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5/06/2024

SILVERDALE WEST PRIVATE PLAN CHANGE

INFRASTRUCTURE REPORT

Proposed Silverdale Private Plan Change Silverdale West Private Plan Change | Infrastructure Report

Dear Fletcher Development,

Thank you for the opportunity for Civix Limited to provide an Infrastructure Report for the proposed Silverdale West Private Plan change. The report and the associated drawings, details and appendices detail the required infrastructure to support the private plan change.

Please do not hesitate to contact us if you have any questions on this report.

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Executive Summary

Civix Ltd is a Planning, Surveying and Engineering company providing engineering advice to Fletcher Development Limited on a proposed Private Plan Change Application (the "application") under the Auckland Unitary Plan Operative in part (22 December 2022), referenced as the "AUP". The land subject to this application is located in Silverdale, and comprises the following addresses:

Property Address	Legal Description
193 Wilks Road	Lot 1 DP 433431
1636 Dairy Flat Highway	Lot 1 DP 208687
1638 Dairy Flat Highway	Lot 1 DP 46158
1646 Dairy Flat Highway	Lot 1 DP 74321
1660 Dairy Flat Highway	Lot 2 DP 74321
1686 Dairy Flat Highway	Lot 1 DP 69561
1700 Dairy Flat Highway	Pt Lot 1 DP 68886
1732 Dairy Flat Highway	Pt Lot 2 DP 68886
1738 Dairy Flat Highway	Lot 1 DP 480626
1744 Dairy Flat Highway	Sec 9 SO 308591, Sec 10 SO 308591
1748 Dairy Flat Highway	Pt Allot 210 Psh Of Okura SO 18072, Sec 19 SO 308591
1748A Dairy Flat Highway	Sec 1 SO 308831
Dairy Flat Highway	Sec 6 SO 308591
Dairy Flat Highway	Lot 2 DP 480626

The proposal is to seek a Private Plan Change to rezone the land within the identified sites, from Future Urban Zone to a combination of Business – Light Industry Zone and Open Space – Informal recreation Zone. A 3D model of the proposed site area was developed to determine the suitability of the land between State Highway 1 and Dairy Flat Highway for Light Industry Zoning. Results show that roading, wastewater, stormwater and water supply servicing in accordance with the standards set out in the Auckland Council code of practices is possible. Indicative public roading connections have been identified, which will be extended to establish a logical and efficient street network to support industrial land use.

This report outlines earthworks, roading, stormwater, flooding, wastewater and water supply infrastructure and the necessary upgrades to support development in accordance with the proposed precinct provisions. A summary of the report is outlined below:

- CMW Geosciences provided a geotechnical assessment report to be submitted with this report as part of the plan change application. The report identified a number of geotechnical considerations and concluded that the site is considered to be geotechnically suitable for the extent of development enabled by the proposed plan change. Refer to Appendix A - Geotechnical assessment report.
- Earthworks will be required in support of the future development of the land and will be detailed in support of future resource consent applications. The plan change area requires bulk earthworks and widespread recontouring across the site to improve contours for the anticipated roading network and to provide development areas suitable for light industrial activity.
- The design of the roading networks will be carried out in accordance with Austroads Design Manual and the Auckland Transport TDM with a speed environment intended to be 50km/h for both local and Collector roads.
- Existing watercourses will be retained and upgraded, with stormwater outfalls utilized to recharge watercourses, and overland flow paths will allow conveyance of 1% AEP storm event runoff to John Creek, generally expected to be channeled via Road Reserves.
- SMAF1 - Retention (5 mm) and detention (95th percentile) measures should be implemented for stormwater runoff for roof areas for all buildings via tanks with non-potable reuse. Retention is not feasible for public roads, COALs and driveways. This solution has been chosen as it is the SMAF 1 specified outcome, which is the most

restrictive outcome and will achieve equivalent hydrology (infiltration, runoff volume, peak flow) to pre-development (grassed state) levels for the buildings in order to alleviate downstream flooding and stormwater quality issues.

- There is sufficient capacity to service the site with public infrastructure for stormwater, and water supply, which can be achieved by utilizing existing and proposed infrastructure.
- Wastewater servicing can be provided via the proposed pump station and proposed public network. In the long term it is anticipated that the public wastewater network will have capacity to accommodate wastewater flows from development across the Plan Change area. While the Army Bay WWTP upgrades will provide sufficient capacity for the catchment from 2031, there is the potential need for an interim wastewater solution to support earlier development across the Plan Change area prior to the upgrades being operational. The Proposed Plan Change sets up a process whereby resource consent for a Non-complying Activity will need to be obtained for an alternative servicing approach where there is not sufficient capacity within the public network.
- Vector have confirmed that they have available supply within the vicinity of the site to service the site for power reticulation. Chorus have been contacted to confirm network capacity, initial discussions indicate that we do not anticipate any servicing capacity issues.

1. Existing Site Description

The Plan change area totals approximately 107 hectares and is located north of Wilks Road and bound between the Northern Motorway and Dairy Flat Highway. Refer to Figure 1 below. The site is characterised by John Creek running north-south with an associated low-lying floodplain area. John Creek flows northward through the site and exits via an existing culvert under the Northern Motorway.

The site comprises easy to moderate slopes from John Creek up to Dairy Flat Highway and Wilks Road which sit around 30-50m higher than the stream. Slopes are steepest closer to the ridgelines where gradients are around 12.5 – 20%. Some steeper areas (up to 20% grade) are present to the north of the plan change area, however this area is limited in extent, and indicative 3D modelling shows these areas can be modified in order to create lot platforms and roads with suitable grades.

Below is a table of all the properties that are affected by the Proposed Plan Change (date sourced 06 January 2023).

Table 1-1 - Properties affected by the proposed private plan change

Property Address	Legal Description	RT Number	Title Area	Registered Owner(s)
193 Wilks Road	Lot 1 DP 433431	527370	56.0419	Wilks Road 2014 Limited
1636 Dairy Flat Highway	Lot 1 DP 208687	NA136D/722	59.245	Wilks Road 2014 Limited
1638 Dairy Flat Highway	Lot 1 DP 46158	NA1698/16	0.3703	Robert George Woolley, Rong Everlyne Woolley
1646 Dairy Flat Highway	Lot 1 DP 74321	NA30B/736	0.7802	Geok Mui Law, Huiping Sun
1660 Dairy Flat Highway	Lot 2 DP 74321	NA30B/737	20.2365	Fletcher Development Ltd
1686 Dairy Flat Highway	Lot 1 DP 69561	NA25C/412	0.7809	Stephen Rodney Wagstaff and Beth Rose Wagstaff
1700 Dairy Flat Highway	Pt Lot 1 DP 68886	NA25A/502	2.6999	Elaine Alice Butler-Stoney
1732 Dairy Flat Highway	Pt Lot 2 DP 68886	NA25A/503	16.3822	YJs Holding Limited
1738 Dairy Flat Highway	Lot 1 DP 480626	672036	0.5481	Mammoth Ventures Ltd
1744 Dairy Flat Highway	Sec 9 SO 308591, Sec 10 SO 308591	65588	2.1924	DP Boocock No 2 Trustee Ltd
1748 Dairy Flat Highway	Pt Allot 210 Psh Of Okura SO 18072, Sec 19 SO 308591	111842	2.7781	DP Boocock No 2 Trustee Ltd
1748A Dairy Flat Highway	Sec 1 SO 308831	72678	3.4377	Evan Lance Kemp and Tracey Michelle Soffe
Dairy Flat Highway	Sec 6 SO 308591	65593	0.99	Papanui Station House Limited
Dairy Flat Highway	Lot 2 DP 480626	672037	0.5345	DP Boocock No 2 Trustee Ltd

A copy of the record of titles for the parcels forming the plan change area have been included in Appendix B of this report. The site is predominantly covered in grassed pasture with existing dwellings/buildings located on all the addresses listed in Table 1-1 except for 1738, Sec 6 SO 308591 and Lot 2 DP 480626 Dairy Flat Highway. The existing properties are accessed from either Dairy Flat Highway or Wilks Road.

There is an existing area of forest located in the centre north of the site which meets the criteria for identification as a Significant Ecological Area and is considered to be an area of significant indigenous vegetation. Therefore, it is proposed to retain this area and include a 10m buffer margin, zoning approximately 4,830m^2 as Special Ecological Area. The width of John Creek also indicates that a 20 m Esplanade Reserve setback may be triggered under the RMA when consents for

development of the site are sought. Refer to the Ecological Values Assessment prepared by RMA Ecology for further details.

The existing properties are accessed from either Dairy Flat Highway or Wilks Road.

The Plan Change Area comprises soft soils which are potentially subject to load induced settlements and unstable slopes. Careful remediation and management will be required to ensure stability across the site and that future lots can be created with any risk minimised.

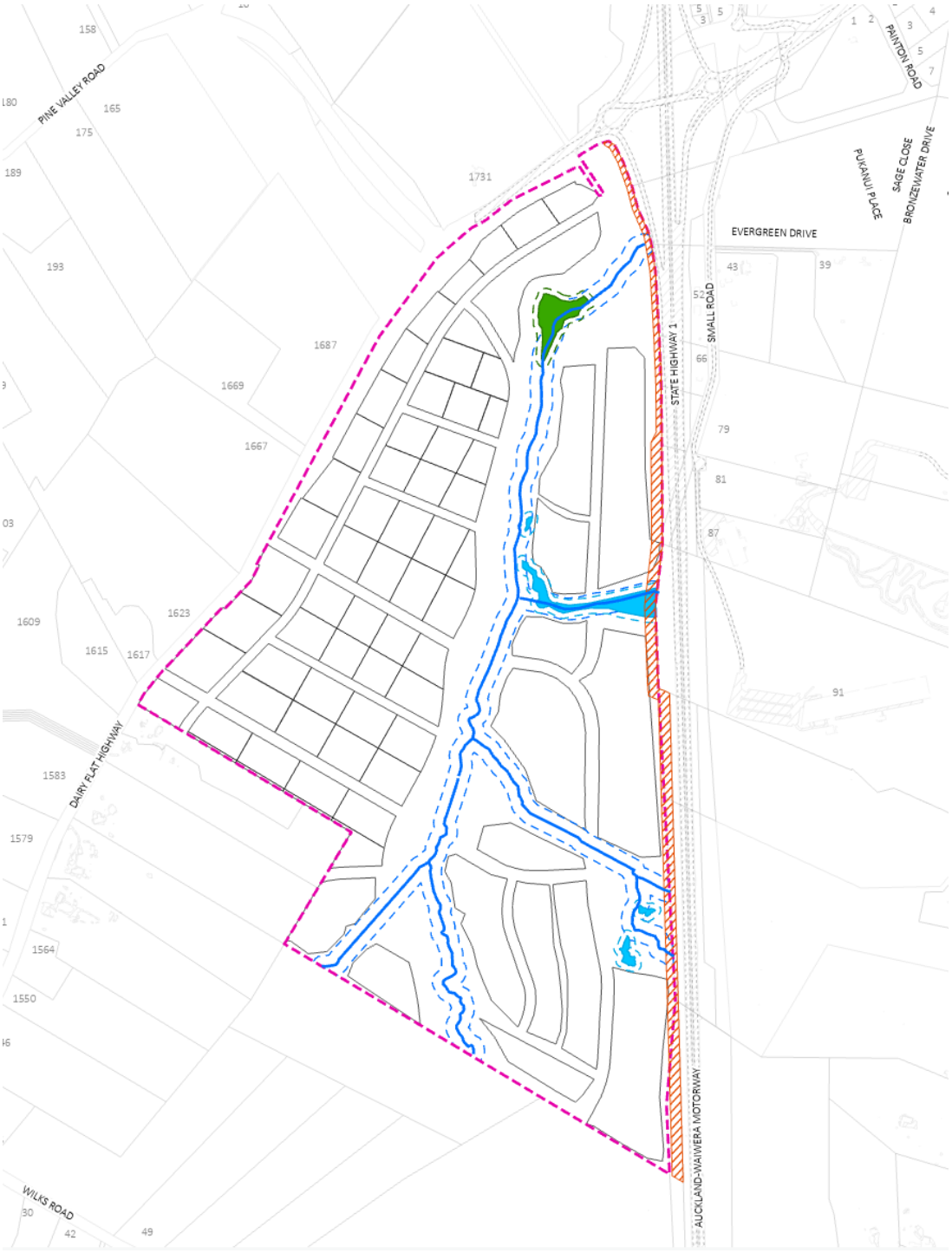

Figure 1: Proposed plan change extents

2. Proposed Development

The proposed Plan Change seeks to rezone a 107ha of land between State Highway 1 and Dairy Flat Highway from Future Urban zone to light industry zone. In addition to the industrial aspect, the plan change request identifies wetlands, streams and associated riparian areas along with the enhancement of the existing stream channel incorporated into the landscape design.

A concept development masterplan (refer to Figure 2 below) has been prepared by Barker & Associates with inputs from Fletchers, Fulton Hogan and the wider consultant team for the Private Plan Change application and is going through final specialist and client review. The full extent of the proposed Plan Change Area has been modelled in 3D to ensure compliant road grades are achievable across the development and ensure levels and grades for the proposed lots are feasible. The masterplan has undergone multiple revisions to ensure the future development of roading and lots are structured in an efficient manner and are feasible to construct. Refer to Appendix C – Concept Development Masterplan.

Figure 2: Concept development Masterplan

3. Earthworks

The proposed development of the plan change area will require bulk earthworks and recontouring across the site to improve contours in order to satisfy the design and layout requirements for the development. Bulk earthworks will be required for the construction of the proposed roading network and to provide suitable building platforms for the lots.

A geotechnical assessment report has been undertaken by CMW Geosciences in support of the proposed plan change. The geotechnical assessment reviewed the suitability of the site for development and details the sites geology and subsurface conditions. The report identified a number of geotechnical considerations and concluded that the site is considered to be geotechnically suitable for the extent of development enabled by the proposed plan change. Refer to Appendix A - Geotechnical Assessment Report.

A detailed geotechnical investigation should be carried out to further investigate hazards identified, and any recommendations stemming from this should be observed during all detailed design works.

Bulk earthworks will need to be undertaken in accordance with NZS 4404, and Auckland Council Standards. Regional and district Land Use Consents will need to be obtained from Auckland Council.

A concept Cut and Fill earthworks plan has been produced to give an idea of the likely earthworks extent and possible depths of cut and fill required. A 3D model was developed to analyse the proposed road network in addition to the building platforms. Some platforms that are adjacent to one another have height differentials which can be managed through retaining walls, similar to existing industrial areas (i.e. Highgate) while height differentials between platforms and open spaces is likely to be managed by using a combination of battered slopes and retaining walls. Refer to drawing series 30000.

All earthworks within the Plan Change Area will be supported by erosion and sediment control measures to ensure all adverse effects are mitigated. Proposed measures for erosion and sediment control will be designed in accordance with Auckland Council Guideline Document GD005 – Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region.

Based on the size of the development and likely volume of earthworks involved, the earthworks will need to be staged, with completed areas progressively stabilised throughout the earthworks phase. The general principals to be used during the earthworks phase will be detailed on erosion and sediment control plans to be prepared for any future resource consent application.

4. Road Network

In order to service the proposed development enabled by the plan change a new public road network will be required throughout the plan change area. A 3d model was developed to enable an understanding of the existing topography, and what works would be required to achieve acceptable roading gradients (maximum 8%) in addition to flat building platforms. Overall, it is considered that the proposed plan change area can be developed and serviced for light industry activities.

Using the current masterplan as an example, the road reserve widths will likely adopt the following widths as set out in the below table. Associated cross sections can be found in Appendix D.

Table 4-1: Summary table for Road Reserve widths

	Road Reserve Width	Carriageway Width
Local Road	16.0m	6.0m
Collector Road	21.0m	7.0m
Arterial Road (2 Lanes)	30.0m	7.0m
Arterial Road (Left turn)	32.0m	16.6m
Arterial Road (Right turn)	30.0m	16.4m

It is expected that the following existing road upgrades as detailed in Integrated Transport Assessment prepared by Stantec will be required when the next stages of development occur:

At the development of 80ha (gross area) within Silverdale west (and around 1,400 dwellings operational in Milldale North), circa 2033:

- Two signalised intersections connecting the PPC area to the external road network via Dairy Flat Highway;
- Signalisation of the Wilks Road / Dairy Flat Highway intersection;
- Signalisation of the Wilks Road / East Coast Road intersection;
- Provision of a slip lane on the western approach to the Silverdale interchange which connects to the northbound on-ramp;
- Upgrade of the Pine Valley Road / Dairy Flat Highway intersection to include a second right turn short bay from the east (turns into Pine Valley Road) (approximately 135m);
- Extending the length of the left turn slip lane on the southbound off-ramp at the Silverdale interchange to around 150m and introducing a ramp meter for the AM peak; and
- Upgrading the Argent Lane / Pine Valley Road roundabout to a roundabout with two circulating lanes.

For the full development of the PPC land (107ha gross area) at the 2038 future year (inclusive of 2,500 dwellings in Milldale North):

- Upgrading the northern access intersection to Silverdale West to allow a double right turn onto Dairy Flat Highway;
- Provision of an additional westbound lane on the Silverdale Overbridge and adding an extra westbound through lane on Dairy Flat Highway between the Silverdale interchange and Pine Valley Road;
- Further upgrade of the Pine Valley Road / Dairy Flat Highway intersection to include:
- An additional right turn bay on the northern approach (turning into Dairy Flat Highway); and
- Extending the left turn slip lane on the northern approach by approximately 45m
- Four-laning of Pine Valley Road between Dairy Flat Highway and Argent Lane;
- Four-laning of Argent Lane between Pine Valley Road and John Fair Drive;
- Upgrading the Argent Lane / John Fair Drive roundabout to a roundabout with two circulating lanes;
- Four laning of Argent Lane between John Fair Drive and Maryvale Road;
- Upgrading the Argent Lane / Maryvale Road roundabout to a signalised intersection;
- Upgrading the proposed Argent Lane / Wainui Road roundabout to a roundabout with two circulating lanes; and
- Providing an extra left turn lane (around 180m on the Millwater northbound off-ramp) and introducing a ramp meter for that off-ramp to control queuing on the ramp.

Footpath widths are likely to vary depending on the road typology, with a minimum 1.8m width expected in accordance with Auckland Transport TDM standards, with some roads including separated cycle paths. Underground services will generally be installed in the berms of the proposed roads and the carriageways will be utilised to convey the overland flow paths for 1% AEP storm event. On-street parking will also be provided with the inclusion of parking bays adjacent to the carriageway.

The geometric design of the proposed road network and upgrades to the existing network will be carried out in accordance with the Austroads Design Manual and the Auckland Transport TDM.

The speed environment for the new local roading design are intended to be 50km/h for both local and collector roads.

5. Stormwater

Existing

Council Geomaps indicates the site has no existing stormwater network.

Proposed connection to the site

Development will require a gravity stormwater system which will be designed in accordance with Auckland Council's Stormwater Code of Practice. The presence of John Creek through the centre of the subject site allows a number of stormwater outfalls to be constructed. Where possible the stormwater outlets shall be constructed in locations where they recharge the existing watercourses present on the site. Scour and erosion protection designed in accordance with Auckland Councils Technical Report: 2013/018 (TR2013/018) shall be suitable for use at the proposed stormwater outlets.

Flood Hazards

John Creek is a permanent stream running through the site with an average width of approximately 4m. As the width of this stream is greater than 3m, esplanade reserve requirements are triggered which in turn results in minimum setbacks of 20m each side with riparian planting margins.

All lot areas have been set back at least a minimum 20m from the stream edge, with most lots extending more than 30m and others more than 50m away from the stream edge in order to facilitate room for the existing natural wetland areas to the east, new artificially constructed wetland area to the west and formation of gentle earthworks batters and landscaping/greenway along the length of John Creek. A minimum of 20m each side of the permanent stream are proposed to be planted with riparian planting, with potential for other uses within the floodplain area for either future planting, landscaping, park, cycleways or additional yield.

The assessment of Flood effects included in the SMP advises that a flood plain will traverse through the subject site. The preliminary afflux results indicate the proposed development will not significantly affect water levels on downstream properties in the 1% AEP design event with the proposed drainage reserve and artificially constructed wetlands.

Please refer Appendix E - Tuflow Flooding Result for details on Flooding for this development.

Stormwater management

Please refer to Appendix F - Stormwater Management Plan for this development.

6. Wastewater Servicing

Existing wastewater network

The Plan Change area is currently not connected to the public wastewater network. However, it lies within the wastewater catchment of the Army Bay Wastewater Treatment Plant (WWTP). Watercare has identified that Army Bay WWTP is anticipated to reach capacity circa 2028, based on pro-rated uptake over the last 2-year cycle. Watercare has advised that Phase 1 of the planned capacity upgrades at the Army Bay WWTP are scheduled for completion in 2031.

It is understood that remaining capacity will be allocated on a first come basis.

Proposed network

The Silverdale West Private plan change area will require a new local wastewater pump station located at the lowest point in the catchment area (A) as shown in Figure 3. This station will ultimately discharge into the existing gravity manhole located at the intersection of Argent Lane and Maryvale Road (I), which then discharges into the Army Bay WWTP.

Additionally, it is noted that the Botanic wastewater pump station (proposed by others), servicing land to the east of SH1 will also discharge into the gravity manhole at the intersection of Argent Lane and Maryvale Road (I). While this requirement is separate from the upgrades needed for the plan change area, coordinating these projects could benefit all parties involved.

Watercare has identified that ultimately a transmission WWPS will be constructed at the low point on Pine Valley Road (E), to service the wider catchment, discharging to the gravity manhole at the intersection of Argent Lane and Maryvale Road (I). Watercare have indicated that this would be undertaken in conjunction with the Army Bay WWTP Phase 1 upgrade and be contracted (and funded) by Watercare as a transmission asset. There is an existing 560mm pipe installed from the traffic circle at the southern end of Argent Lane (F), over the Weiti Bridge, to the manhole located at the intersection of Argent Lane and Maryvale Road, is proposed be extended to the new Transmission WWPS site, as part of the same contract.

Once the transmission WWPS is constructed, the proposed WWPS for the plan change area will lift flows to a gravity manhole constructed within the Dairy Flat Highway Road reserve. This will then connect to the Transmission WWPS via a gravity pipe constructed within Dairy Flat Highway and Pine Valley Road.

Water Acumen has identified and discussed two interim options to service the plan change area ahead of the construction and commissioning of the new Transmission WWPS. These options are summarised below (refer Appendix G – Silverdale Commercial Wastewater servicing memorandum by Water Acumen for further detail):

- Option 1: Rising Main - A rising main constructed with a one-way air valve at the high point on Dairy Flat Highway (B) to ensure the line remains charged and does not drain down between pump cycles.

- Option 2: Inverted siphon - Rising main from the Pump Station (A) to the High Point on Dairy Flat Highway (B). Gravity pipelines that always run part full located along the downhill sections of Dairy Flat Highway and the section in Pine Valley Road above the level of the discharge point (B-C-D), with double acting air valves along the line / at the high point on the pipeline (B), with the subsequent section (D – I) designed as an inverted siphon. Provisional calculations have identified a twin pipe scenario for the inverted siphon – 250 and 400 diameter pipes – to allow self-cleansing / slime shear velocities to be achieved over the course of the developments within the available driving head of the network.

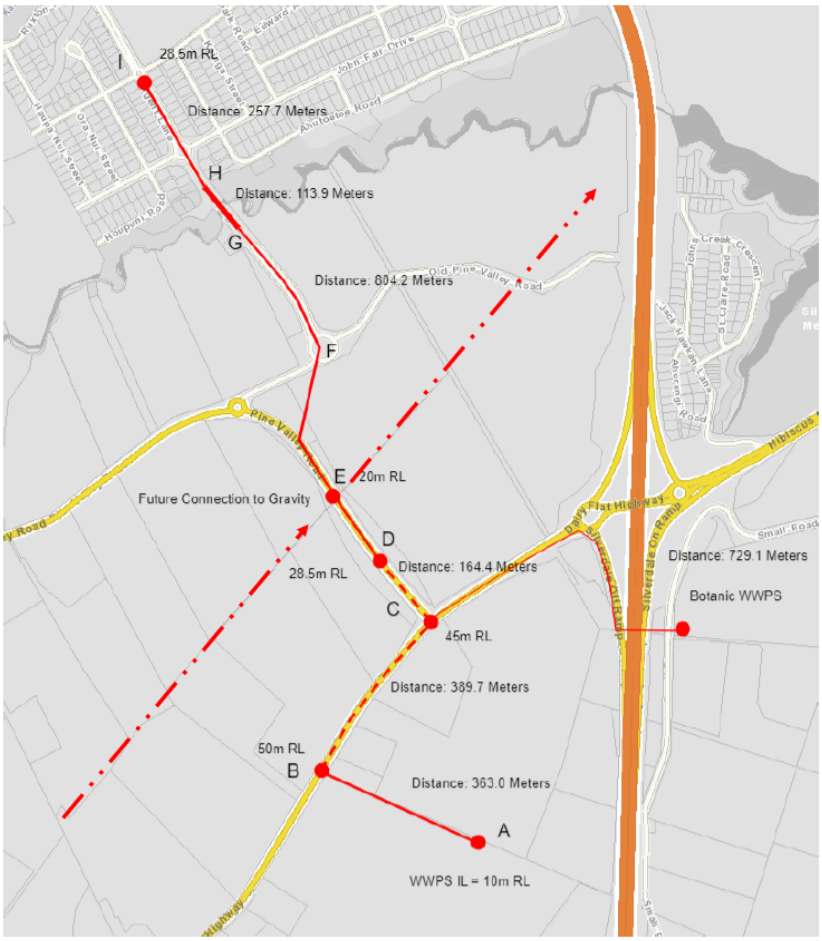

Figure 3: Wastewater concept plan from WW memorandum

(Dashed lines = gravity lines, Solid lines = rising mains/inverted siphons, Dash -dot -dot = future gravity lines)

Option 1 has not been recommended due to the risks associated with the operation of a single acting air valve and potential surge behaviour of the pipeline with the high point being over 20m higher than the discharge point.

Option 2 also allows the Botanic WWPS rising main to also discharge into the gravity manhole (C) at the intersection of Dairy Flat Highway and Pine Valley Road, increasing flows through the inverted siphon, minimising retention times and increasing flow velocity.

Under this option, the plan change area would connect to the gravity manhole (C) at the intersection of Dairy Flat Highway and Pine Valley Road via:

- Network wastewater pump station (with emergency storage),
- Twin (provisionally 200 and 280) rising mains from the WWPS to Dairy Flat Highway (B), routed via public roads,
- Gravity pipeline along Dairy Flat Highway (B to C)

The above options have only been developed to a concept design level to demonstrate that there are feasible options to service the plan change area and would need to be developed to detailed design level as part of an Engineering Plan Approval stage and approved by Watercare.

Proposed reticulation

The wastewater reticulation layout will be a gravity system designed in accordance with Watercare design standards as outlined in the Code of Practice. Collection systems will run along the upslope edge of floodplain and stream areas

collecting wastewater from the immediate development and also upstream catchments as shown in the Silverdale West high level Wastewater servicing plan in Figure 4 below. These systems will be directed to the Wastewater pump station location shown and kept out of the 1% AEP floodplain to avoid surcharge of the collection systems. Local collection will be provided in the form of a 150 – 375mm public networks in the roadways to collect Wastewater from development areas. The size of the public wastewater network for the site is anticipated to be 150mm to 375mm in diameter.

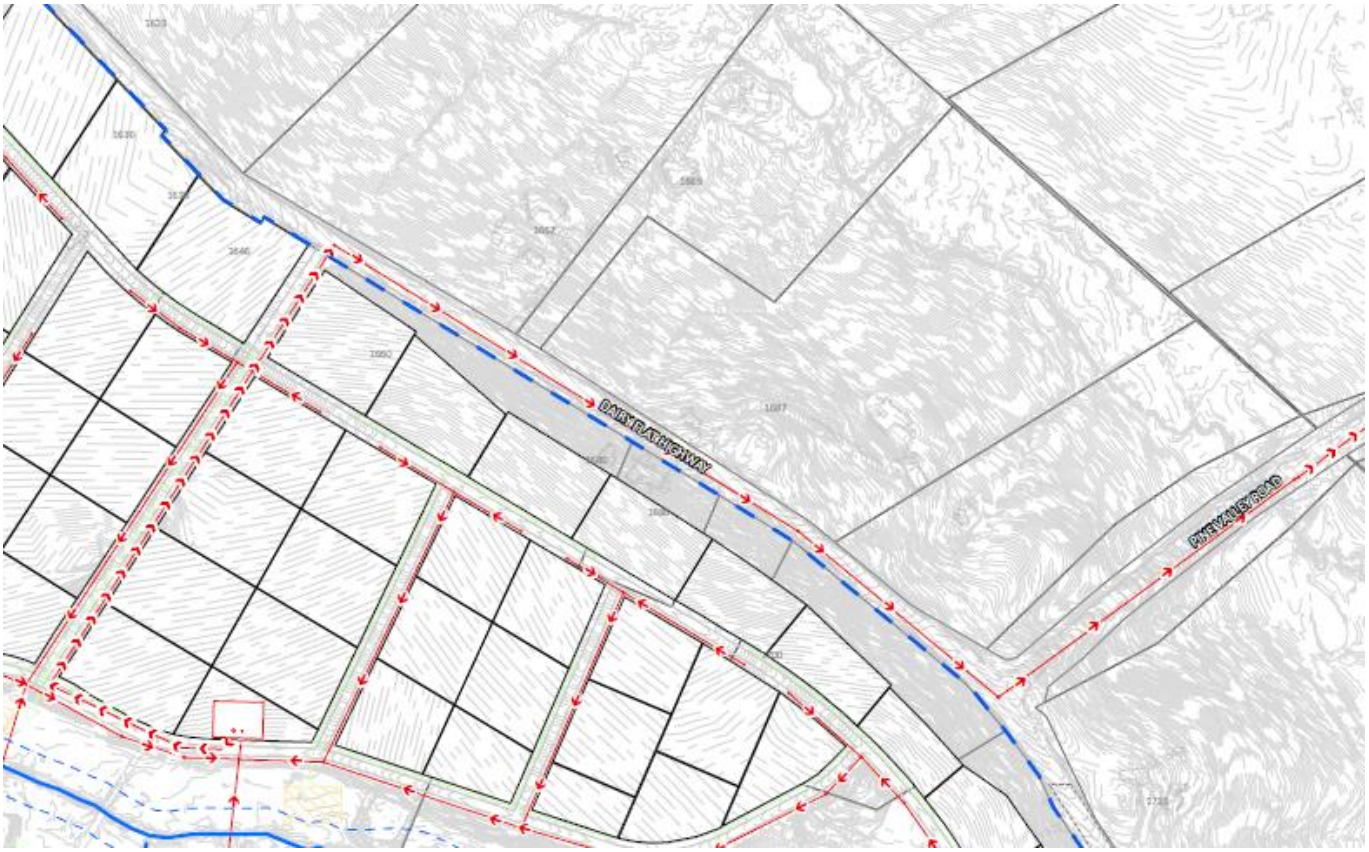

Figure 4: Proposed Wastewater alignment

The network design will seek to avoid additional pump stations and pipe bridges as far as practicable.

Army Bay Wastewater Treatment Plant capacity constraints

As noted above, Watercare has identified that the Army Bay WWTP is anticipated to reach capacity circa 2028, with Phase 1 of the planned capacity upgrades scheduled for completion in 2031.

While the Army Bay WWTP upgrades will provide sufficient capacity for the catchment from 2031, there is the potential need for an interim wastewater solution to support earlier development across the Plan Change area prior to the upgrades being operational. The Proposed Plan Change sets up a process whereby resource consent for a Non-complying Activity will need to be obtained for an alternative servicing approach where there is not sufficient capacity within the public network.

Alternative options are available to service the plan change area in the interim, including the option to tanker wastewater from the plan change area to Rosedale WWTP, or the consenting and construction of an interim on site MBR wastewater treatment plant and onsite disposal to land within the plan change area.

The MBR treatment plant would be owned and operated by the developer until capacity was available at Army Bay WWTP. At this time flows would be switched to feed Army Bay WWTP and the onsite MBR WWTP and disposal apparatus would be decommissioned and removed.

7. Water Supply

Existing reticulation

There is currently no reticulated water supply to the structure plan area.

Proposed connection to site

The current trunk water supply to the Hibiscus Coast area is via the Orewa 1 and Orewa 2 watermains which are both routed along East Coast Road from the Glenvar Reservoir on the North Shore. Improvements are currently being undertaken on the trunk mains in the northern region to provide for growth to the Wainui urban zoned land.

To service the plan change area, upgrades are required and include:

- A new booster pump station located on the Orewa 2 watermain (under construction)
- A new connection from the Orewa 2 watermain across to the Silverdale West Industrial area, and construction of part of the Orewa 3 trunk watermain within the structure plan area.

For long term development of the plan change area, the following upgrades are needed:

- A new Orewa 3 trunk watermain from Albany or Schnapper Rock reservoirs (south) which will pass through the Silverdale West Industrial area on its way north to Orewa and the Whangaparaoa Peninsula.
- New reservoir storage to supplement future localised growth and trunk operation.
- Abandonment of the existing Orewa 1 watermain.

A concept for future servicing of the Silverdale West Dairy Flat Industrial Area is summarised in Figure 5 below:

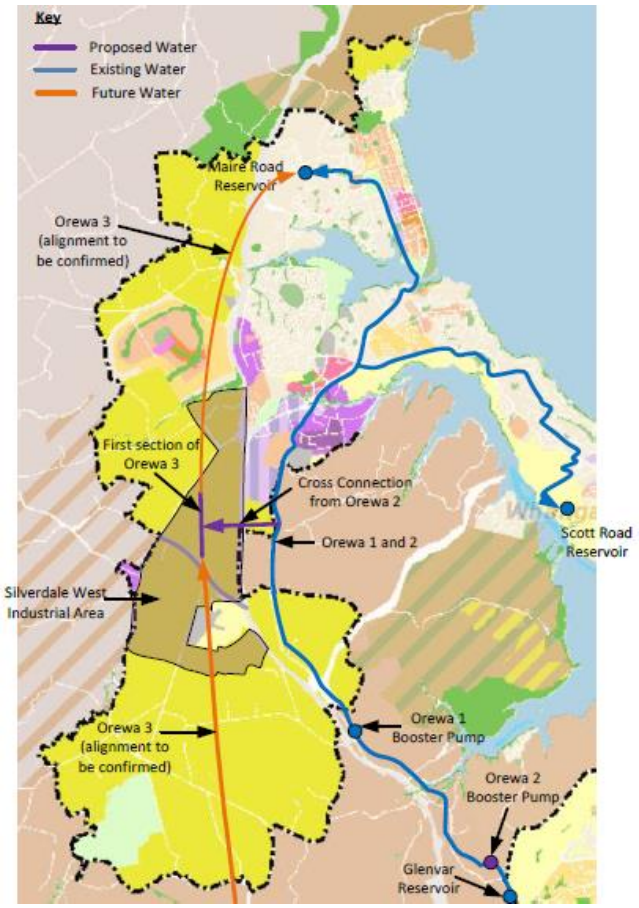

Figure 5: Future water supply servicing for the plan change area

Proposed reticulation

The internal site will be serviced via a combination of 150mm and 200mm Watermains internally. We have allowed for the Watermain along with various fittings, hydrants and valves to service the internal site. An additional section of Watermain has been allowed for along Dairy Flat Highway on the southern side of the road. It is expected that Water pressures to service the development will not be of concern due to the transmission watermains being proposed nearby. Refer to Figure 6 below, and drawing series 70000.

Based on the meeting with Watercare on 29/07/2020, a 300mm diameter is proposed to be extended through to service the structure plan area along with a 750mm diameter transmission watermain. Currently Watermains have been constructed from the Highgate bridge and through, past the Weiti Bridge towards the subject site. The connection across the Highgate bridge is proposed to be made later once construction of the bridge has been completed.

Watercare was once again approached to provide confirmation on servicing the proposed plan change area, however they are still yet to respond.

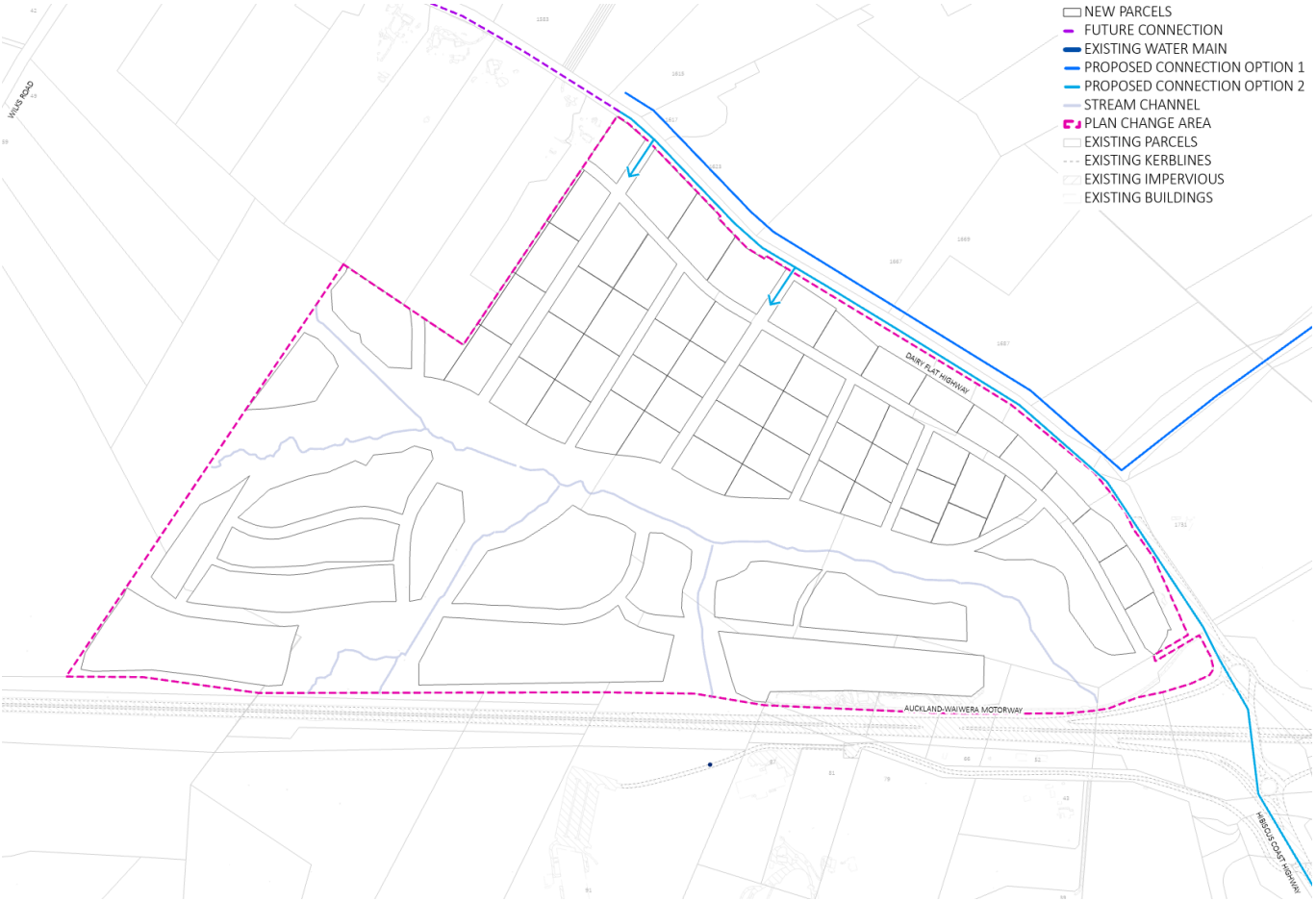

Figure 6: Water Supply connection options

8. Power, Telecom, and Gas Supply

8.1. Power and Gas

The existing 11kV overhead power lines along the southern side of Dairy Flat Highway is proposed to be undergrounded. Undergrounding costs may be able to be avoided as the overhead pole locations are currently across Dairy Flat Highway

on the other side of the road. We would require a surveyed as-built of these positions to confirm to what extent these may be affected by the widening and minor lowering of Dairy Flat Highway along with Constructability/ Health and Safety concerns through the Dairy Flat Highway upgrade process.

Vector confirmed that network connection points can be made available to serve this request, refer to Appendix H; however, a technical assessment is required to determine the number of connections that can be made available within the road reserve to serve this request will be necessary to determine the extent and nature of the work required. In addition, the connection of the lots to the electricity network will be further subject to compliance with the terms and conditions of the Electricity Network Provision and payment of a capital contribution towards the provision of the network connection points. This allows Vector to appropriately invest in its network to ensure quality and security of supply for existing and future consumers.

There are currently no provisions for gas in the area, and if required may be a costly exercise to extend gas to the subject site. Further design for both the Power and Gas could be undertaken by Vector if required for the standard design fee.

