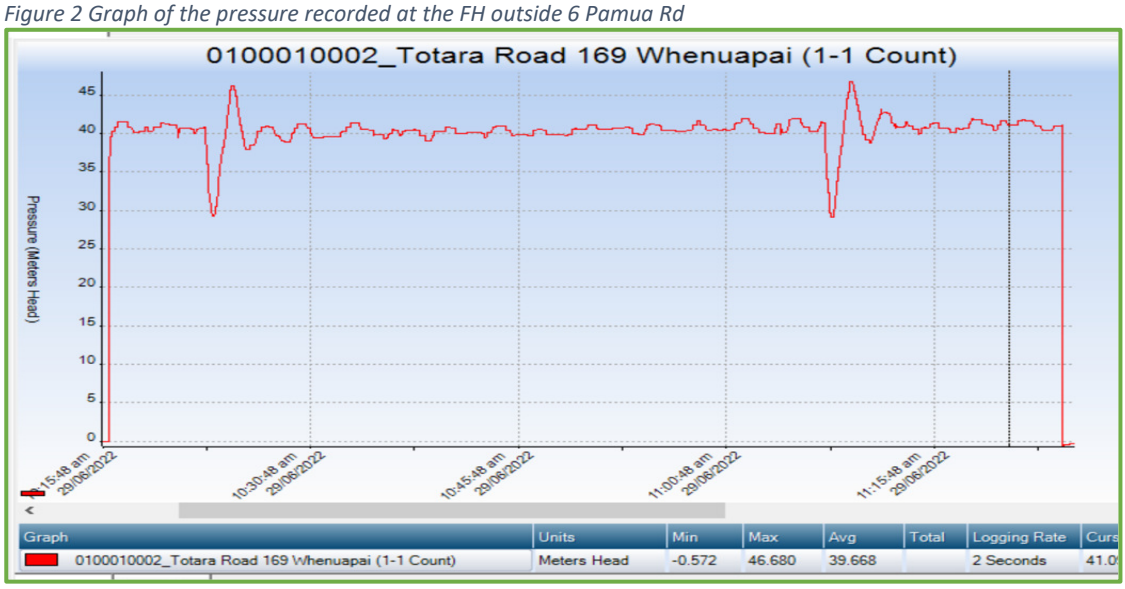
A single fire hydrant outside 169 Totara Road, was specified to undertake the flow test. This hydrant alone could achieve the required flowrate,

A pressure logger was installed on the hydrant outside 6 Pamua Road, to record the pressure during the time the flow test was done. This Pressure gauge was installed for the duration of both flow tests.

Fire Flow	Test Start time	Test End Time	Test Flow rate ℓ/sec	Static pressure (before test)	Residual Pressure
169 Totara Rd	11h07	11h09	25.0	40m	
6 Pamua Rd	9h51	11h23	Pressure	40m	30m

The hydrant at 169 Totara Road was only partially opened and achieved a flow rate of 25 l/s.

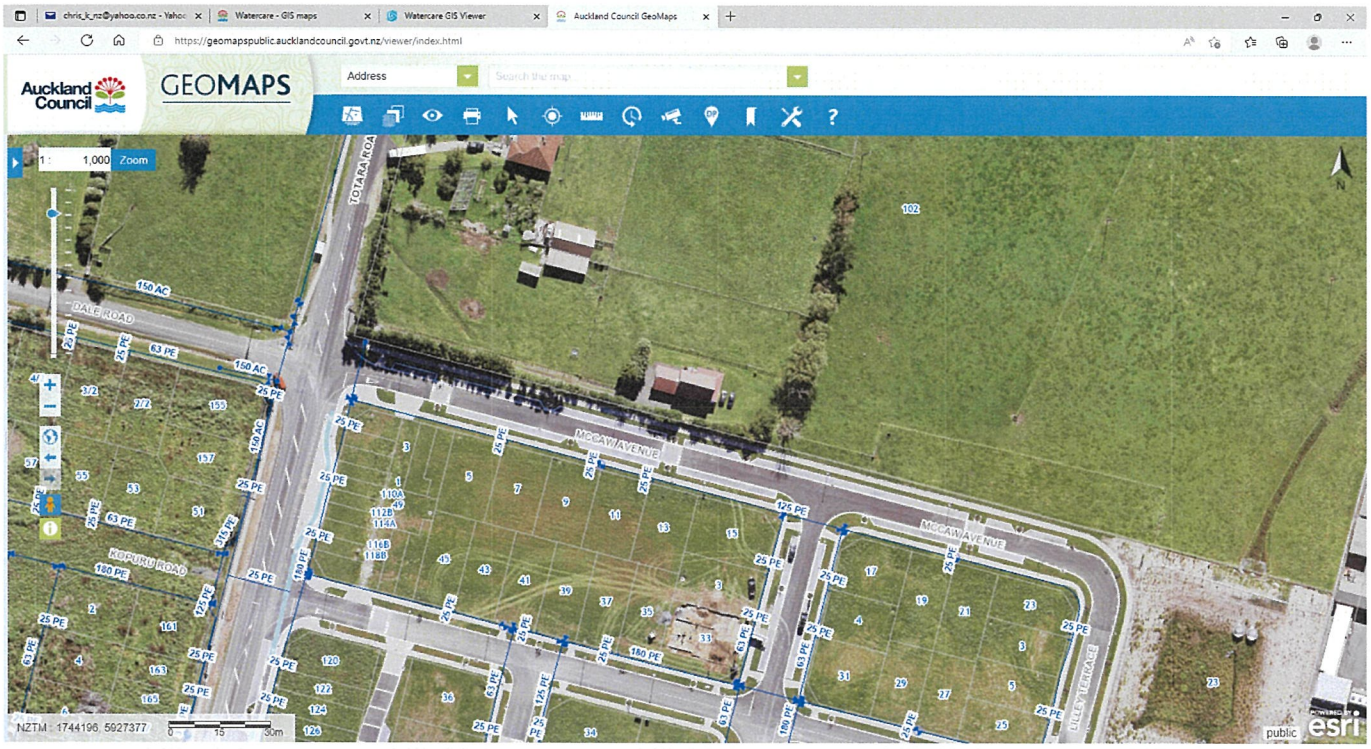
Figure 2 Graph of the pressure recorded at the FH outside 6 Pamua Rd

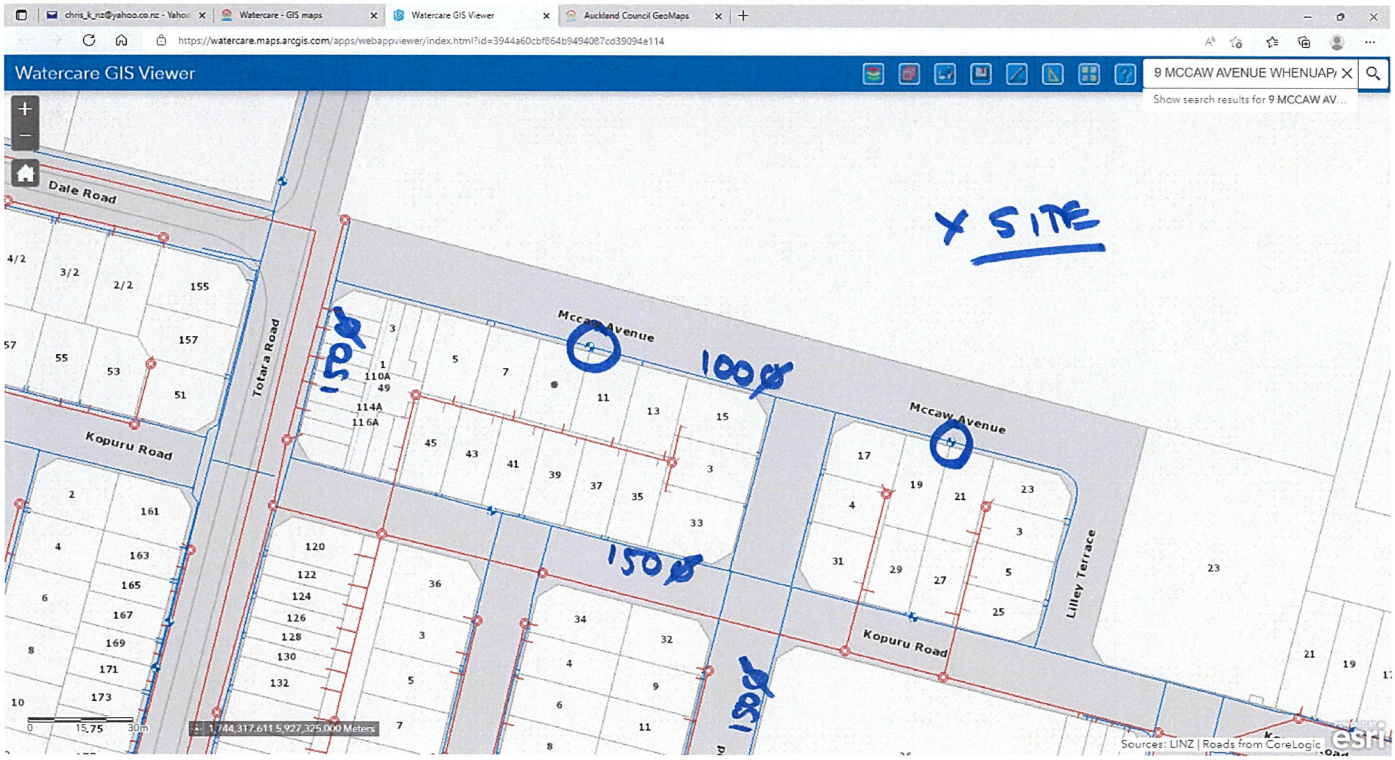


Both tests were successful.

Acknowledgement
Detection Services appreciates the opportunity to undertake these tests on behalf of Neil Construction Ltd.

Charles s 9(2)(a)
Detection Services
P O Box 58951
The Hub, Botany
Auckland.



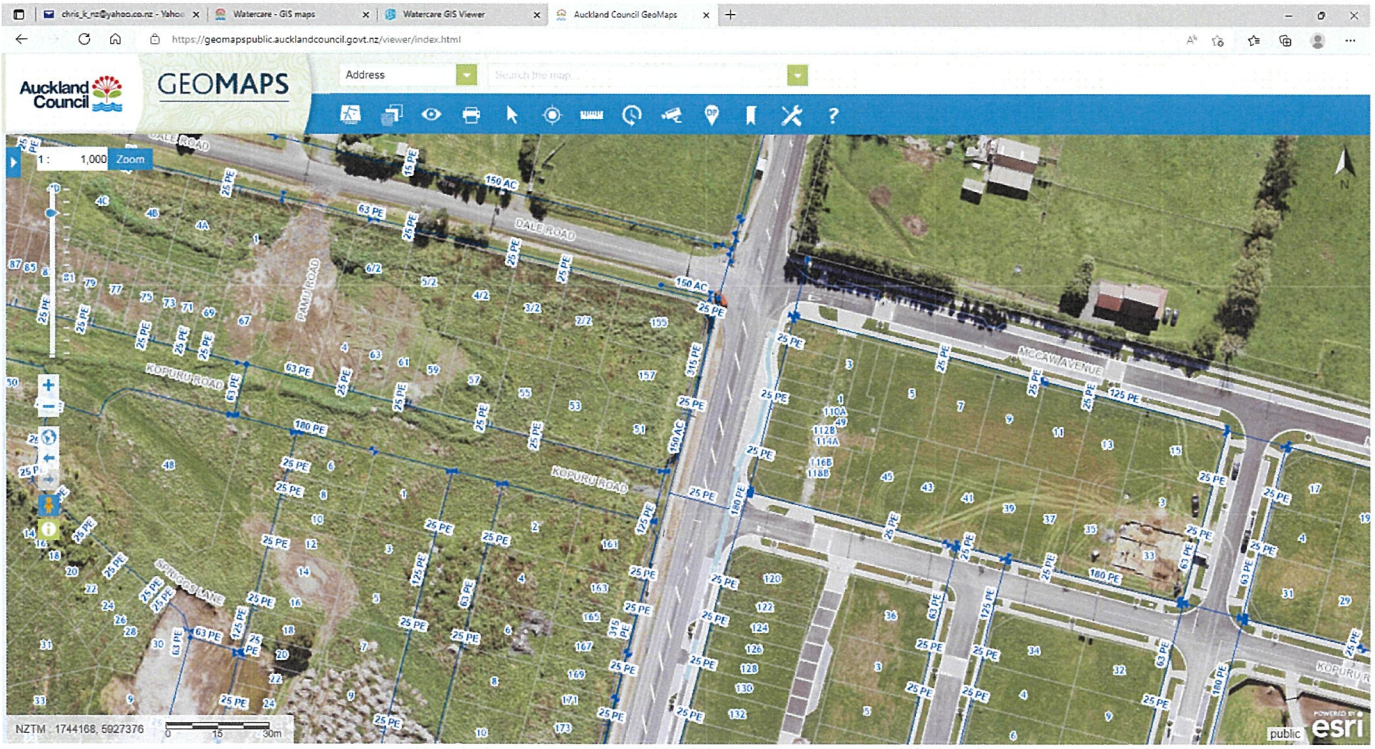


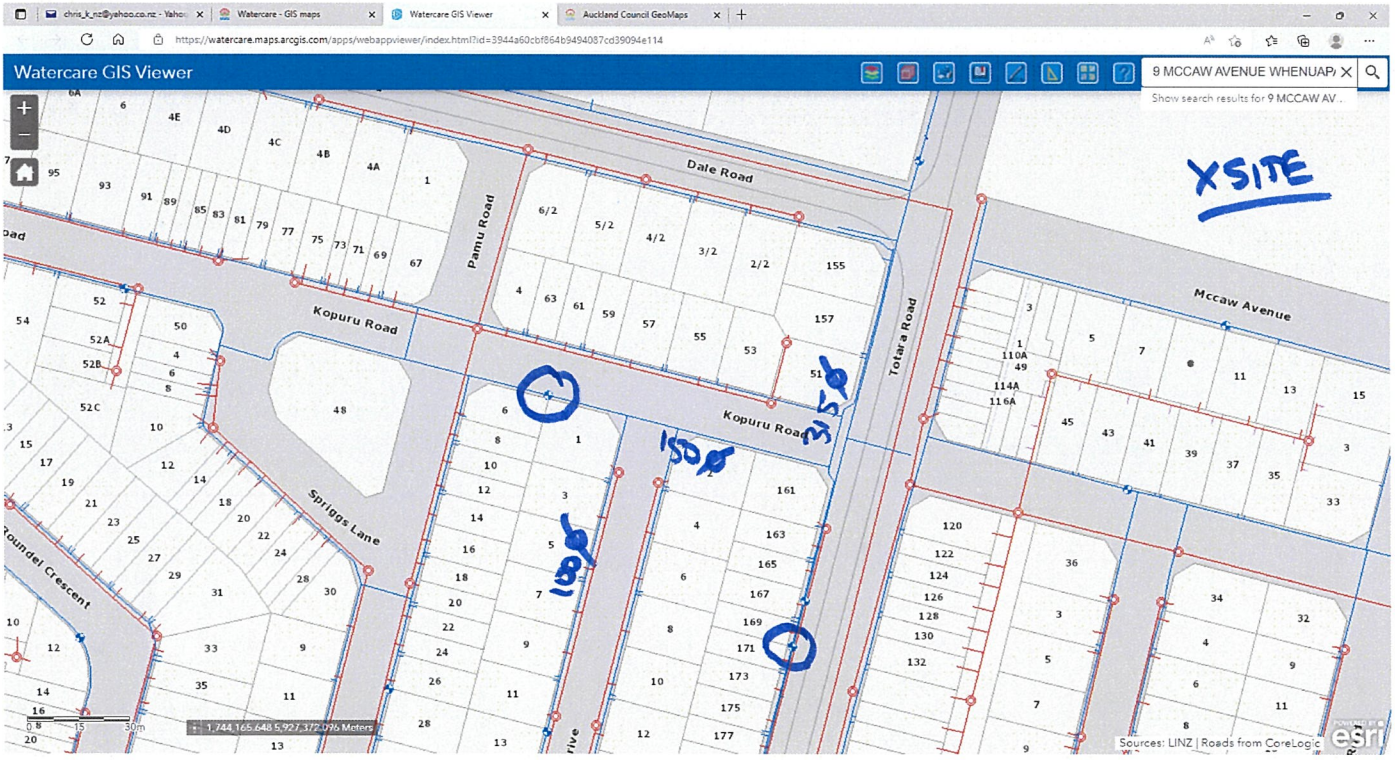
TEST LOCATIONS:

- TEST 1

MCCAW

(9 & 19 MCCAW)





TEST LOCATIONS:

- TEST 2

TOTARA

(6 PAMUA & 169 TOTARA)

APPENDIX B – UTILITIES

Vector

Chorus

15 June 2022

Vector Limited
101 Carlton Gore Rd
PO BOX 99882
Auckland 1149
New Zealand
s 9(2)(a) / vector.co.nz

The Neil Group
PO Box 8751,
Symonds Street, Auckland 1150

Reference Number
1-5205520409

Attention:
Chris Kennedy
s 9(2)(a)

Thank you for your request for an Indicative Cost to underground the overhead network at 102 Totara Road, Whenuapai.

We have made an initial high-level assessment of the following estimated scope of work and the Indicative Cost is approximately s 9(2)(b)(ii) **plus GST.**

Scope of Work:

To underground the existing 11kV overhead network - there will be 6 spans of the overhead network that will be converted to underground:

- Undertake High Voltage (HV) outage on feeder to de-energise the existing overhead network
- Supply and install HV cable from pole 78345 and straight joint to existing underground cable at pole 78352
- Remove existing pole structure and overhead conductors between 78345 to 78352
- Supply and install HV riser on pole 78345 and terminate to the proposed location of the ground mount switch unit
- Supply and install switch unit to replace existing switch unit (proposed location to be confirmed)
- Test and liven as per Vector standards

Please note: The above scope of works assumes that the new HV underground network will be installed along a new road within the development.

Other costs including, but not limited to traffic management and civil works in the Council berm have been estimated and final costs will need to be confirmed by sub-contractors at detailed design.

No allowance has been made for temporary generation, consents, arborists, boundary survey, rock breaking and after hours/weekend work.

This indicative solution may change significantly once a detailed design has been undertaken. A technical approval is required from Vector.

An easement in favour of Vector Limited is required for any equipment installed on private property, private roads or down ROW's. The cost of surveying these easements has not been included in this offer.

This indicative cost is based on information available during a desktop exercise at the time of high-level costs being provided. If scope or requirements changes in detail design stage, any additional costs will be added in final design and pricing.

This Indicative Cost is a non-binding estimate based on Vector's current pricing policy.

Kind regards,

Vinita Ram
Senior Customer Contracts Advisor

7 June 2022

Vector Limited
101 Carlton Gore Rd
PO BOX 99882
Auckland 1149
New Zealand
s 9(2)(a) / vector.co.nz

The Neil Group
PO Box 8751,
Symonds Street, Auckland 1150

Reference Number
1-5164341160

Attention:
The Neil Group Design Team
ncl@neilgroup.co.nz

Thank you for your request for an Indicative Cost to provide a single phase 60Amps connection to each of the 354 residential lots and a 3phase 500Amps point of supply for the proposed school at 98 Totara Road, Whenuapai.

We have made an initial high-level assessment of the following estimated scope of work and the Indicative Cost is approximately s 9(2)(b)(ii) **plus GST.**

There is a design fee applicable of s 9(2)(b)(ii) **plus GST.**

Scope of Work:

To build a new underground electrical network and provide reticulation to supply 354 Lot Subdivision and Lot 800 being a proposed school:

- Supply and install High Voltage (HV) cable into the new development
- Supply and install 4 x switch units and 5 x 300kVA transformers in the required locations to service the residential development and the proposed school
- Supply and install Low Voltage (LV) cable from the transformer(s) inside the development
- Supply and install service pits and pillars to facilitate 354 x single phase 60Amps connection for the residential lots and 3phase 500Amps connection for the proposed school
- Provide civil works and arrange traffic management and corridor access request
- Test and commission as per Vector standards

Please note: As the power requirement for the school is unknown at this stage, this indicative cost is based on installing a 300kVA transformer which can provide a maximum of 3phase 500Amps connection to the school.

Other costs including, but not limited to traffic management and civil works in the Council berm have been estimated and final costs will need to be confirmed by sub-contractors at detailed design.

No allowance has been made for temporary generation, consents, arborists, boundary survey, works within private property, rock breaking and after hours/weekend work.

This indicative solution may change significantly once a detailed design has been undertaken. A technical approval is required from Vector.

An easement in favour of Vector Limited is required for any equipment installed on private property, private roads or down ROW's. The cost of surveying these easements has not been included in this offer.

The proposed transformer(s) must be at least 3m away from any non-fire rated building or structure and at least 2m away from the boundary of any adjoining property. If these clearances cannot be achieved you will be responsible for providing fire rated walls in accordance with our Standards, available upon request. In the event we are required to relocate the transformer in order to help you achieve required clearances, all additional costs will be treated as a variation.

This indicative cost does not include works to connect your service cables. It is your responsibility to bring your own service cables to the point of supply in pits / pillars where it will be terminated by your electrical inspector.

This indicative cost is based on information available during a desktop exercise at the time of high-level costs being provided. If scope or requirements changes in detail design stage, any additional costs will be added in final design and pricing. Please note that only one indicative price will be provided prior to design fee payment. If you require a second indicative price this can be accommodated during the design stage.

This Indicative Cost is a non-binding estimate based on Vector's current pricing policy.

Based on the development contribution policy that came into effect from the 1st December 2021, Vector may contribute towards the transformer and installation of the transformer cost. If applicable this contribution will form part of the customer works agreement that will be issued to you once the design and price has been completed.

If we have not heard back from you in writing within 90 days, this project will be cancelled. You will need to make a new request by emailing customerdevelopments@vector.co.nz and provide the above project number as reference.

Kind regards,

Vinita Ram
Senior Customer Contracts Advisor

LEGEND

EXISTING	PROPOSED	
		CFCC Safelink Switch
		Power pole
		HV Joint
		HV 3c 300mm2 XLPE Cable
		Overhead Conductor

SHEET 1	Main Design
SHEET 2	HV Underground works
SHEET 3	HV Underground works
SHEET 4	HV Underground works
SHEET 5	HV Overhead works
SHEET 6	Easement
SHEET 7	Trench Profile

Disclaimer

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Consultant		File name:
Author	D Schoultz	
Auth Date	27/07/2022	Consultant project no:
Checked by		Q.0529409.1.01
Chk by date		Vector project no:
Approved by		EC-22-NREL2-055
Appr by date		

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102 Totara Road Whenuapai
Electrical Reticulation Design
Main Design

SUBSTATION

Reference designation:

Drawing function:

Drawing stamp: FOR APPROVAL

Scale at : NTS

Doc type:

Drawing no:

Rev: 1

Sheet: 1 of 7

SHEET 2

142285
78345

78347

326074
326485

78348

52527

Terminate 3 core 300mm2 HV XLPE cable to existing overhead road crossing HV at pole 78347.

Install 3 core 300mm2 HV XLPE cable from existing 11 m pole to proposed CFCC HV Safelink2 Switch.

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102 Totara Road Whenuapai
Electrical Reticulation Design
HV Underground works

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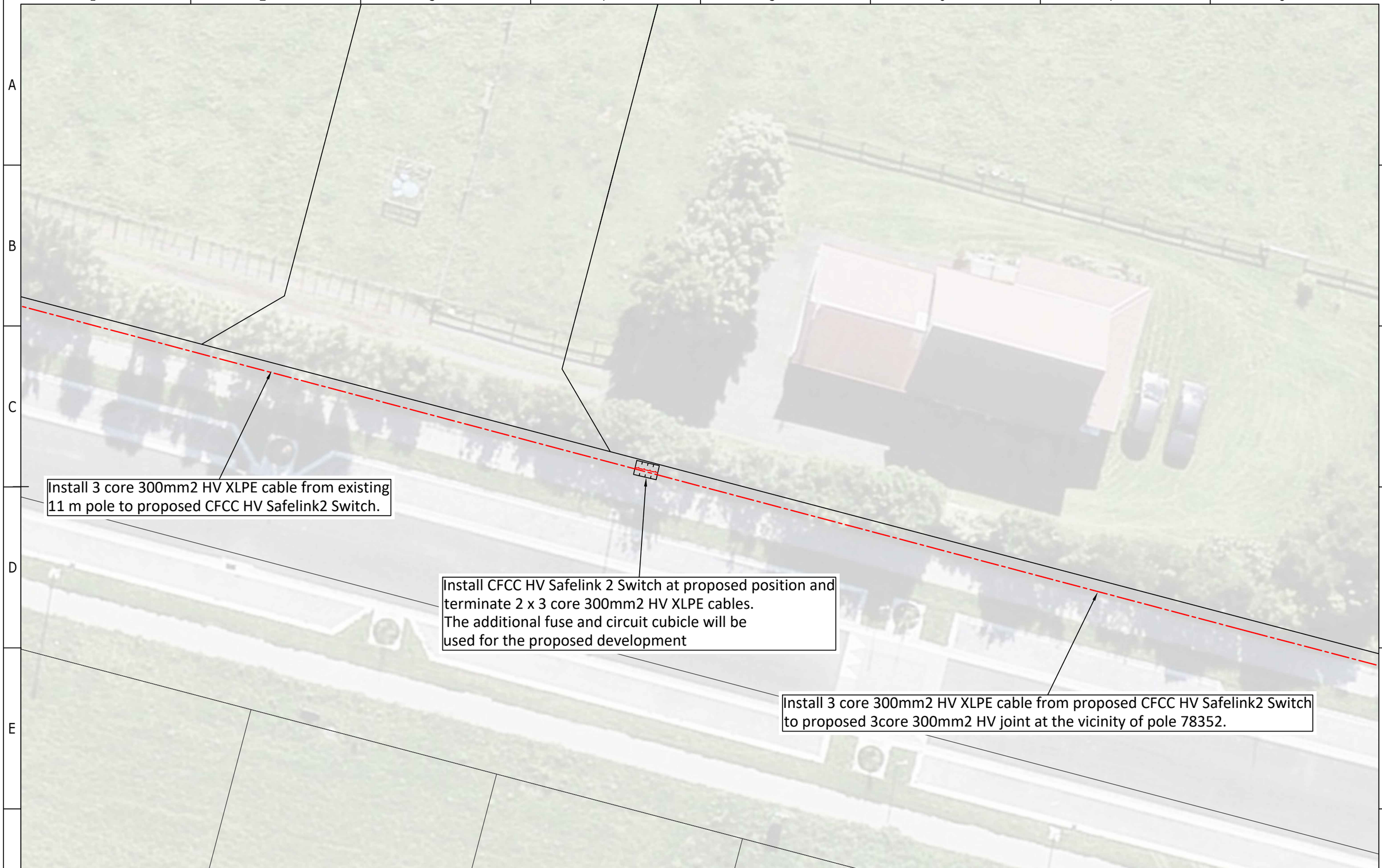

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102 Totara Road Whenuapai
Electrical Reticulation Design
HV Underground works

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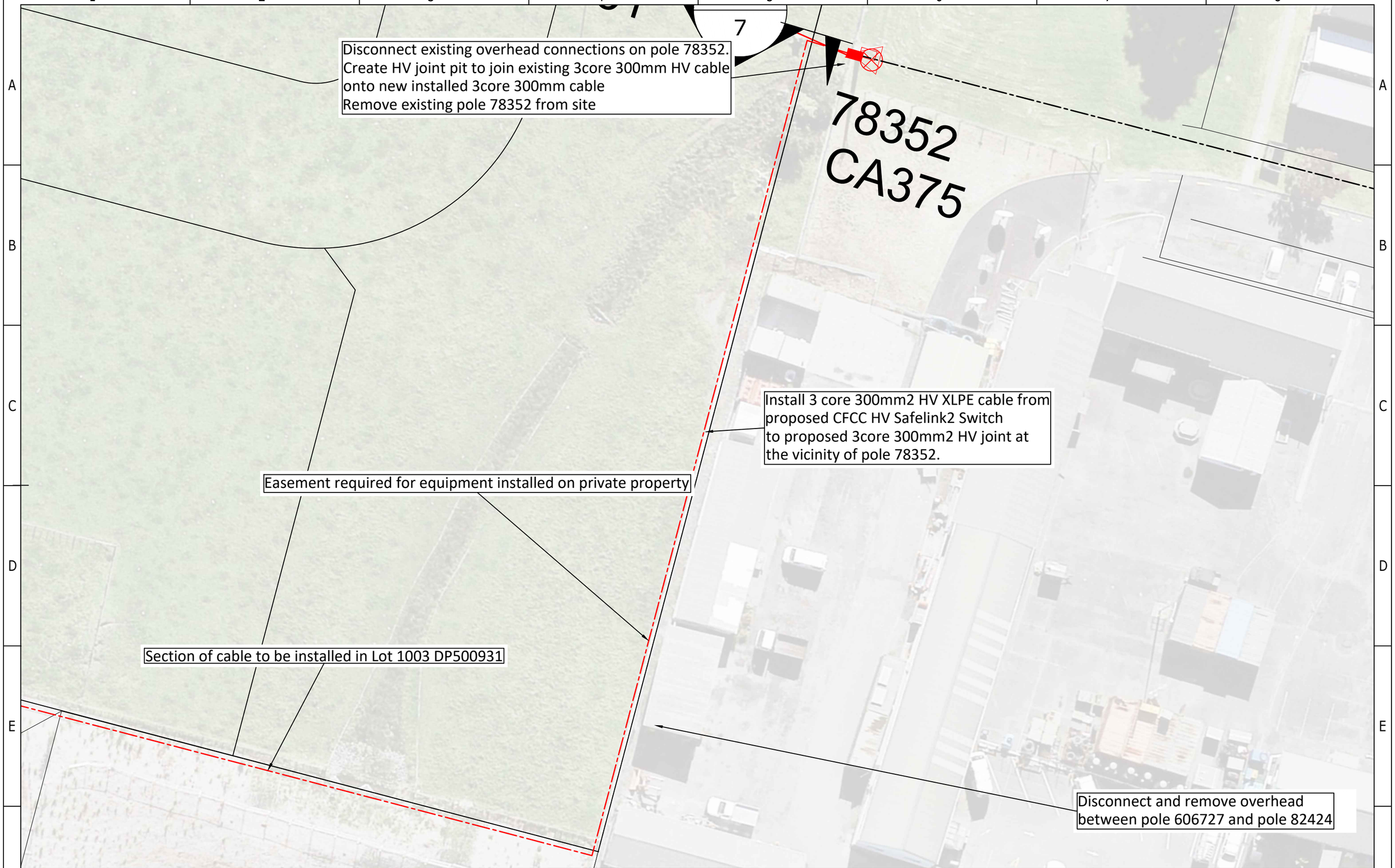
Drawing no:	Rev: 1	Sheet: 3 of 7



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102 Totara Road Whenuapai
Electrical Reticulation Design
HV Underground works

SUBSTATION

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Drawing no:		Rev: 1	Sheet: 4 of 7

Disconnect HV conductors and remove pole 78347 from site.

Disconnect HV conductors and remove pole 78348 from site.

Disconnect HV conductors and remove pole 78349 from site.

Disconnect HV conductors and remove pole 78350 from site.

Disconnect HV conductors and remove pole 78351 from site.

Disconnect and remove overhead between double pole 326074/326085 and pole 78352

Disconnect HV conductors and remove pole 78352 from site.