8.2. Telecom

Chorus were engaged early on in the due diligence process by Fletcher Development Limited to provide input for 1660 Dairy Flat Highway. During this time Chorus confirmed via email that there are existing fibre ducts in the area along Dairy Flat Highway which has sufficient capacity to service the development. Chorus was once again approached to provide confirmation on whether they would be able to service the proposed plan change area, however they are still yet to respond.

9. Conclusions

A 3D model of the proposed site area was developed to determine the suitability of the land between State Highway 1 and Dairy Flat Highway for Light Industry Zoning. Results show that roading, wastewater, stormwater and water supply servicing in accordance with the standards set out in the Auckland Council code of practices is possible, as summarised below:

- Water supply can be provided through the existing and proposed bulk water network.
- The downstream stormwater network has sufficient capacity for the development.
- Stormwater servicing can be provided via a public network extension.
- SMAF mitigation requirements for the site are met via retention tank and extended detention in artificially constructed wetlands.
- The 10% AEP design event can be safety conveyed through the site via a new public stormwater drainage network.
- The 1% AEP flood event can be safety conveyed through the site via the proposed 3D form of the site.
- The proposed plan change will not increase flood risk for surrounding properties.
- Wastewater servicing can be provided via proposed pump station and proposed public network. In the long term it is anticipated that the public wastewater network will have capacity to accommodate wastewater flows from development across the Plan Change area. While the Army Bay WWTP upgrades will provide sufficient capacity for the catchment from 2031, there is the potential need for an interim wastewater solution to support earlier development across the Plan Change area prior to the upgrades being operational. The Proposed Plan Change sets up a process whereby resource consent for a Non-complying Activity will need to be obtained for an alternative servicing approach where there is not sufficient capacity within the public network.
- Telecoms and Power Supply can be provided via new connections.

10. Limitations

- This assessment contains the professional opinion of Civix Limited Staff relating to this development. Civix Limited Staff used their professional judgement and acted in accordance with the standards of care and skill normally exercised by professional engineers providing similar services in similar circumstances. No other express or implied warranty is made as to the professional advice contained in this report.
- We have prepared this report in accordance with the brief provided and following our terms of engagement. The information contained in this report has been prepared by Civix Limited for the client and is exclusively for its client use and reliance. It is not possible to make an assessment of this report without understanding the terms of engagement under which it has been prepared, including the scope of the instructions and directions given to and the assumptions made by Civix Limited. The assessment will not address issues which would need to be considered for another party if that parties' particular circumstances, requirements and experience were known and, further, may make assumptions about matters of which a third party is not aware. No responsibility or liability to any third party is accepted for any loss or damage arising out of the use of or reliance on this assessment by any third party.
- The assessment is also based on information that has been provided to Civix Limited from other sources or by other parties. The assessment has been prepared strictly on the basis that the information that has been provided is accurate, completed, and adequate. To the extent that any information is inaccurate, incomplete or inadequate, Civix Limited takes no responsibility or liability whatsoever for any loss or damage that results from any design and assessment based on information that has been provided to Civix Limited.

APPENDIX A: Geotechnical Assessment

15 December 2022

SILVERDALE WEST

DAIRY FLAT HIGHWAY, SILVERDALE

GEOTECHNICAL ASSESSMENT REPORT

Fletcher Development Limited

AKL2022-0152AB Rev. 1

AKL2022-0152AB		
Date	**Revision**	**Comments**
18/10/2022	A	Initial draft for internal review
21/10/2022	0	Final issue to client
15/12/2022	1	Final issue to client

	Name	Signature	Position
Prepared by	Andrew Gordon		Project Engineering Geologist
Reviewed by	Chris Ritchie		Associate Engineering Geologist CMEngNZ, PEngGeol
Authorised by	Richard Knowles		Principal Geotechnical Engineer CMEngNZ, CPEng

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APPENDICES

1 INTRODUCTION

1.1 Project Brief

CMW Geosciences (CMW) was engaged by Fletcher Development Limited to carry out a geotechnical assessment and reporting for land located at Silverdale, referred to as Silverdale West. This report is to provide geotechnical input to support a Plan Change Application to urbanise current Future Urban zoned land.

1.2 Scope of Work

The scope of work and associated terms and conditions of our engagement were detailed in our services proposal letter referenced AKL2022-0152AA, Rev 0 dated 23 August 2022, and is defined as follows:

- Desktop analysis of the site, including review of available existing reports, historic aerial photographs, and published geology.
- Site walkover and geomorphological mapping.
- Provision of plans showing anticipated geology, geomorphology, and geotechnical hazard / constraint zones.
- A Geotechnical Assessment Report summarising the above, which will include any areas of historic filling identified and discuss potential constraints to future urban development.

2 SITE LOCATION AND LANDFORM

- The site comprises an area of approximately 128.6 hectares and is located immediately west of the Northern Motorway, bound to the northwest by Dairy Flat Highway, as shown on Figure 1.
- The current general landform is presented on the attached Site Plan ***(Appendix A)*** and in Figures 1 & 2.
- The subject area comprises 19 parcels of land.
- Current land use is predominantly pasture, with scattered trees and shelter belts. The northern portion of the site south of Dairy Flat Highway is more densely covered in scrub and trees. Stand-alone rural-residential dwellings are scattered across the western portion of the site, together with assorted farm buildings. Due to the historical farming land use, rubbish fills, offal pits and uncontrolled fills may exist. Where these were observed during our site walkover, they have been noted on the Geomorphology Plan (Figure 6).
- Topography of the site is dominated by an easterly to north-easterly trending ridge, along which lies Dairy Flat Highway. The ridgeline climbs from approximately 32mRL in the north-east, to approximately 70mRL in the south-west. The eastly flank of the ridgeline falls gently towards John Creek, meeting the alluvial terrace at approximately 25mRL, forming a gently sloping wide alluvial valley, with multiple east-west orientated tributaries extending below the Northern Motorway via culverts.
- Under the Auckland Council Unitary Plan, the land is currently zoned Future Urban.

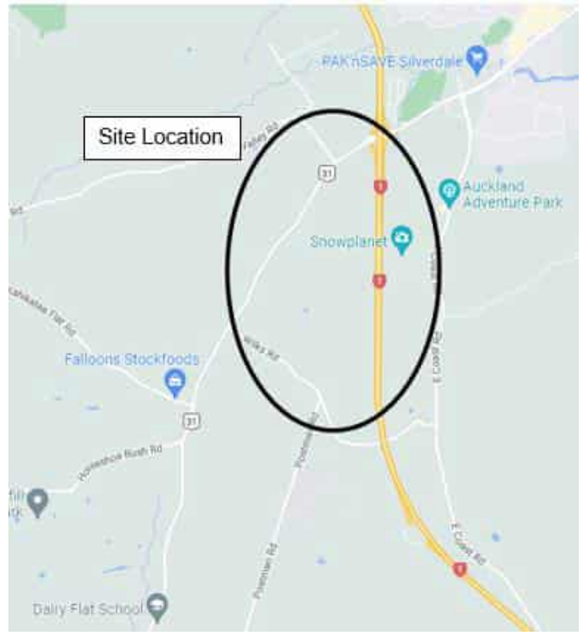


Figure 1: Site Location (Google Maps)

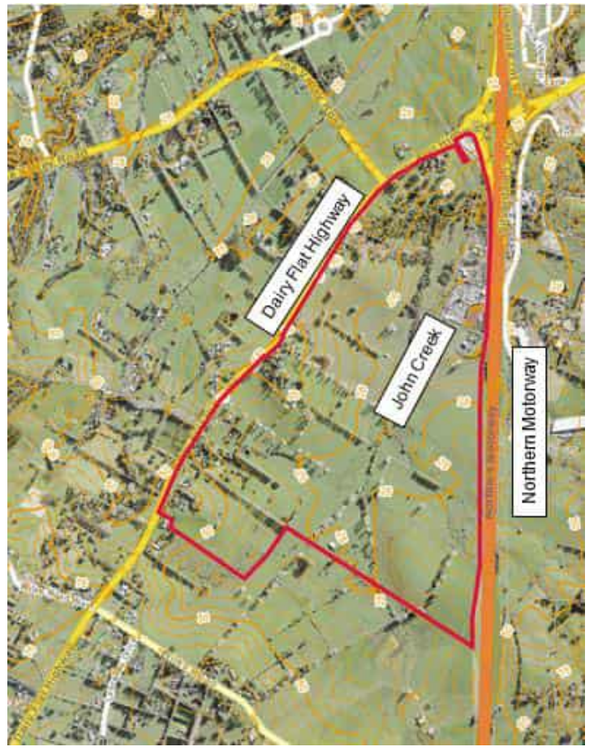


Figure 2: Landform (Auckland Council GeoMaps)

3 RELATED REPORTS REVIEWED

- Auckland Council Silverdale West Dairy Flat Business Area Structure Plan, Geotechnical Topic Report, December 2017.
- Auckland Council Silverdale West Dairy Flat Industrial Area Structure Plan, Geotechnical Topic Report, April 2020.
- CMW Geosciences 1660 Dairy Flat Highway, Dairy Flat, Geotechnical Investigation Report, Ref AKL2020-0122AB Rev.0, 31 July 2020.
- CMW Geosciences Silverdale West. Dairy Flat Highway, Silverdale, Geotechnical Comment on RTN Alignment Options, Ref AKL2020-0122AE Rev.0, 20 July 2021.
- CMW Geosciences Onion patch LOT 2 DP 480626, Dairy Flat Highway, Silverdale, Geotechnical Investigation Report, Ref AKL2019-0198AB Rev.0, 25 November 2019.

4 HISTORIC AERIAL PHOTOGRAPHS

Aerial Photographs from the Retrolens Website:

- S/N 143, North Auckland, Run 84, Photo 30, Scale 1:16000, 24/04/1940;
- S/N 1052, North Auckland, Run C, Photo 6, 7, 8 and 9, Scale 1:12700, 14/04/1958;
- S/N 1370, North Auckland, Run D, Photo 3, 4, Scale 1:16200, 12/09/1961;
- S/N 5783, North Auckland, Run G, Photo 17, Scale 1:25000, 29/03/1981.

Aerial Photographs from the Auckland Council GeoMaps

- Aerial Photography Set – 1999 Rodney
- Aerial Photography Set – 2003-2004
- Aerial Photography Set – 2010 and 2011
- Aerial Photography Set - 2017

Historic Aerial Photograph notes:

- Ad hoc placement of uncontrolled fill has been ongoing across the site from pre 1958 to the present day, filling appears to be concentrated within the northern section of the site, John Creek, farm ponds, farm races and ancillary structures Figures 3 - 6.
    - 1958: Minor filling east of John Creek
    - 1981: Cut and fill of platform at northern end of the site and infilling/realignment of farm drains
    - 1999: Construction of Northern Motorway, placement of fill within north-eastern corner of the site.
    - 2017: Development of industrial area in northern area of the site

Figure 3: 1958 (Retrolens)

Figure 5: 1999 (Auckland Council GeoMaps)

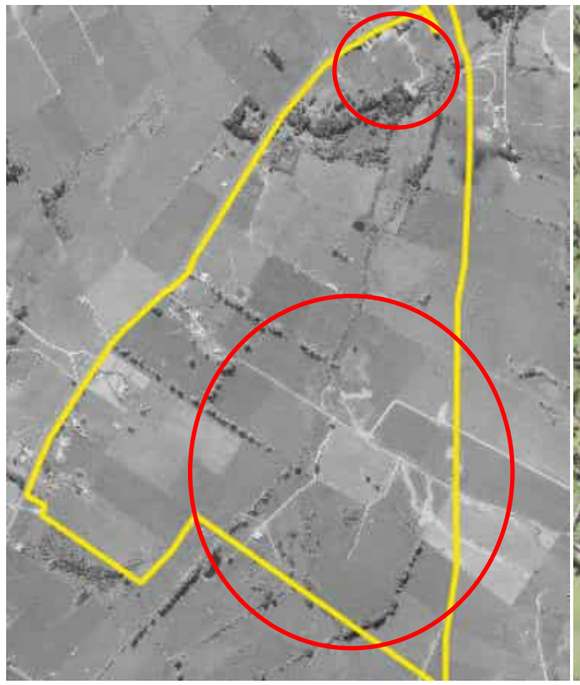


Figure 4: 1981 (Retrolens)

Figure 4: 2017 (Auckland Council GeoMaps)

5 GROUND MODEL

5.1 Geomorphology

- The geomorphology of the site was mapped by examination of aerial photography stereo pairs, and during a site walkover, and is shown in the Geomorphology Plan (Figure 7 and ***Appendix A***).
- The geomorphology reflects the underlying geology and associated slope processes. There are three distinct landforms which likely reflect different geological units.
- The Dairy Flat Highway ridgeline and elevated areas between John Creek and the Northern Motorway are characterised by gentle to moderate slopes with small scale slope instability in the form of creep. Mid-slope water seepages and swampy ground are common, indicating elevated (likely perched) groundwater conditions. These areas are expected to be underlain by Northland Allochthon units, predominantly Mangakahia Complex.
- The western slopes between John Creek and Dairy Flat Highway are typically characterised by gentle slopes, expected to be underlain by Mahurangi Limestone. Localised areas of steeper gradients in the northern corner– are likely underlain by Mangakahia Complex.
- The lower lying, gently sloping to flat areas contain drainage channels and tributary streams flowing to the John Creek. These gently sloping areas likely indicate the extent of the alluvium where it meets the underlying Northland Allochthon, often a line of seepages are observed along this boundary. Small rotational failures are common along the bank of watercourses and farm drains.
- Minor earthworks and fills have been carried out in the past across the site to form farm ponds, farm races, drainage channels and to level building platforms.

5.2 Geology

The geology of the subject area has been assessed from a combination of published geological maps and the topography, geomorphology, and previous geotechnical investigations. A Geology and Geomorphology plan is provided in ***Appendix A.***

A summary of the geohazards associated with each geology were identified through the Preliminary Natural Hazard Risk Assessment for this site attached as ***Appendix B,*** a summary can be found overleaf.

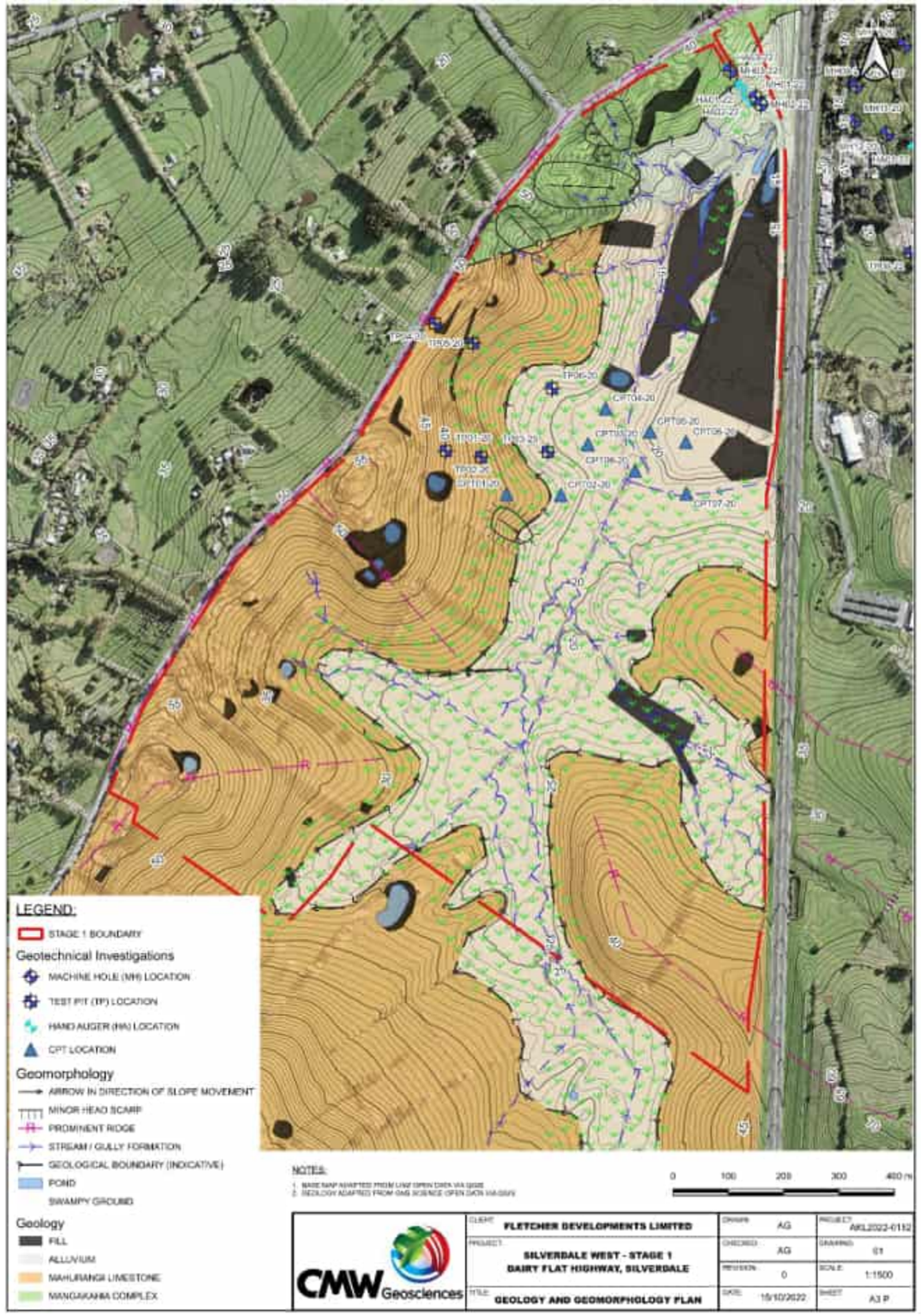


Figure 7: Geology and Geomorphology Plan

Geological Unit	Location	Description	Behaviour
Mahurangi Limestone (of the Northland Allochthon)	Published maps indicate this is the prominent geologic unit underlying the site, predominately found on the eastern side of the Dairy Flat Highway Ridge	Typically, blue grey to white, muddy limestone, with some serpentinite deposits, which forms gently rolling slopes, which weathered to low-permeability clay, typically several meters thick. A shattered rock zone is present at the weathering interface. Both the intact strength and degree of shattering of the rock mass are variable Groundwater levels are expected to be near the existing ground surface across most of the site, as indicated by the extensive covering of rushes over gentle to moderate slopes, with springs likely feeding the various ponds and ephemeral watercourses. Within zones of high elevations, close to ridgelines groundwater is anticipated to be encountered between 2m and 5m depth, generally above the soil-rock interface.	Typical failure mechanisms for this geology will generally comprise shallow translational sliding, even on gentle to moderate gradients, at transition to rock and within the upper profile of the rock mass and is most significantly impacted by either cutting on/below a slope. ***Landslip*** is the predominate geohazard in this geology.
Mangakahia Complex (of the Northland Allochthon)	Mapped within the northern corner of the site, extending along the north-facing slopes underlying Dairy Flat Highway.	Typically, highly fractured or even shattered and variably weathered, soft, red, brown, grey and green, commonly highly sheared, clay-rich mudstone with rare interbeds of glauconitic greensand and micaceous sandstone, which weathers to low shear-strength, high plasticity clays. Many small serpentinite bodies are enclosed within this unit. Groundwater seepages are common from mid-slope.	High plasticity clays are prone to debris sliding and deep-seated creep, even on gentle (<10°) slopes. Weathering generally extends to depths of about 10 metres, however there is seldom a significant improvement in rock strength at this depth and a transitional zone between soil and rock is rarely observed, unlike other units of the Northland Allochthon. ***Landslip*** is the predominant geohazard in this geology.
Tauranga Group Alluvium/ Colluvium	Mapped in low-lying areas around the John Creek.	Late Pleistocene-aged (14,000 to 1.8Ma), up to 20m thick unconsolidated to very soft yellow grey to orange-brown mud, sand and gravel, with local muddy peat and pumice silt beds Upper few metres are commonly weathered to very soft clays. Groundwater is typically shallow in this geological unit, regularly 1 metre below ground level or less.	Susceptible to soil creep and shallow flows on gentle slopes, particularly when saturated. Will usually subside if unsupported or overloaded. ***Subsidence*** (load induced settlement) is the predominant geohazard in this geology, however ***Landslip*** can also be expected in the vicinity of incised watercourses. ***Liquefaction*** is unlikely to be a hazard in this geology, despite its saturated state. Susceptibility analysis of a soil also considers its age and plasticity. Pleistocene aged alluvium has a very low to low risk of liquefaction and deposits in this area are typically plastic.

6 GEOHAZARDS ASSESSMENT & MITIGATION

- Commentary on the most significant hazards are listed overleaf. A preliminary risk assessment of these hazards is presented in ***Appendix B***.
- Three Geohazard Zones have been identified within the subject site. Zones 1 & 2 are defined by the approximate extents of the Northland Allochthon slope areas and Alluvial terrace areas respectively.
- Zone 3 encompasses the stream-edge areas where instability may occur. This is defined by an indicative horizontal offset from the stream of four times the height from the alluvial terrace to the stream invert.

The extents of these areas are shown in the appended Geohazard Zone Plan ***(Appendix A)***.

Geotechnical Hazard	Description	Area Affected	Comments and Geotechnical Control / Mitigation Measures
Water/Groundwater	Surface Water	Alluvial terrace (Geohazard Zone 2)	A significant number of watercourses, some ephemeral, some permanent, exist within the subject area. Many have been altered to form farm drains. For the purposes of this report, we have assumed that these can be filled, except for John Creek and its major tributaries. It can be assumed that any filling will have underfill drainage placed beneath it to allow the flow of water to continue and to prevent the build-up of groundwater pressures from developing beneath the fill.
	Shallow Groundwater	Entire Site	During the site walkover large areas of swampy ground and/or ponding were observed. Mitigated by the installation for subsoil drainage is expected to be required to control water within the natural soils, additionally groundwater take and diversion consents for areas of long-term construction and/or permanent water table lowering will be required. Given the elevation of Dairy Flat Highway, it is likely that the greatest cuts will be undertaken near this boundary. Whilst likely to be considered a restriction discretionary activity (AUP OP E7), the underlying Northland Allochthon soils have extremely low permeability. Experience from earthworks projects in the region are that groundwater drawdowns do not typically extend far beyond the excavation and effects on neighbouring properties from the effect of drawdown are minor. It is expected that this will be investigated with a groundwater monitoring regime carried out prior to any resource consent application along this boundary. Stormwater soakage to ground is typically not feasible.
Erosion	Cut Batters	Unknown (future cut areas)	Mitigated by designing for maximum 1V:5H gradient, or steeper with surface stabilisation / treatment included in design (such as shear keys by over excavation and replacement, soil nails, retaining walls).
	Fill Batters	Unknown (future fill areas)	Mitigated by designing for maximum 1V:3H gradient, stormwater control and/ or steeper with surface stabilisation / treatment in design (such as reinforced earth slopes / walls).
Landslip	Global Slope Instability	Elevated areas and slopes. (Geohazard Zones 1 and 3)	The primary geotechnical hazard in Northland Allochthon terrain is slope instability. Slope stability remedial works in this geology typically include undercutting of transition zone deposits and/ or keying fills into the less weathered rock mass, the installation of extensive networks of subsoil drainage, including underfill drains in mucked-out gully alignments, and placement of engineered fills. In addition, excavations that daylight the transition between soil and rock or expose the rock mass will require careful engineering to prevent surface water ingress that can lead to slope instability. The highly fractured rock mass where it is exposed at finished levels is susceptible to rapid weathering and infiltration of surface water that will compromise stability conditions. Remedial works incorporating over-excavation and capping with engineered filling can be expected. No water should be added to these deposits from external sources such as raingarden soakage. It is likely that a series of shear keys or inground walls will be required throughout the development to produce suitably graded lot platforms.
	Soil Creep	Elevated areas and slopes. (Geohazard Zones 1 and 3)	A function of slope gradient and the expansive nature of the materials, movement is typically along the soil/rock interface. Creep is limited to the sloped areas partially along ridge flanks. To be mitigated by design of slope gradients, including use of retaining walls, subsoil drainage and by design of footings.
	Bearing Capacity Failure	Alluvial terrace areas (Geohazard Zones 2 and 3)	A consideration for large buildings and rapid loading on alluvial soils. Will require specific design of foundations for highly loaded structures (i.e. ground improvement or piled foundations).
	Cut & Fill Batter Instability	Dairy Flat Ridgeline, future cut and fill areas	Mitigated by stormwater control and surface stabilisation, smart construction staging and temporary and permanent retaining.

Expansive Soils	Expansive Soils	Entire site	Expansive soils are classified in NZS 3604 as those soils having a liquid limit of more than 50% and linear shrinkage of more than 15%. Northland Allochthon residual overburden soils and clay alluvial soils are typically highly expansive. Mitigation of the expansive soil hazard is by foundation design at Building Consent stage and will be addressed on a lot-by-lot basis in the Geotechnical Completion Report(s) at the conclusion of the development works.
Subsidence	Soft Soils/ Load Induced Settlement	Alluvial terrace areas (Geohazard Zones 2 and 3)	In areas where fills and/ or significant building construction or storage loads are placed over soft deposits, allowance needs to be made for post-construction settlement of the fills and the underlying ground that could cause damage to structures. Consideration in the design needs to be given to the quantum of settlement that is likely to occur (i.e. ensuring it is insufficient to influence the cut/ fill volumes and balance during earthworks and/ or damage structures) and the time taken for the settlement to occur (i.e. ensuring it will be largely completed by the time a normal civil works programme would likely be commencing). The topography and existing information indicate that the paleo-channel alignment (and therefore the greatest alluvium depth) is located within the vicinity of current John Creek, and eastern tributary alignments. The most appropriate mitigation is to avoid the potential for highly loaded structures in these areas during Master Planning. Remedial options for accelerating settlements in areas of deep alluvium include preloading and installation of wick drains but based on our experience in the Milldale development to the north, pre-loading without wick drains is able to provide good results. Locations and heights of surcharge must be subject to geotechnical review to avoid causing bearing capacity failure in the underlying alluvium.
Existing Fill	Uncertified Fill	Entire Site	Localised zones of existing uncertified fill area have been identified across the site. Re-engineering of existing fill maybe required in some areas. Following environmental testing (by others) material reworking is considered appropriate.
Seismicity	Liquification	Entire Site	Liquefaction is a process where typically saturated, granular soils develop excess pore water pressures during cyclic (earthquake) loading that exceed the effective stress of the soil. Liquefaction potential will be largely dependent on material characteristics of the underlying soils. A region-wide liquefaction assessment has been undertaken by Auckland Council in accordance with MBIE document "*Planning and engineering guidance for potential liquefaction-prone land Resource Management Act and Building Act aspects*" (2017). The liquefaction potential for the Northland Allochthon slope (Geohazard Zone 1) has been assessed to be very low. The alluvial valley (Geohazard Zones 2 and 3) has been assessed to be unlikely.

7 CONCLUSION

Based on our hazard assessment, we consider that the land is suitable for creating stable building platforms and infrastructure, having acceptable levels of post-development residual risk from natural hazards. Consideration of the key geotechnical hazards for each zone should be incorporated into Master Planning. These include:

- Due to the presence of soft soils underlying Zones 2 and 3 (Alluvial Terraces) these areas are considered highly likely to be subject to load induced settlements. Therefore, will require ground improvement beneath building platforms and/or specific foundation design.
- Due to the unstable nature of the slopes within Zone 1 (Elevated Areas and Slopes) slope remediation will be required across these sections of the site, particularly beneath areas of large fills on the existing sloping areas. Shear keys and/or palisade walls will need to be considered following the confirmation of the proposed landform.

Development will require earthworks and drainage to provide adequate stability. This is achievable given appropriate design, and construction. Any proposed earthworks are to be undertaken in accordance with all relevant standards and documents. The engineering controls required to control existing, latent risks are commonplace works in this terrain that are consistent with those being adopted on adjacent land. Further site investigation and design will need to be undertaken to quantify the geotechnical controls prior to resource consent application and the commencement of any works.

8 CLOSURE

This report has been prepared for use by Fletcher Development Limited in relation to the Silverdale West project in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

Where a party other than Fletcher Development Limited seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party.

Additional important information regarding the use of your CMW report is provided in the '*Using your CMW Report*' document attached to this report.

REFERENCES

Edbrooke, S. W. (compiler) 2001: Geology of the Auckland area. Institute of Geological & Nuclear Sciences 1:250 000 geological map 3. 1 sheet +74 p. Lower Hutt, New Zealand. Institute of Geological & Nuclear Sciences.

Schofield, J. C. 1989: Sheets Q10 & R10 – Helensville and Whangaparaoa. Geological map of New Zealand 1:50 000. Map (2 sheets) and notes. Wellington, New Zealand. Department of Scientific and Industrial

USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

Your report's recommendations require confirmation during construction

Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site.

A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

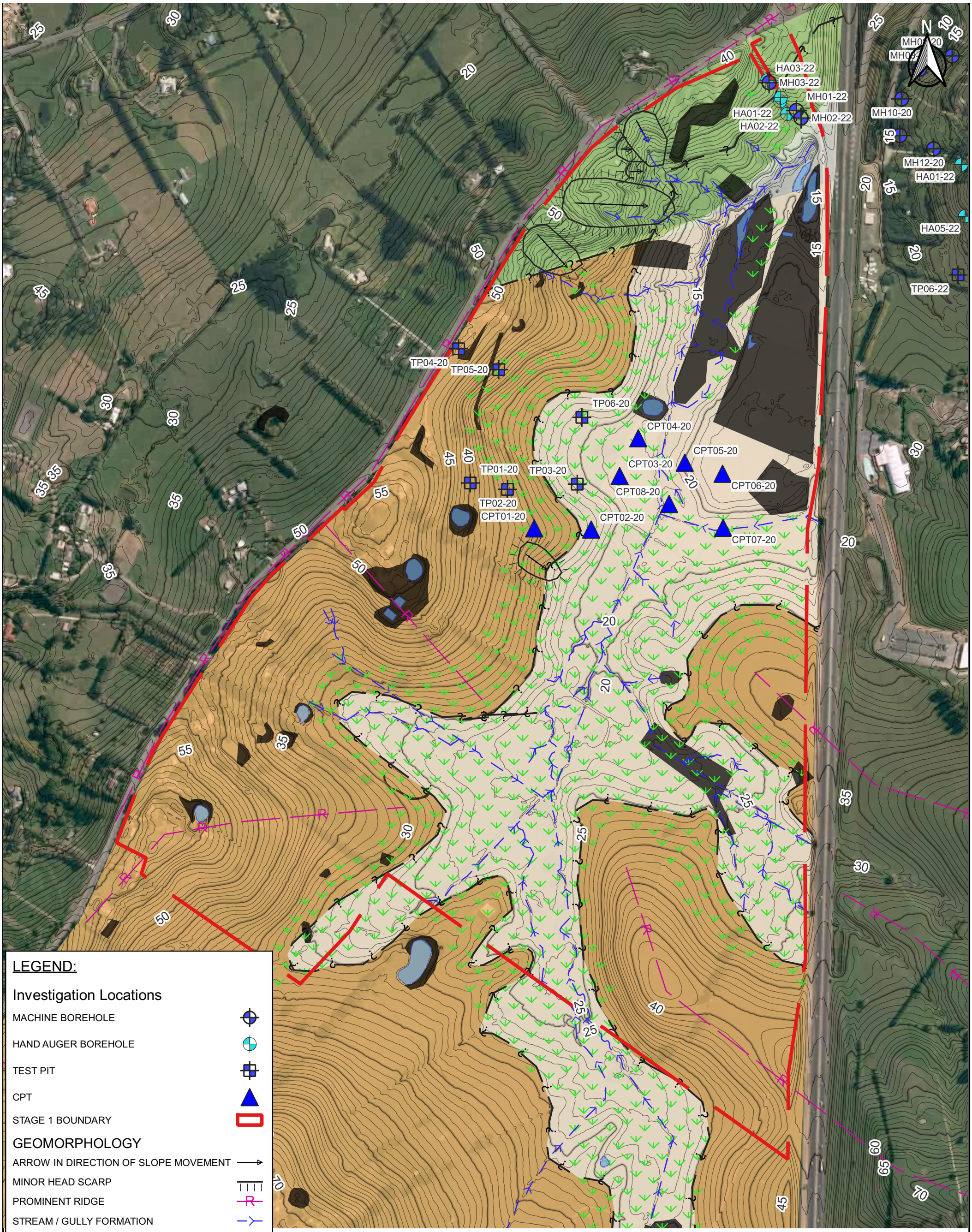
Environmental Matters Are Not Covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.

Appendix A: CMW DRAWINGS

Geology and Geomorphology Plan
Geohazard Zone Plan



LEGEND:

Investigation Locations

- MACHINE BOREHOLE
- HAND AUGER BOREHOLE
- TEST PIT
- CPT
- STAGE 1 BOUNDARY

GEOMORPHOLOGY

- ARROW IN DIRECTION OF SLOPE MOVEMENT
- MINOR HEAD SCARP
- PROMINENT RIDGE
- STREAM / GULLY FORMATION
- GEOLOGICAL BOUNDARY (INDICATIVE)
- POND
- SWAMPY GROUND

GEOLOGY

- FILL
- ALLUVIUM
- MAHURANGI LIMESTONE
- MANGAKAHIA COMPLEX

NOTES:

1. BASE MAP ADAPTED FROM LINZ OPEN DATA VIA QGIS
2. GEOLOGY ADAPTED FROM GNS SCIENCE OPEN DATA VIA QGIS

0 100 200 300 400 m

CMW Geosciences

CLIENT: FLETCHER DEVELOPMENTS LIMITED		DRAWN: AG	PROJECT: AKL2022-0152
PROJECT: SILVERDALE WEST - STAGE 1 DAIRY FLAT HIGHWAY, SILVERDALE		CHECKED: AG	DRAWING: 01
		REVISION: 0	SCALE: 1:6000
TITLE: GEOLOGY AND GEOMORPHOLOGY PLAN		DATE: 15/10/2022	SHEET: A3 P

LEGEND:

STAGE 1 BOUNDARY

GEOHAZARD ZONE

ZONE 1 - ELEVATED AREAS AND SLOPES

ZONE 2 - ALLUVIAL AREAS

ZONE 3 - STREAM EDGE AREAS

NOTES:

1. BASE MAP ADAPTED FROM LINZ OPEN DATA VIA QGIS
2. GEOLOGY ADAPTED FROM GNS SCIENCE OPEN DATA VIA QGIS

0 100 200 300 400 m

CMW Geosciences

CLIENT: FLETCHER DEVELOPMENTS LIMITED		DRAWN: AG	PROJECT: AKL2022-0152
PROJECT: SILVERDALE WEST - STAGE 1 DAIRY FLAT HIGHWAY, SILVERDALE		CHECKED: AG	DRAWING: 02
		REVISION: 0	SCALE: 1:6000
TITLE: GEOHAZARD ZONE PLAN		DATE: 15/10/2022	SHEET: A3 P

Appendix B: PRELIMINARY NATURAL HAZARDS RISK ASSESSMENT

PRELIMINARY NATURAL HAZARDS RISK ASSESSMENT FOR LAND SUBDIVISION

SILVERDALE WEST, DAIRY FLAT HIGHWAY, SILVERDALE

A. CONTEXT

Section 106 of the Resource Management Act (RMA) requires an assessment of the risk from natural hazards to be carried out when considering the granting of a subdivision consent. S106 RMA specifically states that the assessment must consider the combined effect of the natural hazard likelihood and material damage to land, other land or structures (consequence).

Section 2 of the RMA defines natural hazards as any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.

This appendix to CMW report reference AKL2022-0152AB Rev. 0 sets out the criteria for and presents the results of an assessment of the geotechnical-related natural hazards associated with this proposed subdivision development. The remaining hazards, i.e. tsunami, wind, drought, fire and flooding hazards are not covered by this assessment.

B. BASIS OF ASSESSMENT

For this project, this risk assessment has been carried out as a preliminary exercise to assist with identifying those natural hazards which may require addressing in any future development of the land. No development plans are available at the time of reporting, however bulk earthworks, which may include cutting of the Dairy Flat Road ridgeline and filling on the John Creek alluvial terrace to form large flat building platforms are envisaged. It is with reference to this type of development that the latent and residual risk ratings have been assessed.

B.1. Risk Classification

The occurrence of natural hazards and their potential impacts on the proposed subdivision development is assessed in terms of risk significance, which is based on likelihood and consequence factors. A risk table is used to help assess the likelihood and consequence factors, the form of which used by CMW for this project is presented in Table B1.

Table B1: Natural Hazard Risk Classification

Risk Matrix		Consequence				
		Insignificant 1	**Minor 2**	**Moderate 3**	**Major 4**	**Catastrophic 5**
Likelihood	**Almost Certain 5**	Medium 5	High 10	Very high 15	Extreme 20	Extreme 25
	Likely 4	Low 4	Medium 8	High 12	Very high 16	Extreme 20
	Moderate 3	Low 3	Medium 6	Medium 9	High 12	Very high 15
	Unlikely 2	Very low 2	Low 4	Medium 6	Medium 8	High 10
	Rare 1	Very low 1	Very low 2	Low 3	Low 4	Medium 5

B.2. Likelihood

With respect to assessing the likelihood or chance of the risk occurring, the qualitative definitions used by CMW for this project are provided in Table B2 for each likelihood classification.

Table B2: Qualitative Natural Hazard Likelihood Definitions		
1	Rare	The natural hazard is not expected to occur during the design life of the project
2	Unlikely	The natural hazard is unlikely, but may occur during the design life
3	Moderate	The natural hazard will probably occur at some time during the life of the project
4	Likely	The natural hazard is expected to occur during the design life of the project
5	Almost Certain	The natural hazard will almost definitely occur during the design life of the project

B.3. Consequence

In terms of determining the consequence or severity of the natural hazard occurring, the qualitative definitions used by CMW for this project are provided in Table B3 for each consequence classification.

Table B3: Qualitative Natural Hazard Consequence Definitions		
1	Insignificant	Very minor to no damage, not requiring any repair, no people at risk, no economic effect to landowners.
2	Minor	Minor damage to land only, any repairs can be considered normal property maintenance no people at risk, very minor economic effect.
3	Moderate	Some damage to land requiring repair to reinstate within few months, minor cosmetic damage to buildings being within relevant code tolerances, does not require immediate repair, no people at risk, minor economic effect.
4	Major	Significant damage to land requiring immediate repair, damage to buildings beyond serviceable limits requiring repair, no collapse of structures, perceptible effect to people, no risk to life, considerable economic effect.
5	Catastrophic	Major damage to land and buildings, possible structure collapse requiring replacement, risk to life, major economic effect, or possible site abandonment.

B.4. Risk Acceptance

It is recognised that the natural hazard risk assessment provided herein is qualitative and, due to the wide range of possible geohazards that could occur, is somewhat subjective. Other methods are available to quantitatively assess an acceptable level of geotechnical related natural hazard risk, such as defining an acceptable factor of safety with respect to slope stability or acceptable differential ground settlements with respect to recommended building code limits.

Therefore, to give this qualitative natural hazard risk assessment some relevance to more commonly adopted numerical or quantitative geotechnical assessment techniques, a residual risk rating of very low to medium (risk value = 1 to 9 inclusive) is considered an acceptable result for the proposed subdivision development.

A risk rating of high to extreme (risk value ≥ 10) is considered an unacceptable result for the proposed subdivision development.

C. RISK ASSESSMENT

The natural hazards relevant to this proposed subdivision development and adjacent, potentially affected land have been assessed with respect to the criteria outlined above.

Assessment is based on proposed post development ground conditions with and without any geotechnical controls. The latent risk was first assessed with the site in its proposed developed state to consider the risks to the development and surrounding land, including assessment of land modifications from the pre-existing natural state, without any implemented geotechnical controls. The specific geotechnical mitigation measures and engineering design solutions outlined in the table below and CMW report, where relevant, were then considered to determine the natural hazard residual risk remaining after the proposed controls have been implemented.

Results of this assessment are presented in Table C1 below.

Table C1: Natural Hazard Risk Assessment Results

RMA S2 Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Earthquake	Fault Rupture	1	5	Medium 5	No active faults known within close proximity	1	5	Medium 5
	Liquefaction Induced Flooding and/ or Subsidence	1	4	Low 4	Highly plastic Pleistocene aged clays and silts unlikely to liquefy.	1	4	Low 4
	Lateral Spread	1	4	Low 4	Highly plastic clays and silts unlikely to liquefy and therefore unlikely to spread laterally.	1	4	Low 4
Volcanic Activity	Ash & Pyroclastic Falls	1	5	Medium 5	Proximity to active volcanic activity.	1	5	Medium 5
	Lava flows & Lahars	1	5	Medium 5	Proximity to active volcanic activity.	1	5	Medium 5
Geothermal Activity	Formation of geysers, hot springs, fumaroles, mud pools	1	5	Medium 5	Proximity to geothermal activity.	1	5	Medium 5
Erosion	Cut Batters	5	2	High 10	Max 1:5 gradient in this geology.	2	2	Low 4

	Fill Batters	4	2	Medium 8	Stormwater control / benches / geotextiles / gradient / revegetation etc	2	2	Low 4
Landslip	Global Slope Instability	5	4	Extreme 20	Slope gradient / fill buttress / shear key / drainage etc	2	4	Medium 8
	Soil Creep	5	4	Extreme 20	Slope gradient / footing depth / drainage / retaining wall etc	2	4	Medium 8
	Bearing Capacity Failure	5	4	Extreme 20	Consideration for large buildings and rapid loading on alluvial soils. Pre-load and/ or pile foundations.	2	4	Medium 8
	Cut & Fill Batter Instability	4	4	Very high 16	Surface water controls, re-grading, temporary support geogrids & subsoil drainage	1	4	Low 4
Subsidence	Expansive Soils	5	4	Extreme 20	Foundation design	1	4	Low 4
	Sinkholes	2	3	Medium 8	Undercut if encountered. Groundwater control.	1	3	Low 3
	Soft Soils	5	4	Extreme 20	Pre-load, ground improvement & pile foundations	2	4	Medium 8
	Effects of Dewatering (uncontrolled subsidence)	1	4	Low 4	Low compressibility soils in elevated areas are unlikely to settle due to dewatering.	1	4	Low 4
Sedimentation	Not applicable							

Notes:

- Assessments include the impact of the proposed subdivision works on adjacent properties.
- The following reference(s) contain information on the hazards contained in this assessment and the non-geotechnical hazards that have not been included:
    - **Auckland**
      https://aucklandcouncil.maps.arcgis.com/apps/MapSeries/index.html?appid=81aa3de13b114be9b529018ee3c649c8

APPENDIX B: Records of Title

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **111842**

Land Registration District **North Auckland**

Date Issued 14 August 2003

Prior References

65587 NA38A/929

Estate Fee Simple

Area 2.7781 hectares more or less

Legal Description Part Allotment 210 Parish of Okura and Section 19 Survey Office Plan 308591

Registered Owners

DP BOOCOCK NO 2 TRUSTEE LIMITED

Interests

Subject to right of way, telecommunications, electricity & water supply easements over Section 19 SO 308591 created by Easement Instrument 5603637.1 - 29.5.2003 at 9:00 am

Subject to Section 120(9) Public Works Act 1981

Subject to a right of way, telecommunications, electricity and water supply over part Allotment 210 Okura Parish marked F on SO 308591 created by Easement Instrument 5692624.2 - 14.8.2003 at 9:00 am

Appurtenant hereto is a right of way, telecommunications, electricity and water supply created by Easement Instrument 5692624.2 - 14.8.2003 at 9:00 am

8632267.1 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 9.11.2010 at 7:00 am

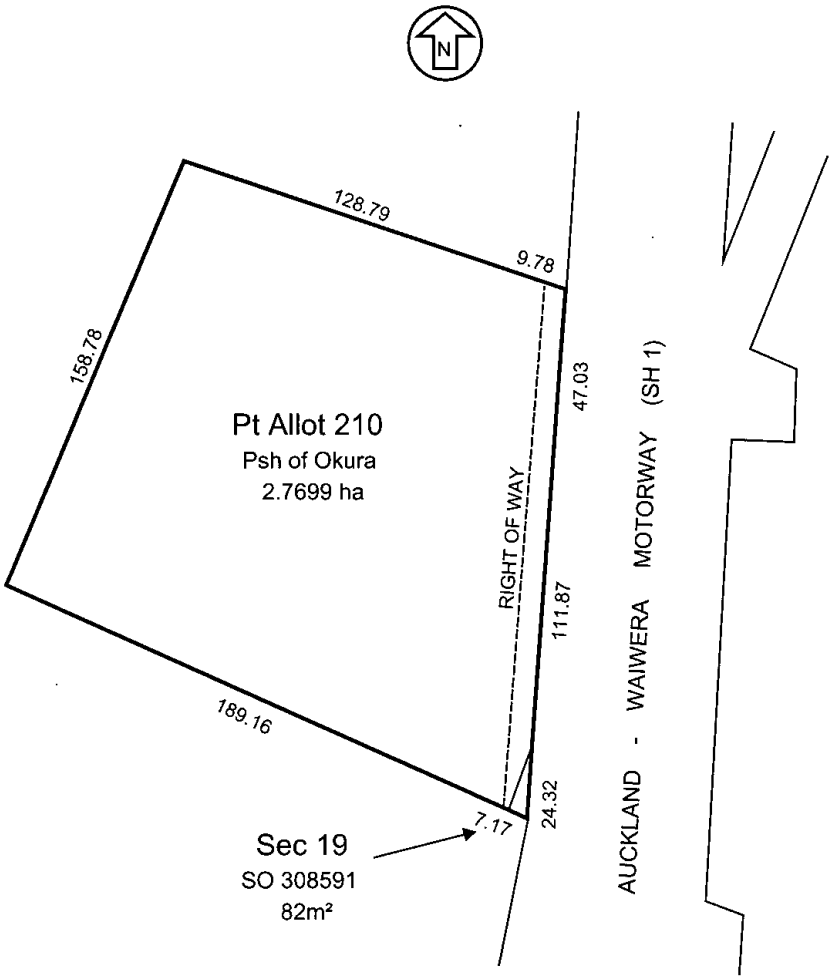
Title Diagram CT111842

Cpy – 01/01, Pgs – 001, 12/09/03, 15:34

DocID 311055640

CT 111842

N4148



TOTAL CT AREA: 2.7781 ha

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **527370**
Land Registration District **North Auckland**
Date Issued 18 August 2010

Prior References
417904

Estate	Fee Simple
Area	56.0419 hectares more or less
Legal Description	Lot 1 Deposited Plan 433431
Registered Owners	

Wilks Road 2014 Limited

Interests

Subject to a stormwater drainage right over part marked A on DP 433431 specified in Easement Certificate 986872.3 - 15.10.1981 at 10:31 am

Appurtenant hereto is a stormwater drainage right specified in Easement Certificate 986872.3 - 15.10.1981 at 10:31 am

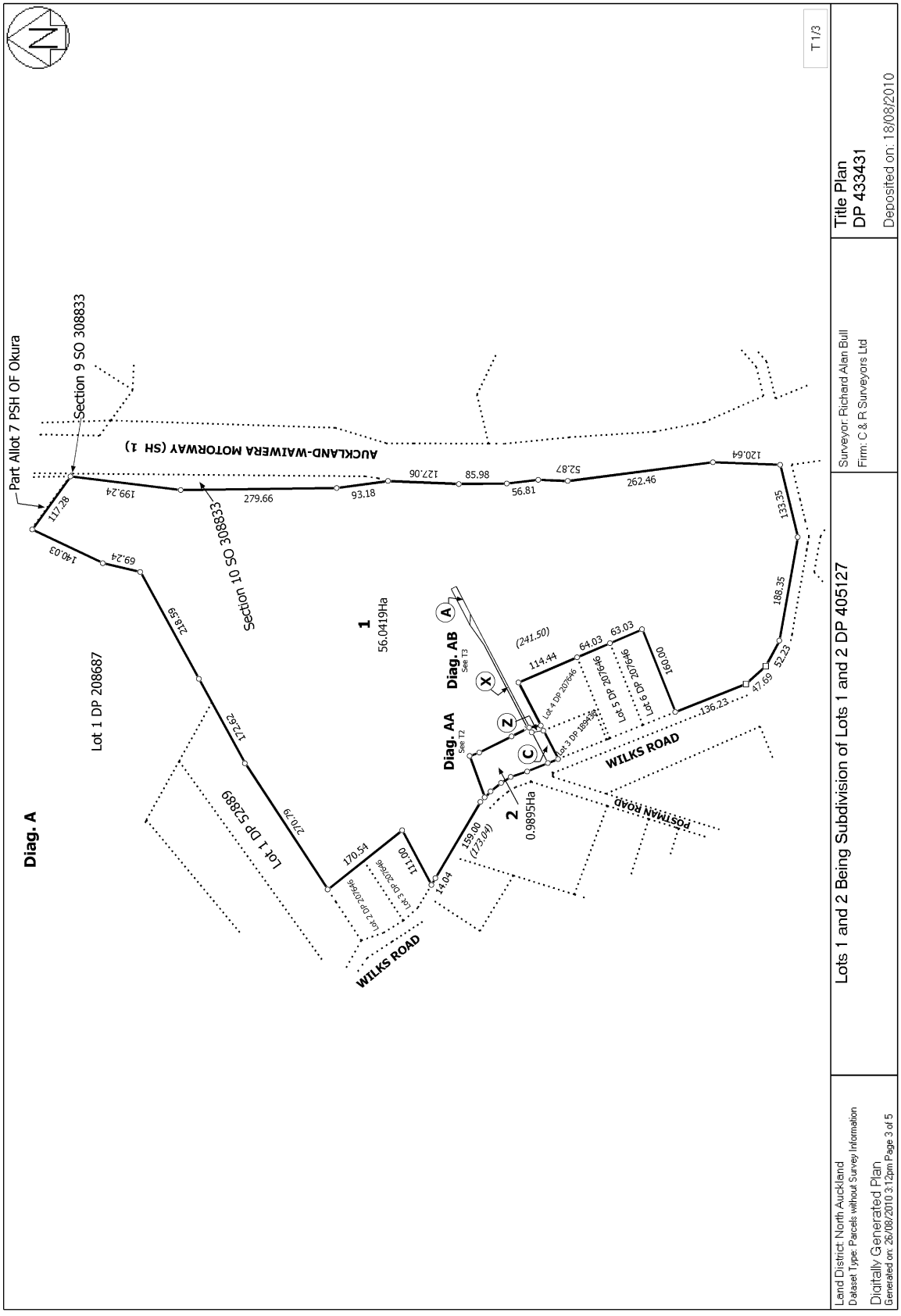
The easements specified in Easement Certificate 986872.3 are subject to Section 309 (1) (a) Local Government Act 1974

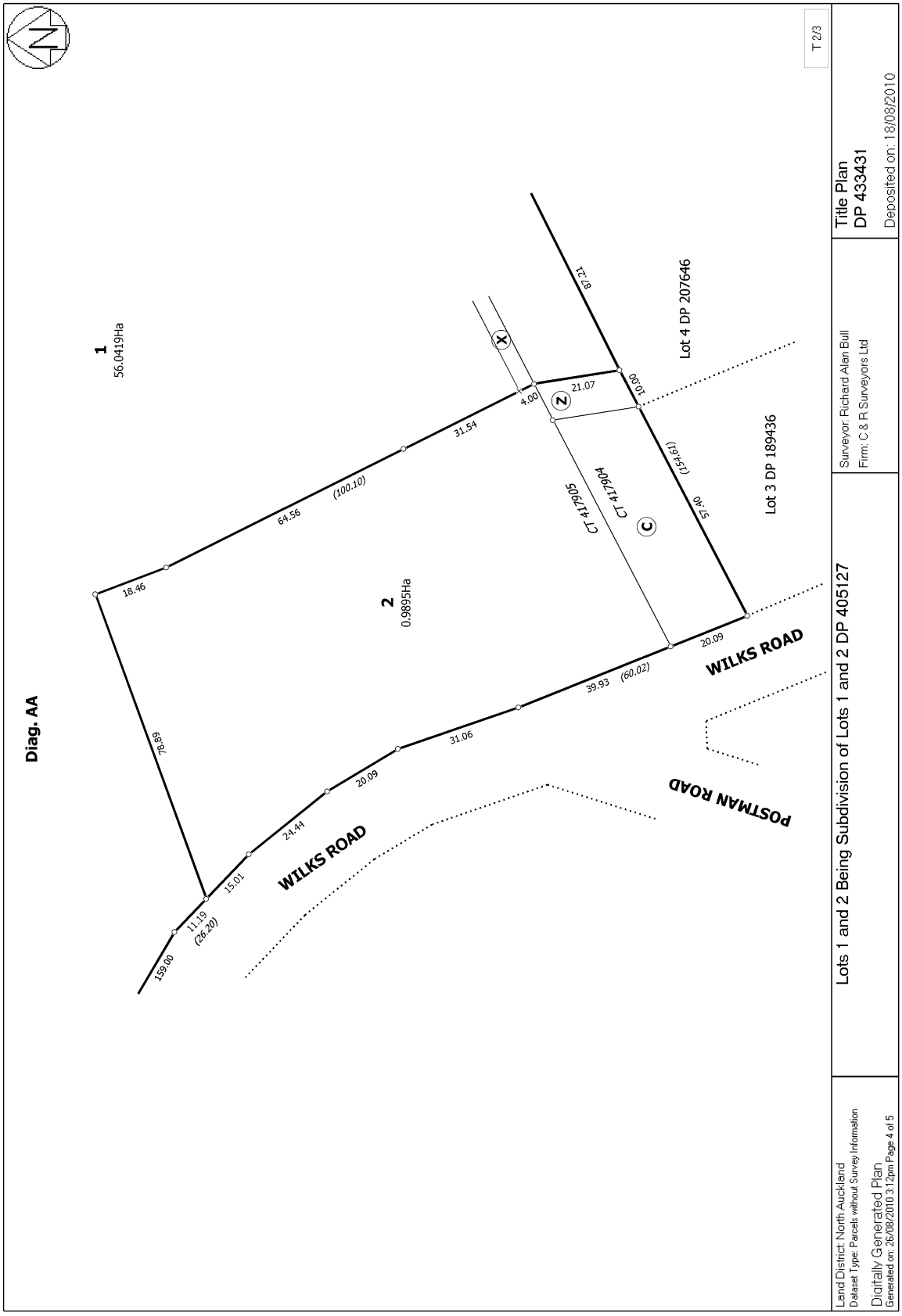
D198981.1 Compensation Certificate pursuant to Section 19 Public Works Act 1981 - 29.9.1997 at 10.38 am (Affects part formerly Lot 2 DP 94526)

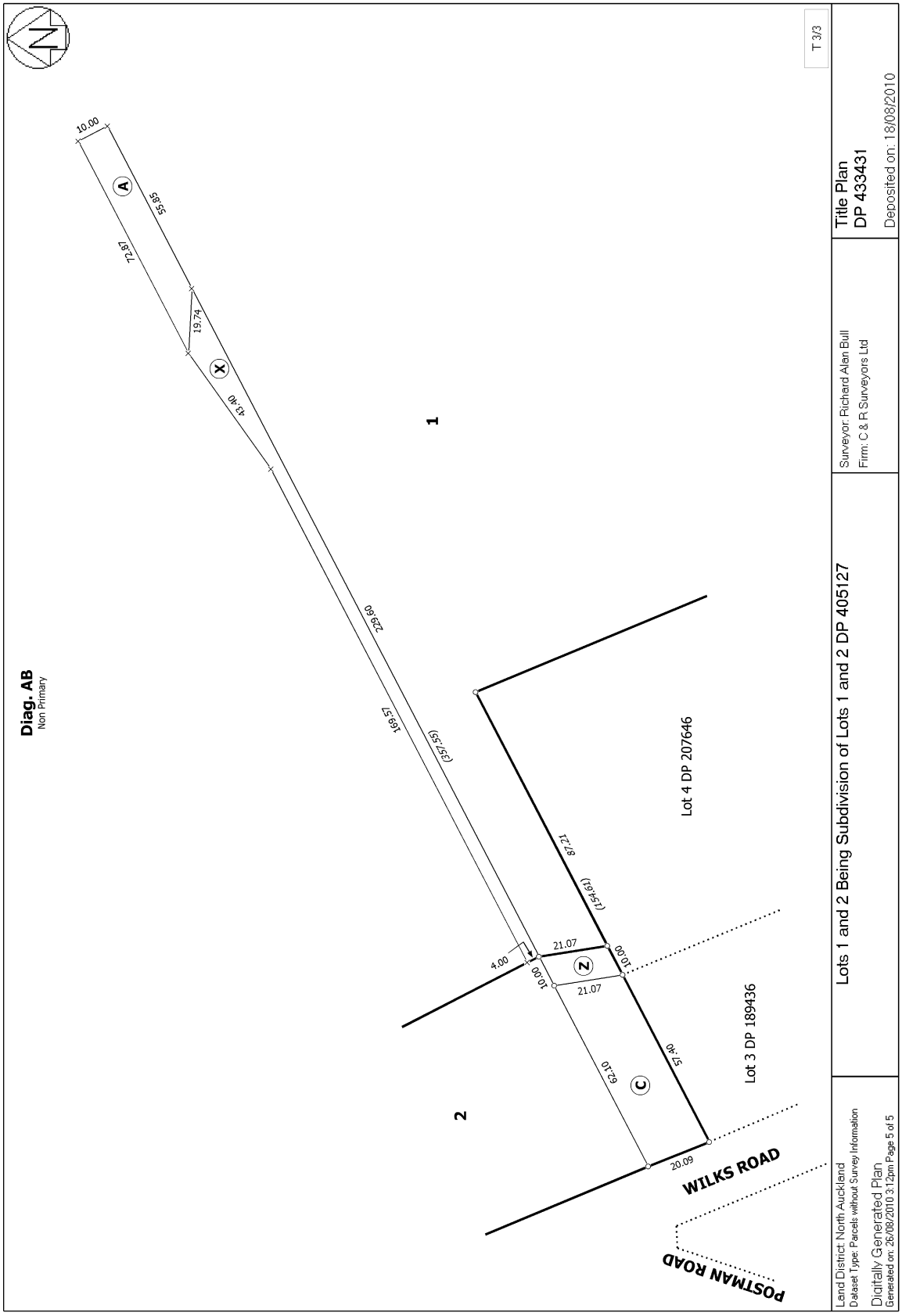
Subject to a right to stormwater drainage over part marked X on DP 433431 created by Easement Instrument 8493150.2 - 25.5.2010 at 12:05 pm

Appurtenant hereto is a right of way and right to drain water and sewage created by Easement Instrument 8555075.6 - 18.8.2010 at 1:50 pm

The easements created by Easement Instrument 8555075.6 are subject to Section 243 (a) Resource Management Act 1991


T 1/3
Part Allot 7 PSH OF Okura
Section 9 SO 308833
AUCKLAND-WAIWERA MOTORWAY (SH 1)
117.28
199.24
279.66
93.18
127.06
85.98
56.81
52.87
262.46
120.64
133.35
188.35
52.23
47.69
136.23
160.00
63.03
64.03
114.44
(241.50)
140.03
69.24
218.59
172.62
270.79
Section 10 SO 308833
Lot 1 DP 208687
Lot 1 DP 52889
1
56.0419Ha
2
0.9895Ha
Diag. A
Diag. AB
See T3
Diag. AA
See T2
A
X
Z
C
Lot 4 DP 207646
Lot 5 DP 207646
Lot 6 DP 207646
Lot 3 DP 189435
WILKS ROAD
POSTMAN ROAD
170.54
111.00
14.04
159.00
(173.04)
Lot 2 DP 207646
Lot 3 DP 207646
WILKS ROAD
Lots 1 and 2 Being Subdivision of Lots 1 and 2 DP 405127
Title Plan
DP 433431
Deposited on: 18/08/2010
Surveyor Richard Alan Bull
Firm: C & R Surveyors Ltd
Land District North Auckland
Dataset Type: Parcels without Survey Information
Digitally Generated Plan
Generated on: 26/08/2010 3:12pm Page 3 of 5


T 2/3
Diag. AA
1
56.0419Ha
2
0.9895Ha
Lot 4 DP 207646
Lot 3 DP 189436
CT 417905
CT 417904
WILKS ROAD
WILKS ROAD
POSTMAN ROAD
87.21
10.00
21.07
4.00
31.54
64.56
(100.10)
18.46
78.89
20.09
24.44
15.01
11.19
(26.20)
159.00
39.93
(60.02)
31.06
20.09
(154.61)
91.45
Lots 1 and 2 Being Subdivision of Lots 1 and 2 DP 405127
Surveyor Richard Alan Bull
Firm: C & R Surveyors Ltd
Title Plan
DP 433431
Deposited on: 18/08/2010
Land District North Auckland
Dataset Type: Parcels without Survey Information
Digitally Generated Plan
Generated on: 26/08/2010 3:12pm Page 4 of 5


T 3/3
Diag. AB
Non Primary
10.00
A
55.85
72.87
19.74
X
43.40
229.60
169.57
(55.55)
1
2
Lot 4 DP 207646
87.21
(154.61)
21.07
10.00
4.00
10.00
N
21.07
62.10
C
54.40
Lot 3 DP 189436
20.09
WILKS ROAD
POSTMAN ROAD
Lots 1 and 2 Being Subdivision of Lots 1 and 2 DP 405127
Surveyor: Richard Alan Bull
Firm: C & R Surveyors Ltd
Title Plan
DP 433431
Deposited on: 18/08/2010
Land District: North Auckland
Dataset Type: Parcels without Survey Information
Digitally Generated Plan
Generated on: 26/08/2010 3:12pm Page 5 of 5

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **672036**

Land Registration District **North Auckland**

Date Issued 24 November 2014

Prior References
65594 65612

Estate Fee Simple

Area 5481 square metres more or less

Legal Description Lot 1 Deposited Plan 480626

Registered Owners
Mammoth Ventures Limited

Interests

5412894.6 Gazette Notice (NZ Gazette, 14/11/2002, No 166, p 4193) declaring the within land to be subject to the restrictions described in paragraph B of the aforementioned gazette notice - 25.11.2002 at 9:00 am (affects part formerly contained in Section 3 SO 308591)

5412894.7 Gazette Notice (NZ Gazette, 14/11/2002, No 166, p 4193) declaring the within land to be subject to the restrictions described in paragraph B of the aforementioned gazette notice - 25.11.2002 at 9:00 am (affects part formerly contained in Section 1 SO 308591)

Subject to right of way, telecommunications, electricity & water supply easements over part marked X on DP 480626 created by Easement Instrument 5603637.1 - 29.5.2003 at 9:00 am

Appurtenant to part formerly contained in Section 3 SO 308591 are right of way, telecommunications, electricity & water supply easements created by Easement Instrument 5603637.1 - 29.5.2003 at 9:00 am

Subject to a right of way, telecommunications, electricity and water supply over part marked X on DP 480626 created by Easement Instrument 5692624.2 - 14.8.2003 at 9:00 am

5900441.1 Certificate that a building consent has been issued in respect of a building on the land that is described in Section 36(2) Building Act 1991 - 16.2.2004 at 9:00 am (affects part formerly contained in Section 3 SO 308591)

Subject to Part IVA Conservation Act 1987

Subject to Section 11 Crown Minerals Act 1991

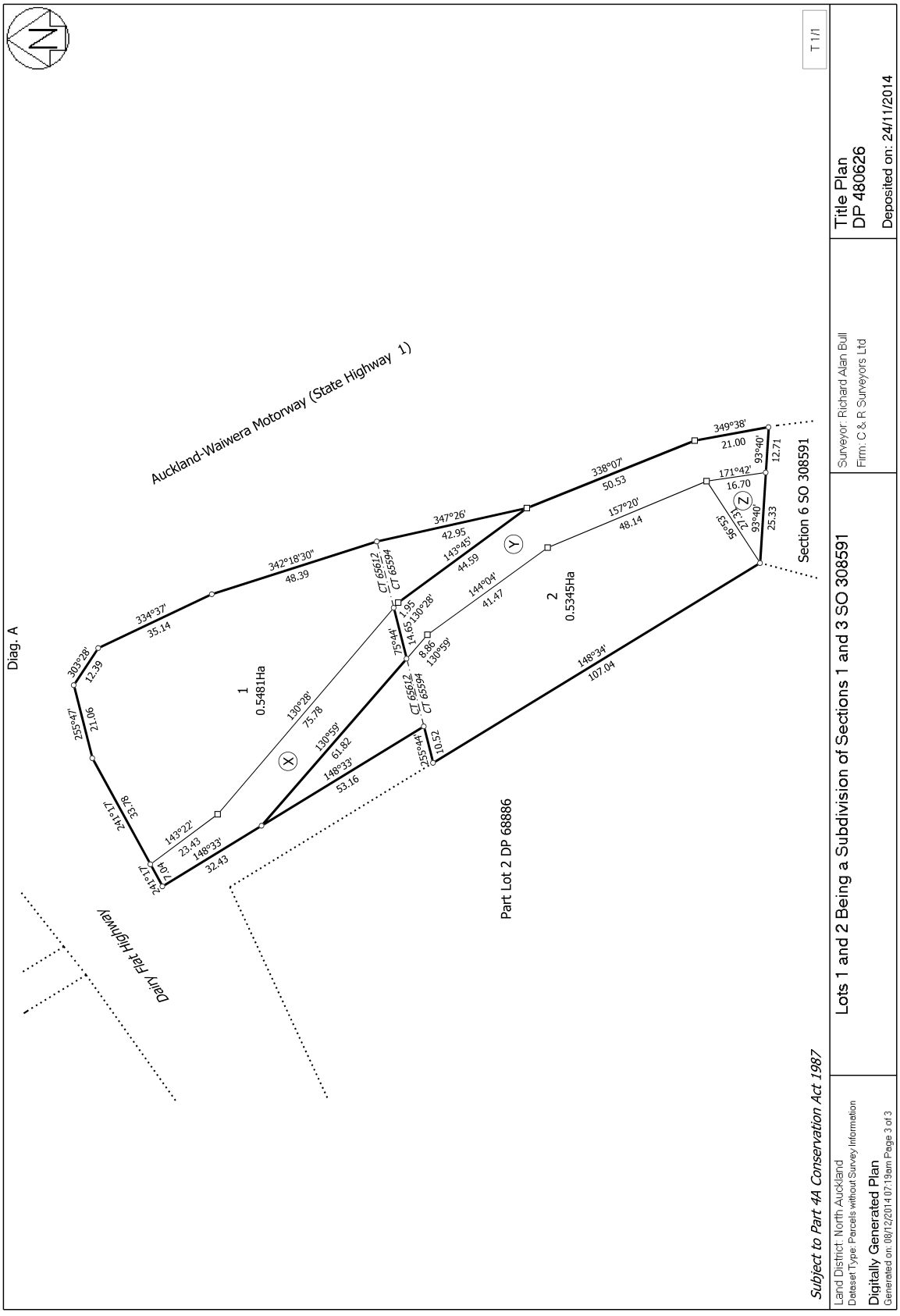
Subject to a right of way easement (in gross) over part marked X on DP 480626 in favour of Her Majesty the Queen created by Transfer 6083974.1 - 19.7.2004 at 9:00 am

8632267.1 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 9.11.2010 at 7:00 am

Subject to a right of way, right to convey water, gas, electricity, telecommunications and computer media over part marked X on DP 480626 created by Easement Instrument 9888834.4 - 24.11.2014 at 3:40 pm

The easements created by Easement Instrument 9888834.4 are subject to Section 243 (a) Resource Management Act 1991

12147754.2 Compensation Certificate pursuant to Section 19 Public Works Act 1981 by Auckland Council - 8.6.2021 at 3:54 pm


Auckland-Waiwera Motorway (State Highway 1)
Diag. A
Part Lot 2 DP 68886
Section 6 SO 308591
Dairy Flat Highway
1
0.5481Ha
2
0.5345Ha
CT 65612
CT 65594
303°28'
12.39
334°37'
35.14
342°18'30"
48.39
347°26'
42.95
143°45'
44.59
338°07'
50.53
349°38'
21.00
93°40'
12.71
171°42'
16.70
93°40'
25.33
157°20'
48.14
144°04'
41.47
130°28'
75.78
130°59'
61.82
148°33'
53.16
255°44'
10.52
148°34'
107.04
75°44'
14.65
130°28'
1.95
130°59'
8.86
255°47'
21.06
241°17'
33.78
143°22'
23.43
148°33'
32.43
241°17'
7.04
Subject to Part 4A Conservation Act 1987
T 1/1
Lots 1 and 2 Being a Subdivision of Sections 1 and 3 SO 308591
Surveyor: Richard Alan Bull
Firm: C & R Surveyors Ltd
Title Plan
DP 480626
Deposited on: 24/11/2014
Land District: North Auckland
Dataset Type: Parcels without Survey Information
Digitally Generated Plan
Generated on: 08/12/2014 07:19am Page 3 of 3

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **672037**

Land Registration District **North Auckland**

Date Issued 24 November 2014

Prior References
65594 65612

Estate Fee Simple

Area 5345 square metres more or less

Legal Description Lot 2 Deposited Plan 480626

Registered Owners
DP BOOCOCK NO 2 TRUSTEE LIMITED

Interests

5412894.6 Gazette Notice (NZ Gazette, 14/11/2002, No 166, p 4193) declaring the within land to be subject to the restrictions described in paragraph B of the aforementioned gazette notice - 25.11.2002 at 9:00 am (affects part formerly contained in Section 3 SO 308591)

5412894.7 Gazette Notice (NZ Gazette, 14/11/2002, No 166, p 4193) declaring the within land to be subject to the restrictions described in paragraph B of the aforementioned gazette notice - 25.11.2002 at 9:00 am (affects part formerly contained in Section 1 SO 308591)

Subject to right of way, telecommunications, electricity & water supply easements over part marked Y on DP 480626 created by Easement Instrument 5603637.1 - 29.5.2003 at 9:00 am

Appurtenant to part formerly contained in Section 3 SO 308591 are right of way, telecommunications, electricity & water supply easements created by Easement Instrument 5603637.1 - 29.5.2003 at 9:00 am

Subject to a right of way, telecommunications, electricity and water supply over part marked Y on DP 480626 created by Easement Instrument 5692624.2 - 14.8.2003 at 9:00 am

Subject to Part IVA Conservation Act 1987

Subject to Section 11 Crown Minerals Act 1991

Subject to a right (in gross) to a stormwater easement over part marked Z on DP 480626 in favour of Her Majesty the Queen created by Transfer 5869264.1 - 20.1.2004 at 9:00 am

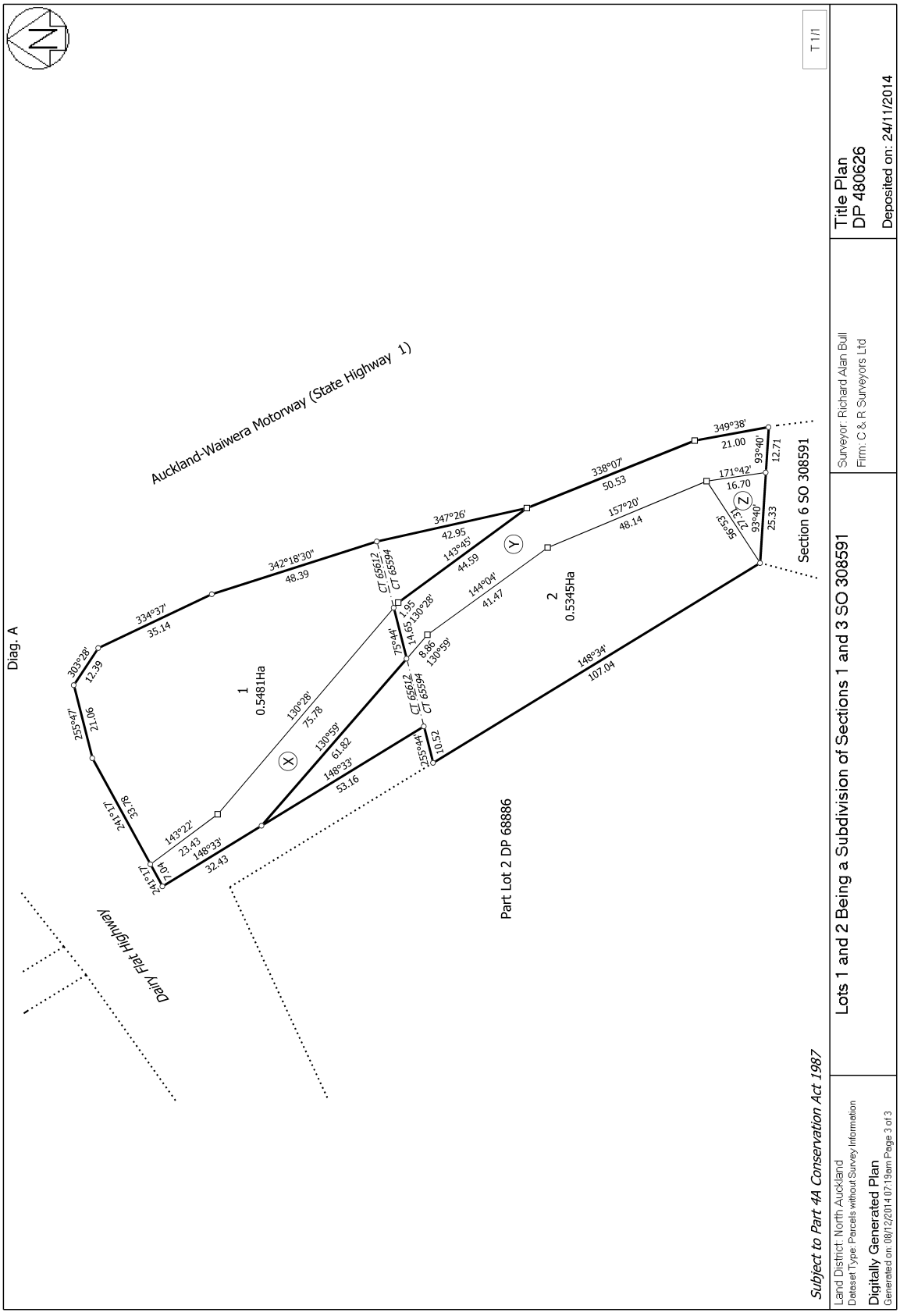
5900441.1 Certificate that a building consent has been issued in respect of a building on the land that is described in Section 36(2) Building Act 1991 - 16.2.2004 at 9:00 am (affects part formerly contained in Section 3 SO 308591)

8632267.1 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 9.11.2010 at 7:00 am

Appurtenant hereto is a right of way, right to convey water, gas, electricity, telecommunications and computer media created by Easement Instrument 9888834.4 - 24.11.2014 at 3:40 pm

The easements created by Easement Instrument 9888834.4 are subject to Section 243 (a) Resource Management Act 1991

12213484.2 Compensation Certificate pursuant to Section 19 Public Works Act 1981 by Auckland Council - 9.8.2021 at 2:26 pm


Auckland-Waiwera Motorway (State Highway 1)
Diag. A
Part Lot 2 DP 68886
Section 6 SO 308591
Dairy Flat Highway
1
0.5481Ha
2
0.5345Ha
CT 65612
CT 65594
303°28'
12.39
334°37'
35.14
342°18'30"
48.39
347°26'
42.95
338°07'
50.53
349°38'
21.00
93°40'
12.71
171°42'
16.70
93°40'
25.33
157°20'
48.14
143°45'
44.59
144°04'
41.47
130°28'
75.78
130°59'
61.82
148°33'
53.16
255°44'
10.52
148°34'
107.04
75°44'
14.65
130°28'
1.95
130°59'
8.86
255°47'
21.06
241°17'
33.78
143°22'
23.43
148°33'
32.43
241°17'
7.04
T 1/1
Subject to Part 4A Conservation Act 1987
Lots 1 and 2 Being a Subdivision of Sections 1 and 3 SO 308591
Surveyor: Richard Alan Bull
Firm: C & R Surveyors Ltd
Title Plan
DP 480626
Deposited on: 24/11/2014
Land District: North Auckland
Dataset Type: Parcels without Survey Information
Digitally Generated Plan
Generated on: 08/12/2014 07:19am Page 3 of 3

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier	**NA3C/1498**
Land Registration District	**North Auckland**
Date Issued	14 May 1964

Prior References
NA642/226

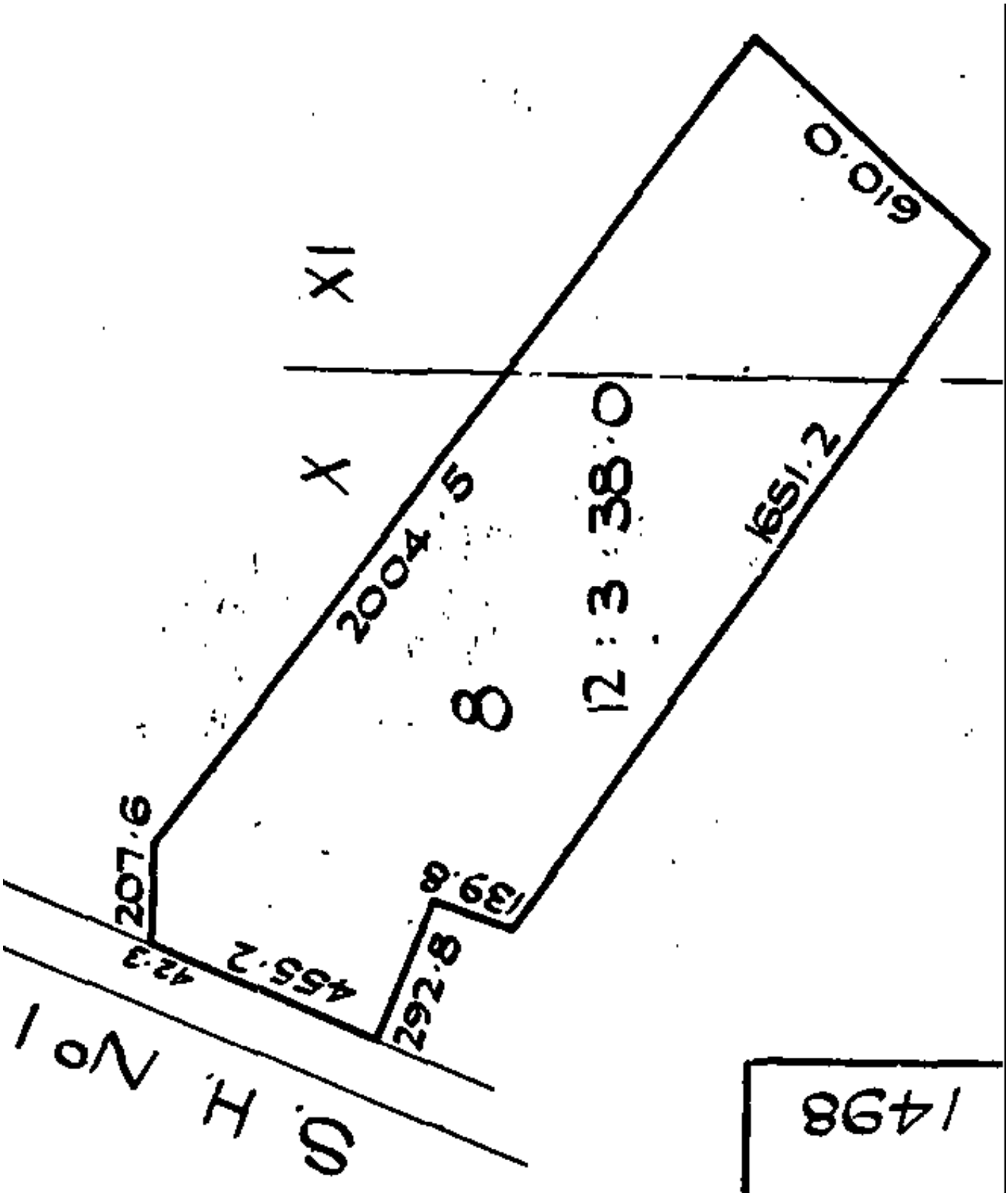
Estate	Fee Simple
Area	5.2559 hectares more or less
Legal Description	Lot 8 Deposited Plan 52889
Registered Owners	

HY North Limited

Interests

548033.1 Gazette Notice declaring the adjoining State Highway No 1 (Awanui-Bluff) to be a limited access road - 18.10.1977 at 2.59 pm

8507197.3 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am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XI
X
2004.5
12:3:38.0
1651.2
8
207.6
139.8
42.3
455.2
292.8
S.H. No 1
1498

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **NA4A/1497**
Land Registration District **North Auckland**
Date Issued 30 July 1964

Prior References
NA642/226

Estate Fee Simple
Area 4.9878 hectares more or less
Legal Description Lot 9 Deposited Plan 52889
Registered Owners
Printemps View Trustee Limited