78347
326074
326485
78348
78349
78350
78351
A-A
7
78352
CA375

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102 Totara Road Whenuapai
Electrical Reticulation Design
HV Overhead works

SUBSTATION

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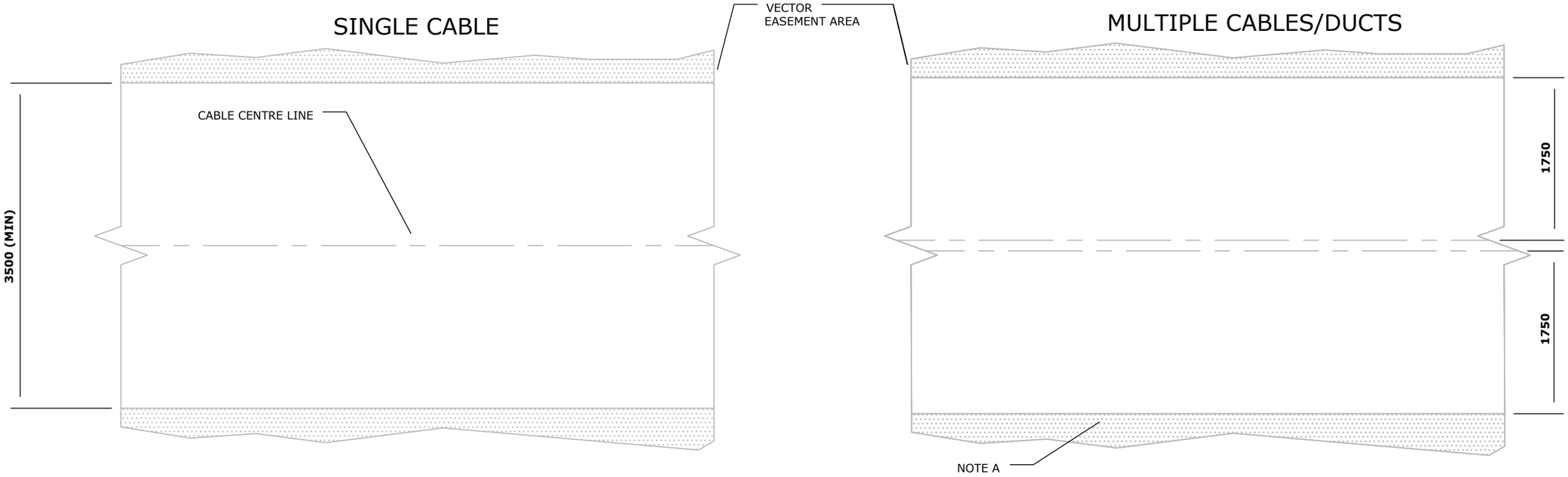
Sheet: 5 of 7

Easement Area

UNDERGROUND CABLE



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102 Totara Road Whenuapai
Easement Area

SUBSTATION

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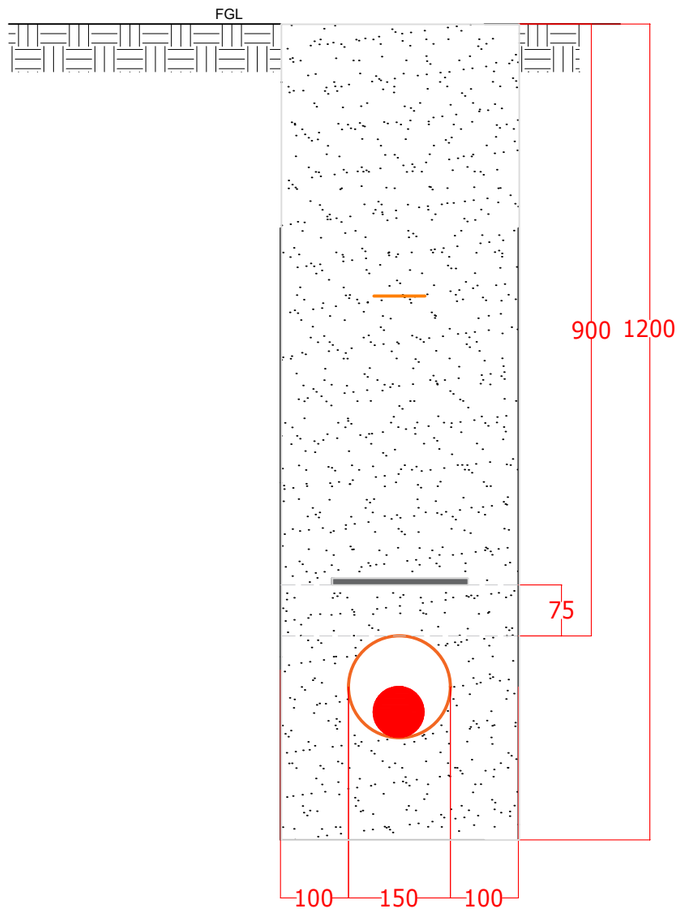
Sheet: 6 of 7

TRENCH PROFILE
A

LEGEND	
	POLYMERIC CABLE COVER
	ELECTRICAL WARNING TAPE
	LV CABLE
	HV CABLE
	ELECTRICAL DUCT

NOTES:

1. Trench profiles indicated are for open trench installations. Polymeric cable protection cover and warning tape are not required if cable is installed in directionally drilled / thrusted HD ducts.
2. 100mm shall be allowed between the outermost cable or it's duct and the side of the trench.
3. All cables in the carriageway shall be installed in Heavy Duty Duct with a minimum cover of 900mm.
4. Ducts and cables may be laid directly on the base of a trench. However, in rock areas or where the base of the trench is unsuitable for direct laying, 100mm of PAP7 GAP7 or stone free soil shall be laid as bedding.
5. Where ducts are light duty or medium duty PVC duct or PE duct with SDR greater than 17, polymeric cable cover and electrical warning tape shall be installed.
6. Electrical warning tape shall be placed at approx. 50% the depth of the polymeric cable cover.
7. Where polymeric cable cover is required they shall be located 75mm above the cables or ducts. They shall be at least 150mm wide and overlap either side of all cable or ducts being protected by at least 40mm. The effective width of the covers may be increasedby overlapping narrower slabs by not less than 20mm.
8. Additional information available from Vector Documents, EDE3020, ESE302, ESE303.



SEPERATION DISTANCES (ESE302)

	HORIZONTAL (mm)	CROSSING (mm)
400V and Pilot	150	100
11kV	150*	100*
Water, storm water, waste water	300	150
Gas	300	150
Telecommunication	300 / 450*	150
Other buried object eg. Telecom pit, manhole	300	150

*Additional information available in ESE302.

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102 Totara Road Whenuapai
Trench Profiles

SUBSTATION

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LEGEND

EXISTING	PROPOSED	
		Transformer
		HV CFCF Switchgear
		3-Way LV link pillar
		Point of supply Tud pit
		Power pole
		HV Overhead
		LV 4c 185MM2 Cable
		3c 300mm2 Cable
		HV 3c 35mm2 Cable

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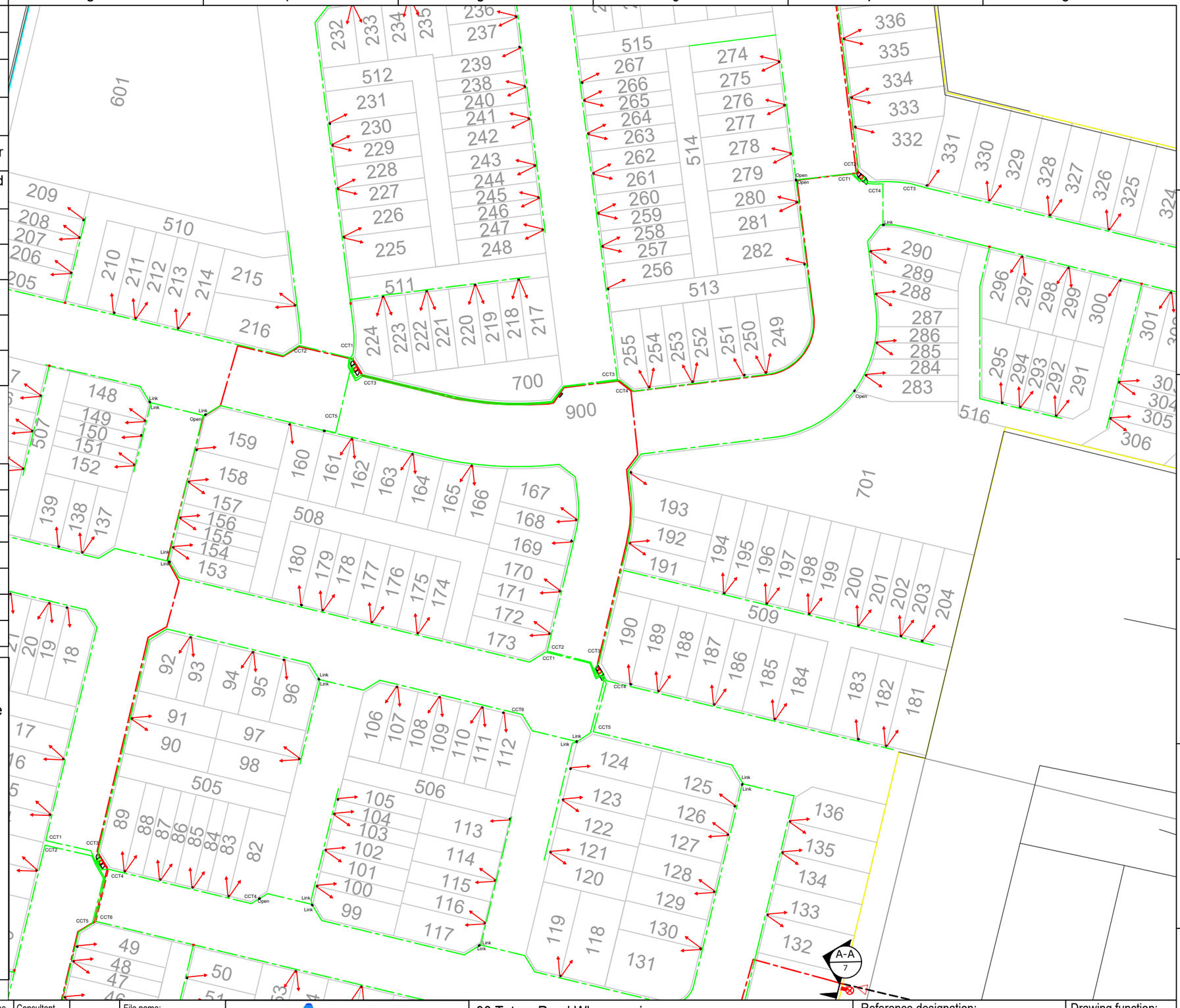

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98 Totara Road Whenuapai
Electrical Reticulation Design
Main Design

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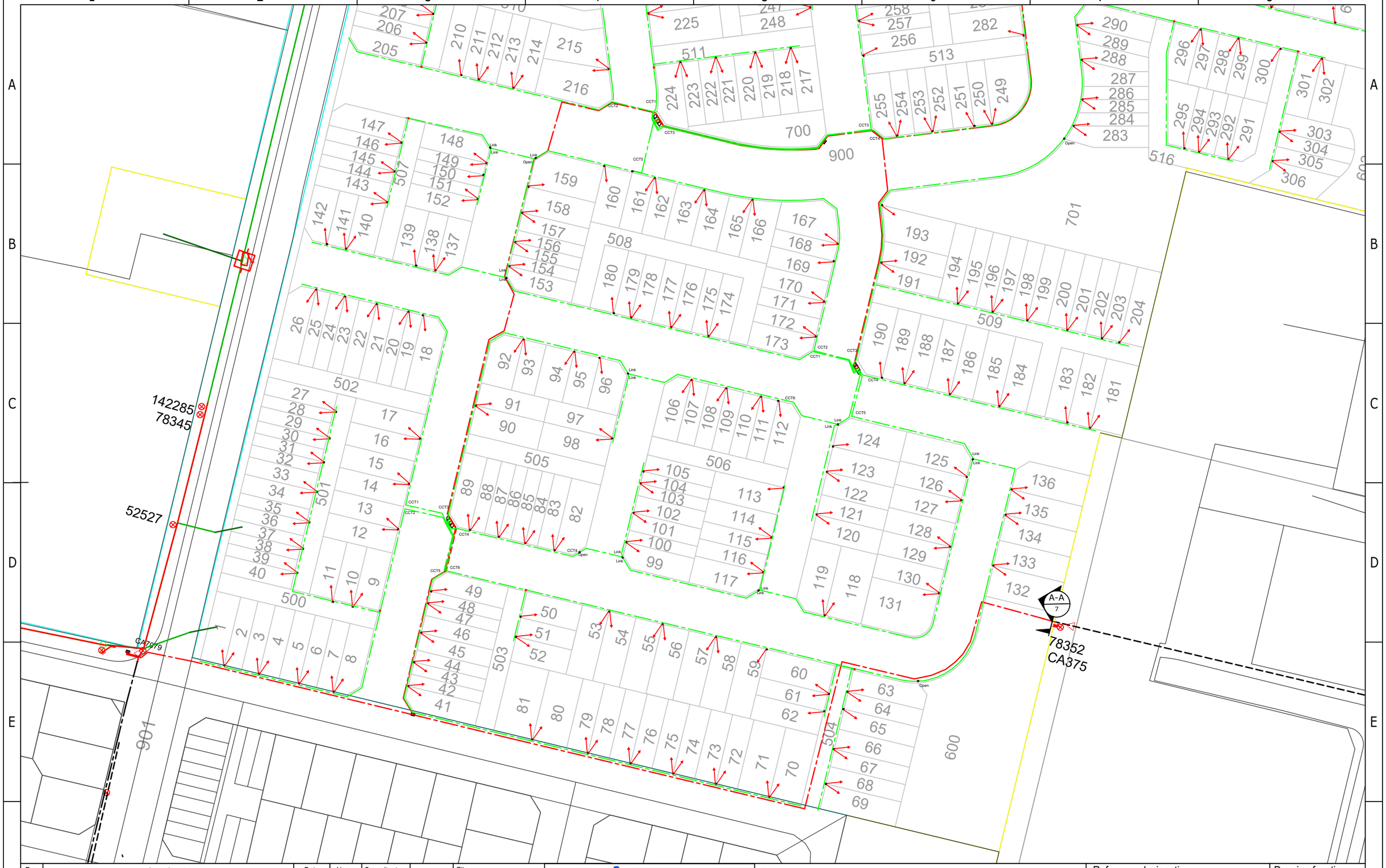

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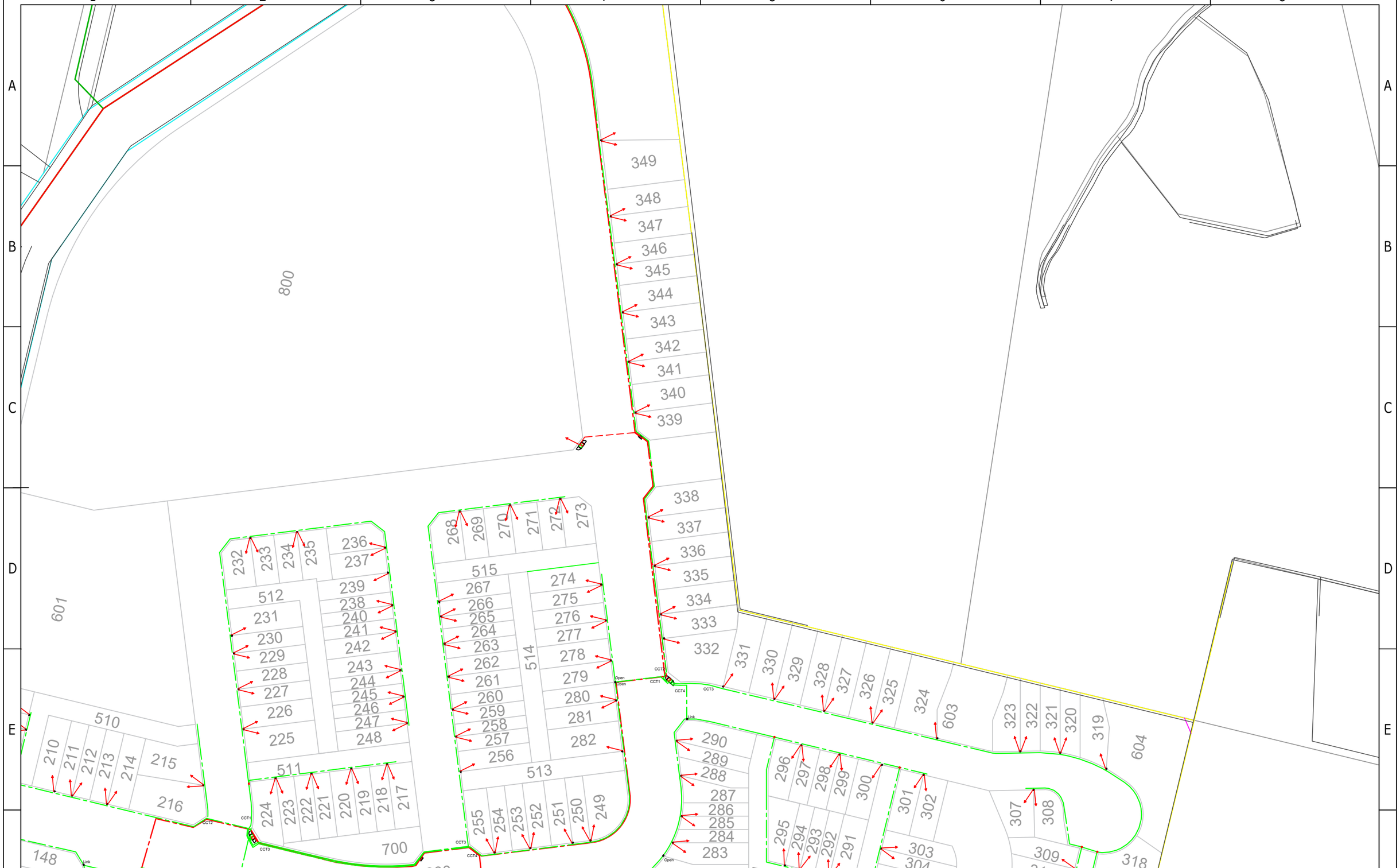