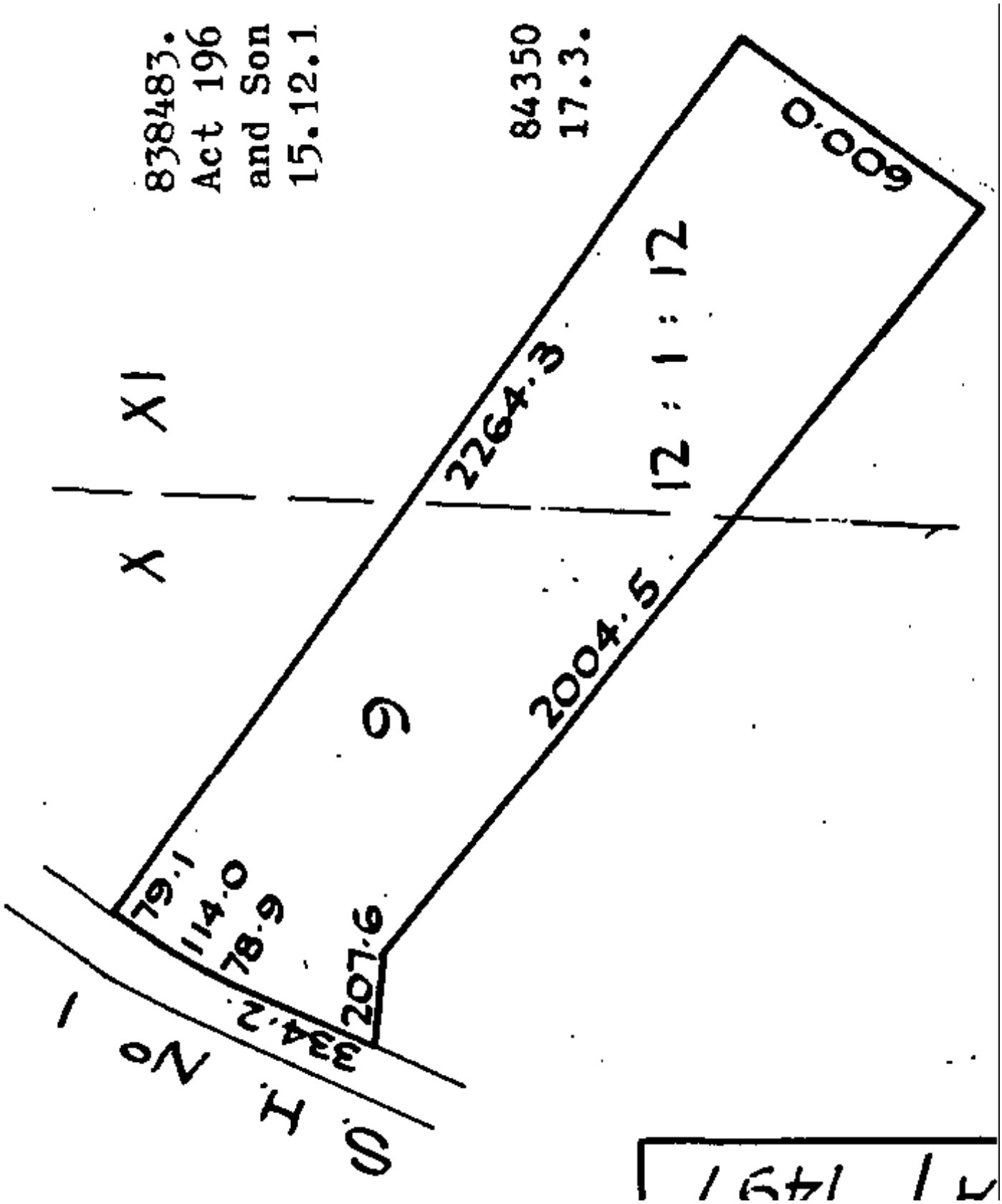
Interests

Fencing Agreement in Transfer A22809 - 30.7.1964

548033.1 Gazette Notice declaring part State Highway No 1 (Awanui-Bluff) adjoining to be a limited access road - 18.10.1977 at 2.59 pm

8507197.1 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am

8507197.2 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am


838483.
Act 196
and Son
15.12.1
84350
17.3.
0.009
12 : 1 : 12
2264.3
2004.5
79.1
114.0
78.9
207.6
334.2
S. H. No 1

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **NA5C/848**

Land Registration District **North Auckland**

Date Issued 05 April 1965

Prior References
NA642/226

Estate Fee Simple

Area 5.5214 hectares more or less

Legal Description Lot 10 Deposited Plan 52889

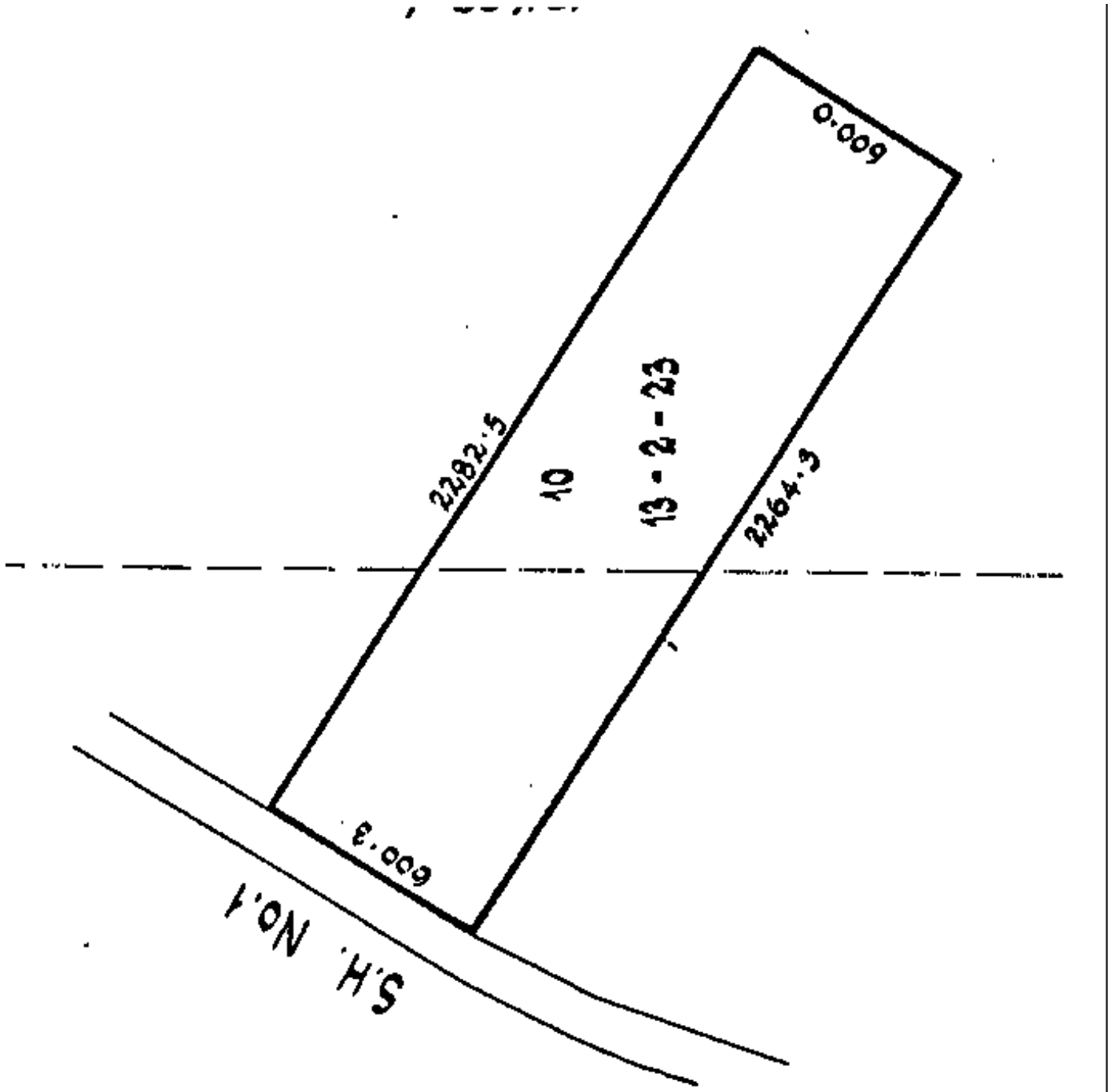
Registered Owners
Hobsonville Development Limited

Interests

548033.1 Gazette Notice declaring State Highway No 1 (Awanui-Bluff) adjoining to be a limited access road - 18.10.1977 at 2.59 pm

8507177.12 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am

11226115.3 Mortgage to Bank of New Zealand - 25.9.2018 at 3:47 pm


0.009
2282.5
10
13 - 2 - 23
2264.3
6.009
S.H. No.1

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General of Land

Identifier **NA25A/502**

Part-Cancelled

Land Registration District **North Auckland**

Date Issued 21 June 1973

Prior References
NA20D/1231

Estate Fee Simple

Area 2.6999 hectares more or less

Legal Description Lot 1 Deposited Plan 68886

Registered Owners

Elaine Alice Butler-Stoney

Interests

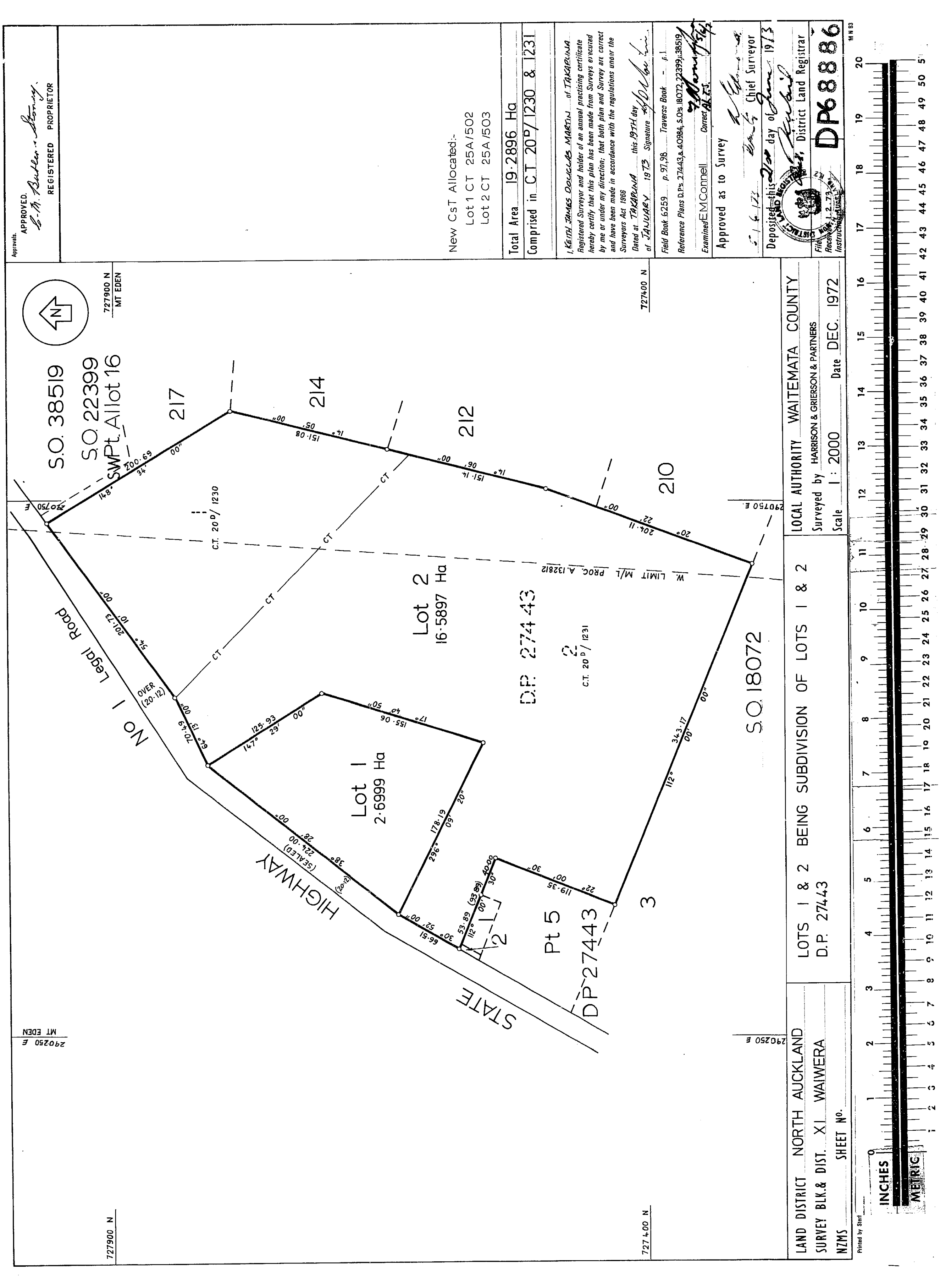
080073.1 Gazette Notice declaring part of the land is hereby taken for road from and after the 14th day of November 1974 - 16.12.1974 at 10.46 am

548033.1 Gazette Notice declaring part State Highway No. 1 (Awanui-Bluff) to be a limited access road - 18.10.1977 at 2.59 pm

8507177.3 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am

8507177.4 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am

12313166.2 Compensation Certificate pursuant to Section 19 Public Works Act 1981 by the Auckland Council - 26.11.2021 at 9:16 am


APPROVED.
REGISTERED PROPRIETOR
New CsT Allocated:-
Lot 1 CT 25A/502
Lot 2 CT 25A/503
Total Area 19·2896 Ha
Comprised in C.T. 20D/1230 & 1231
Approved as to Survey
Chief Surveyor
District Land Registrar
DP68886
LOCAL AUTHORITY WAITEMATA COUNTY
Surveyed by HARRISON & GRIERSON & PARTNERS
Scale 1:2000 Date DEC. 1972
LOTS 1 & 2 BEING SUBDIVISION OF LOTS 1 & 2
D.P. 27443
LAND DISTRICT NORTH AUCKLAND
SURVEY BLK.& DIST. XI WAIWERA
NZMS SHEET No.
S.O. 38519
S.O. 22399
SWPt Allot 16
217
214
212
210
Lot 2
16·5897 Ha
D.P. 27443
C.T. 20D/1230
C.T. 20D/1231
Lot 1
2·6999 Ha
S.O. 18072
Pt 5
DP 27443
3
No 1 Legal Road
STATE HIGHWAY
W. LIMIT M/L PROC. A.132812
727900 N
727400 N
290250 E
290750 E
MT EDEN
INCHES
METRIC

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **NA25A/503**

Part-Cancelled

Land Registration District **North Auckland**

Date Issued 21 June 1973

Prior References

NA20D/1231 NA20D/1232

Estate Fee Simple

Area 16.5897 hectares more or less

Legal Description Lot 2 Deposited Plan 68886

Registered Owners

YJS Holding Limited

Interests

080073.1 Gazette Notice declaring part of the land is hereby taken for road from and after the 14th day of November 1974 - 16.12.1974 at 10.46 am

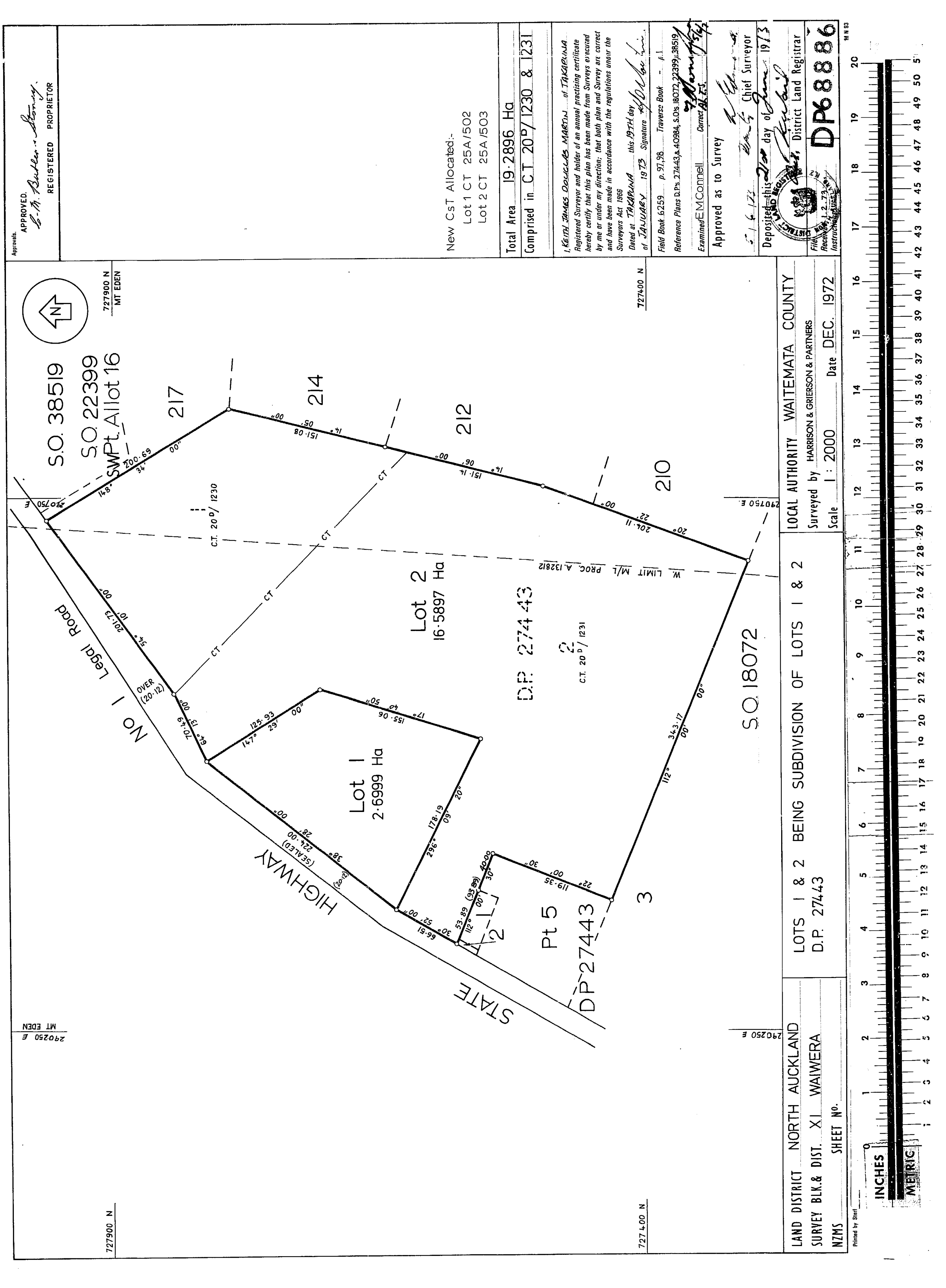
548033.1 Gazette Notice declaring part State Highway No. 1 (Awanui-Bluff) to be a limited access road - 18.10.1977 at 2.59 pm

800521.2 Gazette Notice (N.Z. Gazette 15.3.1979 p.565) taking part within land (1883 square metres) for road from and after 15.3.1979 - 28.3.1979 at 11.26 am

8507177.1 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am

8507177.2 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am

12035482.2 Compensation Certificate pursuant to Section 19 Public Works Act 1981 by Auckland Council - 25.2.2021 at 3:05 pm


APPROVED. REGISTERED PROPRIETOR
New CsT Allocated:-
Lot 1 CT 25A/502
Lot 2 CT 25A/503
Total Area 19·2896 Ha
Comprised in C.T. 20D/1230 & 1231
Approved as to Survey
Chief Surveyor
District Land Registrar
DP68886
LOCAL AUTHORITY WAITEMATA COUNTY
Surveyed by HARRISON & GRIERSON & PARTNERS
Scale 1 : 2000
Date DEC. 1972
LOTS 1 & 2 BEING SUBDIVISION OF LOTS 1 & 2 D.P. 27443
LAND DISTRICT NORTH AUCKLAND
SURVEY BLK.& DIST. XI WAIWERA
NZMS SHEET No.
Lot 1
2·6999 Ha
Lot 2
16·5897 Ha
D.P. 27443
S.O. 38519
S.O. 22399
SWPt Allot 16
S.O. 18072
Pt 5
DP 27443
No 1 STATE HIGHWAY
Legal Road
W. LIMIT M/L PROC. A 132812
C.T. 20D/1230
C.T. 20D/1231
727900 N
727400 N
290250 E
290750 E
MT EDEN
217
214
212
210
3
INCHES
METRIC

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier	**NA25C/412**
Land Registration District	**North Auckland**
Date Issued	22 June 1973

Prior References
NA694/311

Estate	Fee Simple
Area	7809 square metres more or less
Legal Description	Lot 1 Deposited Plan 69561

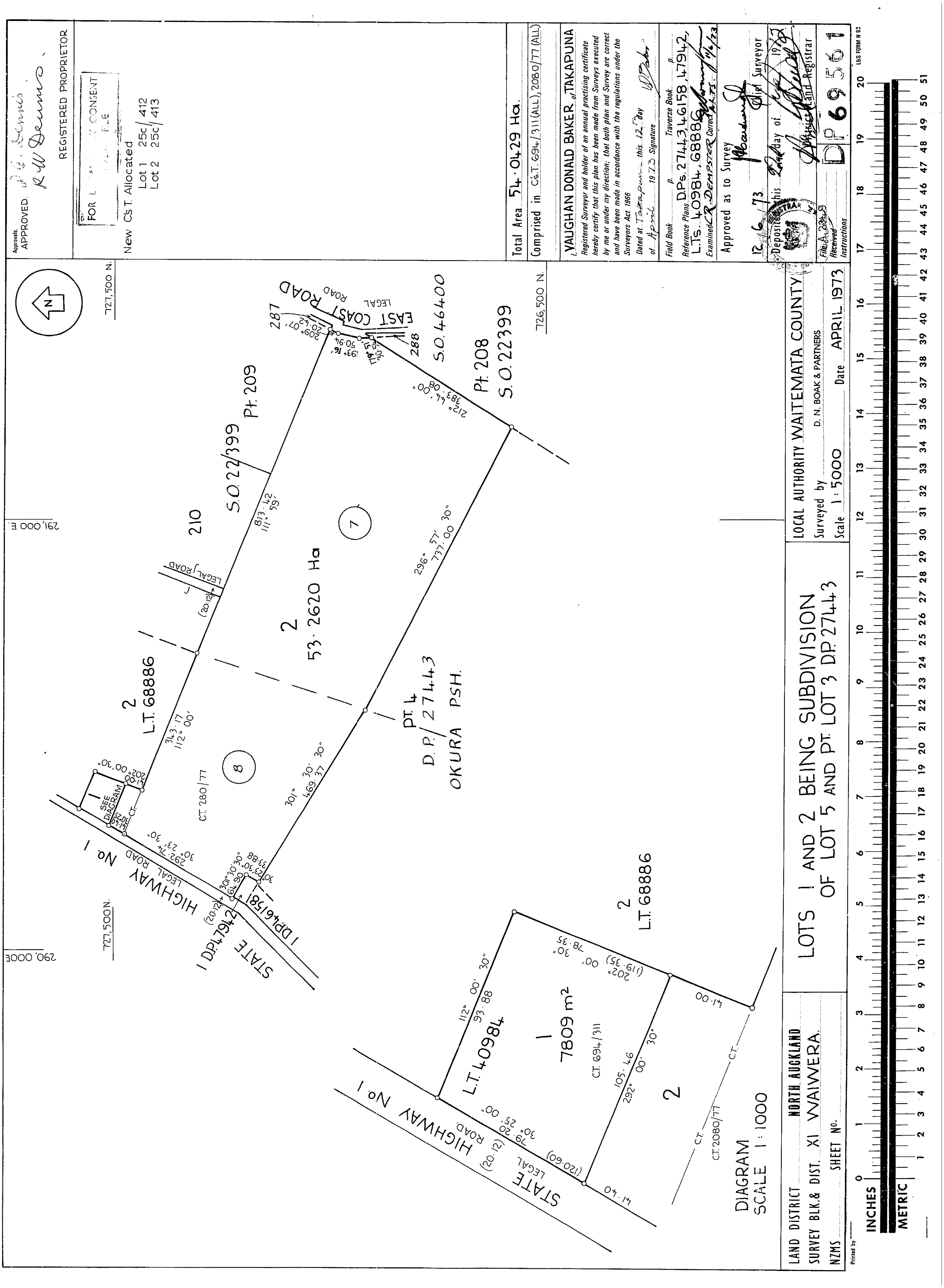
Registered Owners
Stephen Rodney Wagstaff and Beth Rose Wagstaff

Interests

548033.1 Gazette Notice declaring the adjoining State Highway No 1 (Awanui-Bluff) to be a limited access road - 18.10.1977 at 2.59 pm

8476416.1 Mortgage to ASB Bank Limited - 30.4.2010 at 10:48 am

8507177.5 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am



APPROVED
REGISTERED PROPRIETOR
New C's T. Allocated
Lot 1 25c/412
Lot 2 25c/413
Total Area 54·0429 Ha.
Comprised in C.T. 694/311 (ALL), 2080/77 (ALL)
I, VAUGHAN DONALD BAKER of TAKAPUNA
Registered Surveyor and holder of an annual practising certificate hereby certify that this plan has been made from Surveys executed by me or under my direction: that both plan and Survey are correct and have been made in accordance with the regulations under the Surveyors Act 1966
Dated at Takapuna this 12th day of April 1973 Signature
Field Book
Traverse Book
Reference Plans DPs. 27443, 46158, 47942, L.Ts. 40984, 68886
Approved as to Survey
12.6.73
Chief Surveyor
Deposited this day of 1973
District Land Registrar
DP 69561
LOCAL AUTHORITY WAITEMATA COUNTY
Surveyed by D. N. BOAK & PARTNERS
Scale 1:5000
Date APRIL 1973
LOTS 1 AND 2 BEING SUBDIVISION OF LOT 5 AND PT. LOT 3 D.P. 27443
LAND DISTRICT NORTH AUCKLAND
SURVEY BLK.& DIST. XI WAIWERA
NZMS SHEET No.
DIAGRAM SCALE 1:1000
INCHES
METRIC
EAST COAST ROAD
LEGAL ROAD
STATE HIGHWAY No 1
2 53·2620 Ha
1 7809 m²
2 L.T. 68886
L.T. 40984
Pt. 4 D.P. 27443
OKURA PSH.
Pt. 209
Pt. 208
S.O. 22399
S.O. 46400
210
287
288
C.T. 280/77
C.T. 694/311
C.T. 2080/77
1 D.P. 47942
1 D.P. 46158
SEE DIAGRAM
727,500 N.
726,500 N.
291,000 E.
290,000 E.

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **NA30B/736**

Land Registration District **North Auckland**

Date Issued 15 January 1976

Prior References
NA1846/16

Estate Fee Simple

Area 7802 square metres more or less

Legal Description Lot 1 Deposited Plan 74321

Registered Owners

Geok Mui Law as to a 1/5 share

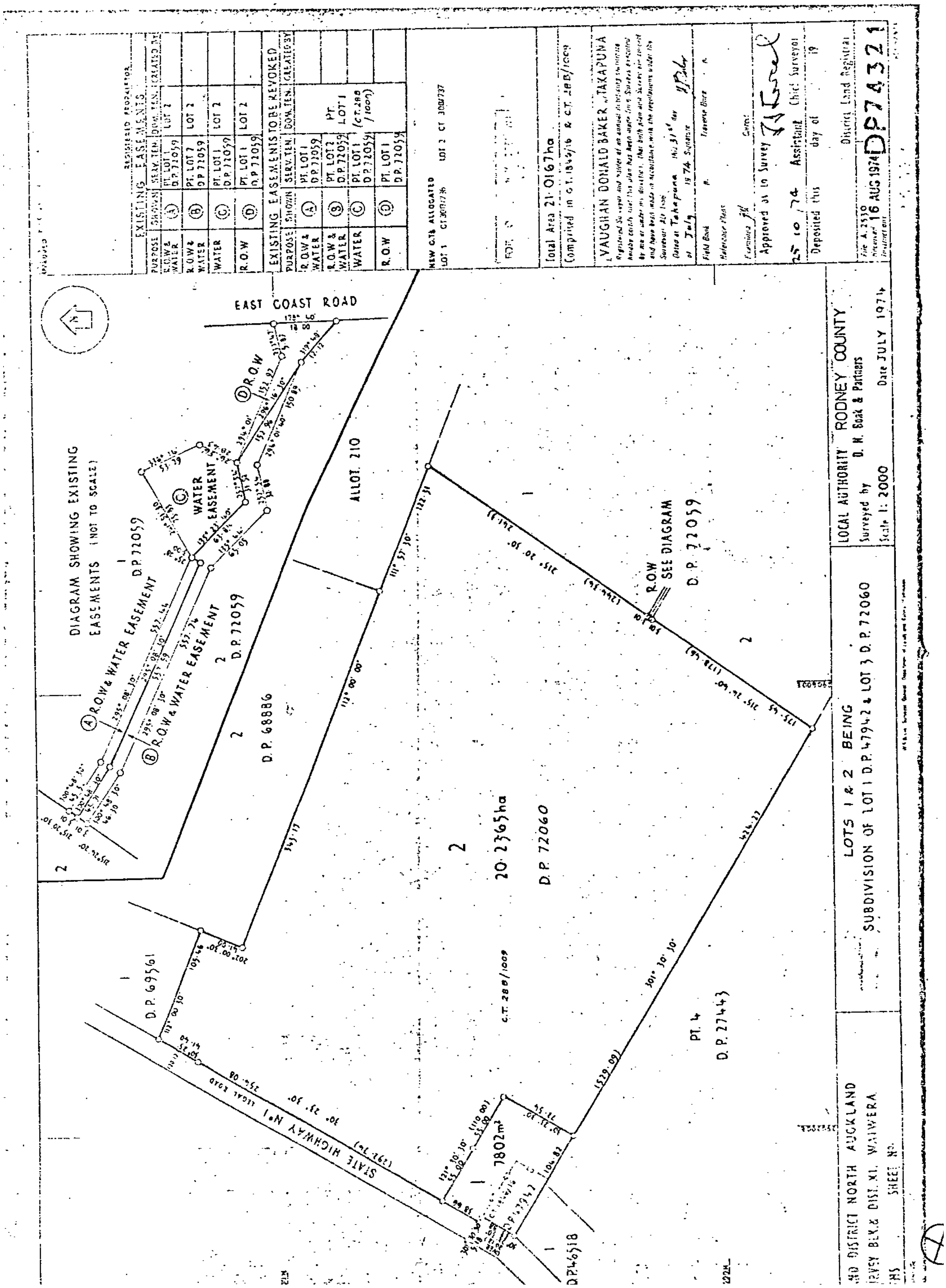
Huiping Sun as to a 4/5 share

Interests

548033.1 Gazette Notice declaring the adjoining State Highway No 1 (Awanui-Bluff) to be a limited access road - 18.10.1977 at 2.59 pm

8507177.8 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am

9476973.4 Mortgage to ASB Bank Limited - 8.8.2013 at 1:16 pm


DP 74321
EAST COAST ROAD
STATE HIGHWAY No 1
DIAGRAM SHOWING EXISTING EASEMENTS (NOT TO SCALE)
ALLOT. 210
20·2365 ha
D.P. 72060
D.P. 72059
D.P. 68886
D.P. 69561
PT. 4
D.P. 27443
7802m²
LOCAL AUTHORITY RODNEY COUNTY
Surveyed by D. N. Boak & Partners
Scale 1: 2000
Date JULY 1974
LOTS 1 & 2 BEING
SUBDIVISION OF LOT 1 D.P. 47942 & LOT 3 D.P. 72060
Total Area 21·0167 ha
VAUGHAN DONALD BAKER, TAKAPUNA
EXISTING EASEMENTS
EXISTING EASEMENTS TO BE REVOKED

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier	**NA30B/737**
Land Registration District	**North Auckland**
Date Issued	15 January 1976

Prior References
NA28B/1009

Estate	Fee Simple
Area	20.2365 hectares more or less
Legal Description	Lot 2 Deposited Plan 74321
Registered Owners	

Fletcher Development Limited

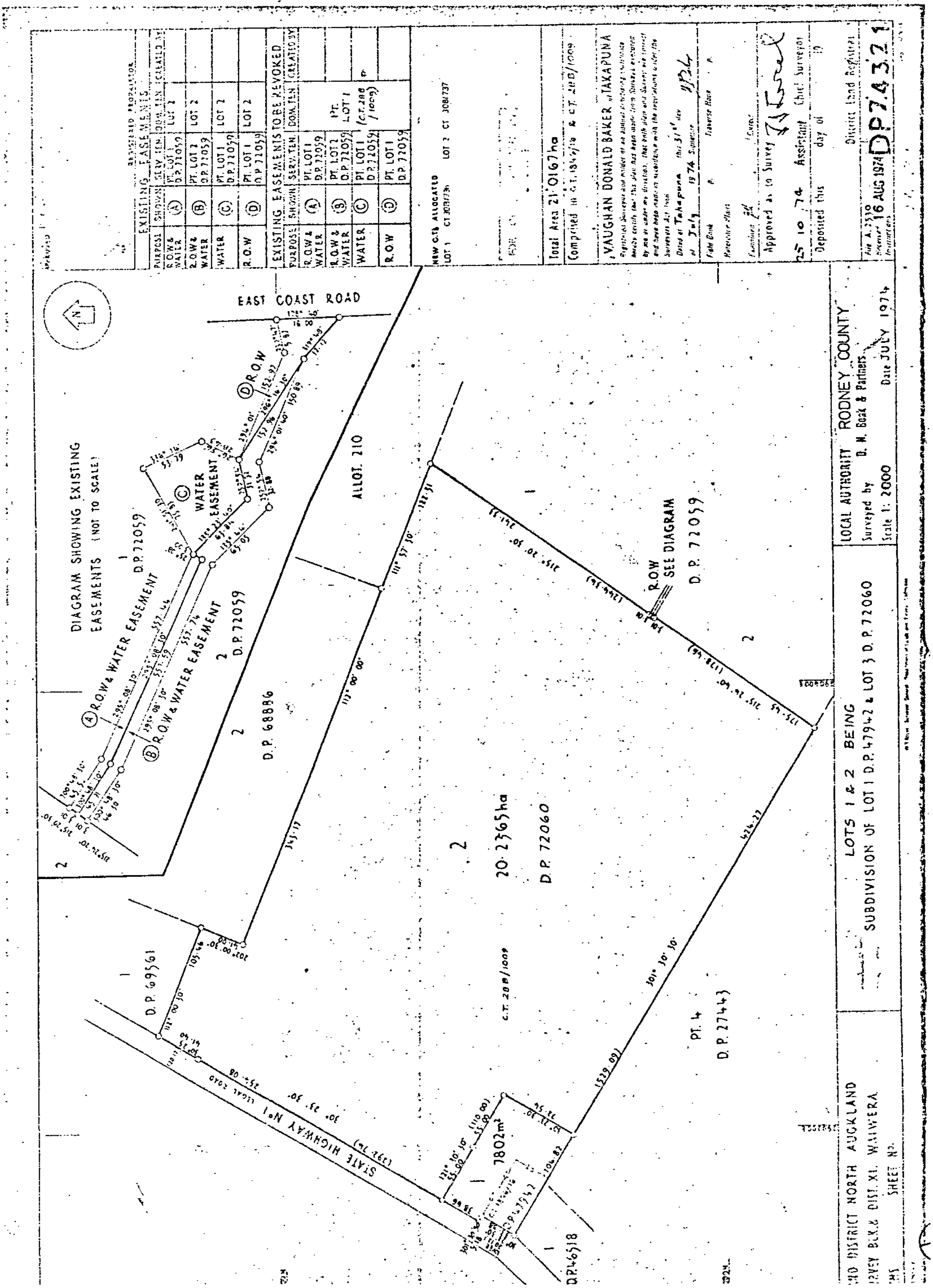
Interests

548033.1 Gazette Notice declaring the adjoining State Highway No 1 (Awanui-Bluff) to be a limited access road - 18.10.1977 at 2.59 pm

C499364.1 Certificate declaring the adjoining road to be a limited access road - 20.7.1993 at 10.22 am

8507177.6 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am

8507177.7 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am


EAST COAST ROAD
STATE HIGHWAY No 1
DIAGRAM SHOWING EXISTING EASEMENTS (NOT TO SCALE)
R.O.W & WATER EASEMENT
WATER EASEMENT
ALLOT. 210
20·2365ha
D.P. 72060
D.P. 72059
D.P. 68886
D.P. 69561
PT. 4
D.P. 27443
7802m²
Total Area 21·0167ha
VAUGHAN DONALD BAKER of TAKAPUNA
LOCAL AUTHORITY RODNEY COUNTY
Surveyed by D. N. Boak & Partners
Scale 1: 2000
Date JULY 1974
LOTS 1 & 2 BEING
SUBDIVISION OF LOT 1 D.P. 47942 & LOT 3 D.P. 72060
LAND DISTRICT NORTH AUCKLAND
DP 74321

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **NA136D/722**

Land Registration District **North Auckland**

Date Issued 30 September 2002

Prior References

NA84A/932 NA84A/933

Estate Fee Simple

Area 59.2450 hectares more or less

Legal Description Lot 1 Deposited Plan 208687

Registered Owners

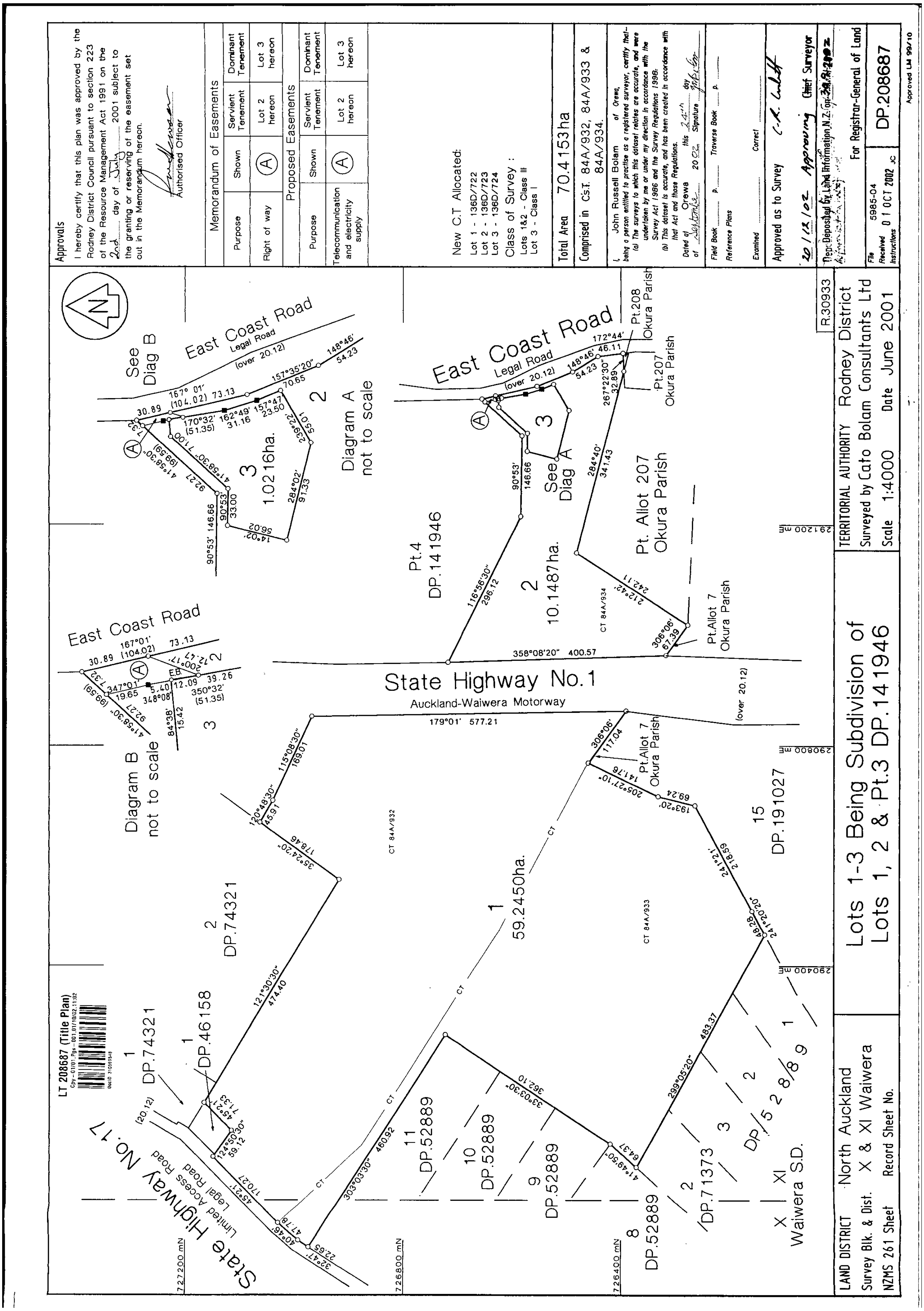
Wilks Road 2014 Limited

Interests

548033.1 Gazette Notice declaring part State Highway No. 1 (Awanui-Bluff) to be a limited access road - 18.10.1977 at 2.59 pm

C499364.1 Certificate declaring the adjoining road to be a limited asccess road - 20.7.1993 at 10.22 am

8507177.10 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am



Approvals
I hereby certify that this plan was approved by the Rodney District Council pursuant to section 223 of the Resource Management Act 1991 on the 2nd day of July 2001 subject to the granting or reserving of the easement set out in the Memorandum hereon.
Authorised Officer
Memorandum of Easements
Purpose | Shown | Servient Tenement | Dominant Tenement
Right of way | A | Lot 2 hereon | Lot 3 hereon
Proposed Easements
Purpose | Shown | Servient Tenement | Dominant Tenement
Telecommunication and electricity supply | A | Lot 2 hereon | Lot 3 hereon
New C.T Allocated:
Lot 1 - 136D/722
Lot 2 - 136D/723
Lot 3 - 136D/724
Class of Survey :
Lots 1&2 - Class III
Lot 3 - Class I
Total Area 70.4153ha
Comprised in C.T. 84A/932, 84A/933 & 84A/934.
Approved as to Survey
For Registrar-General of Land
DP.208687
LT 208687 (Title Plan)
TERRITORIAL AUTHORITY Rodney District
Surveyed by Cato Bolam Consultants Ltd
Scale 1:4000
Date June 2001
Lots 1-3 Being Subdivision of Lots 1, 2 & Pt.3 DP.141946
LAND DISTRICT North Auckland
Survey Blk. & Dist. X & XI Waiwera
NZMS 261 Sheet
Record Sheet No.
East Coast Road
Legal Road
State Highway No.1
Auckland-Waiwera Motorway
State Highway No.17
Limited Access Road
Legal Road
Diagram A not to scale
Diagram B not to scale
1 59.2450ha.
2 10.1487ha.
3 1.0216ha.
Pt.4 DP.141946
Pt. Allot 207 Okura Parish
Pt.Allot 7 Okura Parish
15 DP.191027
2 DP.74321
1 DP.74321
1 DP.46158
11 DP.52889
10 DP.52889
9 DP.52889
8 DP.52889
2 DP.71373
DP 52889
X XI Waiwera S.D.
R.30933

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier	**NA1698/16**
Land Registration District	**North Auckland**
Date Issued	21 December 1959

Prior References
NA694/313

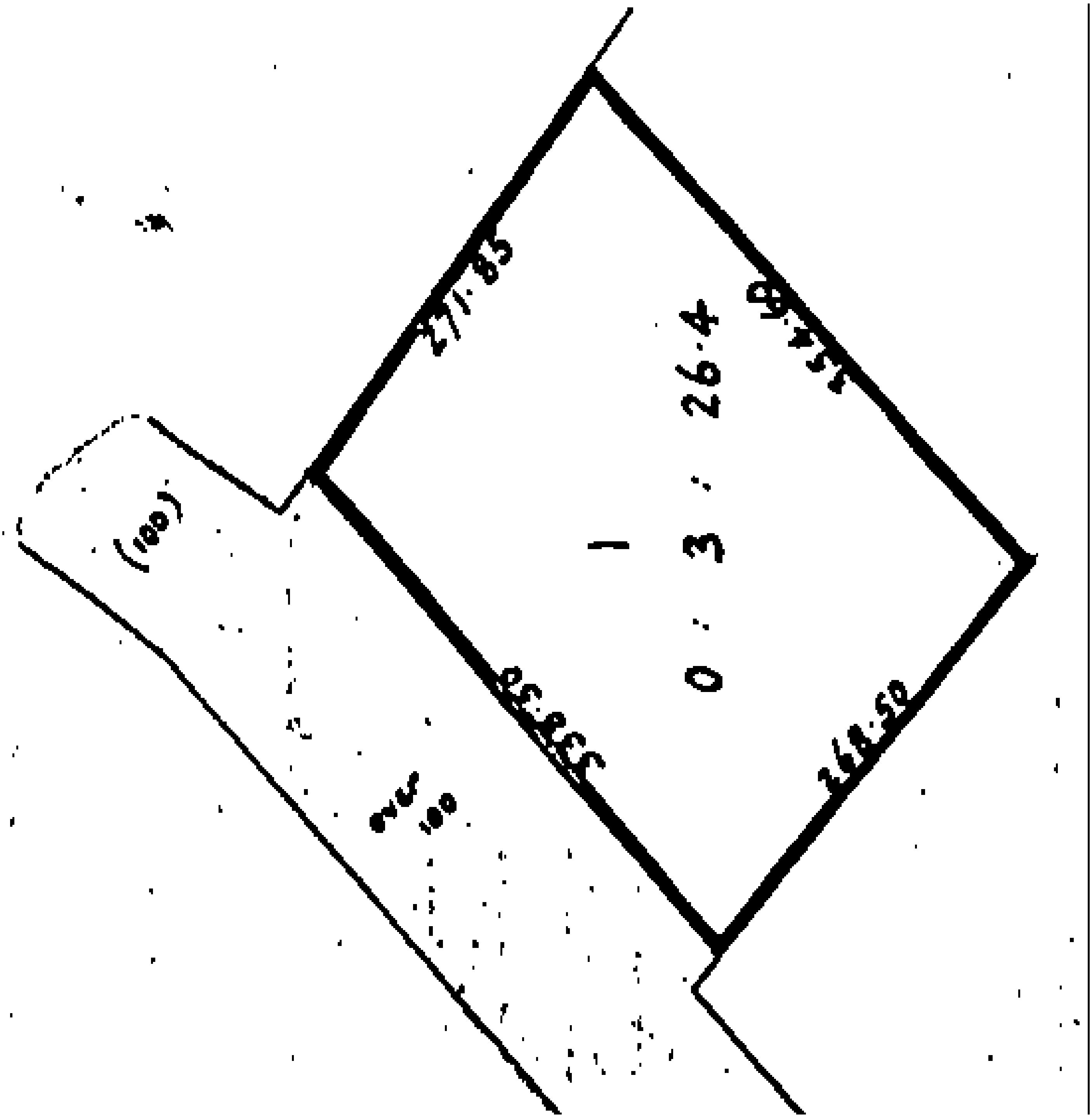
Estate	Fee Simple
Area	3703 square metres more or less
Legal Description	Lot 1 Deposited Plan 46158

Registered Owners
Robert George Woolley as to a 1/2 share
Rong Everlyne Woolley as to a 1/2 share

Interests

548033.1 Gazette Notice declaring part State Highway 1 (Awanui-Bluff) adjoining to be a limited access road - 18.10.1977 at 2.59 pm

8507177.9 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am


271.85
154.98
268.50
1
0 · 3 · 26.4
(100)

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **65588**

Land Registration District **North Auckland**

Date Issued 25 November 2002

Prior References
65619 65620

Estate Fee Simple

Area 2.1924 hectares more or less

Legal Description Section 9-10 Survey Office Plan 308591

Registered Owners
DP BOOCOCK NO 2 TRUSTEE LIMITED

Interests

Subject to right of way, telecommunications, electricity & water supply easements over part Section 9 marked E & part Section 10 marked D on SO 308591 created by Easement Instrument 5603637.1 - 29.5.2003 at 9:00 am

Appurtenant hereto are right of way, telecommunications, electricity & water supply easements created by Easement Instrument 5603637.1 - 29.5.2003 at 9:00 am

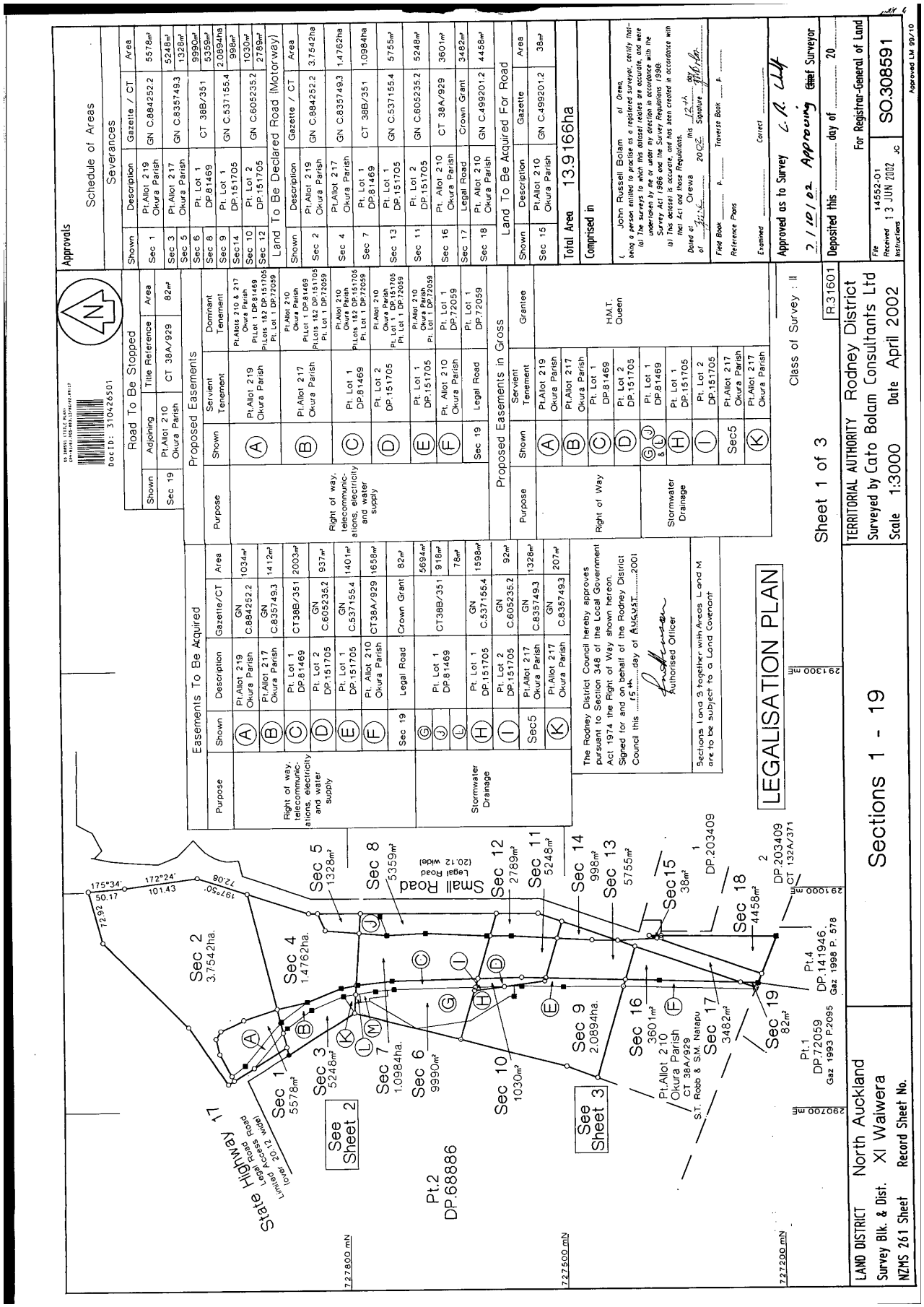
Subject to a right of way, telecommunications, electricity and water supply over part Section 9 marked E, and over part Section 10 marked D on SO 308591 created by Easement Instrument 5692624.2 - 14.8.2003 at 9:00 am

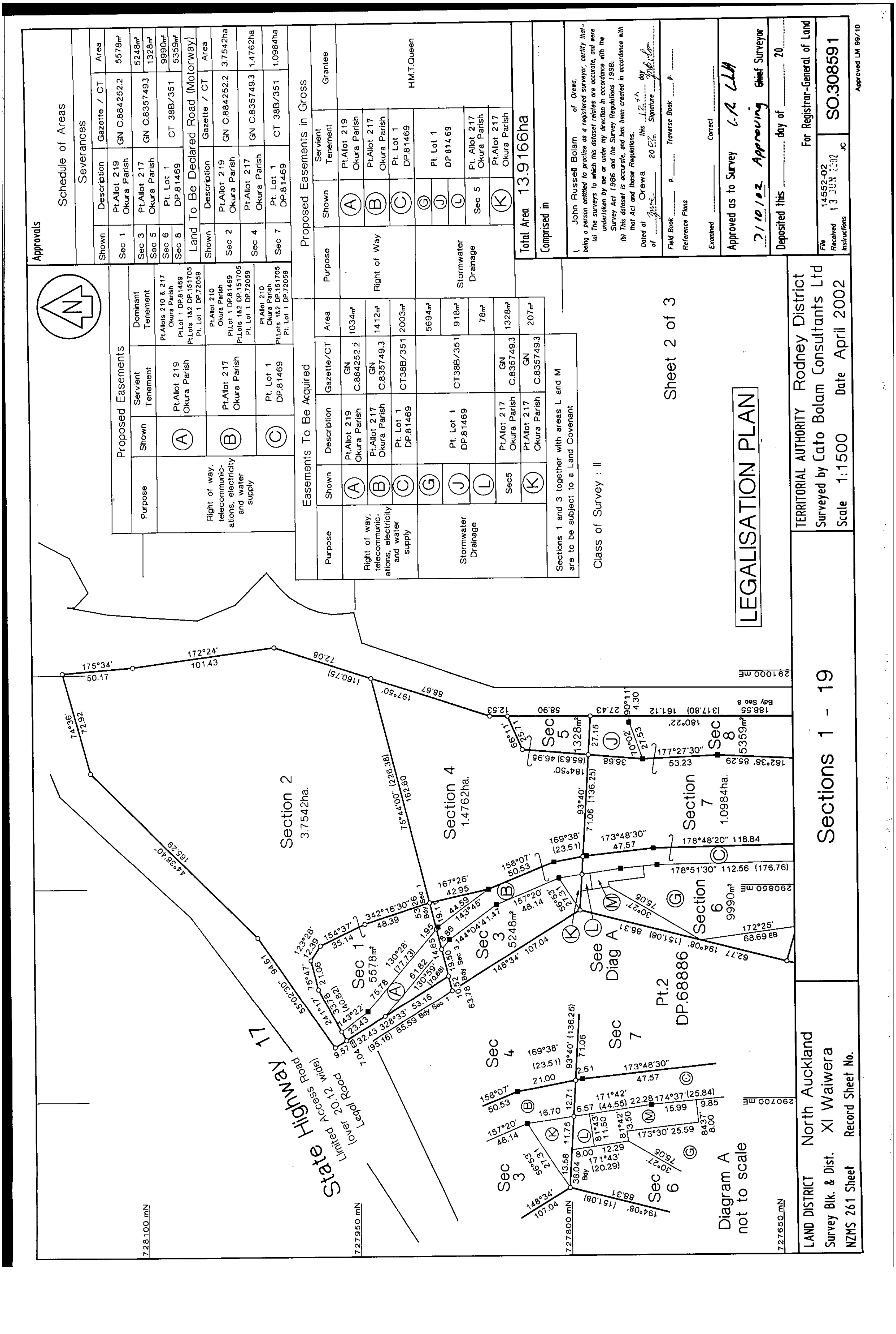
Subject to Part IVA Conservation Act 1987

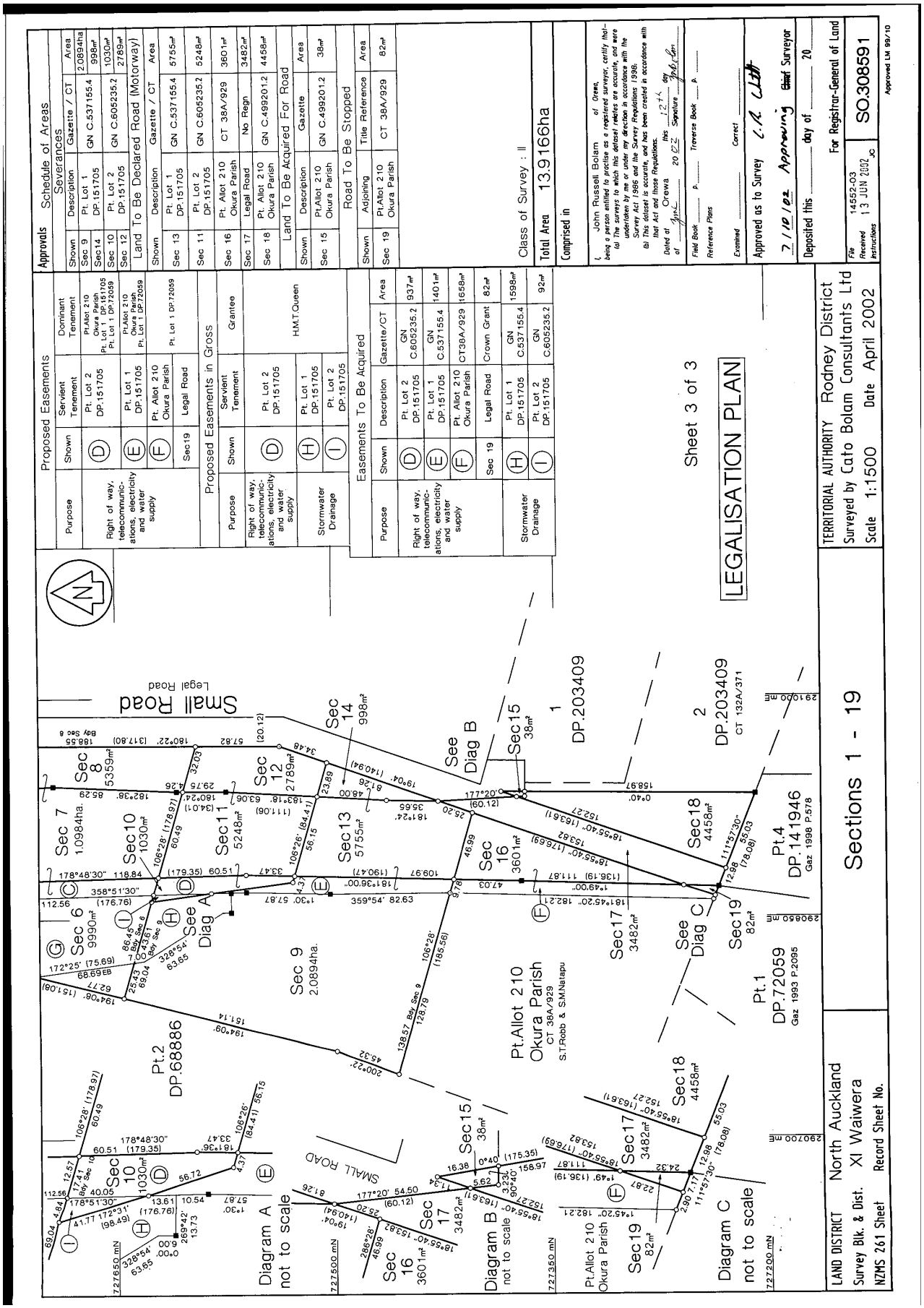
Subject to Section 11 of the Crown Minerals Act 1991

Subject to a stormwater easement (in gross) over part marked 'H' and 'I' on SO Plan 308591 in favour of Her Majesty The Queen created by Transfer 5798808.1 - 13.11.2003 at 9:00 am

8632267.1 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 9.11.2010 at 7:00 am


LEGALISATION PLAN
Sections 1 - 19
Sheet 1 of 3
Schedule of Areas
Severances
Land To Be Declared Road (Motorway)
Land To Be Acquired For Road
Approvals
Approved as to Survey
Deposited this
For Registrar-General of Land
SO.308591
Road To Be Stopped
Easements To Be Acquired
Proposed Easements
Proposed Easements in Gross
Total Area 13.9166ha
Comprised in
TERRITORIAL AUTHORITY Rodney District
Surveyed by Cato Bolam Consultants Ltd
Scale 1:3000 Date April 2002
LAND DISTRICT North Auckland
Survey Blk. & Dist. XI Waiwera
NZMS 261 Sheet Record Sheet No.
Small Road (20.12 wide)
State Highway 17
Sec 1 5578m²
Sec 2 3.7542ha.
Sec 3 5248m²
Sec 4 1.4762ha.
Sec 5 1328m²
Sec 6 9990m²
Sec 7 1.0984ha.
Sec 8 5359m²
Sec 9 2.0894ha.
Sec 10 1030m²
Sec 11 5248m²
Sec 12 2789m²
Sec 13 5755m²
Sec 14 998m²
Sec 15 38m²
Sec 16 3601m²
Sec 17 3482m²
Sec 18 4458m²
Sec 19 82m²
Pt.2 DP.68886
Pt.1 DP.72059 Gaz 1993 P.2095
Pt.4 DP.141946. Gaz 1998 P. 578
DP.203409
CT 132A/371
Pt.Allot 210 Okura Parish CT 38A/929 S.T. Robb & S.M. Natapu
See Sheet 2
See Sheet 3
R.31601
Class of Survey : II
727800 mN
727500 mN
727200 mN
291300 mE
290700 mE


Approvals
Schedule of Areas
Severances
Shown | Description | Gazette / CT | Area
Sec 1 | Pt.Allot 219 Okura Parish | GN C.884252.2 | 5578m²
Sec 3 | Pt.Allot 217 Okura Parish | GN C.8357493 | 5248m²
Sec 5 | 1328m²
Sec 6 | Pt. Lot 1 DP.81469 | CT 38B/351 | 9990m²
Sec 8 | 5359m²
Land To Be Declared Road (Motorway)
Shown | Description | Gazette / CT | Area
Sec 2 | Pt.Allot 219 Okura Parish | GN C.884252.2 | 3.7542ha
Sec 4 | Pt.Allot 217 Okura Parish | GN C.835749.3 | 1.4762ha
Sec 7 | Pt. Lot 1 DP.81469 | CT 38B/351 | 1.0984ha
Proposed Easements
Purpose | Shown | Servient Tenement | Dominant Tenement
Right of way, telecommunications, electricity and water supply
A | Pt.Allot 219 Okura Parish | Pt.Allots 210 & 217 Okura Parish Pt.Lot 1 DP.81469 Pt.Lots 1&2 DP.151705 Pt. Lot 1 DP.72059
B | Pt.Allot 217 Okura Parish | Pt.Allot 210 Okura Parish Pt.Lot 1 DP.81469 Pt.Lots 1&2 DP.151705 Pt. Lot 1 DP.72059
C | Pt. Lot 1 DP.81469 | Pt.Allot 210 Okura Parish Pt.Lots 1&2 DP.151705 Pt. Lot 1 DP.72059
Easements To Be Acquired
Purpose | Shown | Description | Gazette/CT | Area
Right of way, telecommunications, electricity and water supply
A | Pt.Allot 219 Okura Parish | GN C.884252.2 | 1034m²
B | Pt.Allot 217 Okura Parish | GN C.835749.3 | 1412m²
C | Pt. Lot 1 DP.81469 | CT38B/351 | 2003m²
Stormwater Drainage
G | Pt. Lot 1 DP.81469 | CT38B/351 | 5694m²
J | 918m²
L | 78m²
Sec5 | Pt.Allot 217 Okura Parish | GN C.835749.3 | 1328m²
K | Pt.Allot 217 Okura Parish | GN C.835749.3 | 207m²
Proposed Easements in Gross
Purpose | Shown | Servient Tenement | Grantee
Right of Way | A | Pt.Allot 219 Okura Parish
B | Pt.Allot 217 Okura Parish
C | Pt. Lot 1 DP.81469
Stormwater Drainage | G J L | Pt. Lot 1 DP 81469
Sec 5 | Pt. Allot 217 Okura Parish
K | Pt.Allot 217 Okura Parish
H.M.T.Queen
Sections 1 and 3 together with areas L and M are to be subject to a Land Covenant
Class of Survey : II
Total Area 13.9166ha
Comprised in
I, John Russell Bolam of Orewa, being a person entitled to practise as a registered surveyor, certify that- (a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Survey Act 1986 and the Survey Regulations 1998; (b) This dataset is accurate, and has been created in accordance with that Act and those Regulations.
Dated at Orewa this 12th day of June 2002 Signature
Field Book p. Traverse Book p.
Reference Plans
Examined Correct
Approved as to Survey
7/10/02 Approving Chief Surveyor
Deposited this day of 20
For Registrar-General of Land
File 14552-02
Received 13 JUN 2002
Instructions
SO.308591
Approved LM 99/10
Sheet 2 of 3
LEGALISATION PLAN
TERRITORIAL AUTHORITY Rodney District
Surveyed by Cato Bolam Consultants Ltd
Scale 1:1500 Date April 2002
Sections 1 - 19
LAND DISTRICT North Auckland
Survey Blk. & Dist. XI Waiwera
NZMS 261 Sheet Record Sheet No.
State Highway 17
Limited Access Road (over 20.12 wide) Legal Road
Section 2 3.7542ha.
Section 4 1.4762ha.
Sec 1 5578m²
Sec 3 5248m²
Sec 5 1328m²
Section 6 9990m²
Section 7 1.0984ha.
Sec 8 5359m²
Pt.2 DP.68886
See Diag A
Diagram A not to scale


Approvals
Schedule of Areas
Severances
Land To Be Declared Road (Motorway)
Land To Be Acquired For Road
Road To Be Stopped
Proposed Easements
Proposed Easements in Gross
Easements To Be Acquired
Class of Survey : II
Total Area 13.9166ha
Comprised in
LEGALISATION PLAN
Sheet 3 of 3
Sections 1 - 19
TERRITORIAL AUTHORITY Rodney District
Surveyed by Cato Bolam Consultants Ltd
Scale 1:1500 Date April 2002
LAND DISTRICT North Auckland
Survey Blk. & Dist. XI Waiwera
NZMS 261 Sheet Record Sheet No.
Small Road
Legal Road
Pt.2 DP.68886
Pt.Allot 210 Okura Parish
CT 38A/929
S.T.Robb & S.M.Natapu
Pt.1 DP.72059
Gaz 1993 P.2095
Pt.4 DP.141946
Gaz 1998 P.578
1 DP.203409
2 DP.203409
CT 132A/371
Sec 1 1.0984ha.
Sec 2 1030m²
Sec 3 5248m²
Sec 4 5755m²
Sec 5 3601m²
Sec 6 9990m²
Sec 7 5359m²
Sec 8 2789m²
Sec 9 2.0894ha.
Sec 10 1030m²
Sec 11 5248m²
Sec 12 2789m²
Sec 13 5755m²
Sec 14 998m²
Sec 15 38m²
Sec 16 3601m²
Sec 17 3482m²
Sec 18 4458m²
Sec 19 82m²
Diagram A not to scale
Diagram B not to scale
Diagram C not to scale
File 14552-03
Received 13 JUN 2002
Instructions
SO.308591
Approved LM 99/10

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **65593**

Land Registration District **North Auckland**

Date Issued 25 November 2002

Prior References
NA38B/351

Estate Fee Simple

Area 9990 square metres more or less

Legal Description Section 6 Survey Office Plan 308591

Registered Owners

Papanui Station House Limited

Interests

5412894.5 Gazette Notice (NZ Gazette, 14/11/2002, No 166, p4194) declaring part of the within land marked L and M on SO Plan 308591 to be subject to the restrictions described in clause B of the aforementioned gazette notice- 25.11.2002 at 9:00 am

Subject to right of way, telecommunications, electricity & water supply easements over part marked C on SO 308591 created by Easement Instrument 5603637.1 - 29.5.2003 at 9:00 am

Appurtenant hereto are right of way, telecommunications, electricity & water supply easements created by Easement Instrument 5603637.1 - 29.5.2003 at 9:00 am

Subject to a right of way, telecommunications, electricity and water supply over part marked C on SO 308591 created by Easement Instrument 5692624.2 - 14.8.2003 at 9:00 am

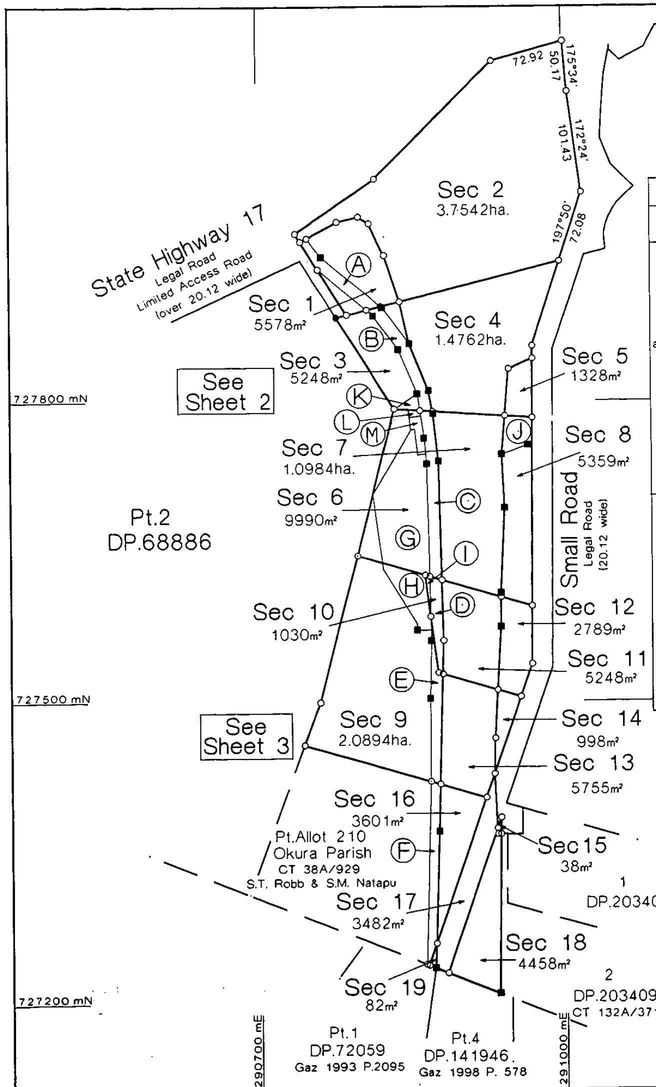
Subject to Part IVA Conservation Act 1987

Subject to Section 11 Crown Minerals Act 1991

Subject to a stormwater right (in gross) over parts marked G and L and a right of way over part marked C on SO plan 308591 in favour of Her Majesty the Queen created by Transfer 5793440.1 - 10.11.2003 at 9:00 am

8632267.1 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 9.11.2010 at 7:00 am

12243687.2 Compensation Certificate pursuant to Section 19 Public Works Act 1981 by Auckland Council - 15.9.2021 at 2:28 pm



SO 308591 (TITLE PLAN)

DocID: 310426501

N

Road To Be Stopped

Shown	Adjoining	Title Reference	Area
Sec 19	Pt.Allot 210 Okura Parish	CT 38A/929	82m²

Easements To Be Acquired

Purpose	Shown	Description	Gazette/CT	Area
Right of way, telecommunications, electricity and water supply	(A)	Pt.Allot 219 Okura Parish	GN C.884252.2	1034m²
	(B)	Pt.Allot 217 Okura Parish	GN C.835749.3	1412m²
	(C)	Pt. Lot 1 DP.81469	CT38B/351	2003m²
	(D)	Pt. Lot 2 DP.151705	GN C.605235.2	937m²
	(E)	Pt. Lot 1 DP.151705	GN C.537155.4	1401m²
	(F)	Pt. Allot 210 Okura Parish	CT38A/929	1658m²
	Sec 19	Legal Road	Crown Grant	82m²
Stormwater Drainage	(G)	Pt. Lot 1 DP.81469	CT38B/351	5694m²
	(J)			918m²
	(L)			78m²
	(H)	Pt. Lot 1 DP.151705	GN C.537155.4	1598m²
	(I)	Pt. Lot 2 DP.151705	GN C.605235.2	92m²
	Sec5	Pt.Allot 217 Okura Parish	GN C.835749.3	1328m²
	(K)	Pt.Allot 217 Okura Parish	GN C.835749.3	207m²

The Rodney District Council hereby approves pursuant to Section 348 of the Local Government Act 1974 the Right of Way shown hereon.
Signed for and on behalf of the Rodney District Council this 15th day of AUGUST 2001

[signature]
Authorised Officer

Sections 1 and 3 together with Areas L and M are to be subject to a Land Covenant

Proposed Easements

Purpose	Shown	Servient Tenement	Dominant Tenement
Right of way, telecommunications, electricity and water supply	(A)	Pt.Allot 219 Okura Parish	Pt.Allots 210 & 217 Okura Parish Pt.Lot 1 DP.81469 Pt.Lots 1&2 DP.151705 Pt. Lot 1 DP.72059
	(B)	Pt.Allot 217 Okura Parish	Pt.Allot 210 Okura Parish Pt.Lot 1 DP.81469 Pt.Lots 1&2 DP.151705 Pt. Lot 1 DP.72059
	(C)	Pt. Lot 1 DP.81469	Pt.Allot 210 Okura Parish Pt.Lots 1&2 DP.151705 Pt. Lot 1 DP.72059
	(D)	Pt. Lot 2 DP.151705	Pt.Allot 210 Okura Parish Pt. Lot 1 DP.151705 Pt. Lot 1 DP.72059
	(E)	Pt. Lot 1 DP.151705	Pt.Allot 210 Okura Parish Pt. Lot 1 DP.72059
	(F)	Pt. Allot 210 Okura Parish	Pt. Lot 1 DP.72059
	Sec 19	Legal Road	Pt. Lot 1 DP.72059

Proposed Easements in Gross

Purpose	Shown	Servient Tenement	Grantee
Right of Way	(A)	Pt.Allot 219 Okura Parish	H.M.T. Queen
	(B)	Pt.Allot 217 Okura Parish	
	(C)	Pt. Lot 1 DP.81469	
	(D)	Pt. Lot 2 DP.151705	
Stormwater Drainage	(G) (J) & (L)	Pt. Lot 1 DP.81469	
	(H)	Pt. Lot 1 DP.151705	
	(I)	Pt. Lot 2 DP.151705	
	Sec5	Pt.Allot 217 Okura Parish	
	(K)	Pt.Allot 217 Okura Parish	

Approvals

Schedule of Areas

Severances

Shown	Description	Gazette / CT	Area
Sec 1	Pt.Allot 219 Okura Parish	GN C.884252.2	5578m²
Sec 3	Pt.Allot 217 Okura Parish	GN C.835749.3	5248m²
Sec 5			1328m²
Sec 6	Pt. Lot 1 DP.81469	CT 38B/351	9990m²
Sec 8			5359m²
Sec 9	Pt. Lot 1 DP.151705	GN C.537155.4	2.0894ha
Sec14			998m²
Sec 10	Pt. Lot 2 DP.151705	GN C.605235.2	1030m²
Sec 12			2789m²

Land To Be Declared Road (Motorway)

Shown	Description	Gazette / CT	Area
Sec 2	Pt.Allot 219 Okura Parish	GN C.884252.2	3.7542ha
Sec 4	Pt.Allot 217 Okura Parish	GN C.835749.3	1.4762ha
Sec 7	Pt. Lot 1 DP.81469	CT 38B/351	1.0984ha
Sec 13	Pt. Lot 1 DP.151705	GN C.537155.4	5755m²
Sec 11	Pt. Lot 2 DP.151705	GN C.605235.2	5248m²
Sec 16	Pt. Allot 210 Okura Parish	CT 38A/929	3601m²
Sec 17	Legal Road	Crown Grant	3482m²
Sec 18	Pt. Allot 210 Okura Parish	GN C.499201.2	4458m²

Land To Be Acquired For Road

Shown	Description	Gazette	Area
Sec 15	Pt.Allot 210 Okura Parish	GN C.499201.2	38m²

Total Area 13.9166ha

Comprised in

I, John Russell Bolam of Orewa, being a person entitled to practise as a registered surveyor, certify that–
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Survey Act 1986 and the Survey Regulations 1998.
(b) This dataset is accurate, and has been created in accordance with that Act and those Regulations.
Dated at Orewa this 12th day of June 2002 Signature [signature]

Field Book ____ p. ____ Traverse Book ____ p. ____
Reference Plans

Examined ____ Correct ____

Approved as to Survey [signature]
2/10/02 Approving ~~Chief~~ Surveyor

Deposited this ____ **day of** ____ **20**__

For Registrar-General of Land

File 14552-01
Received 13 JUN 2002 JC
Instructions

SO.308591

Approved LM 99/10

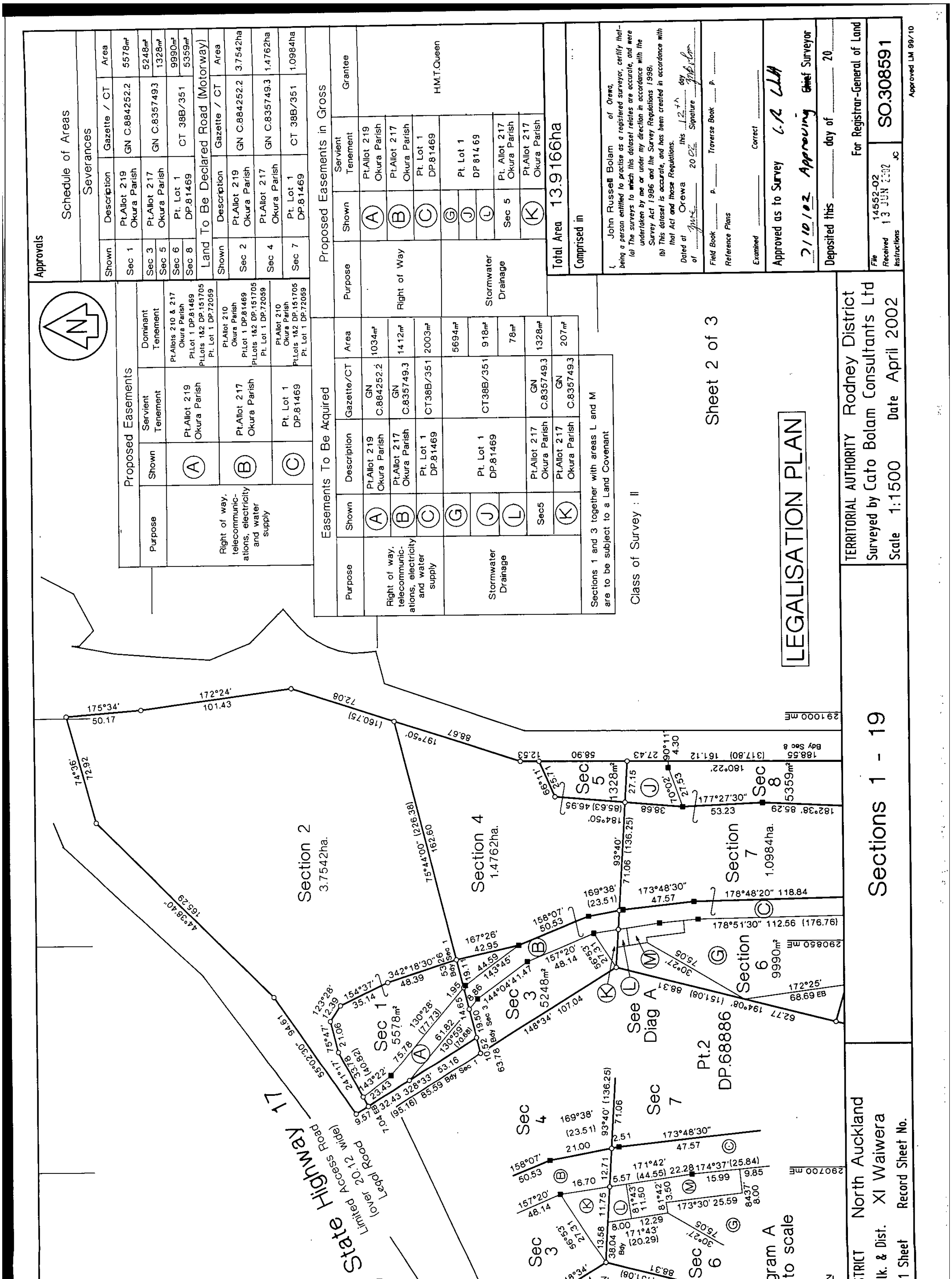
LEGALISATION PLAN

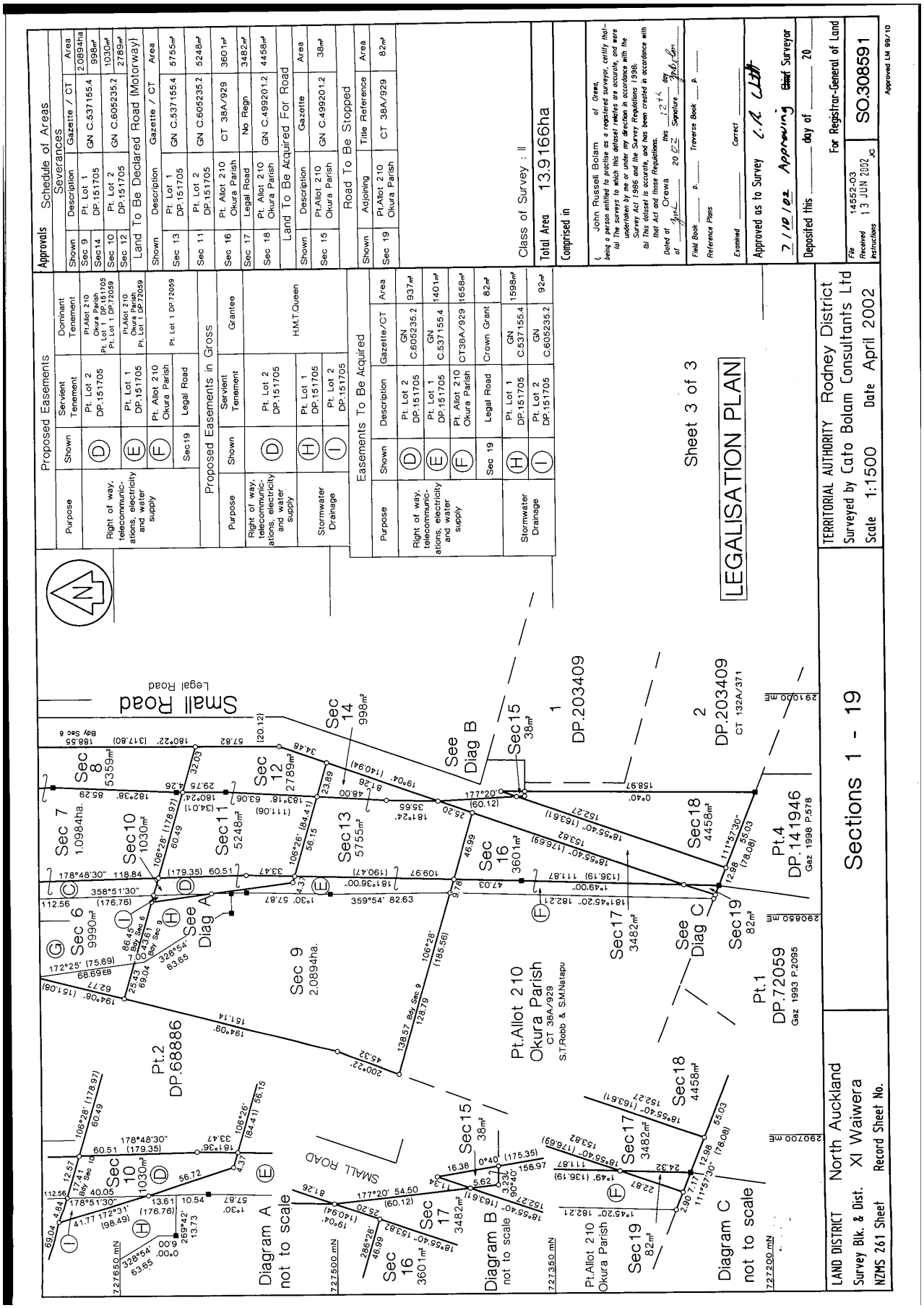
Class of Survey : II

Sheet 1 of 3

R.31601

LAND DISTRICT North Auckland **Survey Blk. & Dist.** XI Waiwera **NZMS 261 Sheet** **Record Sheet No.**	Sections 1 - 19	**TERRITORIAL AUTHORITY** Rodney District **Surveyed by** Cato Bolam Consultants Ltd **Scale** 1:3000 **Date** April 2002	