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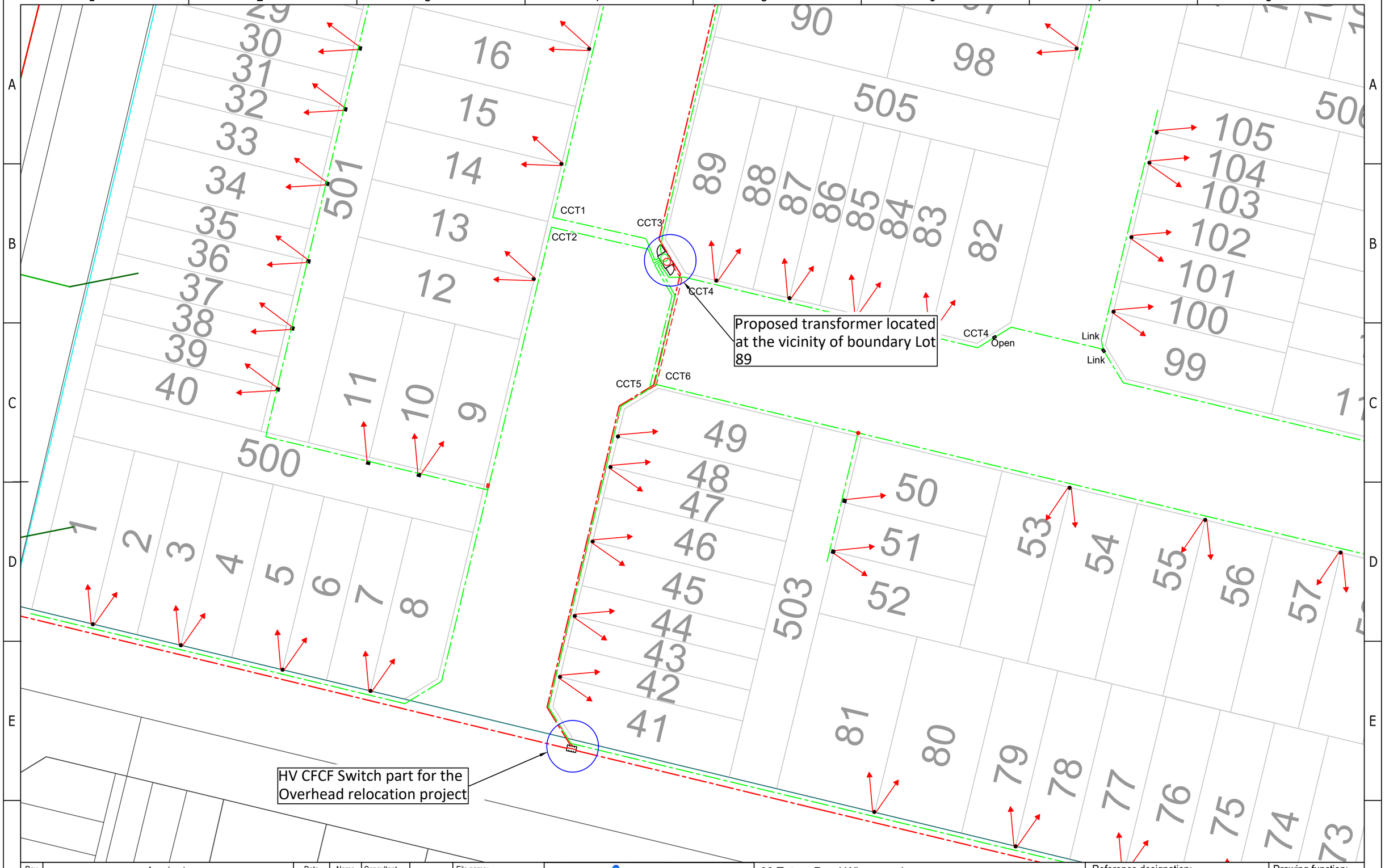

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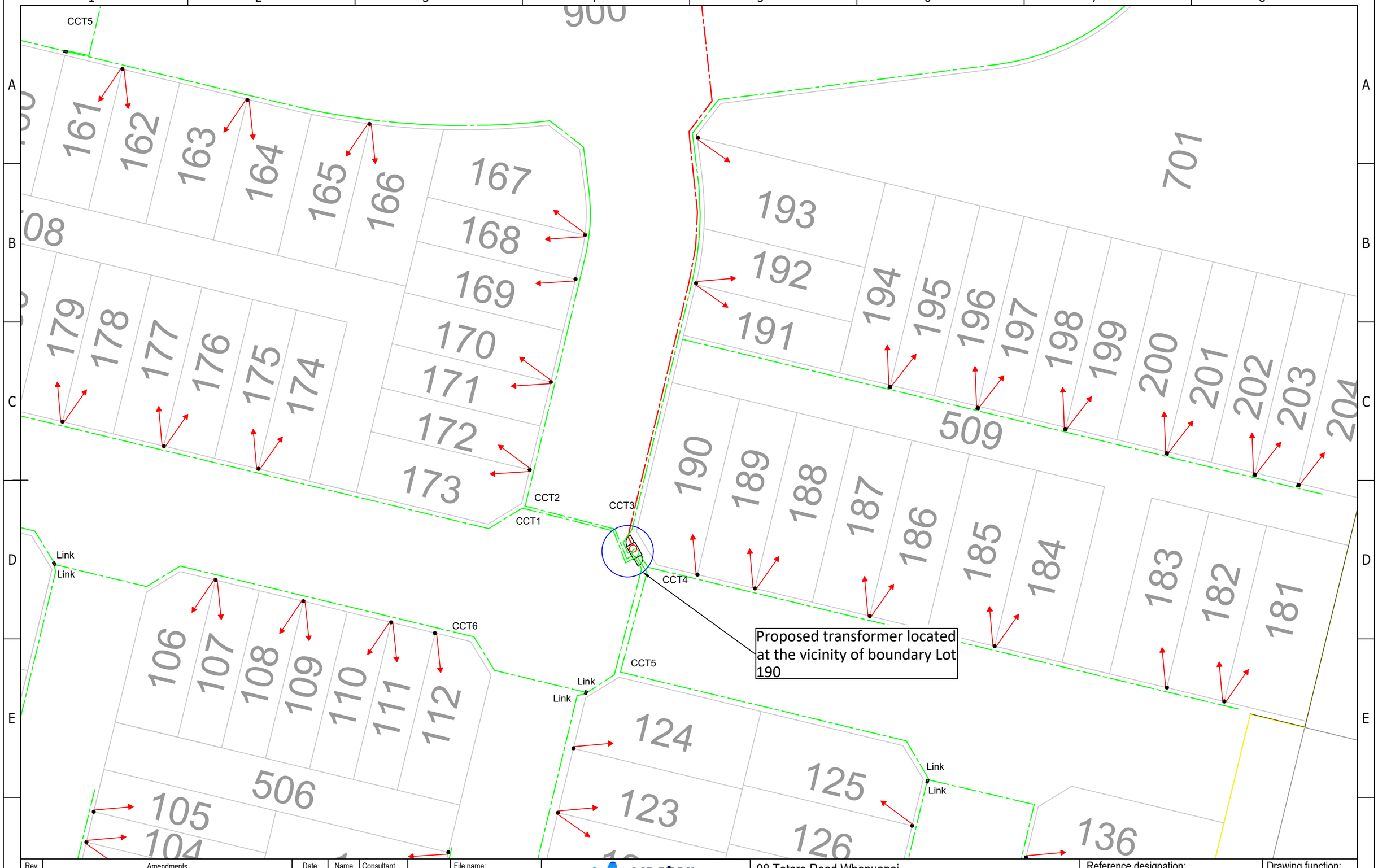

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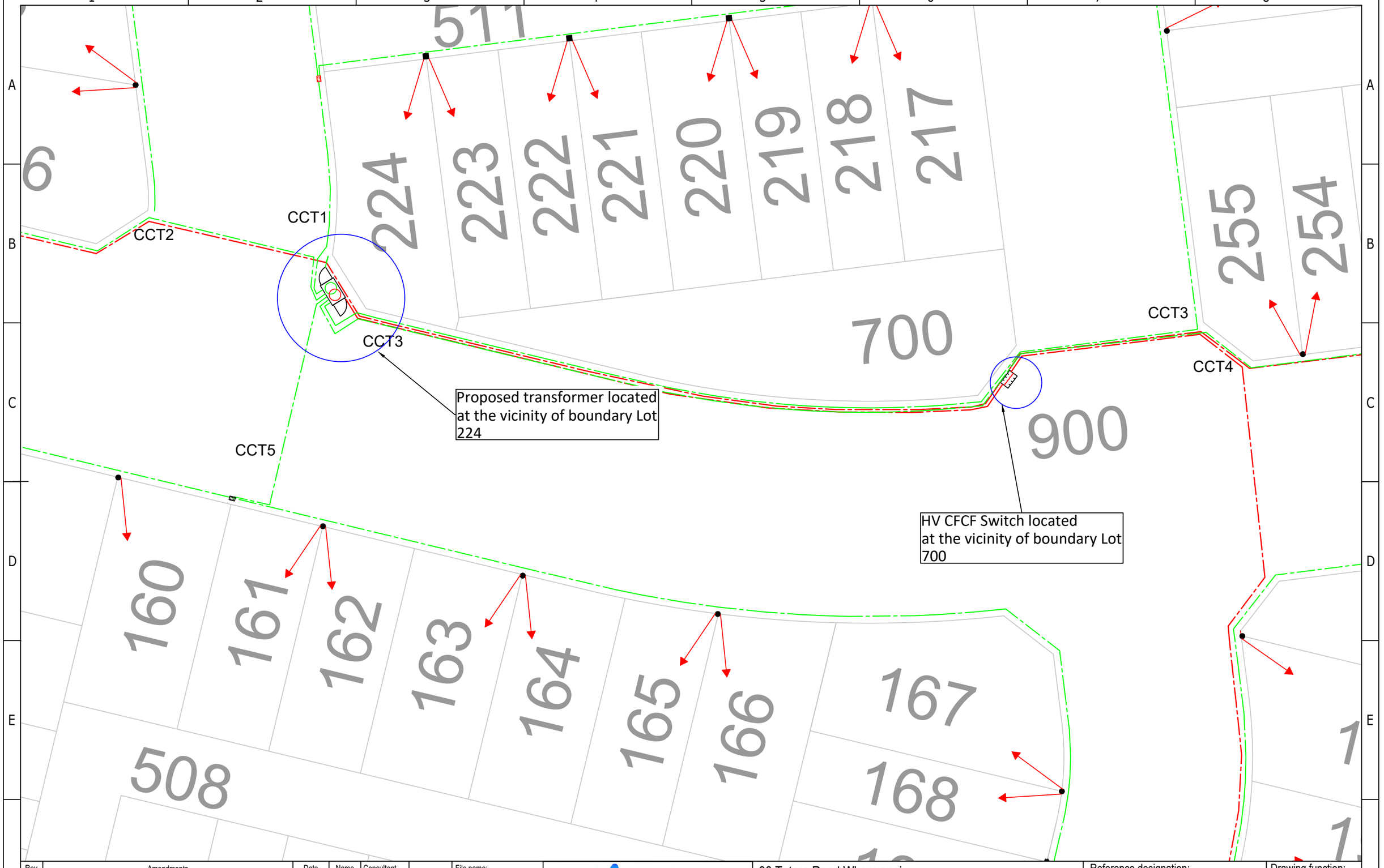

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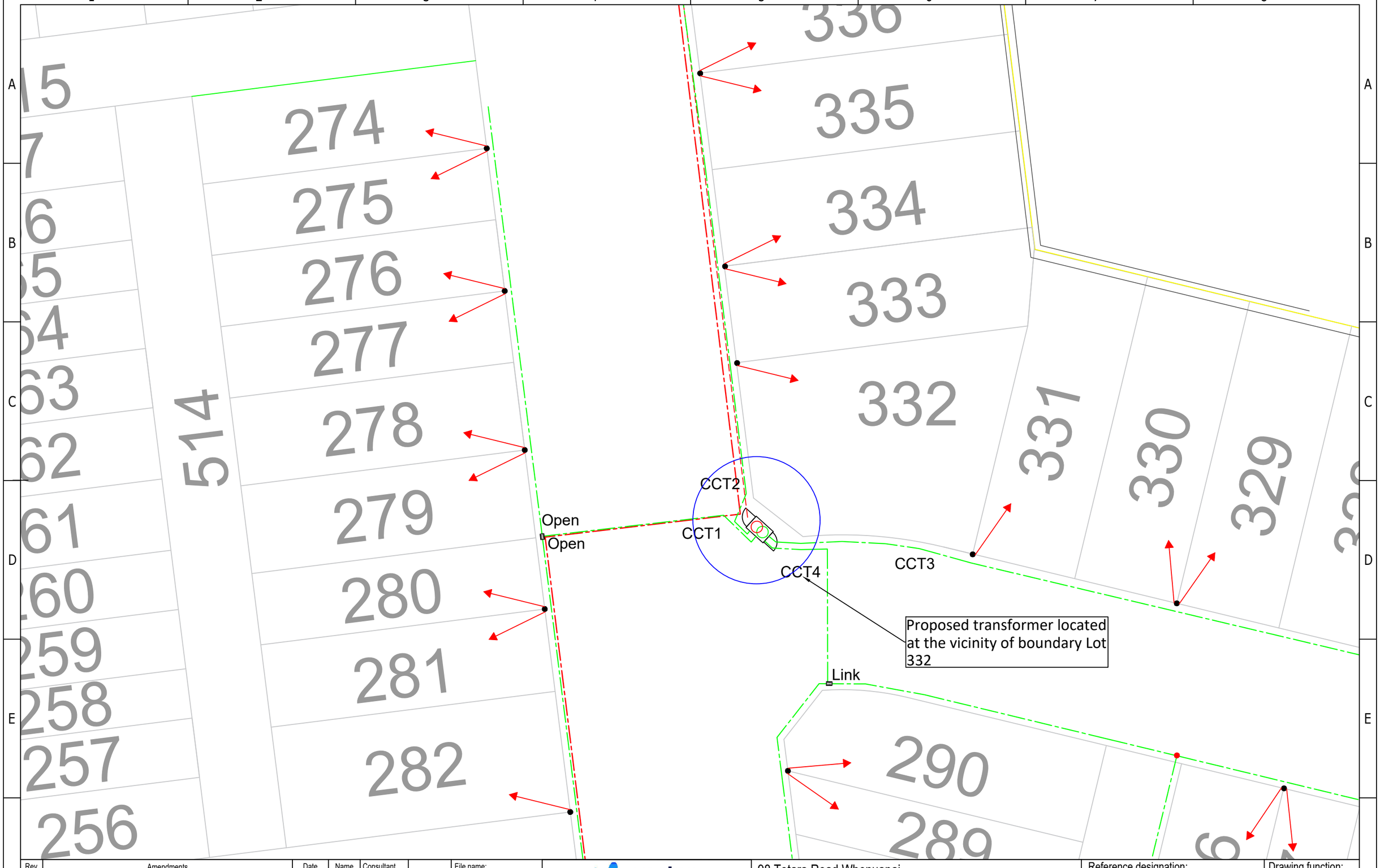

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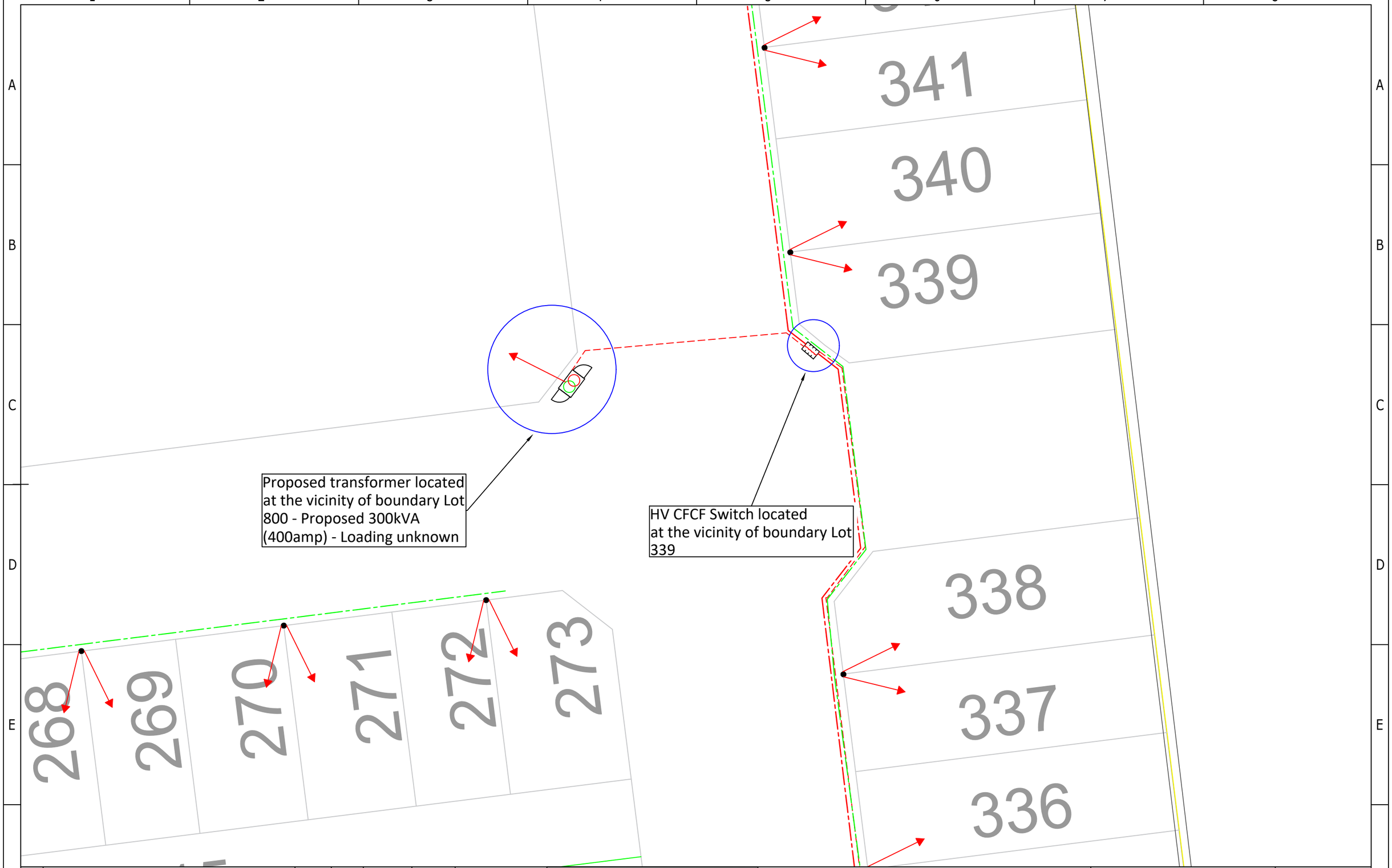

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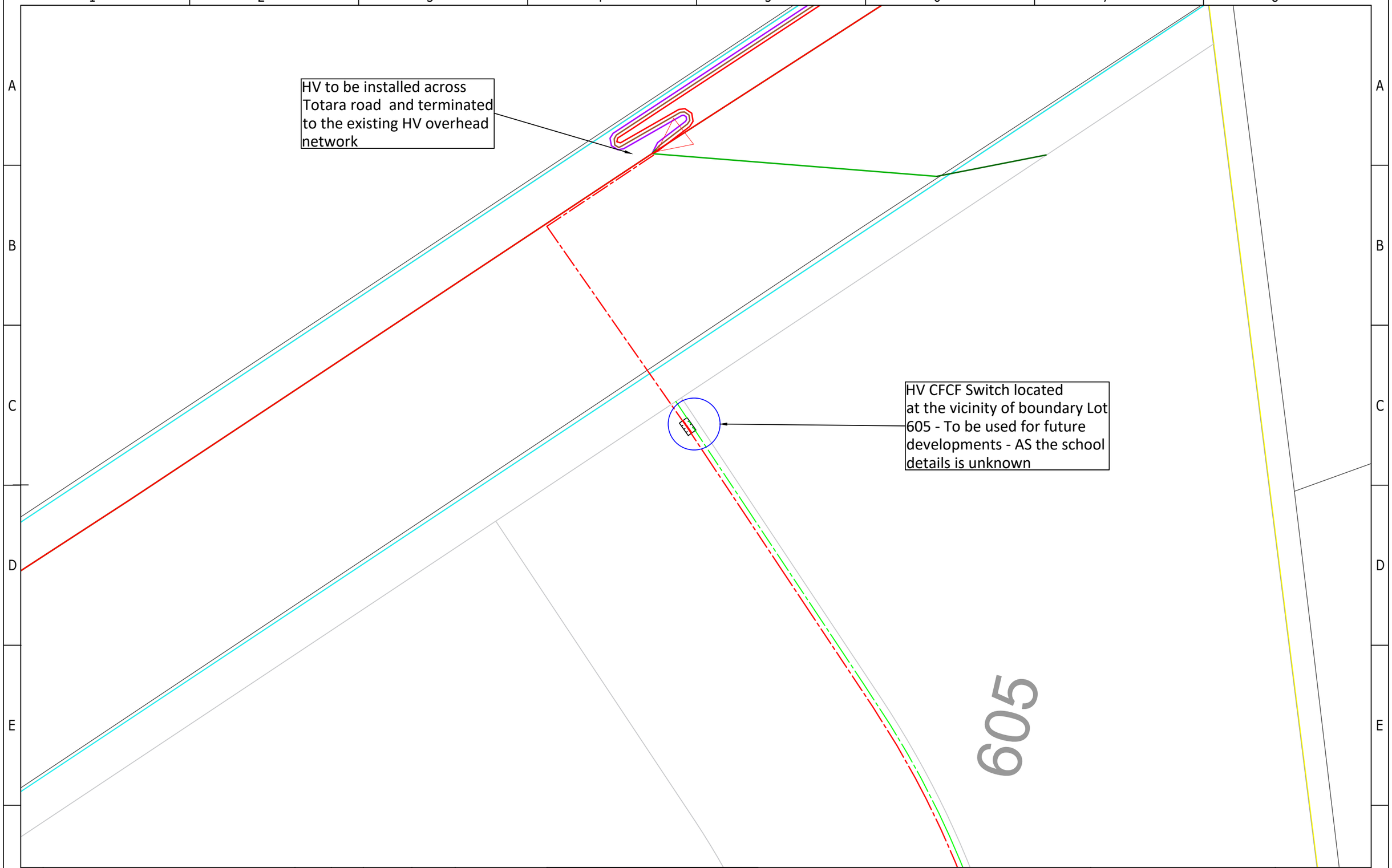

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Sheet: 1 of 7

Chorus New Zealand Limited

15 June 2022

Chorus reference: 10270200

Attention: The Neil Group

Quote: New Property Development

350 connections at 98-100 Totara Road , Whenuapai, Auckland, 0618

Your project: 98-100 Totara Road, Whenuapai 0618, Stage 1 (Concept)

Thank you for your enquiry about having Chorus network provided for the above development.

Chorus is pleased to advise that, as at the date of this letter, we are able to provide reticulation for this property development based upon the information that has been provided:

Fibre network s 9(2)(b)(ii)

The total contribution we would require from you is s 9(2)(b)(ii) **(including GST)**. This fee is a contribution towards the overall cost that Chorus incurs to link your development to our network. This quote is valid for 90 days from 13 May 2022. This quote is conditional on you accepting a New Property Development Contract with us for the above development.

If you choose to have Chorus provide reticulation for your property development, please log back into your account and finalise your details. If there are any changes to the information you have supplied, please amend them online and a new quote will be generated. This quote is based on information given by you and any errors or omissions are your responsibility. We reserve the right to withdraw this quote and requote should we become aware of additional information that would impact the scope of this letter.

Once you would like to proceed with this quote and have confirmed all your details, we will provide you with the full New Property Development Contract, and upon confirmation you have accepted the terms and paid the required contribution, we will start on the design and then build.

For more information on what's involved in getting your development connected, visit our website www.chorus.co.nz/develop-with-chorus

Kind Regards

Chorus New Property Development Team

NEIL CONSTRUCTION LTD

PROPOSED SUBDIVISION
98-100, 102 Totara Road, Whenuapai

WHENUAPAI GREEN – FULL SITE

WATER SUPPLY

EPANET ANALYSIS

December 2022

Supply Modelling Notes, Assumptions and Details:

GENERAL:

- EPANET version 2.2 used.
- Watercare Water Code of Practice 2021 V2.4 used for flow allocations.
- Metric (LPS) flow units used, modelled with Hazen-Williams Formula.
- Pipe roughness values set at a universal rate of 140.
- Pipe lengths and diameters have been entered into model.
- Detection Services Ltd site testing used to set reservoir values.

SITE SPECIFIC:

- Reservoir of 66m total head used (test location static pressure (40m) plus test location RL (26mRL))
- Site elevations range from 14mRL to 26mRL.
- Residential demand based on 353 additional lots (@ 3persons / dwelling and 220l/p/d), added at multiple nodes throughout the model. Resulting in an un-peaked demand flow of 2.70l/s.
- School demand based on 700 students (@ 25l/d) and a staffing ratio of 1:14 (@ 50l/d). Resulting in an un-peaked demand flow of 0.231l/s.
- As per other developments in the area, no cross connections between the two networks in the area, being the old AC mains and the new PE mains.
- Full site totals:
    - Residential Peak Daily Flow Rate: 5.39l/s
    - Residential Peak Hourly Flow Rate: 13.48l/s
    - School Daily Flow Rate: 0.231l/s
    - Peak Daily Flow Rate with School: 5.62l/s
    - Peak Hourly Flow Rate with School: 13.71l/s

EPANET Model / Scenario Tests undertaken:

As per above Watercare code:

1. Average Daily Water Demand plus Fire Flow at two or more Hydrants, (minimum 12.5l/s and maximum 35l/s flow per hydrant) :

    - Peak Daily Demand:
        - Average Daily Demand, residential lots with a peaking factor of 2, plus school demand.

- Firefighting Demand:
    - FW2 Classification - Above Peak Daily Demand plus FW2 Classification of 12.5 l/s applied at two hydrants simultaneously. Several fire hydrant nodes checked for model sensitivity.

    - FW3 Classification - Above Peak Daily Demand plus FW3 Classification of 25 l/s applied at two hydrants adjacent the school site simultaneously. Several fire hydrant nodes checked for model sensitivity.

2. Peak Hourly Demand:

    - Peak Daily Demand x Peaking Factor of 2.5 applied to all residential lots and school demands.

Preferable Model Assessment Criteria.

- Design Pressure to be between 250kPa and 800kPa (25-80m)
- Design Normal velocities at hourly peak less than 3.0 m/s

Location of Models:

- Synergy12d://NGSQL01/Projects/Whenuapai Green - 4520/Reports/Water/EPA NET 12 2022

RESULTS

1. Full Development – Peak Daily Demand plus Fire Flow

    FW2 Fire Classification:
    Several combinations of fire hydrants were considered, attached is an output from one scenario:

    Results gave a minimum pressure of 39.87m at node J19 (highest point on site), maximum pressure of 50.78m J58 (lowest point on site), and a maximum velocity of 1.45m/s in pipe link P73, which leads to one of the fire flow test hydrants.

    FW3 fire Classification:
    Several combinations of fire hydrants were considered, attached is an output from one scenario with hydrants adjacent the school site:

    Results gave a minimum pressure of 39.69m at node J19 (highest point on site), maximum pressure of 50.15m J58 (lowest point on site), and a maximum velocity of 1.66m/s in pipe link P53, which leads to one of the fire flow test hydrants.

2. Full Development - Peak Hourly Demand

    Attached is the output for the peak hourly demand.

    Results gave a minimum pressure of 39.96m at node J19 (highest point on site), maximum pressure of 50.96m at node J58 (lowest point on the site), and a maximum

velocity of 0.26m/s in pipe link P1, leading from one reservoir point and the existing 315mmdia connection pipe.

CONCLUSION

Watercare Code of Practice velocity and pressure limits are not exceeded when this development is serviced from the South, as modelled and defined above.

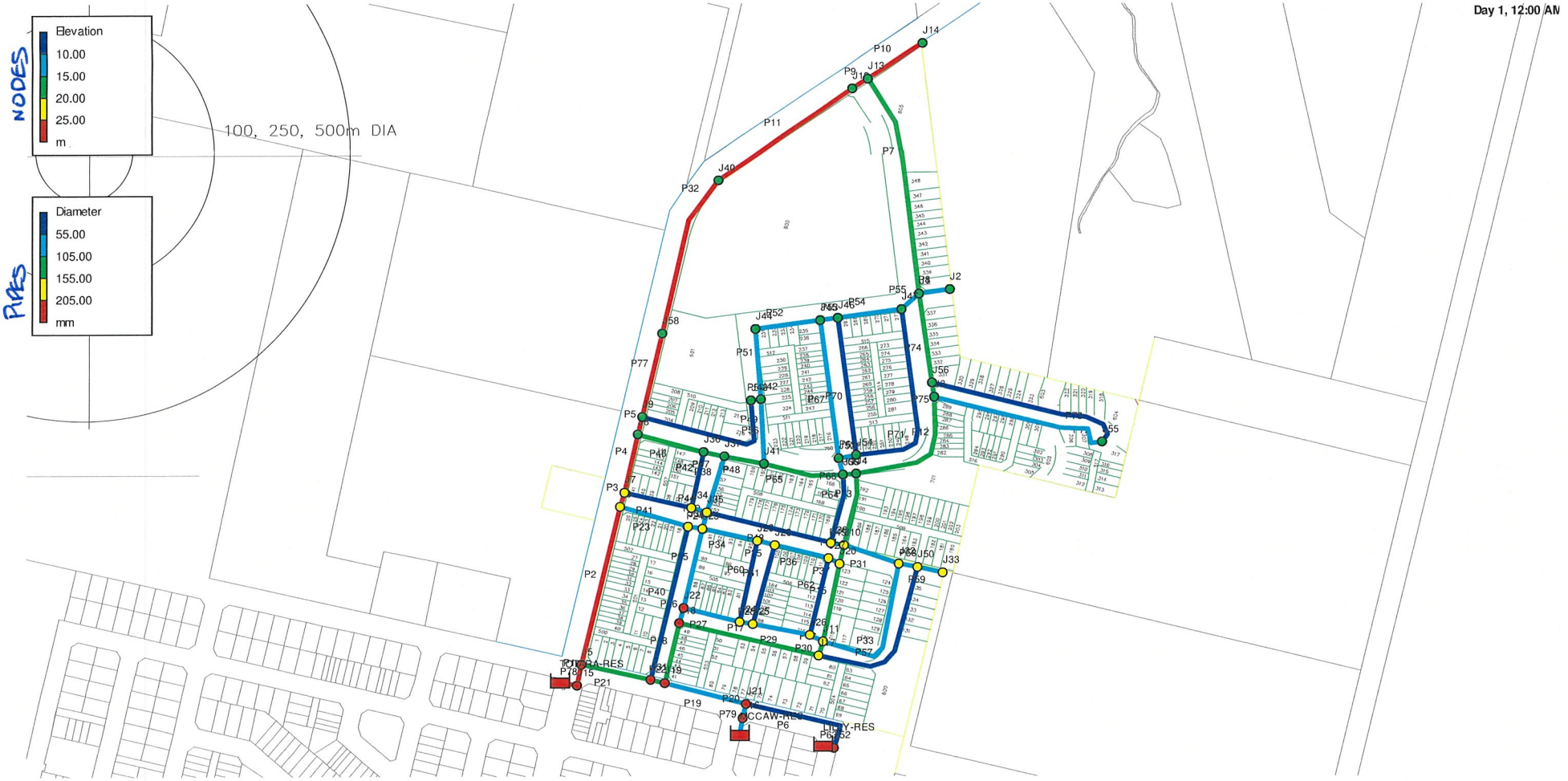
Prepared by:

Chris Kennedy
Civil Design Manager
The Neil Group Ltd

December 2022

Attached: Hydrant testing and EPANet scenario outputs

WHENUAPAI GREEN WATER SUPPLY



MODELED PIPE SIZES

(250|150|100|50)