LEGALISATION PLAN
Sheet 2 of 3
Sections 1 - 19
Schedule of Areas
Severances
Land To Be Declared Road (Motorway)
Proposed Easements
Easements To Be Acquired
Proposed Easements in Gross
Total Area 13.9166ha
Section 2
3.7542ha.
Section 4
1.4762ha.
Section 7
1.0984ha.
Section 6
9990m²
State Highway 17
Limited Access Road
(over 20.12 wide)
Legal Road
Pt.2
DP.68886
Diagram A
not to scale
Class of Survey : II
Sections 1 and 3 together with areas L and M are to be subject to a Land Covenant
TERRITORIAL AUTHORITY Rodney District
Surveyed by Cato Bolam Consultants Ltd
Scale 1:1500 Date April 2002
LAND DISTRICT North Auckland
Survey Blk. & Dist. XI Waiwera
NZMS 261 Sheet Record Sheet No.
SO.308591
For Registrar-General of Land
Approved LM 99/10


LEGALISATION PLAN
Sheet 3 of 3
Sections 1 - 19
Schedule of Areas
Approvals
Proposed Easements
Proposed Easements in Gross
Easements To Be Acquired
Land To Be Declared Road (Motorway)
Land To Be Acquired For Road
Road To Be Stopped
Class of Survey : II
Total Area 13.9166ha
Comprised in
Small Road
Legal Road
Pt.2 DP.68886
Pt.Allot 210 Okura Parish
CT 38A/929
S.T.Robb & S.M.Natapu
Pt.1 DP.72059
Gaz 1993 P.2095
Pt.4 DP.141946
Gaz 1998 P.578
1 DP.203409
2 DP.203409
CT 132A/371
Sec 7 1.0984ha.
Sec 8 5359m²
Sec 9 2.0894ha.
Sec 10 1030m²
Sec11 5248m²
Sec 12 2789m²
Sec 13 5755m²
Sec 14 998m²
Sec 15 38m²
Sec 16 3601m²
Sec 17 3482m²
Sec18 4458m²
Sec19 82m²
Diagram A not to scale
Diagram B not to scale
Diagram C not to scale
LAND DISTRICT North Auckland
Survey Blk. & Dist. XI Waiwera
NZMS 261 Sheet Record Sheet No.
TERRITORIAL AUTHORITY Rodney District
Surveyed by Cato Bolam Consultants Ltd
Scale 1:1500 Date April 2002
SO.308591
For Registrar-General of Land
Approved LM 99/10

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **71145**
Land Registration District **North Auckland**
Date Issued 20 November 2003

Prior References
NA112A/485

Estate Fee Simple
Area 1.8559 hectares more or less
Legal Description Lot 1 Deposited Plan 318185
Registered Owners
Jai Soo Lee

Interests

548033.1 Gazette Notice declaring part State Highway No 1 (Awanui - Bluff) to be a limited access road - 18.10.1977 at 2.59 pm

5807046.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 20.11.2003 at 9:00 am

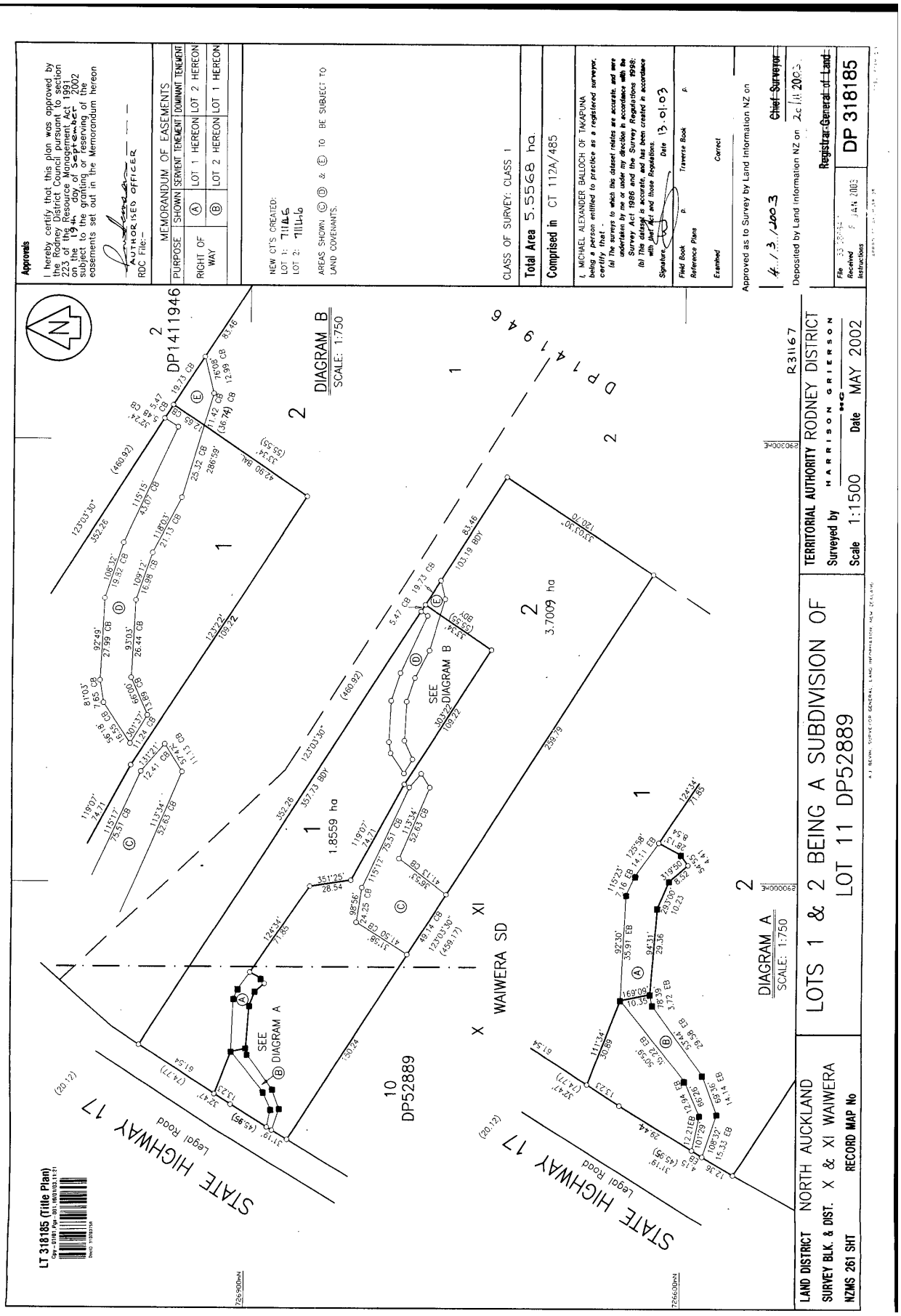
Appurtenant hereto is a right of way created by Easement Instrument 5807046.5 - 20.11.2003 at 9:00 am

Subject to a right of way over part marked A on DP 318185 created by Easement Instrument 5807046.5 - 20.11.2003 at 9:00 am

The easements created by Easement Instrument 5807046.5 are subject to Section 243 (a) Resource Management Act 1991

8507177.11 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am

10949639.3 Mortgage to Kookmin Bank - 4.2.2019 at 2:29 pm


Approvals
I hereby certify that this plan was approved by the Rodney District Council pursuant to section 223 of the Resource Management Act 1991 on the 19th day of September 2002 subject to the granting or reserving of the easements set out in the Memorandum hereon
AUTHORISED OFFICER
RDC File:-
MEMORANDUM OF EASEMENTS
PURPOSE | SHOWN | SERVIENT TENEMENT | DOMINANT TENEMENT
RIGHT OF WAY | (A) | LOT 1 HEREON | LOT 2 HEREON
(B) | LOT 2 HEREON | LOT 1 HEREON
NEW CT'S CREATED:
LOT 1: 71145
LOT 2: 71146
AREAS SHOWN (C) (D) & (E) TO BE SUBJECT TO LAND COVENANTS.
CLASS OF SURVEY: CLASS 1
Total Area 5.5568 ha.
Comprised in CT 112A/485
I, MICHAEL ALEXANDER BALLOCH OF TAKAPUNA being a person entitled to practice as a registered surveyor, certify that -
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Survey Act 1986 and the Survey Regulations 1998.
(b) This dataset is accurate, and has been created in accordance with Land Act and those Regulations.
Signature
Date 13.01.03
Field Book p Traverse Book p
Reference Plans
Examined Correct
Approved as to Survey by Land Information NZ on
4./3./2003
Chief Surveyor
Deposited by Land Information NZ on 24 JAN 2003
Registrar-General of Land
File
Received
Instructions
DP 318185
DIAGRAM B
SCALE: 1:750
DIAGRAM A
SCALE: 1:750
LOTS 1 & 2 BEING A SUBDIVISION OF LOT 11 DP52889
TERRITORIAL AUTHORITY RODNEY DISTRICT
Surveyed by HARRISON GRIERSON
Scale 1:1500 Date MAY 2002
LAND DISTRICT NORTH AUCKLAND
SURVEY BLK. & DIST. X & XI WAIWERA
NZMS 261 SHT RECORD MAP No
LT 318185 (Title Plan)
STATE HIGHWAY 17
Legal Road
WAIWERA SD
DP1411946
DP52889
R31167
SEE DIAGRAM A
SEE DIAGRAM B
1.8559 ha
3.7009 ha
A J BROWN SURVEY FOR GENERAL LAND INFORMATION NEW ZEALAND

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **71146**

Land Registration District **North Auckland**

Date Issued 20 November 2003

Prior References
NA112A/485

Estate	Fee Simple
Area	3.7009 hectares more or less
Legal Description	Lot 2 Deposited Plan 318185
Registered Owners	

YJS Holding Limited

Interests

548033.1 Gazette Notice declaring part State Highway No 1 (Awanui - Bluff) to be a limited access road - 18.10.1977 at 2.59 pm

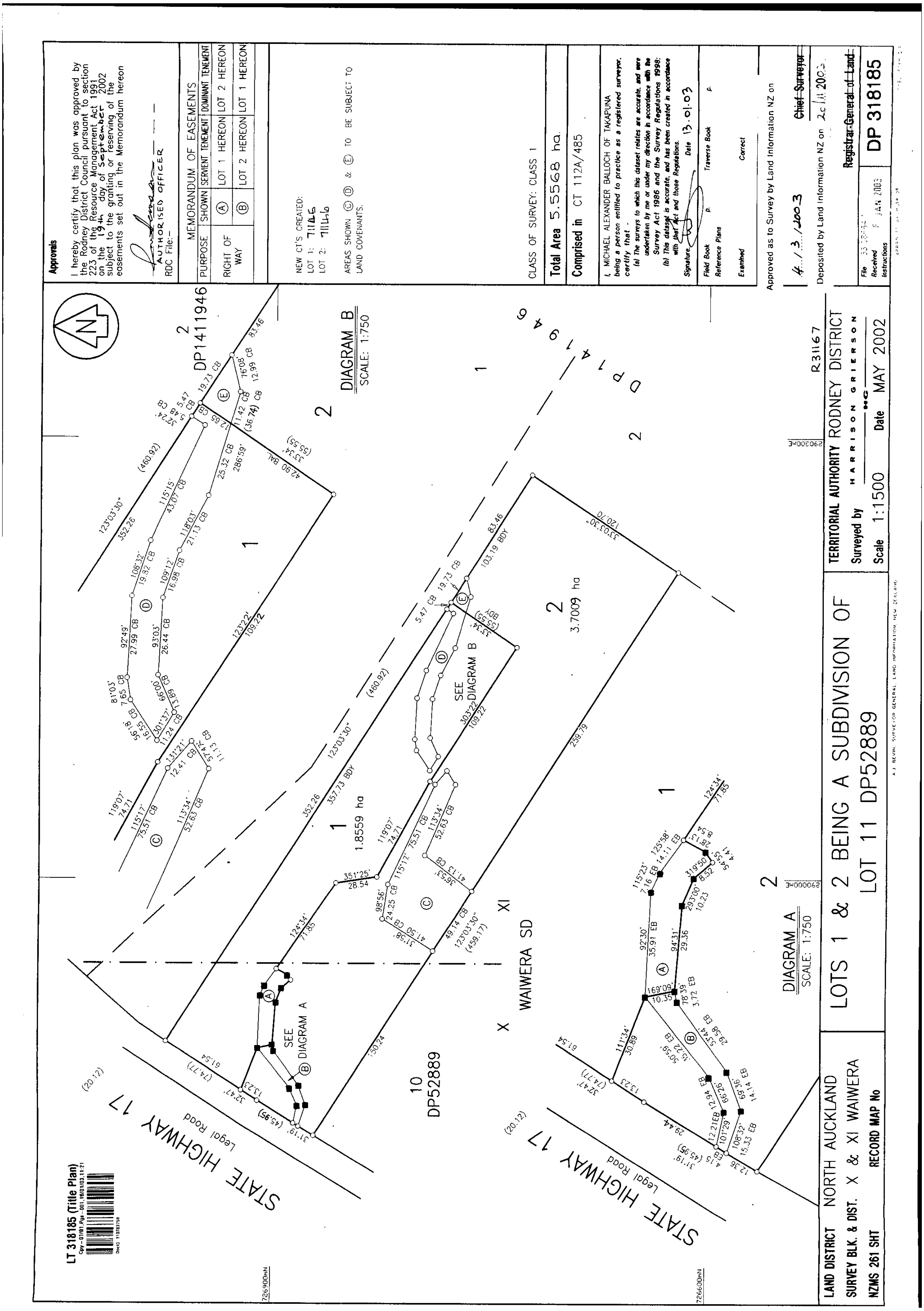
5807046.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 20.11.2003 at 9:00 am

Appurtenant hereto is a right of way created by Easement Instrument 5807046.5 - 20.11.2003 at 9:00 am

Subject to a right of way over part marked B on DP 318185 created by Easement Instrument 5807046.5 - 20.11.2003 at 9:00 am

The easements created by Easement Instrument 5807046.5 are subject to Section 243 (a) Resource Management Act 1991

8507177.11 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 31.5.2010 at 9:00 am


Approvals
I hereby certify that this plan was approved by the Rodney District Council pursuant to section 223 of the Resource Management Act 1991 on the 19th day of September 2002 subject to the granting or reserving of the easements set out in the Memorandum hereon
AUTHORISED OFFICER
RDC File:-
MEMORANDUM OF EASEMENTS
PURPOSE | SHOWN | SERVIENT TENEMENT | DOMINANT TENEMENT
RIGHT OF WAY | A | LOT 1 HEREON | LOT 2 HEREON
B | LOT 2 HEREON | LOT 1 HEREON
NEW CT'S CREATED:
LOT 1: 71145
LOT 2: 71146
AREAS SHOWN C D & E TO BE SUBJECT TO LAND COVENANTS.
CLASS OF SURVEY: CLASS 1
Total Area 5.5568 ha.
Comprised in CT 112A/485
I, MICHAEL ALEXANDER BALLOCH OF TAKAPUNA being a person entitled to practise as a registered surveyor, certify that -
(a) The surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Survey Act 1986 and the Survey Regulations 1998;
(b) This dataset is accurate, and has been created in accordance with that Act and those Regulations.
Signature Date 13.01.03
Field Book
Reference Plans
Examined
Traverse Book
Correct
Approved as to Survey by Land Information NZ on
4/3/2003
Chief Surveyor
Deposited by Land Information NZ on 20 JAN 2003
Registrar-General of Land
DP 318185
TERRITORIAL AUTHORITY RODNEY DISTRICT
Surveyed by HARRISON GRIERSON
Scale 1:1500
Date MAY 2002
R31167
LOTS 1 & 2 BEING A SUBDIVISION OF LOT 11 DP52889
LAND DISTRICT NORTH AUCKLAND
SURVEY BLK. & DIST. X & XI WAIWERA
NZMS 261 SHT
RECORD MAP No
DIAGRAM A
SCALE: 1:750
DIAGRAM B
SCALE: 1:750
SEE DIAGRAM A
SEE DIAGRAM B
DP 141946
1
2
1.8559 ha
3.7009 ha
10 DP52889
X WAIWERA SD XI
STATE HIGHWAY 17
Legal Road
LT 318185 (Title Plan)

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier **72678**

Land Registration District **North Auckland**

Date Issued 23 December 2002

Prior References

GN 5446971.6 GN C503245.2

Estate Fee Simple

Area 3.4377 hectares more or less

Legal Description Section 1 Survey Office Plan 308831

Registered Owners

Evan Lance Kemp and Tracey Michelle Soffe

Interests

Appurtenant hereto are right of way, telecommunications, electricity & water supply easements created by Easement Instrument 5603637.1 - 29.5.2003 at 9:00 am

Appurtenant hereto is a right of way, telecommunications, electricity and water supply created by Easement Instrument 5692624.2 - 14.8.2003 at 9:00 am

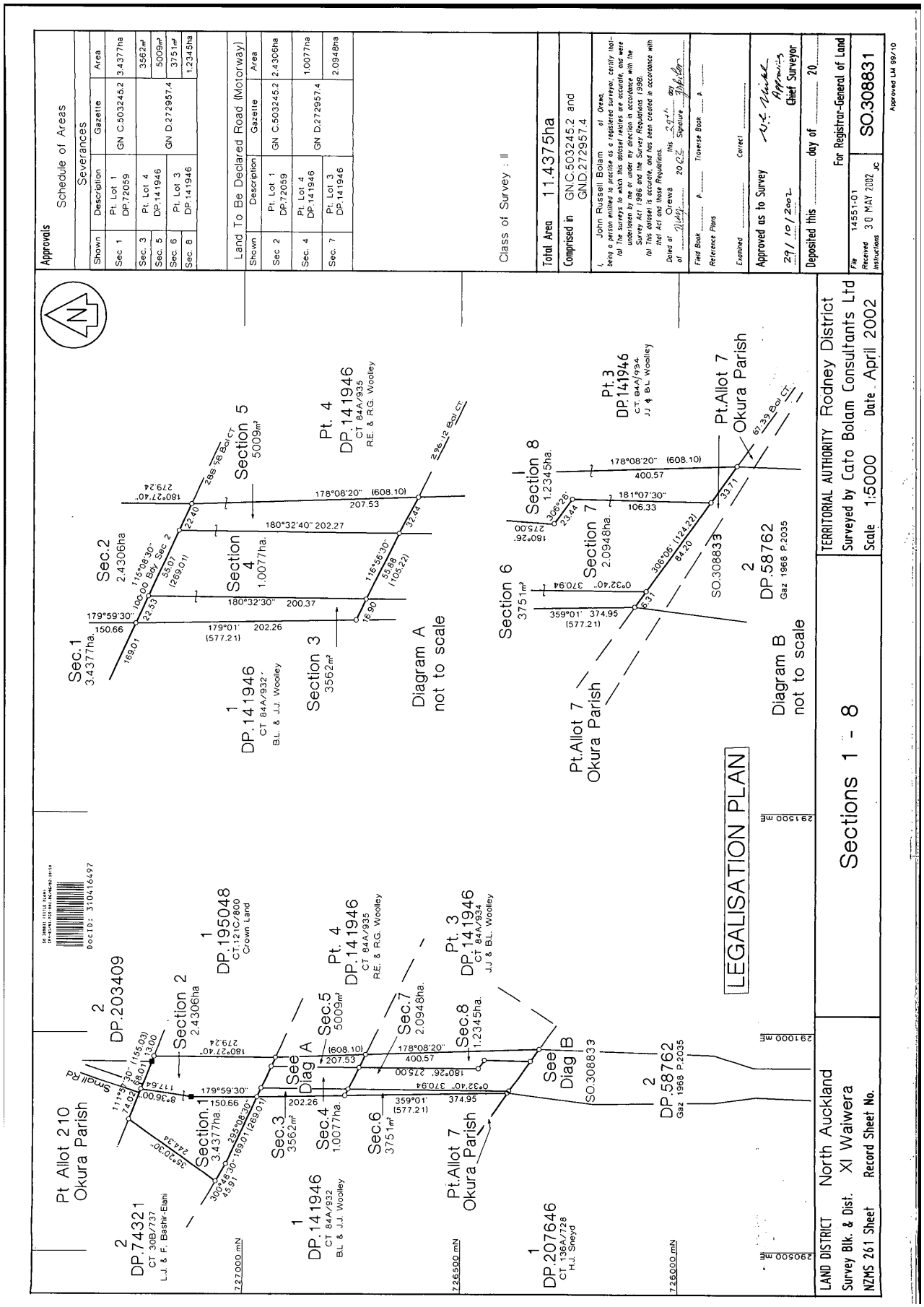
Subject to Part IVA Conservation Act 1987

Subject to Section 11 Crown Minerals Act 1991

8632267.1 Notice pursuant to Section 91 Transit New Zealand Act 1989 - 9.11.2010 at 7:00 am

11453754.5 Mortgage to First Mortgage Custodians Limited - 14.1.2020 at 9:02 am

12558660.1 CAVEAT AGAINST THE SHARE / INTEREST OF EVAN LANCE KEMP BY LEGAL SERVICES COMMISSIONER - 12.9.2022 at 4:10 pm


LEGALISATION PLAN
Sections 1 - 8
Diagram A not to scale
Diagram B not to scale
Schedule of Areas
Severances
Land To Be Declared Road (Motorway)
Class of Survey : II
Total Area 11.4375ha
Comprised in GN.C.503245.2 and GND.2729574
Approved as to Survey
Deposited this
For Registrar-General of Land
LAND DISTRICT North Auckland
Survey Blk. & Dist. XI Waiwera
NZMS 261 Sheet Record Sheet No.
TERRITORIAL AUTHORITY Rodney District
Surveyed by Cato Bolam Consultants Ltd
Scale 1:5000 Date April 2002
SO.308831
Approved LM 99/10

APPENDIX C: Concept development plan

3.1 Development Concept Plan

The site opportunities and constraints previously identified along with input from the client and other various specialists engaged on this project has helped to inform the adjacent development concept plan for discussion purposes.

Legend

- Existing road network (Dairy Flat Highway, SH1, Pine Valley Road
- Existing parcels
- Existing viewshaft from SH1 to Lloyds Hill and the hinterlands
- Existing permanent and intermittent streams with 20m riparian corridors
- Existing wetlands (10m offsets have been assumed but not graphically represented)
- Proposed light industrial developable area
- Proposed public open space for amenity and ecological purposes - collocated with existing waterways / features and potential future detention facilities.
- Proposed gateways to the development
- Proposed collector road network
- Proposed local road network
- Proposed landscape buffers along SH1 and Dairy Flat Highway (extents provided by Boffa Miskell)
- Proposed stream crossing points
- Possible commercial / plaza space locations
- Possible key pedestrian / cycle connections. It is assumed these will continue through the open space / riparian areas to form a cohesive network
- Proposed 30m height variation

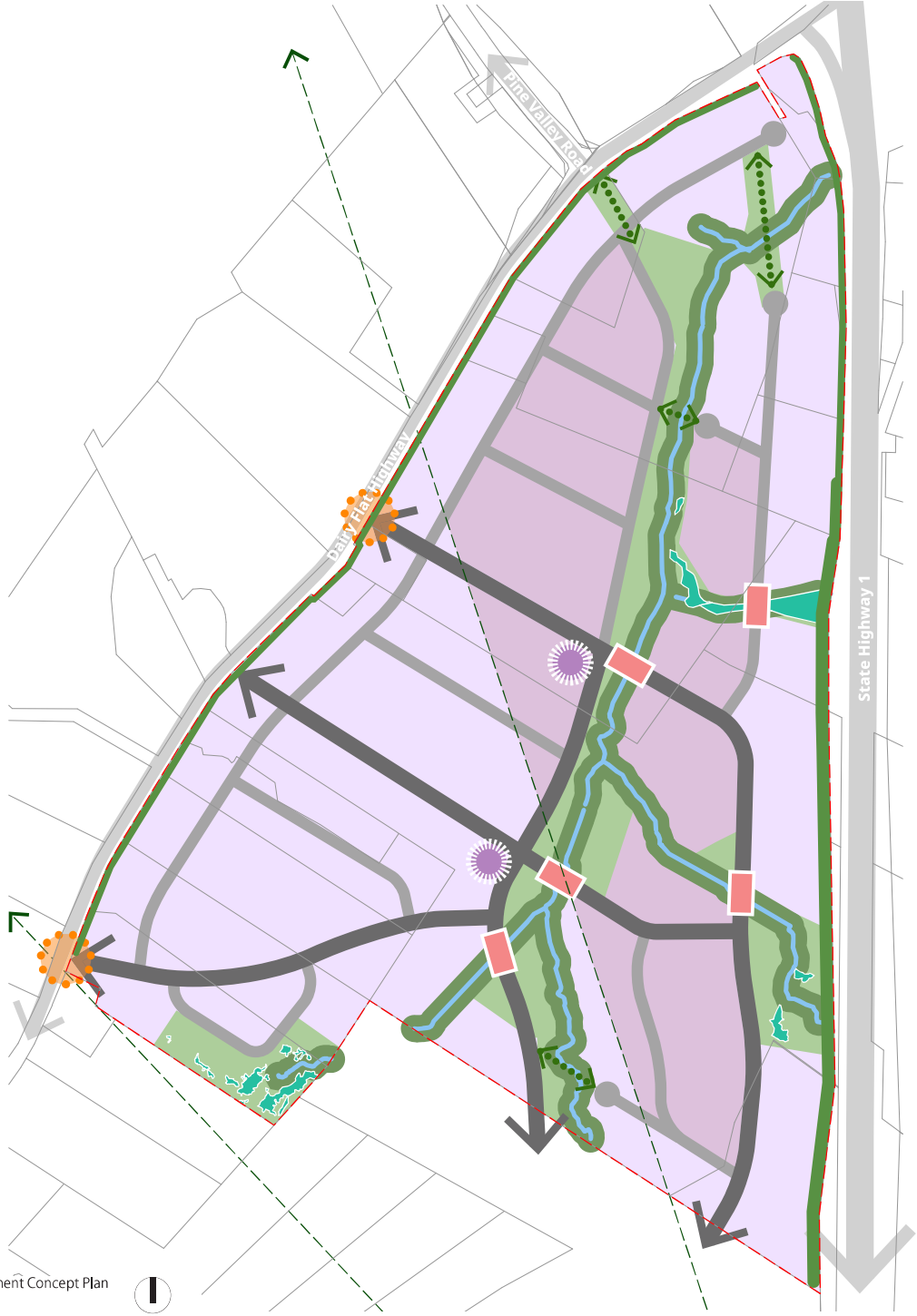
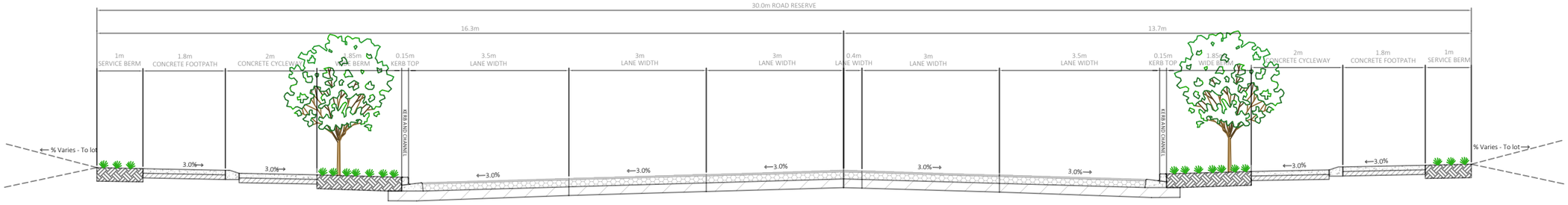


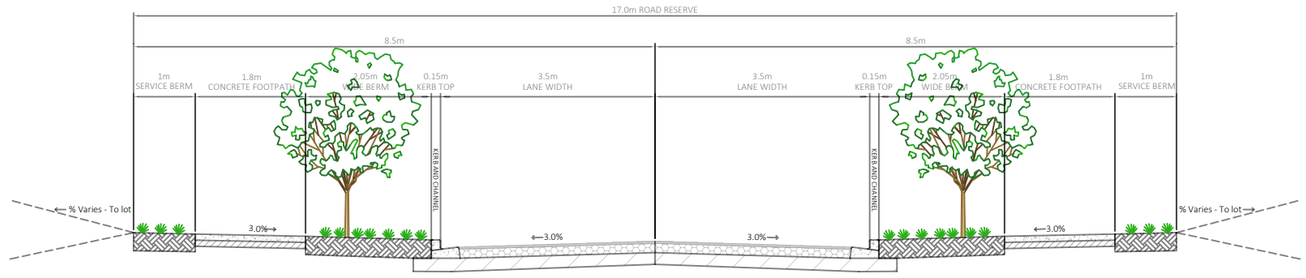
Figure 01 - Development Concept Plan
1:7500 at A3

DRAFT WORK IN PROGRESS

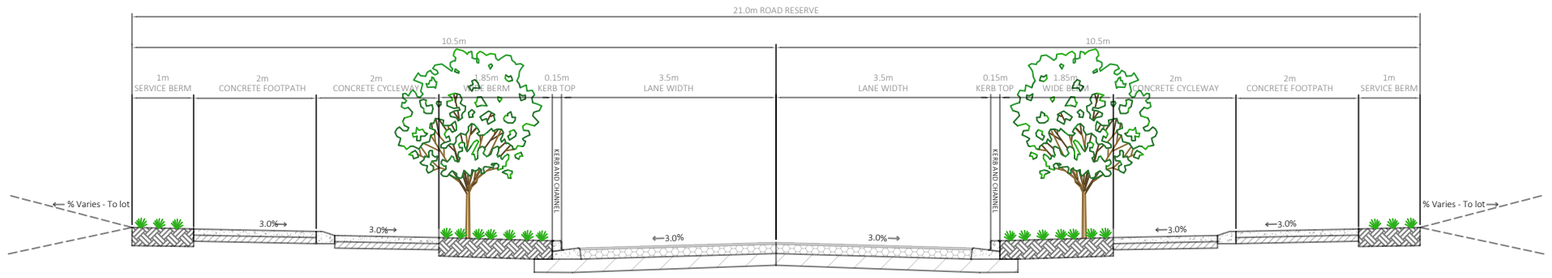
APPENDIX D: Road cross sections



SILVERDALE WEST PLAN CHANGE - TYPICAL CROSS SECTION - ARTERIAL ROAD - RIGHT TURN BAY
SCALE 1:100 (A3)



SILVERDALE WEST PLAN CHANGE - TYPICAL CROSS SECTION - LOCAL ROAD
SCALE 1:100 (A3)



SILVERDALE WEST PLAN CHANGE - TYPICAL CROSS SECTION - COLLECTOR ROAD
SCALE 1:100 (A3)

REVISION	AMENDMENT	BY
_	_	_
_	_	_
_	_	_
_	_	_
_	_	_

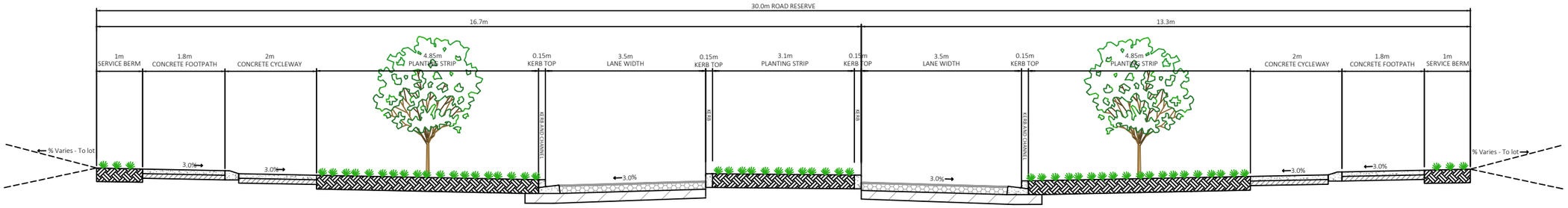
DESIGNED: MO
DRAWN: MO
RELEASED: SB

CIVIX

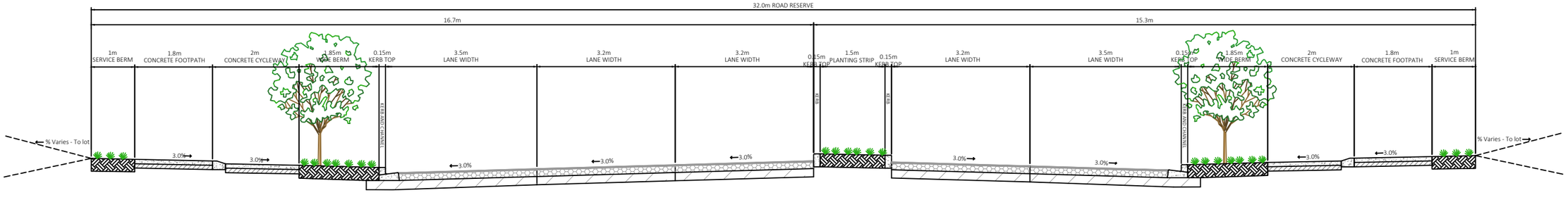
PROJECT: SILVERDALE WEST PLAN CHANGE

TITLE: ROADING CROSS SECTIONS

STATUS: FOR INFORMATION ONLY
DRAWING NO: 34000
SCALE & SIZE: - A3
REV: 28/03/2023



SILVERDALE WEST PLAN CHANGE - TYPICAL CROSS SECTION - ARTERIAL ROAD - TWO LANES
SCALE 1:100 (A3)



SILVERDALE WEST PLAN CHANGE - TYPICAL CROSS SECTION - ARTERIAL ROAD - LEFT TURN
SCALE 1:100 (A3)

_	_	_	DESIGNED: MO	CIVIX	PROJECT: SILVERDALE WEST PLAN CHANGE	TITLE: ROADING CROSS SECTIONS	STATUS: FOR ONFORMATION ONLY
_	_	_					DRAWING NO: 34001
_	_	_	DRAWN: MO				SCALE & SIZE: - A3 / REV: 28/03/2023
_	_	_					
_	_	_	RELEASED: SB				
REVISION	AMENDMENT	BY					

APPENDIX E: Tuflow flooding results and methodology

CIVIX

PLANNING
ENGINEERING
SURVEYING

+64 9 303 1113
www.civix.co.nz
Level 1, 87 Albert St, Auckland

31/03/2023

SILVERDALE WEST PRIVATE PLAN CHANGE

FLOOD MODELLING METHODOLOGY

+64 9 303 1113
www.civix.co.nz
Level 1, 87 Albert Street, Auckland
PO Box 5204 Wellesley St, Auckland 1141

Silverdale West Private Plan Change , | Flood Modelling Methodology

Dear Fletcher Development,

Thank you for the opportunity for Civix Limited to provide an Flood Modelling Methodology for the proposed Silverdale West private plan change.

Please do not hesitate to contact us if you have any questions on this report,

Written By:

Chris Turner
Civil Designer
0274197013210 829 4484
chris@civix.co.nz

Civix Limited

Reviewed By:

Sam Blackbourn
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1. Introduction

This document details the methodology utilised by Civix Ltd in the modelling of flood hydrology using the Tuflow modelling package and ArcGIS Pro. The full TuFlow modelling package for a project can be provided on request for review as required. Any deviation from this standard methodology will be outlined in the flooding section of the Infrastructure Report provided for the proposed plan change. Refer to the Infrastructure Report for details of the proposal and the exiting and proposed site descriptions.

2. Extent

The extent of the flood model has been set to account for upstream, adjacent and downstream hydraulic features that could affect the location and extent of flow into, through and out of the site. The location of overland flow paths in Council GIS is also taken into account to ensure flow paths entering the site are captured. The site is characterised by John Creek which flows in a northerly direction, exiting the site via a culvert under State Highway 1, and discharging to Karepiro Bay through Weiti River. The model extent captures the downstream outlet of the two culverts in order to ensure any backwater effects are modelled. The extent also captures the high-point of the whole contributing catchment which roughly aligns with Dairy Flat Highway to the north-west and Wilks Road to the south.

3. Inflows

Site characteristics for the TuFlow modelling are determined based on an Auckland region-wide overlay of rainfall depths and soil classifications. The rainfall depths have been found through a linear interpolation for each storm based on the rainfall contour plots in TP108. Rainfall depths are then adjusted for climate change to give rainfall depths used in the modelling.

Soil classifications are determined based on soil mapping information available from Auckland Council and also national datasets. These datasets have been combined to provide an SCS soil classification across the Auckland region. This SCS soil classification is then used to determine the permeable curve number for the site.

The upstream catchment areas are set based on the area accumulation model in the region-wide GIS layer. Catchment lengths are determined through the model designer tracing the catchment length in GIS, which is then draped on the national 15m resolution LiDAR DEM and the equal area slope calculated to give the upstream catchment slope. The channelisation factor is set based on the nature of the upstream catchment and using TP108.

The catchment factors are then used to calculate inflow hydrographs using the SCS Curve runoff method, as recommended in TP108.

4. Levels and Landuse

Model levels are determined based on survey and LiDAR information. A TIN is prepared for the existing and proposed scenarios and used to create the level raster used by the TuFlow modelling engine.

To determine the Manning's values and to model the existing and proposed buildings in the catchment an analysis of buildings and surfaces is undertaken. Firstly, the model determines the location of existing buildings in the catchment and deactivates these cells in the 2D domain, unless the building is flagged as being on poles in the GIS data.

For the remaining active areas of the model, the Manning's value is set based on the surface type. Manning's values used in this model are given below in Table 1.

Table 1 TuFlow Landuse Mannings N Values

Landuse Description	Pipe	Grass	Pave Lot	Pave Road	Stream	Retaining Wall	Building
Mannings N Value	0.014	0.030	0.020	0.015	0.050	0.100	0.150

5. Pipes

Pipe assets that are sufficiently sized to not be considered 100% blocked in the Auckland Council Modelling Guidelines are included in the model as 1D assets with 1D to 2D connections made at the manhole locations. Blockage factors are applied based on the guidance in the Auckland Council Stormwater Code of Practice. The ground level rasters for the model are adjusted at manhole locations to lower levels around the manhole. This ensures the manhole is filled up prior to overland flow proceeding downstream of the manhole location. Some invert information for existing assets has been assumed using minimum grades from the Code of Practice where information is not available from GIS or as-builts. In particular, levels for two existing culverts running under Hibiscus Coast Highway have been assumed as these are not available from Auckland Council, however the location of inlet/outlet structures and the diameter of the culverts was obtained from as-built records.