WHENUAPAI GREEN WATER SUPPLY

WHENUAPAI GREEN WATER SUPPLY

Network Table - Nodes

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc J5	26	0	0.00	65.95	39.95
Junc J6	21	0	0.00	65.84	44.84
Junc J7	21	0	0.00	65.83	44.83
Junc J8	17	0	0.00	65.80	48.80
Junc J9	17	0	0.00	65.80	48.80
Junc J12	16	0	0.00	65.73	49.73
Junc J13	16	0	0.00	65.73	49.73
Junc J14	15	0	0.00	65.73	50.73
Junc J15	26	0	0.00	65.98	39.98
Junc J16	26	0	0.00	65.98	39.98
Junc J1	18	0.168	0.17	65.32	47.32
Junc J2	18	0	0.00	65.32	47.32
Junc J3	19	0.122	0.12	65.28	46.28
Junc J4	19	0	0.00	65.52	46.52
Junc J10	20	0	0.00	65.61	45.61
Junc J11	24	0.214	0.21	65.66	41.66
Junc J17	24	0.306	0.31	65.67	41.67
Junc J18	25	0.306	0.31	65.77	40.77
Junc J19	26	0	0.00	65.87	39.87
Junc J20	21	0	0.00	65.63	44.63
Junc J21	26	0	0.00	65.97	39.97
Junc J22	25	0.260	0.26	65.74	40.74
Junc J23	21	0	0.00	65.72	44.72
Junc J24	24	0	0.00	65.70	41.70
Junc J25	24	0.290	0.29	65.69	41.69
Junc J26	24	0	0.00	65.67	41.67
Junc J27	21	0	0.00	65.64	44.64
Junc J28	21	0	0.00	65.68	44.68
Junc J29	21	0	0.00	65.69	44.69
Junc J30	21	0.306	0.31	65.74	44.74
Junc J31	26	0.306	0.31	65.88	39.88
Junc J32	22	0.367	0.37	65.62	43.62
Junc J33	23	0	0.00	65.62	42.62
Junc J34	21	0	0.00	65.71	44.71
Junc J35	21	0.275	0.28	65.71	44.71
Junc J36	19	0.244	0.24	65.70	46.70
Junc J37	19	0	0.00	65.67	46.67
Junc J38	20	0	0.00	65.61	45.61
Junc J39	19	0.153	0.15	65.52	46.52
Junc J41	19	0	0.00	65.59	46.59
Junc J42	17	0	0.00	65.46	48.46
Junc J43	17	0.183	0.18	65.46	48.46
Junc J44	17	0	0.00	65.29	48.29
Junc J45	18	0.214	0.21	65.13	47.13
Junc J46	18	12.5	12.50	64.99	46.99

LOWEST PRESSURE 7.25m VV

FH

WHENUAPAI GREEN WATER SUPPLY

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc J47	18	0.229	0.23	65.24	47.24
Junc J50	23	0.076	0.08	65.62	42.62
Junc J52	26	0	0.00	66.00	40.00
Junc J53	19	0.275	0.28	65.44	46.44
Junc J54	19	0.290	0.29	65.43	46.43
Junc J55	17	13.126	13.13	61.76	44.76
Junc J56	19	0.092	0.09	65.28	46.28
Junc J58	15	0	0.00	65.78	50.78
Junc J40	16	0.231	0.23	65.76	49.76
Resvr TOTARA-RES	66	#N/A	-28.00	66.00	0.00
Resvr MCCAW-RES	66	#N/A	-2.35	66.00	0.00
Resvr LILLY-RES	66	#N/A	-0.19	66.00	0.00

FH

HIGHEST PRESSURE < 80m VV

SCENARIO N°1 (SEE PLAN)

FIRE - HYDRANTS J55/ J46. VV

WHENUAPAI GREEN WATER SUPPLY

Network Table - Links

Link ID	Diameter mm	Flow LPS	Velocity m/s
Pipe P1	250	28.00	0.57
Pipe P2	250	21.22	0.43
Pipe P3	250	18.51	0.38
Pipe P4	250	18.01	0.37
Pipe P5	250	9.95	0.20
Pipe P9	250	9.16	0.19
Pipe P10	250	0.00	0.00
Pipe P7	150	9.16	0.52
Pipe P8	100	0.00	0.00
Pipe P12	150	-9.00	0.51
Pipe P13	150	-7.50	0.42
Pipe P14	150	-6.65	0.38
Pipe P15	150	-4.48	0.25
Pipe P16	150	-4.77	0.27
Pipe P17	150	-5.27	0.30
Pipe P18	150	-8.67	0.49
Pipe P19	100	-2.54	0.32
Pipe P20	100	-2.35	0.30
Pipe P21	150	6.78	0.38
Pipe P22	150	6.13	0.35
Pipe P23	100	2.71	0.34
Pipe P24	100	2.74	0.35
Pipe P25	100	-0.95	0.12
Pipe P26	100	-3.09	0.39
Pipe P27	100	1.88	0.24
Pipe P28	100	1.77	0.22
Pipe P29	100	1.35	0.17
Pipe P30	100	1.13	0.14
Pipe P31	100	-0.96	0.12
Pipe P33	100	-1.20	0.15
Pipe P34	100	1.70	0.22
Pipe P35	100	1.81	0.23
Pipe P36	100	1.94	0.25
Pipe P37	100	2.17	0.28
Pipe P38	100	-1.76	0.22
Pipe P39	100	-1.99	0.25
Pipe P40	50	0.34	0.18
Pipe P41	50	0.50	0.25
Pipe P42	50	0.13	0.06
Pipe P43	50	0.33	0.17
Pipe P44	100	-0.37	0.05
Pipe P45	100	-0.10	0.01
Pipe P46	150	8.07	0.46
Pipe P47	150	7.95	0.45
Pipe P48	150	9.71	0.55

WHENUAPAI GREEN WATER SUPPLY

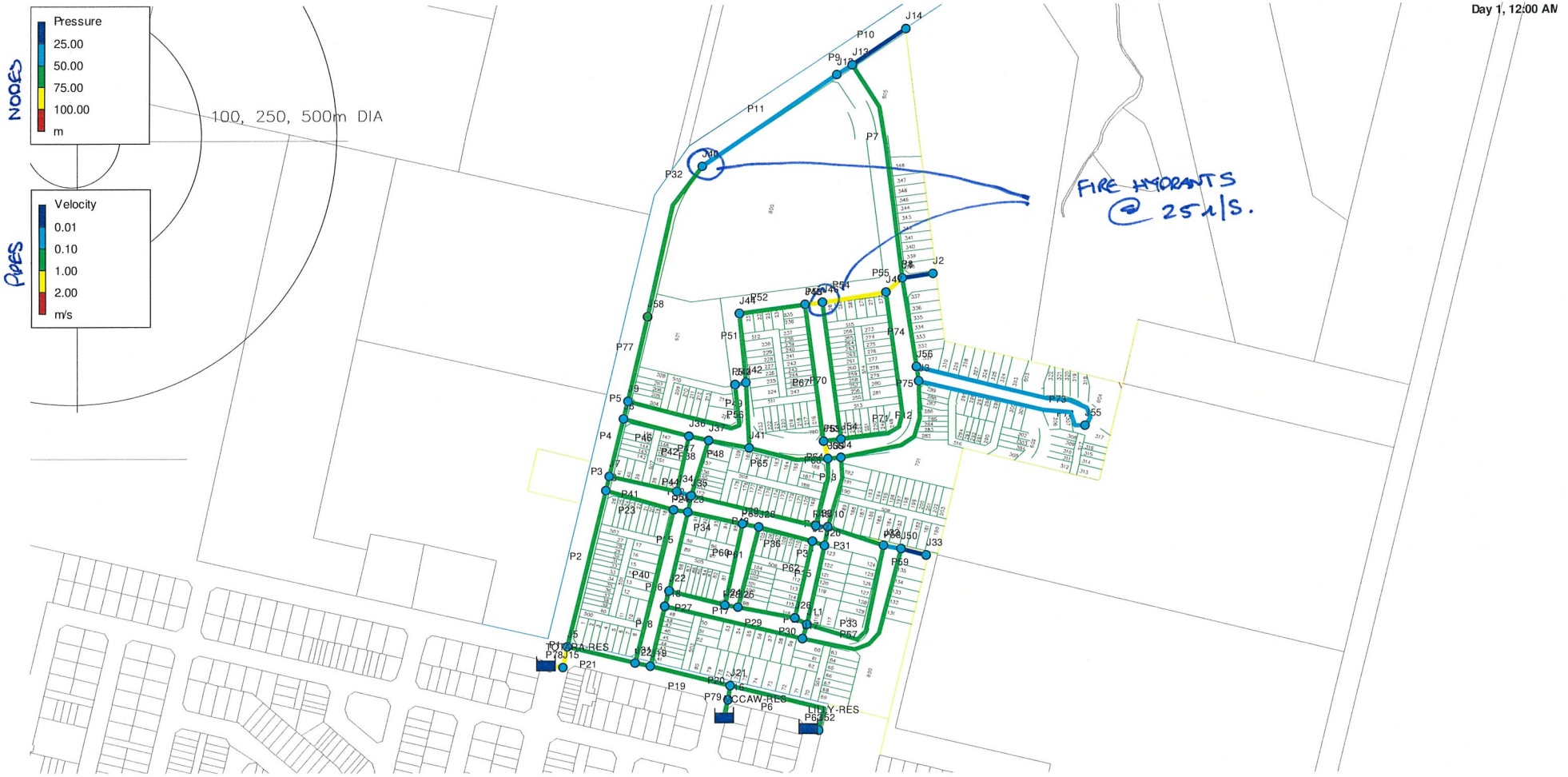
Link ID	Diameter mm	Flow LPS	Velocity m/s
Pipe P49	100	3.34	0.42
Pipe P50	100	-0.38	0.05
Pipe P51	100	3.71	0.47
Pipe P52	100	3.71	0.47
Pipe P53	100	7.03	0.90
Pipe P54	100	-4.78	0.61
Pipe P55	100	-4.64	0.59
Pipe P56	50	0.56	0.28
Pipe P57	50	0.20	0.10
Pipe P58	100	-0.12	0.02
Pipe P59	100	0.00	0.00
Pipe P60	50	-0.11	0.06
Pipe P61	50	-0.13	0.07
Pipe P62	50	-0.22	0.11
Pipe P64	50	-0.43	0.22
Pipe P65	150	6.37	0.36
Pipe P66	150	-1.49	0.08
Pipe P67	100	-3.53	0.45
Pipe P68	100	-5.15	0.66
Pipe P69	100	1.35	0.17
Pipe P70	50	-0.69	0.35
Pipe P71	50	0.36	0.18
Pipe P72	50	1.76	0.90
Pipe P73	100	11.37	1.45
Pipe P74	150	4.34	0.25
Pipe P75	150	2.49	0.14
Pipe P77	250	-9.39	0.19
Pipe P78	250	-28.00	0.57
Pipe P79	100	-2.35	0.30
Pipe P11	250	-9.16	0.19
Pipe P32	250	-9.39	0.19
Pipe P6	50	-0.19	0.09
Pipe P63	100	0.19	0.02

HIGHEST VELOCITY vv < 3.0m/s (LEADS TO FH FLOW)

SCENARIO NO 1 (see PLAN)

12/22

WHENUAPAI GREEN WATER SUPPLY



SCENARIO N°1

(PEAK DAILY PLUS FW3 FIRE)

SCHOOL

12/22
FW3
School

WHENUAPAI GREEN WATER SUPPLY

Network Table - Nodes

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc J5	26	0	0.00	65.86	39.86
Junc J6	21	0	0.00	65.45	44.45
Junc J7	21	0	0.00	65.42	44.42
Junc J8	17	0	0.00	65.29	48.29
Junc J9	17	0	0.00	65.27	48.27
Junc J12	16	0	0.00	64.92	48.92
Junc J13	16	0	0.00	64.92	48.92
Junc J14	15	0	0.00	64.92	49.92
Junc J15	26	0	0.00	65.93	39.93
Junc J16	26	0	0.00	65.96	39.96
Junc J1	18	0.168	0.17	64.80	46.80
Junc J2	18	0	0.00	64.80	46.80
Junc J3	19	0.122	0.12	64.88	45.88
Junc J4	19	0	0.00	65.02	46.02
Junc J10	20	0	0.00	65.18	45.18
Junc J11	24	0.214	0.21	65.29	41.29
Junc J17	24	0.306	0.31	65.30	41.30
Junc J18	25	0.306	0.31	65.48	40.48
Junc J19	26	0	0.00	65.69	39.69
Junc J20	21	0	0.00	65.21	44.21
Junc J21	26	0	0.00	65.92	39.92
Junc J22	25	0.260	0.26	65.41	40.41
Junc J23	21	0	0.00	65.32	44.32
Junc J24	24	0	0.00	65.34	41.34
Junc J25	24	0.290	0.29	65.32	41.32
Junc J26	24	0	0.00	65.29	41.29
Junc J27	21	0	0.00	65.23	44.23
Junc J28	21	0	0.00	65.28	44.28
Junc J29	21	0	0.00	65.29	44.29
Junc J30	21	0.306	0.31	65.35	44.35
Junc J31	26	0.306	0.31	65.71	39.71
Junc J32	22	0.367	0.37	65.20	43.20
Junc J33	23	0	0.00	65.20	42.20
Junc J34	21	0	0.00	65.28	44.28
Junc J35	21	0.275	0.28	65.28	44.28
Junc J36	19	0.244	0.24	65.20	46.20
Junc J37	19	0	0.00	65.17	46.17
Junc J38	20	0	0.00	65.18	45.18
Junc J39	19	0.153	0.15	65.02	46.02
Junc J41	19	0	0.00	65.07	46.07
Junc J42	17	0	0.00	64.69	47.69
Junc J43	17	0.183	0.18	64.69	47.69
Junc J44	17	0	0.00	64.21	47.21
Junc J45	18	0.214	0.21	63.75	45.75
Junc J46	18	25	25.00	63.32	45.32

LOWEST PRESSURE
>25 mVV

FH

WHENUAPAI GREEN WATER SUPPLY

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc J47	18	0.229	0.23	64.43	46.43
Junc J50	23	0.076	0.08	65.20	42.20
Junc J52	26	0	0.00	66.00	40.00
Junc J53	19	0.275	0.28	64.78	45.78
Junc J54	19	0.290	0.29	64.77	45.77
Junc J55	17	0.626	0.63	64.87	47.87
Junc J56	19	0.092	0.09	64.87	45.87
Junc J58	15	0	0.00	65.15	50.15
Junc J40	16	25.231	25.23	64.93	48.93
Resvr TOTARA-RES	66	#N/A	-51.51	66.00	0.00
Resvr MCCAW-RES	66	#N/A	-3.73	66.00	0.00
Resvr LILLY-RES	66	#N/A	-0.29	66.00	0.00

HIGHEST PRESSURE <80m W

FH

SCENARIO NO1 (FW3)
(See PLAN)

FH Hydrants J40 / J46

12/22
FW3
School

WHENUAPAI GREEN WATER SUPPLY

Network Table - Links

Link ID	Diameter mm	Flow LPS	Velocity m/s
Pipe P1	250	51.51	1.05
Pipe P2	250	41.79	0.85
Pipe P3	250	38.98	0.79
Pipe P4	250	38.45	0.78
Pipe P5	250	30.70	0.63
Pipe P9	250	4.72	0.10
Pipe P10	250	0.00	0.00
Pipe P7	150	4.72	0.27
Pipe P8	100	0.00	0.00
Pipe P12	150	-6.68	0.38
Pipe P13	150	-10.14	0.57
Pipe P14	150	-8.93	0.51
Pipe P15	150	-6.38	0.36
Pipe P16	150	-6.86	0.39
Pipe P17	150	-7.44	0.42
Pipe P18	150	-12.85	0.73
Pipe P19	100	-4.03	0.51
Pipe P20	100	-3.73	0.48
Pipe P21	150	9.71	0.55
Pipe P22	150	8.83	0.50
Pipe P23	100	2.81	0.36
Pipe P24	100	3.09	0.39
Pipe P25	100	-2.32	0.30
Pipe P26	100	-5.11	0.65
Pipe P27	100	2.53	0.32
Pipe P28	100	2.27	0.29
Pipe P29	100	1.71	0.22
Pipe P30	100	1.38	0.18
Pipe P31	100	-1.47	0.19
Pipe P33	100	-1.64	0.21
Pipe P34	100	1.68	0.21
Pipe P35	100	1.95	0.25
Pipe P36	100	2.22	0.28
Pipe P37	100	2.55	0.32
Pipe P38	100	-3.21	0.41
Pipe P39	100	-3.72	0.47
Pipe P40	50	0.58	0.30
Pipe P41	50	0.53	0.27
Pipe P42	50	0.44	0.23
Pipe P43	50	0.33	0.17
Pipe P44	100	-0.09	0.01
Pipe P45	100	-0.26	0.03
Pipe P46	150	7.74	0.44
Pipe P47	150	7.94	0.45
Pipe P48	150	11.15	0.63