Inlet losses are modelled via an inlet loss on the pipe model link, rather than the manhole model node. An inlet loss value of 0.5 is used in the model on the links. No head discharge relationship is applied on the manhole itself.

6. Outflows

Outflows from the modelled area are modelled using a Manning's value channel set at a 1% grade. The TuFlow software automatically determines the ground profile along the outlet location and develops a stage storage relationship using the Manning's N values from **Error! Reference source not found.**. These are then used to control o utflow from the model. The model extent includes significant downstream hydraulic features, so the effect of the outflow stage storage should be reduced.

7. Afflux Plots

Pre- and post-development scenario results are presented as afflux plots as well as with the results of the pre- and post- models in the 50000 drawing series. These drawings have three panes, the left-hand pane is the existing model results, the middle pane is the proposed modelling results, and the right-hand pane is the afflux results which is the differences between the pre- and the post- modelling results. An afflux plot is similar in nature to a cut-fill plan, comparing the existing and proposed water level surfaces.

The output existing and proposed drawings show the model depth via colours bands and, flow directions at the time of peak flow, peak depth and velocity values are labelled across the drawing to provide further information on modelling results. The afflux plots are labelled with the depth difference and velocity differences between the pre- and post- modelling scenarios.

8. Model Health

To determine the accuracy of the modelling, we consider the model health parameters shown below as well as any surrounding flood level information from Council where available to determine that the results presented in our analysis are accurate. The results of the modelling undertaken are shown below in Table 2, in general, a Final Cumulative ME of less than 5% is considered good and less than 10% is considered adequate for land development assessment purposes. Note that several scenarios have been run in the analysis of this development, with the A3 scenario being reflected in the results presented as part of the Infrastructure Report for the proposed plan change.

Table 2 TuFlow Model Run Statistics

Item	Units	01_Ex100yr	02_Pr100yr	03_Ex100yr	04_Pr100yr	05_Ex100yr	06_Pr100yr
Warnings During Simulation		47,421	142,813	47,421	31,695	47,421	40,558
Total Volume Out	m³	2,535,935	3,518,397	2,535,935	2,620,981	2,535,935	2,611,675
Volume Error	m³	41100 or 0.9%	962129 or 17.5%	41100 or 0.9%	62881 or 1.5%	41100 or 0.9%	55408 or 1.2%
Final Cumulative ME	%	0.01%	0.17%	0.01%	0.01%	0.01%	0.01%
Peak Flow In	m³/s	276.100	289.300	276.100	289.700	276.100	289.300
Peak Flow Out	m³/s	121.300	150.400	121.300	111.900	121.300	130.300

9. Results

Please refer to the Infrastructure Report which includes flood modelling results plans and associated sections/calculations which compare the pre-development level for the site and show the estimated effects to the upstream/downstream properties post-development. A discussion on the results and how they impact the development is included in the flooding section of the infrastructure report.

10. Limitations

This assessment contains the professional opinion of Civix Limited Staff relating to this development. Civix Limited Staff used their professional judgement and acted in accordance with the standards of care and skill normally exercised by professional engineers providing similar services in similar circumstances. No other express or implied warranty is made as to the professional advice contained in this report.

We have prepared this report in accordance with the brief provided and following our terms of engagement. The information contained in this report has been prepared by Civix Limited for the client and is exclusively for its client use and reliance. It is not possible to make an assessment of this report without understanding the terms of engagement under which it has been prepared, including the scope of the instructions and directions given to and the assumptions made by Civix Limited. The assessment will not address issues which would need to be considered for another party if that parties' particular circumstances, requirements and experience were known and, further, may make assumptions about matters of which a third party is not aware. No responsibility or liability to any third party is accepted for any loss or damage arising out of the use of or reliance on this assessment by any third party.

The assessment is also based on information that has been provided to Civix Limited from other sources or by other parties. The assessment has been prepared strictly on the basis that the information that has been provided is accurate, completed, and adequate. Assumptions have been made in the preparation of this analysis, as detailed in this report. To the extent that any information is inaccurate, incomplete or inadequate, Civix Limited takes no responsibility or liability whatsoever for any loss or damage that results from any design and assessment based on information that has been provided to Civix Limited.

APPENDIX F: Stormwater management plan

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23/05/2024

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Development of Silverdale West Plan Change | Stormwater Management Plan

Dear Hamish,

Thank you for the opportunity for Civix Limited to provide an Stormwater Management Plan for the Proposed Plan change for Silverdale West.

The report and drawings contained in this document show infrastructure details for the Development of Silverdale West Plan Change.

Please do not hesitate to contact us if you have any questions on this report,

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Appendix A - Drawings

Drawing Series	Description
30001	Catchment Plan
55000	TuFlow Flooding Results
55500	TuFlow Section(s)

Appendix B – TuFlow Flooding Models

Appendix C – Silverdale River Styles Framework

Appendix D – Wetland Sizing Calculations

Appendix E – Figures for details

Link to above documents: SMP Supporting Documents

References

Auckland Council. (2017, December). *Geotechnical Topic Report: Silverdale West Dairy Flat Business Area Structure Plan*.

Tonkin & Taylor Ltd. (2013). *Geotechnical Desk Study North and North-West Auckland Rural Urban Boundary Project*.

Auckland Council. (2013). *Auckland Unitary Plan stormwater management provisions: Technical basis of contaminant and volume management requirements* (TR2013/035).

URS. (2010). *Silverdale South Integrated Catchment Management Plan and Network Management*.

Auckland Council. (2021). *Silverdale River Styles – Initial Desktop Analysis*.

Brierley, G. J., & Fryirs, K. A. (2013). *Geomorphology and River Management: Applications of the River Styles Framework*. [Publisher if known].

Auckland Council. (2022, November 25). *Silverdale West Industrial Plan Change Stormwater Management Plan (Draft)*.WSP. (2018, November 1). *Silverdale West Dairy Flat Business Area Structure Plan*.

1. Executive Summary

The purpose of the Stormwater Management Plan is to inform the proposed Private Plan Change for Silverdale West and provide guidance on how the stormwater and existing freshwater system are to be managed when developing within the plan change area. This Stormwater Plan has been developed to achieve consistency with the objectives and policies of the Auckland Unitary Plan as well as Auckland Council's Guideline Documents and industry best practice options.

The proposed Stormwater Management Plan is consistent with the Silverdale West Dairy Flat Industrial Area Structure Plan and the SMP written by WSP/Opus in November 2018 and the draft SMP prepare by Auckland Council dated 25/11/22.

The Plan Change Area is located within the Silverdale South Catchment, west of the Auckland Northern Motorway (SH1). The development is bounded by SH1 on the northeast, Wilks Road on the south Dairy Flat Highway Road on the West. The site ultimately drains to Karepiro Bay via Weiti River.

The Stormwater Management Plan seeks to establish a cohesive approach to the management of stormwater runoff by specifying controls on the quality and quantity of the runoff and requiring ecological enhancements including:

- Identify Best Practice Options for Stormwater treatment for the development area.
- Promote Water Sensitive Design to mitigate adverse effects of development on the receiving environment.
- Minimise discharge of contaminants into the receiving environment
- Protect and improve existing freshwater systems.
- Not worsen downstream flooding

Proposed methodologies to achieve the above outcomes include:

- Provide for stormwater treatment either at source or within artificially constructed wetlands (communal wetlands)
- Locating the natural wetlands to be retained upstream of the development area and treatment devices, thereby ensuring the hydrology of the existing natural wetlands will not be significantly affected by the development.
- Provide for SMAF-1 equivalent hydrology treatment for all impervious areas.

Civix have been engaged to undertake civil design for the proposed plan change for Silverdale West. The proposed industrial zoning area of 107ha includes new public local and collector roads. The stormwater management strategy for the site has been developed to meet the requirements in the Auckland Unitary Plan, specifically the provisions set out in the following sections:

- Section E1 – Water quality and integrated management,
- Section E8 – Stormwater discharge and diversion
- Section E9 – High contaminant generating carparks and high use roads.
- Section E10 – Stormwater management area – Flow 1 and Flow 2
- Section E36 – Natural hazards and flooding

This report also outlines the management approach / key elements of the catchment and provides an assessment, which includes such detail on the scale and significance of the effects of the proposal, of how an Integrated Stormwater Management Approach has been adopted in the design and associated stormwater management in

accordance with the policies in the AUP Sections E1.3, B7 and B8 (See Annexure 1). This assessment shows how the SMP seeks to:

- Minimise the stormwater related effects of development.
- Retain/restore natural hydrology as far as practicable.
- Minimise the generation and discharge of contaminants (including gross stormwater pollutants) and stormwater flows at source.
- Minimise temperature related effects.
- Enhance freshwater systems including streams and riparian margins.
- Minimise the location of engineered structures in streams. Protect the values of Significant Ecological Areas as identified in the Auckland Unitary Plan

A summary of the stormwater management strategy for the site is summarised in Table 1-1 below.

Table 1-1 Stormwater Management Summary

Requirement	**Design response**
Water Quality	Communal artificially constructed wetlands are proposed for site runoff. The artificially constructed wetlands will be designed and constructed in accordance with GD01.
SMAF1 - Retention (5 mm) and reuse on site	Public Road Corridors: Impervious areas along public road corridors will undergo retention measures utilising GD01 recommended devices. These devices may include Infiltration devices, Bioretention Swales, Rain Gardens, Stormwater Tree Pits, or Planter Boxes wherever practicable. Private Lots: Retention of runoff from impervious areas within private lots will be achieved through the installation of rainwater tanks which will collect roof water, and then be reused for non-potable purposes. Considering the future transition of the site into a light industrial zone, any retained water not utilised within a 24-hour period will be added to the detention volume in Communal Wetland to augment overall stormwater management capacity. Note, in cases where these devices are not practical, then these areas will be integrated into a communal wetland as additional detention.
SMAF1 – Detention (95th percentile)	Detention for the site is provided via communal artificially constructed wetlands which meet the NDC objectives.
Stream hydrology	No direct discharge to stream and natural wetlands is permitted. Stormwater discharge into the stream only occurs once the runoff is treated within the artificially constructed communal wetlands. See section 6.2.2. The communal wetlands are designed to provide extended detention for stream protection, 2 year and 10 year peak flow mitigation.
Stream Erosion	Determine erosive flow levels and hold back flows on site for as long as practicable below these values to mitigate effects of development on downstream erosion. Provide riparian planting along stream length to reinforce banks and provide a buffer from the development.
Primary Drainage Network	The underground drainage network will be sized for 10% Annual Exceedance Probability (AEP) design storm. The design ensures that there is sufficient capacity within the pipe network downstream of the connection point to cater for the stormwater runoff associated with the development in a 10% AEP event including incorporating flows from contributing catchments at maximum probable development with expected mitigation for upstream areas. See section 6.2.3.

Requirement	Design response
Flood Hazard Management	TuFlow modelling has been carried out on the development and found that the design of the development safely conveys flows through the site. The modelling also found increases in flood levels downstream in the 1% AEP event from the development if no mitigation is included in the design. To maintain existing flow properties flood storage is provided onsite as the mitigation to ensure no adverse effect to downstream and neighbouring properties.
Buildings 1% AEP event	No buildings are proposed within the 1% AEP and floor levels are set to provide the required freeboard in accordance with Auckland Council Stormwater Code of Practice (SWCoP). See section 6.2.4.

2. Existing Site Description

The Plan change area totals approximately 107 hectares and is located north of Wilks Road and bound between the Northern Motorway and Dairy Flat Highway. The area is characterised by John Creek running north-south with an associated low-lying floodplain area. John Creek flows northward through the site and exits via an existing culvert under the Northern Motorway.

The site comprises easy to moderate slopes from John Creek up to Dairy Flat Highway and Wilks Road which sit around 30-50m higher than the stream. Slopes are steepest closer to the ridgelines where gradients are around 12.5 – 20%. Some steeper areas (up to 20% grade) are present to the north of the plan change area, however this area is limited in extent, and indicative 3D modelling shows these areas can be modified in order to create lot platforms and roads with suitable grades.

The proposed Plan Change seeks to rezone a 107ha of land between State Highway 1 and Dairy Flat Highway from Future Urban zone to light industry zone. Figure 1 below shows the indicative extent of plan change area, stream channel, existing wetlands, indigenous vegetation and the associated buffers.

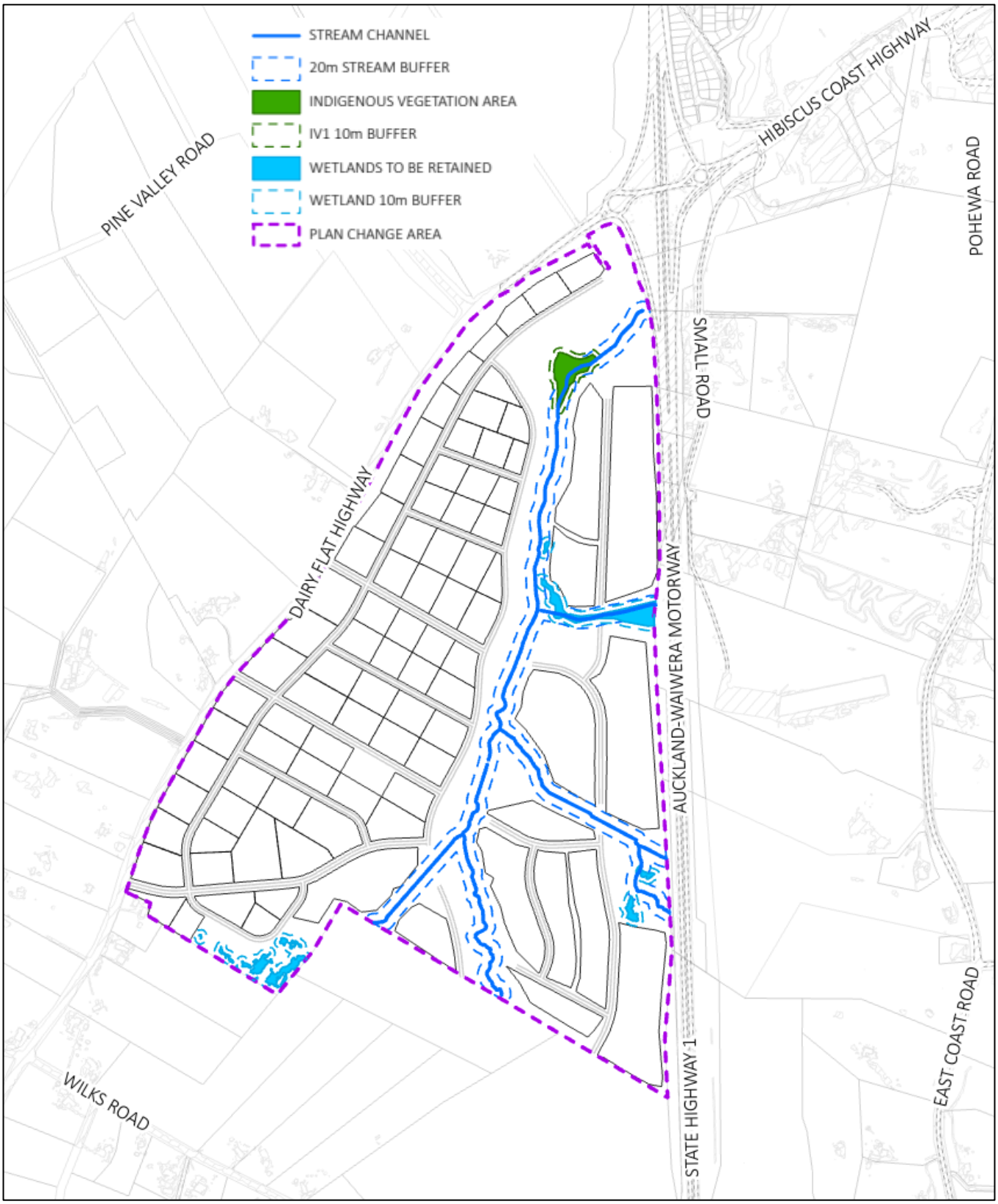


Figure 1: Silverdale West Plan change area *(Refer to Appendix E for more details)*

The subjected site comprises of 14 parcels of land and is predominantly covered in grassed pasture with existing buildings located on all the addresses listed in Table 2-1. except for 1738, Sec 6 SO 308591 and Lot 2 DP 480626 Dairy Flat Highway.

Table 2-1 - Properties affected by the proposed private plan change

Property Address	Legal Description	RT Number	Title Area	Registered Owner(s)
193 Wilks Road	Lot 1 DP 433431	527370	56.0419	Wilks Road 2014 Ltd
1636 Dairy Flat Highway	Lot 1 DP 208687	NA136D/722	59.245	Wilks Road 2014 Limited
1638 Dairy Flat Highway	Lot 1 DP 46158	NA1698/16	0.3703	Robert George Woolley, Rong Everlyne Woolley
1646 Dairy Flat Highway	Lot 1 DP 74321	NA30B/736	0.7802	Geok Mui Law, Huiping Sun
1660 Dairy Flat Highway	Lot 2 DP 74321	NA30B/737	20.2365	Fletcher Development Ltd
1686 Dairy Flat Highway	Lot 1 DP 69561	NA25C/412	0.7809	Stephen Rodney Wagstaff and Beth Rose Wagstaff
1700 Dairy Flat Highway	Pt Lot 1 DP 68886	NA25A/502	2.6999	Elaine Alice Butler-Stoney
1732 Dairy Flat Highway	Pt Lot 2 DP 68886	NA25A/503	16.3822	YJs Holding Limited
1738 Dairy Flat Highway	Lot 1 DP 480626	672036	0.5481	Mammoth Ventures Ltd
1744 Dairy Flat Highway	Sec 9 SO 308591, Sec 10 SO 308591	65588	2.1924	DP Boocock No 2 Trustee Ltd
1748 Dairy Flat Highway	Pt Allot 210 Psh Of Okura SO 18072, Sec 19 SO 308591	111842	2.7781	DP Boocock No 2 Trustee Ltd
1748A Dairy Flat Highway	Sec 1 SO 308831	72678	3.4377	Evan Lance Kemp and Tracey Michelle Soffe
Dairy Flat Highway	Sec 6 SO 308591	65593	0.99	Papanui Station House Limited
Dairy Flat Highway	Lot 2 DP 480626	672037	0.5345	DP Boocock No 2 Trustee Ltd

There is an existing area of indigenous vegetation located in the centre north of the site which meets the criteria for identification as a Significant Ecological Area, and is considered to be an area of significant indigenous vegetation. Therefore, it is proposed to retain this area and include a 10m buffer margin, zoning approximately 4,830m^2 as Special Ecological Area. The width of John Creek also indicates that a 20 m Esplanade Reserve setback may be triggered under the RMA when consents for development of the site are sought. Refer to the Ecological Values Assessment prepared by RMA Ecology for further details.

The Plan Change Area comprises soft soils which are potentially subject to load induced settlements and unstable slopes. Careful remediation and management will be required to ensure stability across the site and that future lots can be created with any risk minimised.

2.1. Topography

The Silverdale South catchment and has a total area of 557 ha which drains to the Weiti River. The plan change area is located within this catchment, consisting of 107 ha. The topography generally slopes down toward a north draining gully which runs through the approximate centre of the site and exits the site near the northeast corner underneath SH1. The east has a slight gradient towards the centre of the site, whereas the west of the site is moderately steep.

2.2. Geotechnical

Geotechnical assessment for the site has been completed by CMW Geosciences (CMW).

Geological ground modelling revealed three distinct landforms across the site, which likely reflects different geological units. These areas are predominately underlain with Mangakahia complex, Mahurangi Limestone and Tauranga Group Alluvium respectively. Minor earthworks and fills have been carried out in the past across the site to form farms, drainage channels and to level building platforms. The geomorphology of the site was mapped by examination of aerial photography stereo pairs, and during a site walkover, and is shown in the Geomorphology Plan in Figure 2 below.

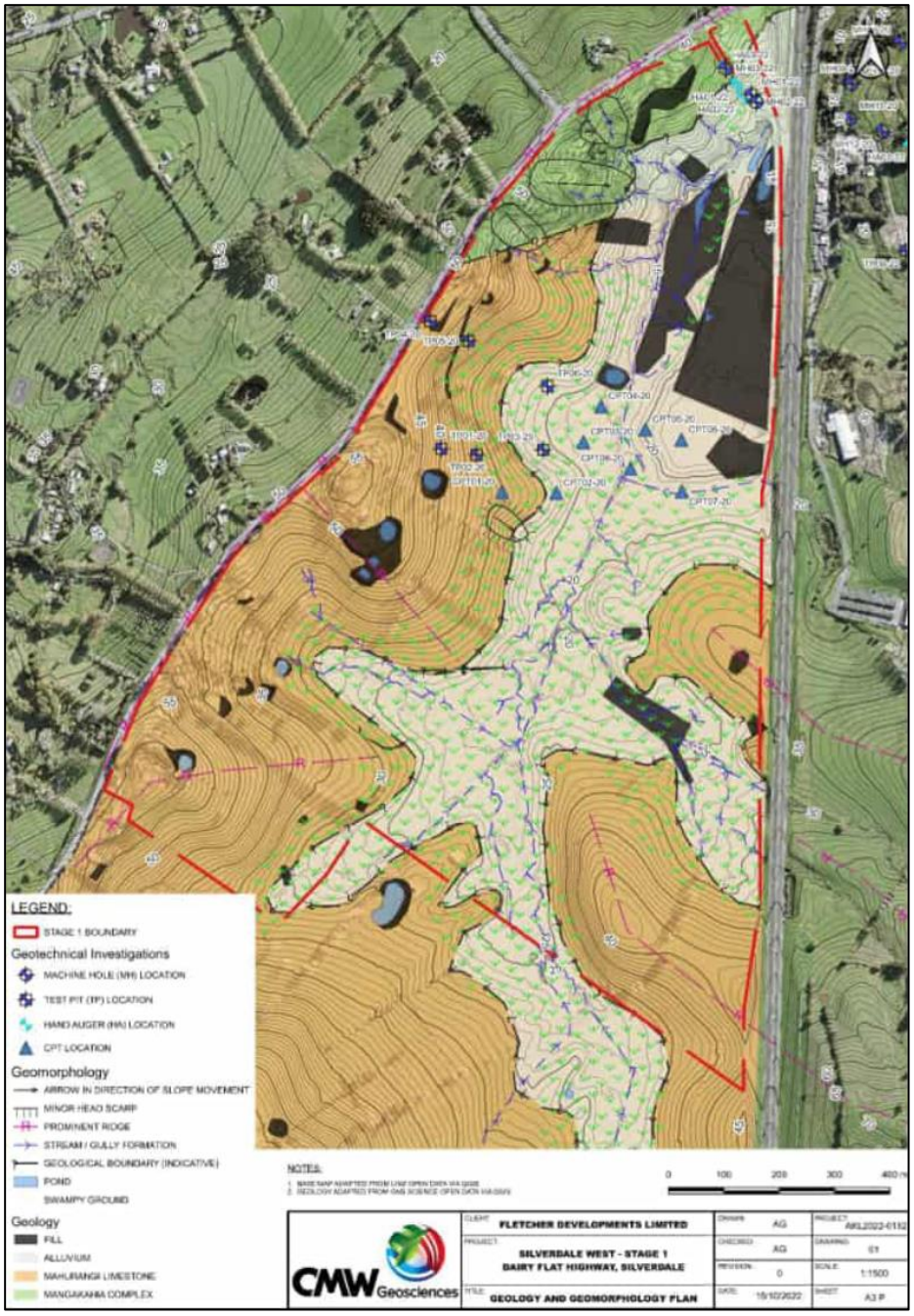


Figure 2: CMW Geology and Geomorphology Plan *(Refer to Appendix E for more details)*

Results after detailed hazard assessment indicate that the land is suitable for creating stable building platforms and infrastructure. Key considerations from the geotechnical hazards should be incorporated into the Master Planning (Please refer to CMW Geosciences Silverdale West Geotechnical Assessment Report).

The Plan Change Area's geological structure is predominantly composed of the Northland Allochthon, underlain by the Mahurangi Formation, characterized by its moderately dense, fractured, muddy limestone with occasional layers of glauconitic sandstone. The Northland Allochthon presents as soft, low shear strength clays near the surface, extending to depths of approximately 5 meters, the rock itself shows a high frequency of rock mass defects and often appearing shattered with millimeter-scale laminations.

The recent sedimentary deposits in the floodplain areas are associated with the site's stream network and are chiefly composed of modern alluvial and colluvial soils. These valley terraces are layered with unconsolidated materials including very soft muds, sands, gravels, interspersed with muddy peat and pumice silt strata. These deposits, which are commonly weathered into extremely soft clays at the surface, are projected to vary in depth from 1.5 meters to nearly 5 meters across the site. Such characteristics suggest that these regions may present challenges related to ground settlement, particularly influencing the design and implementation of stormwater infrastructure.

While the majority of the site is not prone to slope instability, areas of focus should be near steeper gradients and adjacent to stream banks where ground liquefaction may pose a risk.

Remediation strategies may include the application of shear keys, excavation and replacement of existing soils, and enhancement of subsoil drainage to improve stability. For constructions within a 100-meter proximity to unsupported soil banks, such as stream edges, a tailored lateral spread analysis is likely required. (Adapted from the Silverdale West Dairy Flat Business Area Structure Plan Geotechnical Topic Report by Auckland Council, 2017, and related studies by Tonkin & Taylor, 2013.

2.2.1. Hydro Geology

Subsurface water levels across the site are anticipated to lie between 2 to 4 meters beneath the ground surface, groundwater levels should be considered in the design of stormwater management systems, especially in low-lying parts of the site, Tonkin & Taylor (2013).

While the presence of natural springs within the site is probable, their specific locations remain undetermined. The conservation of these springs, along with their integration into the safeguarding and enhancement of perennial and episodic stream networks, is crucial for sustaining consistent stream flows.

The geological constitution of the site suggests that the permeability rates of the rock mass are expected to span from 10^-7 to 10^-11 meters per second, indicative of an overall low infiltration capability. The Mahurangi Limestone's propensity for exfiltration, is mitigated by the highly sheared condition of the limestone, which limits exfiltration by interrupting the continuity of fractures. Nevertheless, subterranean water flows within the rock, coupled with the shallow groundwater in depressions, are anticipated to provide a significant contribution to the stream baseflows.

The site's low permeability and the possibility of voids within the Mahurangi Limestone means the use of soakage methods for stormwater discharge is not recommended. Stormwater retention strategies that involve infiltration are still potentially suitable, dependant upon detailed site-specific geotechnical evaluations to ascertain the actual infiltration rates and soil conditions.

The design of groundwater control measures, such as cut-off or subsoil drainage systems for development platforms, should incorporate strategies for discharging into stream networks to bolster baseflow. This approach is aimed at addressing the potential adverse effects associated with the concentration of flows into streams, thereby mitigating the intensification of erosion issues.

In summary, groundwater management systems are to be optimized by discharging directly into nearby streams, aligning discharge points as close to the source as possible. This strategy is essential to minimize the impact of flow concentration and also to support stream baseflow.

2.3. Existing Drainage Features and Stormwater Infrastructure

Auckland Council's Geomaps service indicates no existing public stormwater infrastructure within the site. The stormwater runoff within the Silverdale South Stormwater Catchment is mostly channelled via streams through Johns Creek and its small tributaries. Due to the predominantly rural nature of the catchment many of the streams and tributaries are exposed to stock. By assessing aerial photos and from site visits there has also been some stream modification works (mainly in the upper Silverdale South Catchment area) carried out in the smaller tributaries to form drainage channels with the straightening of natural drainage patterns. The presence of John Creek through the centre of the subject site allows new stormwater outfalls to be constructed in the future. Outfalls scour and erosion protection should be designed and constructed in accordance with Auckland Council Technical Report:2013/018.

Culverts located beneath State Highway 1, provide drainage to the highway's east side from the Plan Change Area on the west. These culverts are integral to the stormwater management system, ensuring the controlled passage and flow within the Plan Change Area.

The network of culverts under the motorway, erected in the 1990s, was not constructed in compliance with current design criteria established by Waka Kotahi NZTA.

The culverts downstream are essential for the reliability of SH1. Detailed analysis of culvert capacity and performance has been conducted through the TuFlow flood modelling.

2.4. Receiving environment

There are several intermittent and ephemeral watercourses within the Silverdale West Precinct and the primary watercourse, John Creek, is categorized as a permanent stream and flows through the center of the property.

The current watercourses have undergone examinations, been classified as permanent, and had their ecological significance evaluated. Based on ecological values, the site is classified as having low to moderate ecological values overall.

As the main stream, John Creek is supplied with water from several other intermittent and ephemeral watercourses. The John Creek outflow is routed via a 4 m diameter culvert beneath State Highway 1 (the Silverdale off ramp). The only outflow (exit) for the site is the 4 m diameter culvert. This ultimately drains to Karepiro Bay via Weiti River.

Because of this culvert constraint, the culvert's capacity limits the flows that can leave the location.

Figure 3 displays the position of John Creek, the other contributing watercourses. While Figure 4 displays a summary of the site inflows and outflows.

Figure 3: Wetlands (turquoise/ orange polygons) at the site, and site boundary (turquoise line) and ponds at the site.

Source: Ecological Values Assessment dated August 2023, prepared by RMA Ecology Ltd (Refer to Appendix E for details).

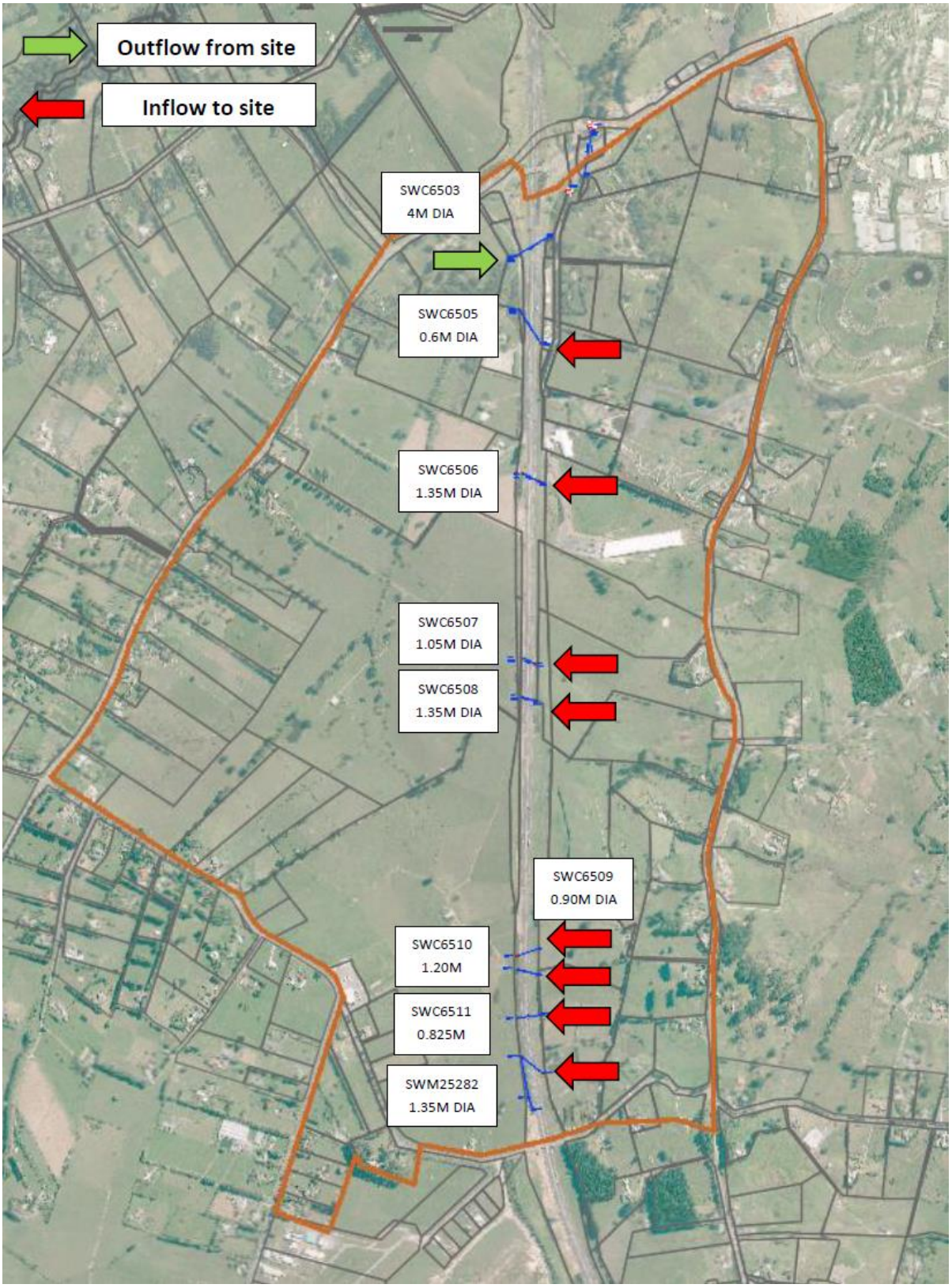


Figure 4: Inflows and Outflows

The information provided indicates a clear need for careful and strategic planning to protect the natural and ecological value of the Wēiti Stream and the larger ecosystems it supports, including the Long Bay Marine Reserve and the Hauraki Gulf Marine Park. Given the designation of the area as a Natural Stream Management Area with high natural character and ecological values, development within the Plan Change Area must adhere to stringent standards to preserve these qualities.

The Auckland Unitary Plan (AUP) outlines rules that aim to protect areas like the Wēiti Stream with unmodified beds and indigenous riparian vegetation indicative of high water quality and ecological value. The connection between the stream, the marine reserve, and the larger marine park underscores the importance of an integrated management approach that considers not only the immediate area but also the downstream effects on sensitive ecological zones.

With the identification of the Long Bay Marine Reserve and the Hauraki Gulf Marine Park as areas of significant conservation value, it is imperative that any construction or development activities include plans for stormwater management that prevent sedimentation and pollution. This includes during the construction phase and afterwards, when increased runoff and potential erosion from developed lands could pose new risks.

A stormwater management plan should be developed that includes:

- Sediment control during construction to prevent runoff into the estuary and marine park.
- Long-term infrastructure to manage increased runoff from developed areas to prevent erosion and pollution.
- Restoration initiatives that may include replanting indigenous riparian vegetation, streambank stabilization, and habitat enhancement for the local fauna. See Section 6.2.3 below for details.
- Monitoring and adaptive management strategies to ensure the effectiveness of mitigation measures and to respond to unforeseen impacts.

2.5. Existing Hydrological Features

There are 15 existing natural inland wetlands as defined by the NPS-FM, located within the proposed plan change area. The Masterplan layout anticipates that many of the smaller mid and upper slope seepage wetlands may be removed to enable the road network and efficient lot sizes. All of these wetlands are of very low ecological value as they are exotic rush dominated and intensively grazed. Where wetland removals may require ecological redress, there are substantial opportunities on the site where offsetting could be applied. Offsetting at off-site locations is also possible and can be undertaken in accordance with the AUP. The mitigation hierarchy will be applied as per the NPS-FM, including efforts to mitigate and offset on site, especially around W9-W10 where there are opportunities for wetland recreation and restoration. Where offsets cannot be located within the plan change site, wetland enhancement and recreation will be located elsewhere in line with Council's accepted practice. See Figure 5 below for reference.

Figure 5: Wetlands W9 – W10 (*Source: Ecological Values Assessment dated August 2023, prepared by RMA Ecology Ltd.)*

The natural wetlands to be retained are located upstream of the development area and treatment devices and are fed by existing flow paths/stream channels. Therefore, it is not anticipated that the hydrology of the existing natural wetlands will be significantly affected by the development.

John Creek is located through the centre of the site. Riparian planting is proposed for a minimum of 10 meters on each side of the stream for widths less than 3 meters, and a minimum of 20 meters for widths greater than 3 meters. Additionally, a 20m building offset will be established to protect this feature. Other hydrological features include overland flow paths across the site.

Refer to the Ecological Values Assessment prepared by RMA ecology for further details.

2.6. Existing Infrastructure

See Sections 2.3 & 2.4 above.

2.7. Flooding and Flow Paths

As indicated on Auckland Council Geomaps, numerous overland flow paths (OLFP) are present across the extent of the site and converge at John Creek as shown in Figure 6 below. Floodplains associated with these flow paths and John Creek are also present, predominantly in the low lying areas to the north of the site.

John Creek is a permanent stream which runs through the site, with a width varies between 1.5m and 4.98m. Where the width of this stream is greater than 3m, esplanade reserve requirements are triggered which in turn results in minimum setbacks of 20m each side with riparian planting margins.

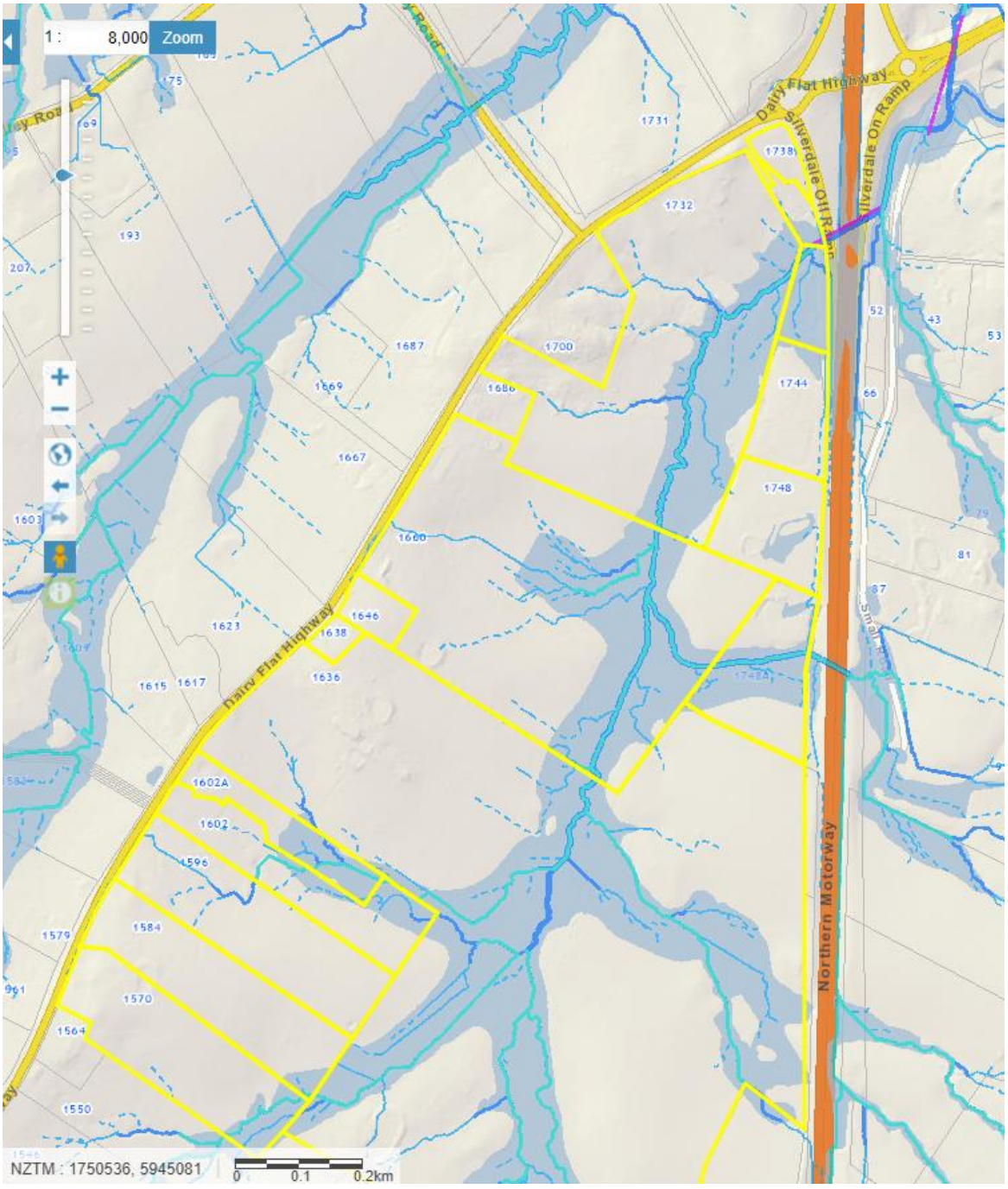


Figure 6: Existing OLFP & Flood plain associated with John Creek *(Source: Council Geomaps dated 22/05/2024)*

To meet the esplanade reserve requirement, all lot areas have been set back at least a minimum 20m from the stream edge (i.e., the top of the stream bank on either side as the edge of the stream), with most lots extending more than 30m and others more than 50m away from the stream edge to facilitate room for the existing wetland areas to the east, new wetland area to the west and formation of gentle earthworks batters and landscaping/greenway along the length of John Creek. A minimum of 20m each side of the permanent stream would be proposed to be planted with Riparian planting, with potential for other uses within the floodplain area for either future planting, landscaping, park, cycleways, or additional yield.