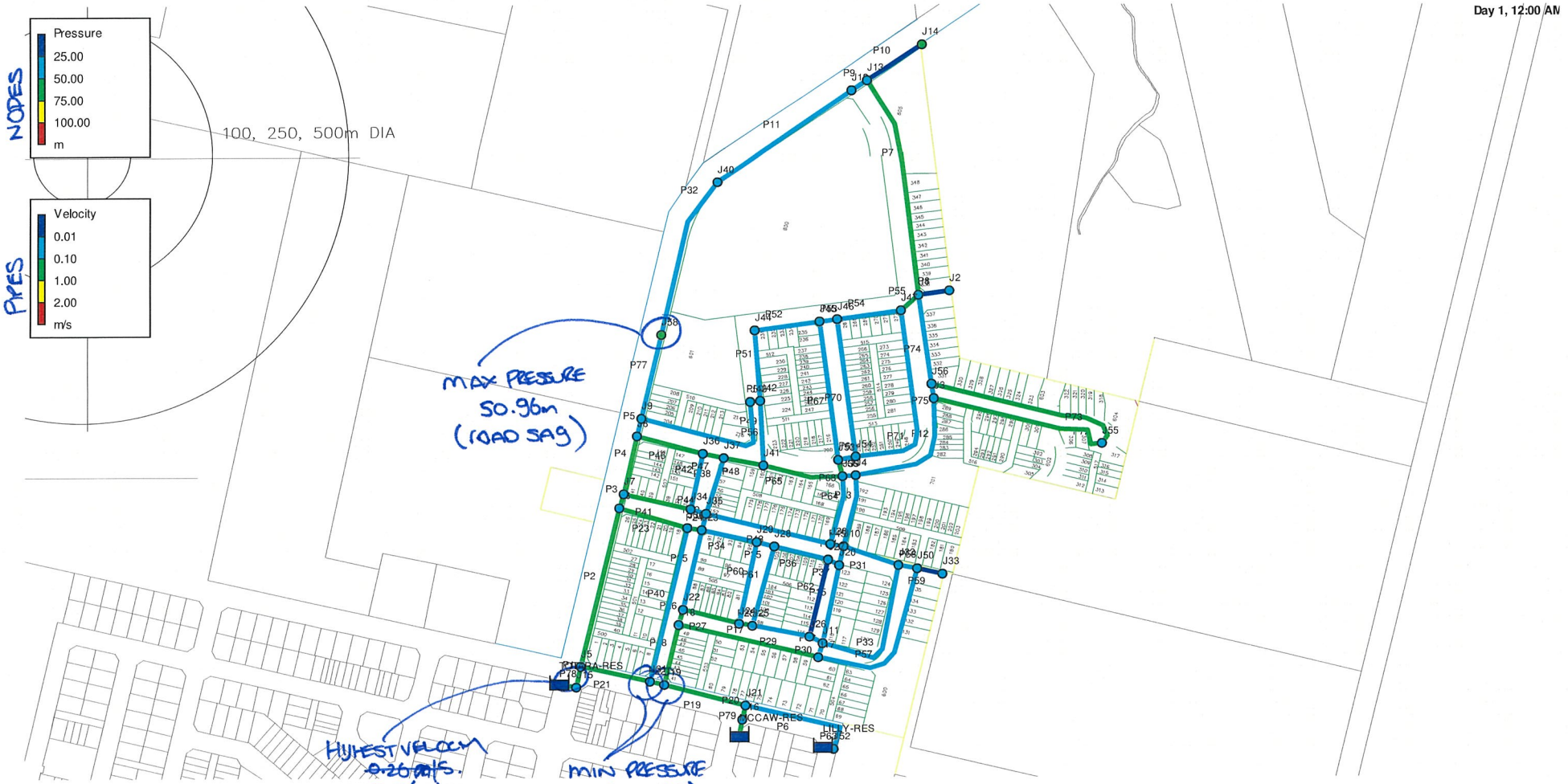
WHENUAPAI GREEN WATER SUPPLY

Link ID	Diameter mm	Flow LPS	Velocity m/s
Pipe P49	100	5.92	0.75
Pipe P50	100	-0.57	0.07
Pipe P51	100	6.49	0.83
Pipe P52	100	6.49	0.83
Pipe P53	100	13.03	1.66
Pipe P54	100	-10.66	1.36
Pipe P55	100	-10.39	1.32
Pipe P56	50	0.75	0.38
Pipe P57	50	0.27	0.14
Pipe P58	100	-0.20	0.03
Pipe P59	100	0.00	0.00
Pipe P60	50	-0.27	0.14
Pipe P61	50	-0.27	0.14
Pipe P62	50	-0.33	0.17
Pipe P64	50	-0.59	0.30
Pipe P65	150	5.23	0.30
Pipe P66	150	3.46	0.20
Pipe P67	100	-6.76	0.86
Pipe P68	100	-9.13	1.16
Pipe P69	100	2.10	0.27
Pipe P70	50	-1.32	0.67
Pipe P71	50	0.49	0.25
Pipe P72	50	0.04	0.02
Pipe P73	100	0.59	0.07
Pipe P74	150	-5.84	0.33
Pipe P75	150	-5.97	0.34
Pipe P77	250	-29.95	0.61
Pipe P78	250	-51.51	1.05
Pipe P79	100	-3.73	0.48
Pipe P11	250	-4.72	0.10
Pipe P32	250	-29.95	0.61
Pipe P6	50	-0.29	0.15
Pipe P63	100	0.29	0.04

HIGHEST VELOCITY
< 3.0 m/s ✓
(PIPE ADJACENT FIRE FLOW # J46)

SCENARIO NO 1 (FW3)
(SEE PLAN)

WHENUAPAI GREEN WATER SUPPLY



WHENUAPAI GREEN WATER SUPPLY

Network Table - Nodes

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc J5	26	0	0.00	65.99	39.99
Junc J6	21	0	0.00	65.97	44.97
Junc J7	21	0	0.00	65.97	44.97
Junc J8	17	0	0.00	65.96	48.96
Junc J9	17	0	0.00	65.96	48.96
Junc J12	16	0	0.00	65.95	49.95
Junc J13	16	0	0.00	65.95	49.95
Junc J14	15	0	0.00	65.95	50.95
Junc J15	26	0	0.00	66.00	40.00
Junc J16	26	0	0.00	65.99	39.99
Junc J1	18	0.168	0.42	65.92	47.92
Junc J2	18	0	0.00	65.92	47.92
Junc J3	19	0.122	0.31	65.91	46.91
Junc J4	19	0	0.00	65.92	46.92
Junc J10	20	0	0.00	65.92	45.92
Junc J11	24	0.214	0.53	65.92	41.92
Junc J17	24	0.306	0.77	65.92	41.92
Junc J18	25	0.306	0.77	65.94	40.94
Junc J19	26	0	0.00	65.96	39.96
Junc J20	21	0	0.00	65.92	44.92
Junc J21	26	0	0.00	65.99	39.99
Junc J22	25	0.260	0.65	65.93	40.93
Junc J23	21	0	0.00	65.93	44.93
Junc J24	24	0	0.00	65.92	41.92
Junc J25	24	0.290	0.73	65.92	41.92
Junc J26	24	0	0.00	65.92	41.92
Junc J27	21	0	0.00	65.92	44.92
Junc J28	21	0	0.00	65.92	44.92
Junc J29	21	0	0.00	65.92	44.92
Junc J30	21	0.306	0.77	65.93	44.93
Junc J31	26	0.306	0.77	65.96	39.96
Junc J32	22	0.367	0.92	65.91	43.91
Junc J33	23	0	0.00	65.91	42.91
Junc J34	21	0	0.00	65.93	44.93
Junc J35	21	0.275	0.69	65.93	44.93
Junc J36	19	0.244	0.61	65.94	46.94
Junc J37	19	0	0.00	65.93	46.93
Junc J38	20	0	0.00	65.92	45.92
Junc J39	19	0.153	0.38	65.92	46.92
Junc J41	19	0	0.00	65.92	46.92
Junc J42	17	0	0.00	65.92	48.92
Junc J43	17	0.183	0.46	65.92	48.92
Junc J44	17	0	0.00	65.91	48.91
Junc J45	18	0.214	0.53	65.91	47.91
Junc J46	18	0	0.00	65.91	47.91

MIN PRESSURE >25 m VV

MIN PRESSURE >25 m VV

WHENUAPAI GREEN WATER SUPPLY

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc J47	18	0.229	0.57	65.91	47.91
Junc J50	23	0.076	0.19	65.91	42.91
Junc J52	26	0	0.00	66.00	40.00
Junc J53	19	0.275	0.69	65.91	46.91
Junc J54	19	0.290	0.73	65.91	46.91
Junc J55	17	0.626	1.57	65.84	48.84
Junc J56	19	0.092	0.23	65.91	46.91
Junc J58	15	0	0.00	65.96	50.96
Junc J40	16	0.231	0.58	65.95	49.95
Resvr TOTARA-RES	66	#N/A	-12.54	66.00	0.00
Resvr MCCAW-RES	66	#N/A	-1.20	66.00	0.00
Resvr LILLY-RES	66	#N/A	-0.09	66.00	0.00

MAX PRESSURE VV < 80m

SCENARIO Nº2 (SEE PLAN)

EPANET 2.2

8/22

WHENUAPAI GREEN WATER SUPPLY

Network Table - Links

Link ID	Diameter mm	Flow LPS	Velocity m/s
Pipe P1	250	12.54	0.26
Pipe P2	250	8.76	0.18
Pipe P3	250	7.22	0.15
Pipe P4	250	6.97	0.14
Pipe P5	250	3.23	0.07
Pipe P9	250	2.47	0.05
Pipe P10	250	0.00	0.00
Pipe P7	150	2.47	0.14
Pipe P8	100	0.00	0.00
Pipe P12	150	-0.93	0.05
Pipe P13	150	-0.53	0.03
Pipe P14	150	-1.07	0.06
Pipe P15	150	-0.51	0.03
Pipe P16	150	-1.25	0.07
Pipe P17	150	-2.08	0.12
Pipe P18	150	-4.15	0.23
Pipe P19	100	-1.30	0.17
Pipe P20	100	-1.20	0.15
Pipe P21	150	3.77	0.21
Pipe P22	150	2.85	0.16
Pipe P23	100	1.54	0.20
Pipe P24	100	0.93	0.12
Pipe P25	100	0.15	0.02
Pipe P26	100	-1.31	0.17
Pipe P27	100	0.81	0.10
Pipe P28	100	0.87	0.11
Pipe P29	100	0.22	0.03
Pipe P30	100	0.22	0.03
Pipe P31	100	0.62	0.08
Pipe P33	100	-0.42	0.05
Pipe P34	100	0.69	0.09
Pipe P35	100	0.63	0.08
Pipe P36	100	0.57	0.07
Pipe P37	100	0.56	0.07
Pipe P38	100	0.35	0.04
Pipe P39	100	-0.08	0.01
Pipe P40	50	0.16	0.08
Pipe P41	50	0.25	0.13
Pipe P42	50	-0.11	0.06
Pipe P43	50	0.11	0.06
Pipe P44	100	-0.36	0.05
Pipe P45	100	0.08	0.01
Pipe P46	150	3.73	0.21
Pipe P47	150	3.01	0.17
Pipe P48	150	2.66	0.15

WHENUAPAI GREEN WATER SUPPLY

Link ID	Diameter mm	Flow LPS	Velocity m/s
Pipe P49	100	0.70	0.09
Pipe P50	100	0.27	0.03
Pipe P51	100	0.43	0.05
Pipe P52	100	0.43	0.05
Pipe P53	100	-0.22	0.03
Pipe P54	100	-0.26	0.03
Pipe P55	100	-0.88	0.11
Pipe P56	50	0.18	0.09
Pipe P57	50	0.07	0.03
Pipe P58	100	0.12	0.02
Pipe P59	100	0.00	0.00
Pipe P60	50	0.06	0.03
Pipe P61	50	0.07	0.03
Pipe P62	50	0.01	0.00
Pipe P64	50	-0.03	0.01
Pipe P65	150	1.96	0.11
Pipe P66	150	-0.40	0.02
Pipe P67	100	0.11	0.01
Pipe P68	100	-1.21	0.15
Pipe P69	100	0.64	0.08
Pipe P70	50	0.04	0.02
Pipe P71	50	-0.05	0.02
Pipe P72	50	0.21	0.11
Pipe P73	100	1.36	0.17
Pipe P74	150	1.17	0.07
Pipe P75	150	0.73	0.04
Pipe P77	250	-3.05	0.06
Pipe P78	250	-12.54	0.26
Pipe P79	100	-1.20	0.15
Pipe P11	250	-2.47	0.05
Pipe P32	250	-3.05	0.06
Pipe P6	50	-0.09	0.05
Pipe P63	100	0.09	0.01

MAX VELOCITY VV < 3.0m/s.

SCENARIO N°2 (SEE PLAN)

DETECTION SERVICES
WATER LOSS MANAGEMENT

New Zealand: Auckland • Wellington • Christchurch • Queenstown
Australia: Sydney • Melbourne • Brisbane • Adelaide
Head Office: s 9(2)(a)
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Mr Chris Kennedy
Engineering Design Manager
Neil Construction Limited
s 9(2)(a)

5 July 2022

RESULTS OF A FURTHER FIRE FLOW TEST FOR 98 - 100 AND 102 TOTARA ROAD, WHENUAPAI.

Wednesday 29 June 2022
Ross Ollerenshaw

Background

The proposed development at 98 - 100 Totara Road, Whenuapai, includes #102 Totara Road, all of which requires adequate fire protection that meets the Fire Service Code of Practice.

To confirm adequate fire services to the development, Neil Group requested that the new mains in the area also be tested at 9 McCaw Avenue and 169 Totara Road

Neil Construction Ltd advised that this development is classified FW2.

The Fire Service Code of Practice stipulates that for a FW2 development, 25 l/s is required using a maximum of 2 hydrants, with one hydrant supplying at least 12.5 l/s within 135m of the development, and a second 12.5l/s is required from an additional hydrant within a distance of 270m. WaterCare require a minimum residual pressure of 200 kPa, measured at the next nearest FH.

Detection Services are competent to undertake such testing.

Procedure Test 1: 9 McCaw Avenue

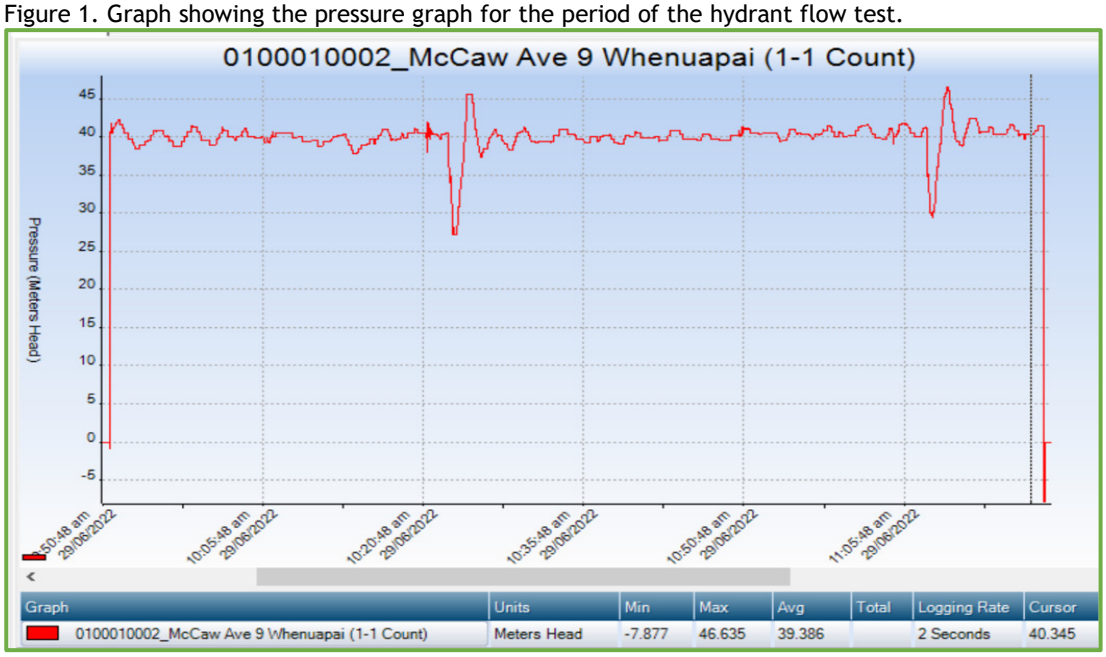
A single fire hydrant outside 9 McCaw Avenue, was specified to undertake the flow test. This hydrant alone could achieve the required flowrate,

A pressure logger was installed on the hydrant outside 19 McCaw Avenue, to record the pressure during the time the flow test was done. This Pressure gauge was installed for the duration of both flow tests.

Fire Flow	Test Start time	Test End Time	Test Flow rate ℓ/sec	Static pressure (before test)	Residual Pressure
9 McCaw Ave	10h22	10h24	25.0	40m	
19 McCaw Ave	9h51	11h18	Pressure	40m	27m

The hydrant at 9 McCaw Avenue was only partially opened and achieved a flow rate of 25 l/s.

Figure 1. Graph showing the pressure graph for the period of the hydrant flow test.



Procedure Test 2: 169 Totara Road

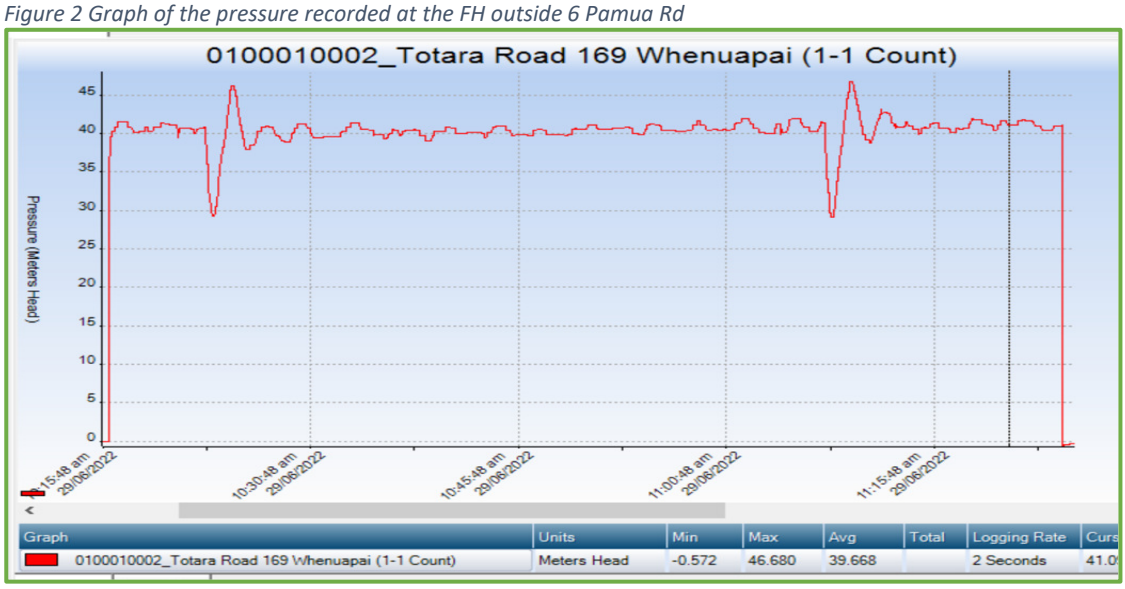
A single fire hydrant outside 169 Totara Road, was specified to undertake the flow test. This hydrant alone could achieve the required flowrate,

A pressure logger was installed on the hydrant outside 6 Pamua Road, to record the pressure during the time the flow test was done. This Pressure gauge was installed for the duration of both flow tests.

Fire Flow	Test Start time	Test End Time	Test Flow rate ℓ/sec	Static pressure (before test)	Residual Pressure
169 Totara Rd	11h07	11h09	25.0	40m	
6 Pamua Rd	9h51	11h23	Pressure	40m	30m

The hydrant at 169 Totara Road was only partially opened and achieved a flow rate of 25 l/s.

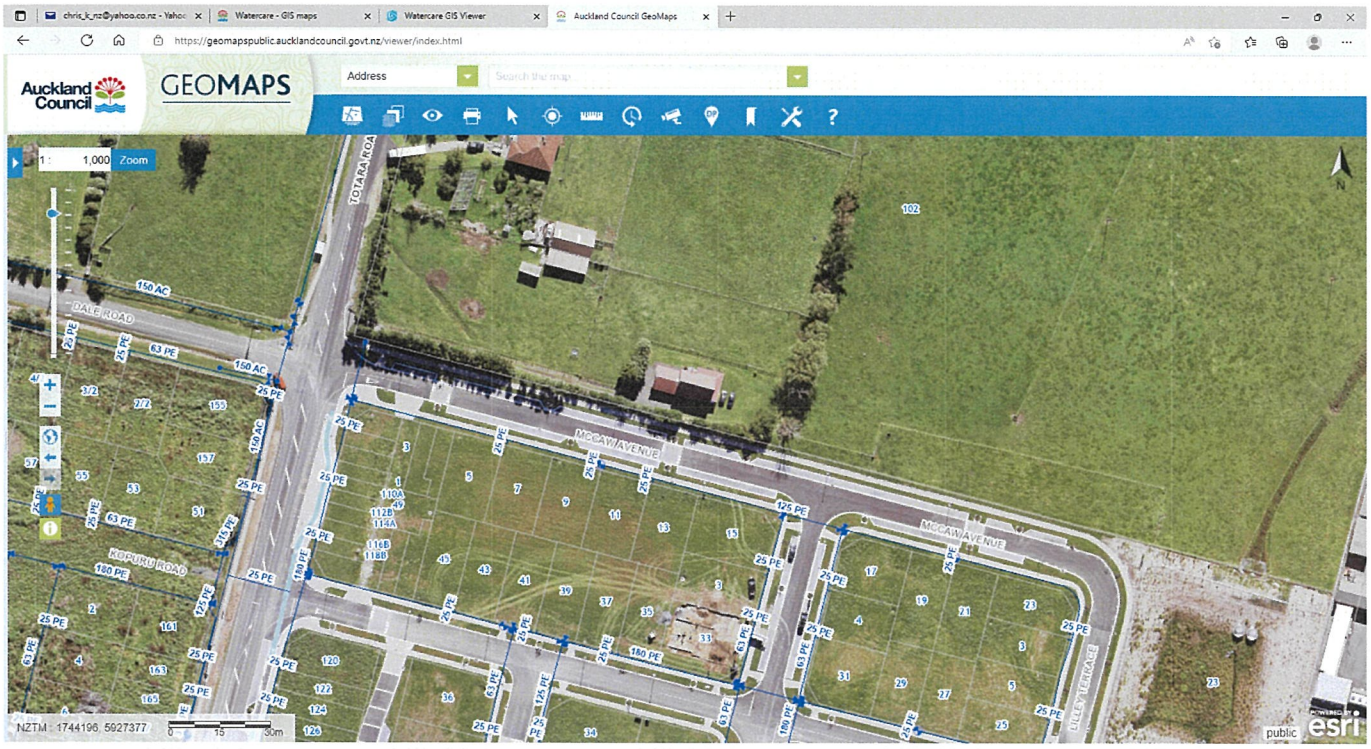
Figure 2 Graph of the pressure recorded at the FH outside 6 Pamua Rd

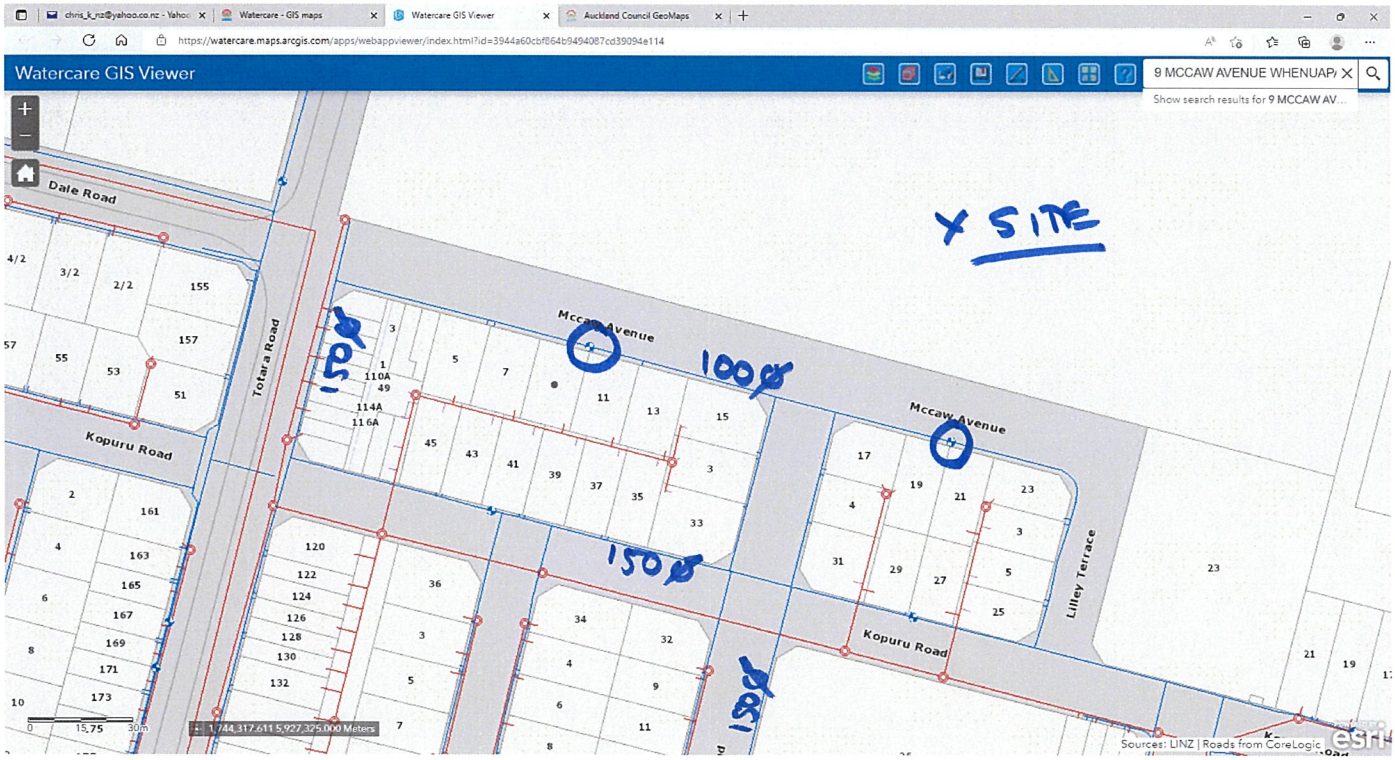


Both tests were successful.

Acknowledgement
Detection Services appreciates the opportunity to undertake these tests on behalf of Neil Construction Ltd.

Charles (mob s 9(2)(a)
Detection Services
P O Box 58951
The Hub, Botany
Auckland.



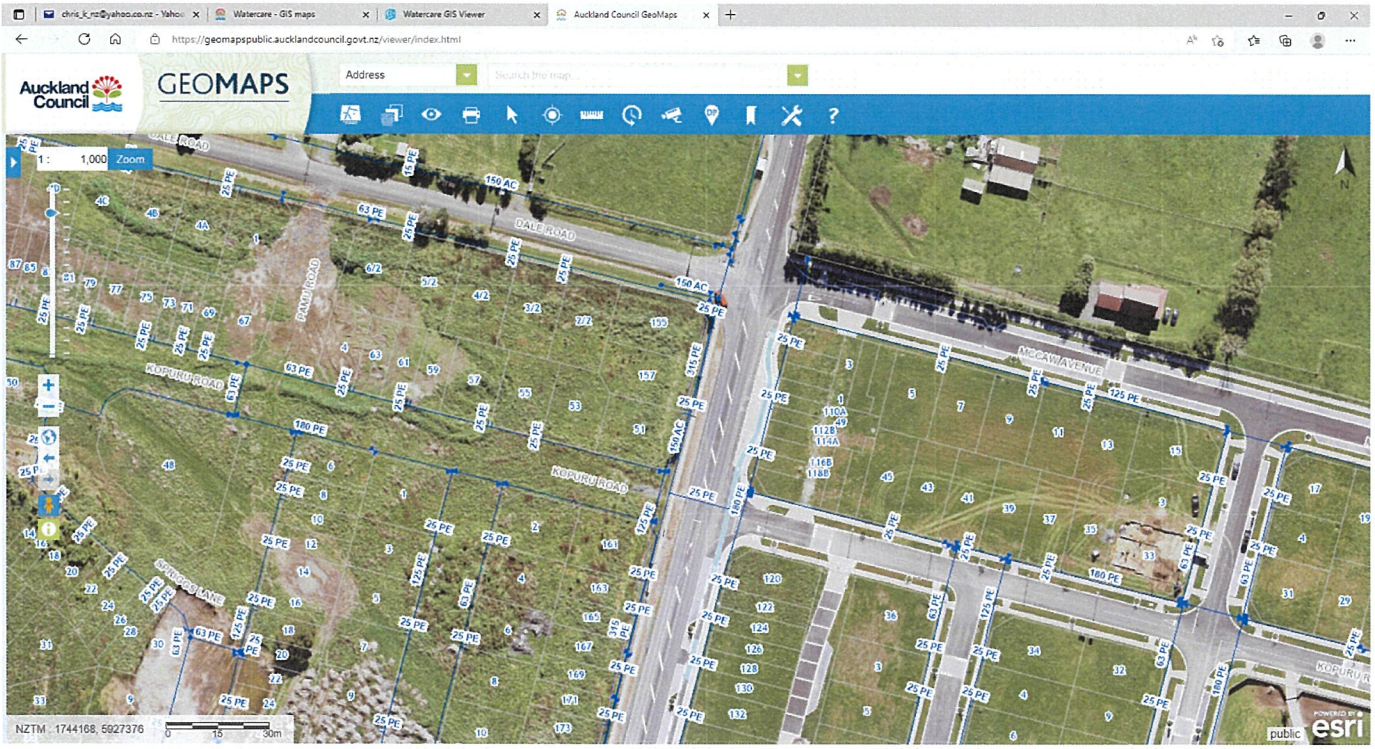


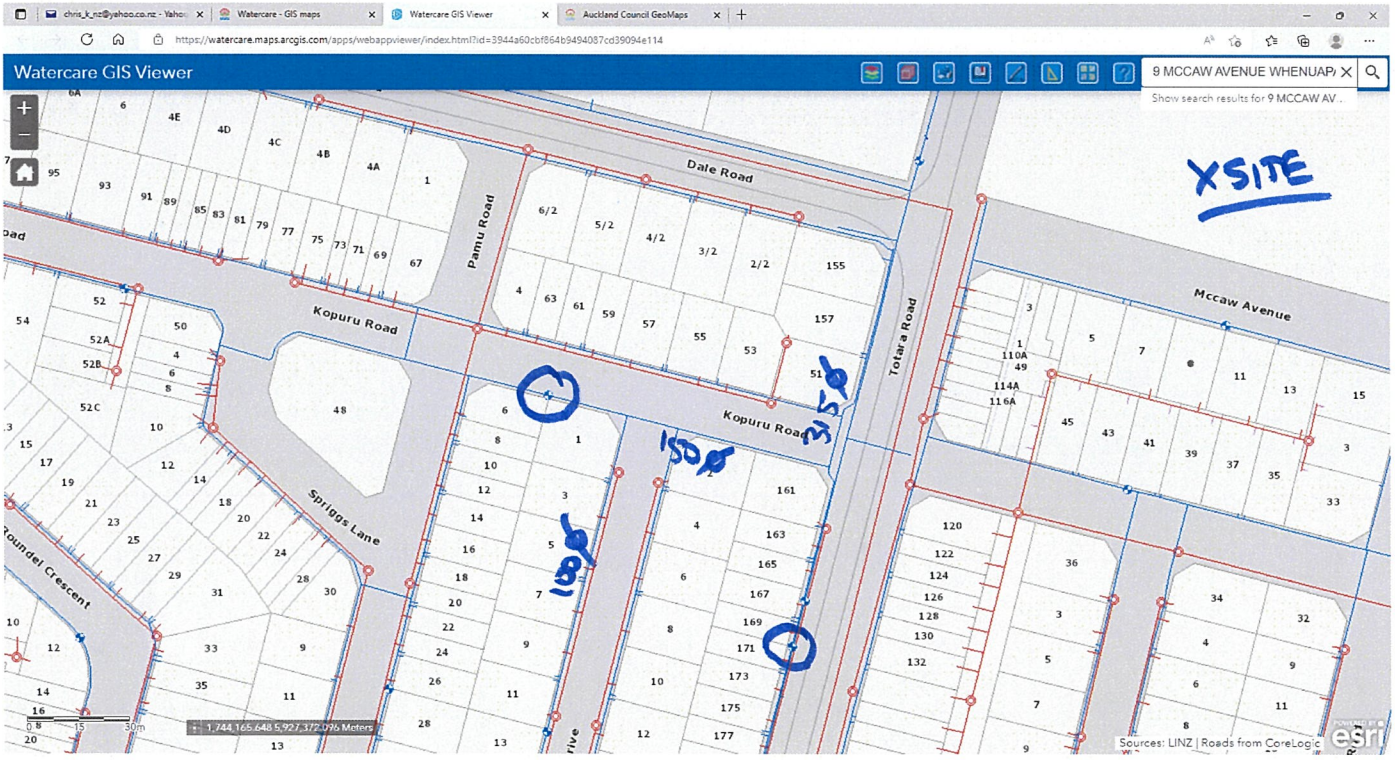
TEST LOCATIONS:

- TEST 1

MCCAW

(9 & 19 MCCAW)





TEST LOCATIONS:

- TEST 2

TOTARA

(6 PAMUA & 169 TOTARA)