While, where the width of the stream is lesser than 3m, a minimum of 10m riparian margin and planting will be provided on each side.

The assessment confirms that the stormwater flows generated by additional impervious area based on the proposed masterplan will have negligible effect on the flood plain. Please refer to Section 6.2.7 Flooding details for this development.

2.8. Coastal Inundation

The lowest elevation within the site is approximately 11m RL, therefore site is not subjected to risk of Coastal Inundation.

2.9. Biodiversity

Biodiversity Assessment of the site has been undertaken by RMA Ecology Ltd, regarding aquatic and terrestrial ecology.

There are key ecological features on site, which can be summarised by the main stem of John Creek and its tributaries, riparian margins surrounding the John Creek catchment, mosaic of wetlands within low lying areas, possible copper skinks in some parts of the site and the existing indigenous forest site (IV1 – Refer to RMA Ecological report). There is no remnant native forest on this site, no significant ecological areas are listed at the site in the AUP.

The assessment of the site concludes a highly modified landform that has lost most of its original indigenous value. Although most native components are absent, and key ecological features such as streams and wetlands are highly degraded, there is substantial opportunity to improve on this and return biodiversity and ecological function to the site.

2.10. Cultural and Heritage Sites

Archaeological assessment of the site has been carried out as part of the plan change application process. Refer to Proposed Plan Change – Silverdale West, Auckland: Archaeological Assessment Report.

2.11. Contaminated Land

Contaminated Land assessment of the site has been carried out by Groundwater and Environmental Services as part of the preliminary site investigation.

Current Auckland Council contaminated site databases do not contain records of actual or potential contamination within the property and no activities considered likely to cause significant contamination were identified in the surrounding area.

There is low risk potential for contamination of the ground within identified areas in the north-west and south-west of the property, as well as within sediment and a small stream in the east of the property. These areas of potential contamination are a relatively small portion when measured against the whole subject site.

2.12. Stream Bank Erosion

The development of the catchment and its related increase in impermeable surfaces will, unless mitigated, intensify the volume of water discharging through stream networks, increasing the potential for erosion. The scouring of stream banks and the alteration of channel shapes negatively impact stream morphology and ecological integrity. Such stream erosion is intimately tied to the alterations in flow delivery rates that accompany land cover modifications, which in turn escalate hydraulic loads. This sequence of events triggers rapid adjustments within stream systems, especially during recurrent flows that exceed the 2-year Average Recurrence Interval (ARI) rainfall event, as per Auckland Council Technical Report 2013/035.

Nested within a gently sloping valley, the Silverdale South have experienced a vertical accumulation of fine, highly erodible sediments over time, facilitated by geological uplift, slope erosion, and the spillover of floodwaters. The gentle gradient of the catchment gives a limited ability to channel water efficiently through its naturally established conduits, leading instead to the formation of marshlands and wetlands. However, anthropogenic agricultural practices have significantly altered this landscape, manifesting in the channelization and drainage of natural wetlands and the deforestation of areas. This change has had the effect of streamlining the flow of water through the catchments. This change has induced pronounced erosion, particularly at the lower reaches of the Silverdale South Catchment, heightening the risk of continued erosion as the system seeks a new state of balance.

The Northland Allochthon soils, prevalent within the area, are highly susceptible to erosion under the impact of water discharge. Conversely, alluvial soils in the flatter regions are somewhat more resistant to erosion but are vulnerable to being scoured away as stream connectivity enhances and shear forces intensify with changes in flow patterns, as identified by URS (2010).

Without mitigation, further development is poised to intensify stream erosion and sediment flow into downstream environments. Consequently, measures to offset the hydrological detriments from erosive flows will become imperative, ensuring the stability of stream banks and the preservation of aquatic habitats and downstream water quality.

2.12.1. Existing Erosion Assessment

The Watercourse Assessment Report by Morphum Environmental Ltd in 2020 observed that within the Plan Change Area, a significant portion of the banks of permanent and intermittent streams and tributaries were experiencing erosion, with 20-40% of the banks affected. Localized areas displayed varying degrees of erosion severity.

Subsequent efforts have aimed at pinpointing regions currently undergoing erosion or at risk of future erosion in light of evolving boundary conditions. For this purpose, a preliminary geomorphic assessment was carried out, employing the first stage of the River Styles Framework—a method that supplies river managers with tailored, catchment-specific resources to discern the characteristics and dynamics of streams (Brierley & Fryirs, 2013). This assessment, dubbed the "Silverdale River Styles – Initial Desktop Analysis," was prepared by Auckland Council in 2021. Refer to Appendix B for Erosion Assessment Memo – Silverdale River Styles.

Within the Plan Change Area, two stream sections have been identified as erosion hotspots by the River Styles Framework:

1. Johns Creek (downstream/outside Plan Change Area): This section is categorized as "Partly Confined, Terrace Margin Controlled, Incised, Low Sinuosity Channel" with a medium sensitivity to erosion. It is currently experiencing vertical incision exacerbated by flow concentration during significant storms, funnelled through a culvert from an upstream highway. The surrounding fine-grained floodplain material is highly erodible, leading to over-steepened banks and significant geotechnical failures.
2. Johns Creek (downstream margin of Plan Change Area): Here, the channel is defined as "Partly Confined, Bedrock Margin Controlled, Incised Channel." This stretch has a low to moderate sensitivity to change since it has already gone through incision and widening. Although lateral adjustments are limited by bedrock margins, ongoing incision could propagate upstream, impacting less sensitive areas.

Most streams within the Plan Change Area are considered to have low to moderate sensitivity to change. However, without intervention, current erosion is likely to extend upstream, potentially affecting areas that are currently stable, particularly due to human-induced changes like artificial channel modifications and altered flow regimes.

Given the context of moderately sensitive downstream areas, stormwater management strategies must include measures to mitigate erosive forces, accounting for hydrological effects.

2.12.2. Future Erosion Considerations

The dynamics of erosional processes in the Plan Change Area (PCA) are heavily dependent on the balance between the natural channel-forming capacity of streams and the modifications that have been made to their flow paths, primarily through human activities.

The upstream extents of streams along Johns Creek, where natural sediment transport and channel formation begin, are categorized using the River Styles Framework as "Partly Confined, Bedrock Margin Controlled, Discontinuous Floodplain, Meandering, Discontinuous Channel". These segments are integral to the natural geomorphology of the watercourse, where the stream actively engages with its floodplain and forms meandering patterns.

However, these natural patterns are interrupted by reaches that have been artificially modified ("Partly Confined, Bedrock Margin Controlled, Channelised Fill"). Such areas were historically swamps or wetlands but have been transformed into straightened channels to facilitate agricultural land use, thereby increasing the connectivity and flow speed through these once disconnected wetlands.

While these upstream reaches are not currently experiencing high erosion rates, they possess inherent vulnerabilities to erosive processes. The introduction of headcuts (a sudden break in the stream profile often caused by an abrupt change in channel slope) can initiate a chain reaction of erosion through both the artificially straightened and the naturally meandering sections.

To prevent the degradation of these watercourses, mitigation measures for hydrology changes should be implemented as development progresses within the PCA. In additional, a focus on areas identified as hotspots to prevent continued erosion and its spread to stable streams. Remedial and rehabilitative efforts should be considered to halt any ongoing degradation resulting from past landuse changes in the catchment.

3. Development Summary and Planning Context

A review of the relevant stormwater guidelines and policies were carried out to determine the appropriate stormwater and flooding requirements to adopt in the Stormwater Management Plan for this development. The relevant requirements are summarised in Table 3-1.

Table 3-1 Regulatory and design requirements

Requirement	Design response
Unitary Plan – SMAF hydrology mitigation	5mm retention to be achieved via tanks with non-potable water reuse for all buildings. In cases where these devices are not practical, then these areas will be integrated into a communal wetland as additional detention. Detention Volume for stream protection via artificially constructed wetlands for all paved surfaces
High Contaminant Generating Areas	Treatment for the site to be provided via artificially constructed wetlands prior to discharging into the natural stream.
Natural Hazards	Flood modelling and assessment. Design of the site to ensure safe access and that floor levels are not at risk of flooding.
Auckland Unitary Plan Precinct	(N/A)
Existing Catchment Management Plan	(N/A)
Auckland Council Regionwide Network Discharge Consent	Measures proposed comply with the NDC: • Natural hydrology is restored and protected as far as practicable, utilising SMAF-1 requirements. • Discharge of contaminants and temperature related effects are managed using engineered wetlands. • Engineered structures are located outside of stream extents and 1% AEP floodplain. • Water quality treatment is proposed for all impervious surfaces • Flooding is contained within the stream extent, and downstream flooding is not exacerbated by the proposed development. • All assets to be vested as public are to be designed in accordance with relevant guidelines

4. Mana Whenua Values

Mana Whenua values are intrinsic to the design, construction, and management of stormwater devices in the Auckland region. A review been completed to ensure the stormwater design for the site aligns with relevant Mana Whenua values. In particular the principles of Taiao and Mauri Tū feed into the design of the stormwater system and works relating to the existing streams and wetlands.

The Mana Whenua value of Taiao guides design consideration of the stream and wetlands to protect, restore and enhance these aspects of the natural environment. The proposed plan change seeks to establish a 20m buffer around John Creek, and a 10m minimum buffer around wetlands and areas of indigenous vegetation to protect these features from any deleterious effects of intensification in the plan change area. The proposal also provides an opportunity for restoration of the severely degraded wetlands and stream by native restorative planting and limiting further degradation. Detailed planting and restoration plans can be developed as part of the detailed design and should include local species as much as possible. The indicative wastewater design proposes multiple wastewater crossing points over John Creek. Ongoing consultation with Iwi is recommended to ensure that the wastewater design is sensitive to Mana Whenua values of protecting environments.

The stormwater system is also designed to protect the environmental health of the plan change area into the future, in line with Mauri Tū principles. This is accomplished by sensitive management and treatment of stormwater flows to minimise temperature related effects, excess runoff volume, contaminated water, and sediment from entering the stream network. Managing these effects restores and protects the habitat for aquatic fauna (such as waterfowl, fish, eels, and macroinvertebrate communities), thus contributing to the long-term health of the environment. This is accomplished using the requirement for roof areas to utilise retention and detention tanks, and for all paved areas including roadways to be detailed to avoid effects of increased

imperviousness on downstream hydrology. Additionally, stormwater outfalls are proposed to lead to new communal artificially created wetlands prior to discharging to stream. Refer to section 6 of this report for details on the stormwater management devices proposed for the site.

5. Proposed Development

5.1. Location and Area

The site proposal seeks for a plan change to rezone a 107ha of land between State Highway 1 and Dairy Flat Highway. Refer to Section 2 of this report for details of the site.

5.2. Purpose of the Development

The site proposal seeks for a plan change to rezone 107ha of land from Future Urban zone to light industry zone. In addition to the industrial aspect, the plan change request identifies wetlands, streams and associated riparian areas along with the enhancement of the existing stream channel incorporated into the landscape design.

5.3. Site layout and urban form

Refer to the Concept Development Masterplan for details on the proposed layout of the plan change area.

The full extent of the proposed Plan Change Area has been modelled in 3d to ensure compliant road grades are achievable across the development and ensure levels and grades for the proposed lots are feasible.

There are two proposed bridges with culverts along the stream that will require work within the stream margin, but no other works are proposed within the stream or riparian margin.

5.4. Earthworks

Earthworks will be consented with Council after obtaining approval for plan change application.

Earthworks are required for recontouring across the site to improve contours to satisfy the design and layout requirements, in addition for the proposed roading network and to provide suitable building platforms.

Due to the size of the development, earthworks will likely be staged, with completed areas progressively stabilised through the earthworks phase, which prevents a large area of exposed land at once.

Further geotechnical investigation will be required to identify specific retaining wall, and ground stabilisation requirements.

6. Stormwater management

A review of the relevant stormwater guidelines and policies was carried out to determine the appropriate stormwater and flooding requirements to adopt as part of this SMP. The relevant documents are as follows:

The general provisions set out in the Auckland Unitary Plan – Operative in Part:

- Section E1 – Water quality and integrated management,
- Section E8 – Stormwater discharge and diversion
- Section E9 – High contaminant generating carparks and high use roads.
- Section E10 – Stormwater management area – Flow 1 and Flow 2

- Section E36 – Natural hazards and flooding

Under section E8 of the Auckland Unitary Plan, Auckland Council's assessment criteria includes whether the relevant network discharge consent has been considered (clause E.8.7.2.1.b) as part of the stormwater management strategy.

Per Auckland Council's regionwide network discharge consent, the development is classified as Greenfield.

6.1. Principles of stormwater management

The following principles will guide the management of stormwater for the site.

- Water Quality – Treatment of all impervious pavement areas is to be provided by a water quality device that removes contaminants and is approved by Auckland Council prior to discharge into the stream.
- Stream Hydrology – As this discharge is to a stream outside a SMAF area, equivalent hydrology requirement will apply. This can be completed using artificially constructed wetlands or other treatment methods such as wetlands and proprietary devices.
- Flooding – There is flooding within the proposed development area particular in the vicinity of John Creek. Flooding risk is mitigated by providing attenuation on site up to the 100-year ARI event to pre-development peak flow. Setbacks from the creek have been considered to avoid the 1% AEP floodplain. Reticulated public stormwater network discharging to new outfalls will be provided to convey the 10% AEP event safely through the development. Setback extents are shown in the stream setback drawing attached to this report.
- Assets – All new private and public assets proposed as part of SMP will be designed to comply with the relevant local and national standards to ensure they are durable and last the design life with suitable maintenance.
- SMAF1 Provisions.
    - Retention (volume reduction) for the first 5mm of runoff for all impervious areas. In cases where these devices are not practical, then these areas will be integrated into a communal wetland as additional detention.
    - Detention (temporary storage) with a drain down period of 24 hours for the difference between the pre-development (grassed state) and post development runoff volumes from the 95th percentile, 24-hour rainfall event minus the retention volume for all impervious areas.
- Ensure that there is sufficient capacity within the pipe network downstream of the connection point to cater for the additional stormwater runoff associated with the development in a 10% AEP event; or
- Demonstrate that flows more than the pipe capacity in a 10% AEP event within the pipe network downstream of the connection point will not increase flooding of any other property; or
- Demonstrate through an assessment that flows more than the pipe capacity in the 10% AEP event within the pipe network downstream of the connection point will not increase adverse effects on any other property.

6.2. Proposed stormwater management

The proposed stormwater management strategy for the site is described in the following sections. The proposed Stormwater Management approach is consistent with the Silverdale West Dairy Flat Business Area Structure Plan SMP prepared by WSP/Opus in November 2018 and Draft Silverdale West Industrial Plan Change SMP prepared for Auckland Council by WSP dated 25/11/2022.

Table 6-2-1 Comparison with other SMPs

Other SMPs	Key elements	Design response
Silverdale West Dairy Flat Business Area Structure Plan SMP prepared by WSP/Opus in November 2018	Flood Risk Management Hierarchy is recommended. Water Sensitive Design Toolbox	It has been adopted and the following has been proposed: - Any development has been set aside from the floodplains. - Riparian planting has been proposed along the stream within the floodplain. - Engineering interventions such as Stream crossing culverts/bridge, land raising, and flood storage have been proposed to attenuate the 1% AEP event within the site. - All finished floor levels for the proposed buildings shall meet the freeboard requirements for the 1% AEP flood plain in accordance with Table 5 of the SW CoP Guidance. Proposed hydrological mitigation and treatment devices are consistent with the options listed.
Draft Silverdale West Industrial Plan Change SMP prepared for Auckland Council by WSP dated 25/11/2022	Preferred Flood Mitigation option is to attenuate on-site up to the 100-year ARI event. Preferred option for Stormwater Management Implementation is via providing Water quality treatment 'at source', detention and attenuation in communal devices downstream, enhance existing streams.	Same approach is adopted as it would not increase the flooding risk for key infrastructure including SH1 Johns Creek Culvert No. 2 and Small Road Culvert and buildings at 2 and 4 Blue Gum Avenue further downstream. Similar approach is adapted where retention is provided 'at source', while treatment & detention is provided 'at subcatchment-level communal devices' (such as wetlands) at downstream and with riparian planting along the stream. This approach provides more certainty on the treatment as the communal wetlands will be operated and maintained by Auckland Council and therefore, less likely to miss-out on the treatment prior to discharging to the stream.

The following Table 6-2-2 provides a summary of implementing options considered similar to the Silverdale West Industrial Plan Change SMP:

Table 6-2-2 Summary of options on how to implement the stormwater management principles

Option	1 All at Source	2 All sub-catchment (Communal Wetlands only)	3 Combination (At-source retention + Communal Wetlands for treatment & detention)
Water Quality	Private Lots Good treatment, however, O&M may not be carried out correctly by private lot owners. Public Roads Good treatment but will results in a large number of small devices that are not preferred by Healthy Waters or Auckland Transport.	Good treatment and O&M by council less likely to be missed. However, will require larger land and higher O&M costs for Council.	Same as option 2

Option	1 All at Source	2 All sub-catchment (Communal Wetlands only)	3 Combination (At-source retention + Communal Wetlands for treatment & detention)
Stream Hydrology	Private Lots Good for mitigation, however, opportunity to incorporate reuse into an industrial development will be dependent on the activity. Public Roads Providing attenuation within roads will results in larger devices and complicates the O&M.	No retention viable and O&M more robust with council running O&M.	Similar to Option 1. Most preferred as retention provided earlier where possible and O&M robust.
Stream Erosion	2-year detention on site requires more complex system	Centralising detention control in wetlands easier to design and operate	Same as option 2
Network Capacity	Good	Good	Good
Flooding	Not a viable option to mitigate within the private lots and public roads	Good	Good
Life Cycle Cost	Most expensive, based on prior projects at least 2 x cost of alternatives	Cheapest option as centralised devices and cheaper to build and maintain	Good value for money, on-lot retention adds some expense.

Best Practicable Option (BPO) Discussion

Option 3 Combination (At-source retention where practicable + Communal Wetlands for treatment & detention) is considered to be the best practicable option for the Plan Change Area as it:

- Delivers a treatment via Communal Wetlands operated and maintained by Auckland Council. Therefore, less likely to be missed.
- Retention is provided at source wherever possible provides resilience against single device failure. However, in cases where these devices are not practical, then these areas will be integrated into a communal wetland as additional detention.
- Requires slightly smaller communal devices than Option 2 reducing the overall O&M burden for Auckland Council.
- Reduces the loss of developable land while achieving required performance criteria.
- Avoids the need for separate pipe network for roads compared to lots so that discharge attenuated 'on lot' isn't combined within road runoff still requiring attenuation.

6.2.1. Water quality

Treatment recommendations from previous SMP's for this catchment have recommended treatment to GD01 standards for building roofs, driveways, waste storage (high contaminant generating areas) and roadways. Given the scale of the catchment these SMP's recommend treatment to be provided via communal wetlands which also aligns with the recommendations of the other SMPs, particularly Draft Silverdale West Industrial Plan Change SMP dated 25/11/2022.

Communal Wetlands are proposed to treat all the impervious areas including roadways prior to slowly discharging the runoff into the natural stream.

Communal Wetland – BPO Discussion for treatment

If individual discrete devices such as on-lot raingardens or proprietary devices were to be used this would result in higher lifecycle costs vs communal wetlands, due to this high cost it's likely that some areas would be excluded from treatment to ensure reasonable stormwater management costs for the catchment. This means that utilising individual on lot treatment devices would have a higher cost with poorer environmental outcomes vs centralising the treatment devices in wetlands which are sized to treat all impervious areas. For this reason, wetlands are proposed as the best practicable option for treatment from a life cycle cost and environmental outcomes standpoint.

In addition to the Communal Wetlands, as per Schedule 4 of the NDC, gross pollutant traps are required for runoff from (communal) waste storage areas located within the private lots. Hence, a LittaTrap is proposed to be placed in the catchpit capturing runoff from these waste storage areas. The purpose of LittaTrap is to capture and retain plastic and litter before they enter the drainage system and therefore before they can reach the wetland and streams. The maintenance of this system will be within the private lot owner.

6.2.2. Stream hydrology

The proposed development is to ensure that there is no direct discharge to the stream. All runoffs from the development will be conveyed to the proposed communal wetlands where the treatment and detention are provided to mimic up to the 10-year pre-development flow into the stream.

In accordance with AUP E10, SMAF-1 are for those catchments which discharge to sensitive or high value streams that have relatively low levels of existing impervious area. While SMAF-2 areas typically discharge to streams with moderate to high values and sensitivity to stormwater, but generally with higher levels of existing impervious area within the catchment. Although this plan change area is not identified to be within the stormwater management area controls, we have taken a conservative approach to adopt SMAF-1 for the entire plan change area. Furthermore, the area downstream of the plan change site has been already identified as the SMAF-1 control area. Additionally, it is also in consistent with Silverdale West Industrial Plan Change SMP dated 25/11/2022 which identified that SMAF1 retention and detention are to be applied for hydrology mitigation.

Hence, to protect stream hydrology, the following SMAF1 hydrology mitigation is proposed for the site:

- Retention (volume reduction) of at least 5mm runoff depth for the impervious area is to be provided via reuse tanks for the private lots while utilising GD01 recommended devices for public roadways wherever practicable.
- Detention (temporary storage) with a drain down period of 24 hours for the difference between the pre-

development (grassed state) and post development runoff volumes from the 95th percentile, 24-hour rainfall event minus the retention volume for all impervious areas. SMAF-1 detention for the plan change area will be provided via communal wetlands which will also act as a detention for stream protection and will be in accordance with GD01.

Communal Wetland – BPO Discussion for detention

Based on life cycle costing analysis prepared for other projects, we know that wetlands have total life cycle costs roughly half that of smaller site based devices. Wetlands are also assessed as having the best environmental outcomes for the site with bulk treatment of flows. Consolidating wetland locations was considered however the extra network required increases the life cycle cost of this proposal offsetting any benefits from fewer devices and the environmental outcomes of this proposal are considered inferior due to centralised discharge points to the waterways causing higher fluctuations in stream hydrology. Also, in accordance with GD01 Table 15 & Table 16, the wetlands are considered as the most effective and have significant benefits on the Social, cultural, and environmental values compared to any other devices.

6.2.3. Stream Erosion

As mentioned in section 2.12 of this report, significant existing erosion of stream networks on the site and downstream of the development site were observed. To mitigate the effects of proposed development on these systems, it is recommended that erosive flows for these downstream waterways are quantified via a shear analysis of the stream banks and then detention controls should be implemented into the proposed wetlands as far as practicable to reduce the flow duration of these erosive flows as much as practicable.

The following ecological protection and restoration initiatives are expressed in the Structure/Masterplan:

1. A central south-north, green corridor centred on John Creek which will provide a central focal point, connectivity, and integration of ecological services through stormwater management, conveyance, and treatment, as well as opportunities for ecological restoration, and connectivity to indigenous vegetation patches across the site;
2. Improve aquatic habitat, function, and biodiversity values of John Creek as a natural outcome of the revegetation and enhancement of the margins of the Creek and the restoration of the main wetland clusters at either end of the site. This will improve in-stream habitat, riparian margin revegetation and improvements to water quality, both within the site, and, therefore, improvements to the northern receiving area of John Creek and Weiti Stream and the nearby estuary.
3. Where riparian enhancement is included, this provides opportunities for not only revegetation planting, but also including created habitat for lizards, bats, and invertebrates (for example, by including logs, refuge stacks, and including specific forest trees within riparian margin management).

The above ecological protection and restoration initiatives are to be provided either side of the waterway to provide a buffer between the development and the waterway and to restore the bank stability and ecological functions. These are also reflected in the draft Precinct Provisions. For further details, refer to Ecological Values Assessment prepared by RMA Ecology Limited.

The proposed development is divided into sub-catchments such that the runoff from each sub-catchments will convey into the communal wetland which provides SMAF mitigation and 10-year detention to mimic the pre-development flow into the stream. Furthermore, the proposed riparian yards and plantings will improve the water temperature and minimises stream erosion.

Whilst the above mitigations mitigate the impact of development on the downstream watercourses and improve the condition of the existing watercourses, it is still anticipated that stream erosion will continue due to the existing modified nature of the catchment. There is an opportunity for enhancement both within the plan change area and downstream. These opportunities would be most effective via a partnership between the developers and council to improve and enhance the waterways on site prior to significant development taking place. The cost of enhancing these waterways prior to development will be much lower than trying to restore these waterways post development.

6.2.4. Network Capacity

The primary stormwater network for the development will be designed to have sufficient capacity to meet the requirements of the SWCoP, i.e., the 10% AEP. While the secondary system will be designed to accommodate the 1% AEP design storm event. The drainage reserve for the site has been sized to utilise the culverts as hydraulic controls to maintain downstream flows and water levels at pre-development conditions (i.e., existing being greenfield or grassed state). The TuFlow flood modelling for the 100-year scenario shows an unchanged scenario in water levels downstream so the development proposed is mitigating the 100-year event within the site.

6.2.5. Proposed Wetlands

The site is divided into 14 distinct sub catchments, each requiring specific design and grading to accommodate the masterplan. Therefore, implementing a communal device (such as a wetland) in each sub catchment is deemed essential. These communal devices serve multiple purposes, including hydrology and flood mitigation for all land uses within the sub catchments. This compares to approximately 10 wetlands shown in the draft Silverdale West Private Plan Change SMP. The increase in wetland count is due to specific design and grading required to support the masterplan. These wetlands will be found inside the designated open area next to John Creek. The idea is to build wetlands next to streams wherever the outfalls are in order to capture the stormwater mains along the roads. These "offline" features will help reduce the amount of stormwater runoff by acting as buffers. Refer to Drawing 30001 for Proposed Communal Wetland locations and catchments.

Existing natural wetlands on site are largely preserved in the development proposal. Any modifications to these existing natural wetlands should follow an appropriate consenting process to ensure effects are appropriately managed.

Based on life cycle costing analysis prepared for other projects, we know that wetlands have total life cycle costs roughly half that of smaller site based devices. Wetlands are also assessed as having the best environmental outcomes for the site with bulk treatment of flows. Consolidating wetland locations was considered however the extra network required increases the life cycle cost of this proposal offsetting any benefits from fewer devices and the environmental outcomes of this proposal are considered inferior due to centralised discharge points to the waterways causing higher fluctuations in stream hydrology. Lifecycle costing should be provided for proposed stormwater management devices at the time of Resource Consent application.

The following benefits are anticipated from the wetlands for this development:

- Natural habitat
- Stormwater treatment
- Detention (95th percentile)
- Wetlands are proposed to use GD01, the design of the wetlands will include a bathymetric and forebay.

The wetlands are also proposed to provide 2 year and 10 year peak flow mitigation for the development to mitigate the effects of new impervious areas on downstream erosion. Further discussions with Healthy Waters are being held on this approach to inform the SMP.

Catchment areas for each Wetland are shown in the Wetland Catchment Area drawing 30001 attached to this SMP.

All proposed communal wetlands are sized in accordance with Council Guideline Document 2017/001 (GD01). Refer to Appendix D for the Wetland Sizing Calculations for details.

Table 3-2-5: Summary of Sub-Catchments and Wetland Areas

Wetland	Sub-Catchment Area (m2)	Required Area (m2)	Allocated Area (m2)
1	221900	8161	9120
2	115900	4621	4935
3	66600	2509	2835
4	15900	650	865
5	16500	650	1180
6	31300	1186	1475
7	27600	1037	1215
8	16200	650	790
9	40500	1514	1740
10	28300	1186	1585
11	37800	1693	1745
12	59400	2290	2365
13	42900	1514	1815
14	40100	1345	2065
		29000	33730

Further details and calculations for Wetlands are to be provided at Resource Consent Stage.

Access to Wetlands

All communal wetlands are to be located such that they can access from the public road corridor.

6.2.6. Outfalls

New outfalls will be required as part of the new wetland system and overall stormwater management for the site. To minimise the impact all new outfalls should be designed as 'green' outfalls that integrate into the natural landscape around them such as Scruffy dome outlet with smaller orifice catering for detention for stream protection will be provided in the wetland and the downstream of the outlet will be a wingwall culvert with rip-rap protection to ensure the flow does not trigger any stream erosion.

Each wetland will have a separate outfall to convey water into the stream. The wetland and outfall locations have been selected to fit with layout of the sub catchments and also to provide regular points of discharge into the stream network, maintaining stream baseflows. Refer to drawing 30001 for a layout of proposed communal wetlands for the plan change area.

6.2.7. Flooding

Rainfall

Existing rainfall depths do not include allowances for climate change. Future rainfall depths allow for a projected average temperature increase of 2.1°C, per the Ministry for Environment's Guidance Manual for Local Government in New Zealand (2008). Rainfall depths used for modelling are:

Table 6-2-4 Rainfall depths used for flood modelling:

	24 hr – TP108 Rainfall Depth (mm)	% increase (based on 2.1°C)	24 hr – Rainfall Depth incl. Climate Change (mm)	% increase (based on 3.8°C)	24 hr – Rainfall Depth incl. Climate Change (mm)
Rainfall 2 year – 50% AEP	85.5	9.0%	93.2	27.4%	108.9
Rainfall 5 year – 20% AEP	119.4	11.3%	132.9	29.6%	154.7
Rainfall 10 year – 10% AEP	142.0	13.2%	160.7	30.8%	185.7
Rainfall 20 year – 5% AEP	162.0	15.1%	186.4	31.2%	212.5
Rainfall 50 year – 2% AEP	180.0	16.8%	210.2	31.9%	237.4
Rainfall 100 year – 1% AEP	212.3	16.8%	248.0	32.7%	281.7

We have also completed a model run using (3.8°C climate change) for comparison purposes.

Curve Numbers

A curve number of 98 was used for all impervious areas. A curve number of 74 was used for pervious areas.

Upstream Catchment Inflows

Site characteristics for the TuFlow modelling are determined based on a Citywide overlay of rainfall depths and soil classifications. The rainfall depths have been found through a linear interpolation for each storm based on the rainfall contour plots in TP108. Rainfall depths are then adjusted for Climate Change to give rainfall depths used in the modelling.

The upstream catchment areas are set based on the area accumulation model in the Citywide GIS layer. Catchment lengths are determined via the OLFP layer which is then draped on the Citywide LIDAR layer and the equal area slope calculated to give the upstream catchment slope. The channelisation factor is set based on the nature of the upstream catchment and using TP108.

The catchment factors are then used to calculate inflow Hydrographs using the SCS Curve runoff method, as recommended in TP108.

Catchment inflow data is shown in the model data.

Impervious Coverages

Existing impervious coverages were calculated specific to delineated catchments based on known impervious coverages in the catchment. This includes road kerbs, building footprints and North Shore City Council's GIS impervious surface data.

Proposed impervious coverages have been modelled at 85% of the catchment area. The following table provide the calculation for the site impervious coverages under proposed development:

Table 6-2-4 Site Impervious Coverage for the proposed development:

	Area (ha)	Area (%)
Proposed Development Area (100% impervious)	78 ha	73%
Proposed Open Space Area (0% impervious)	29 ha	27%
Total	107 ha	100%

Refer to Drawing 30001 for catchment areas.

While the estimated impervious percentage of the site stands at approximately 73%, a conservative approach has been adopted for flood modelling. Consequently, the proposed site imperviousness has been modelled at 85%.

To meet the esplanade reserve requirement, all lot areas have been set back at least a minimum 20m from the stream edge (i.e., the top of the stream bank on either side as the edge of the stream), with most lots extending more than 30m and others more than 50m away from the stream edge to facilitate room for the existing wetland areas to the east, new wetland area to the west and formation of gentle earthworks batters and landscaping/ greenway along the length of John Creek. A minimum of 20m each side of the stream where the width is greater than 3m would be proposed to be planted with Riparian planting, with potential for other uses within the floodplain area for either future planting, landscaping, park, cycleways, or additional yield. While a minimum of 10m each side of the stream where the width is lesser than 3m would be proposed with Riparian planting.

Results

As indicated on Auckland Council Geomaps, several OLFP are located across the extent of the site. Flood plains associated with these OLFP are also present.

A flood assessment evaluation has been undertaken to assess the flows within the site and upstream/downstream of the site. Flood modelling has been undertaken using Tuflow. The model has been developed for the purpose of demonstrating that the mitigation measures included within the site mitigate the effects of the development. This means that the existing and proposed scenarios are only different in the ways that the development will affect the site, i.e. change in imperviousness within the site and increased efficiency of the drainage network in the site. Changes outside the effects of the development including Climate Change and development of upstream catchment areas are not legally required to be mitigated within the development, this was a principal established in the Queenstown-Lakes District Council v Hawthorn Estate Ltd (2006) 12 ELRNZ 299; [2006] NZRMA 424 (CA) decision.

The assessment calculations are based on maximum probable development for the site and are factored for climate change. The existing model included the existing state of the site (as 8% impervious). The proposed model included the proposed development on site (as 85% impervious), with the proposed stream crossing culverts and flood storage areas providing attenuation for the 1 in 100 year event.

The extent of the flooding in the existing and proposed development scenarios are shown in drawing series 55000 while the extent of drainage reserve, communal wetlands and riparian margin are shown in drawing series 30001. The preliminary afflux results indicate the proposed development will not significantly affect water levels on downstream properties in the 1% AEP design event with the proposed drainage reserve and artificially constructed wetlands.

The table below summarises the Peak outflow immediately outside the site on the downstream side, comparing both existing and proposed scenarios with the location shown in Figure 7:

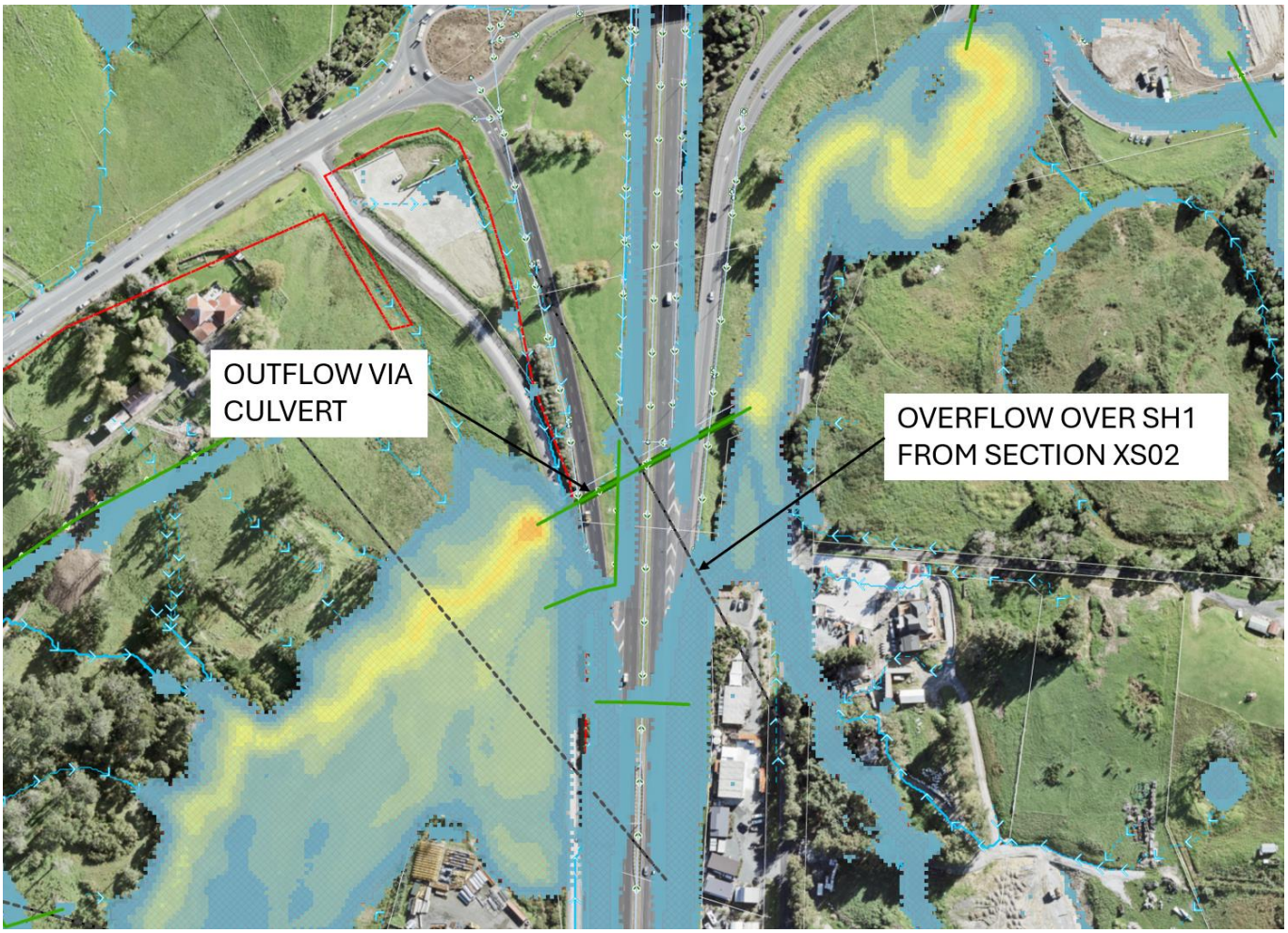


Figure 7: Silverdale West Site OLFP Outlet Location

Table 6-2-5 Peak Outflow summary results

I1 – 100 year (No Climate Change)			A5 - 100 year (2.1° Climate Change)				A6 - 100 year (3.8° Climate Change)			
	Existing		Existing		Proposed		Existing		Proposed	
Peak Outflow via Culvert	52.1	m3/s	64.9	m3/s	66.8	m3/s	68.2	m3/s	69.3	m3/s
Peak Overflow over SH1	6.0	m3/s	6.1	m3/s	6.1	m3/s	6.2	m3/s	8.0	m3/s
Total	**58.1**	m3/s	**71.0**	m3/s	**72.9**	m3/s	**74.4**	m3/s	**77.3**	m3/s
Difference			**1.9**			m3/s	**2.9**			m3/s

Both scenarios (2.1°C and 3.8°C) indicate no significant effects on downstream water levels from the proposed development. The slight increase in peak outflow can be mitigated by the proposed communal wetlands, which attenuate the 10-year event. Currently, these wetlands are not modelled. It is also important to note that the proposed scenario is modelled with 85% impervious surfaces, whereas the realistic figure is only 73%, making this a conservative approach.

According to the flood assessment results for the pre- and post-development scenarios, stormwater runoff is effectively contained in the post-development scenario. The pre-development scenario has a much wider flood extent, which is purely a result of the topography which is very flat and low lying.

Ponding along the eastern edge of State Highway 1 in the post development model has been noted. The model indicates the ponding is a result of inletting capacity into existing culverts that is resulting in these flows overtopping and traversing down the eastern edge of State Highway 1. John Creek will need to be throttled at the two proposed stream crossing locations in order to not increase flood water levels downstream. These throttled stream crossing structures will allow water to back up behind the structures to alleviate pressure downstream. No overtopping is intended at the throttled stream crossing locations. The road levels will be set higher to accommodate the required freeboard from the 100-year flood level. Inlet and outlet for the culverts will be proposed with rip-rap protection to prevent from stream erosion. The locations of stream crossing culverts are also shown on the catchment plan Drawing 30001. The stream crossings and actual calculated cross-sectional areas will be addressed via detailed design of the development levels at Resource Consent stage.

All finished floor levels for the proposed buildings shall meet the freeboard requirements for the 1% AEP flood plain in accordance with Table 5 of the SW CoP Guidance V3. Also, it's important to note that while V4 of the SW CoP hasn't been mandated for use, Table 5 remains unchanged.

The proposed flooding results also show no negative effects upstream of the development as well, demonstrating that the mitigations proposed for flooding are suitable.

In summary, the approaches outlined above demonstrate that stormwater can be managed in a way that meets the requirement to be included under the Auckland Council Regionwide Stormwater Network Discharge Consent for the proposed plan change area.

6.2.8. Development staging

Due to the size of the development, construction is intended to be staged, the details of which will be provided at Resource Consent stage. SMAF mitigation for buildings will be provided as they are constructed. The primary stormwater network will be developed to allow flexibility with staging.

6.3. Hydraulic connectivity

The development is connected hydraulically through new public stormwater network, which ties into outfalls leading to new wetlands and the stream running through the site.

6.4. Asset ownership

Mitigation systems such as reuse tanks located within the private lot will be privately owned.

Drainage assets that drain more than 1 title are proposed as public.

Any communal devices such as Communal Wetlands and Public SW pipe network will be vested to Council upon completion. The process as set in SW CoP guidance, particularly Section 4.3.6.2 shall be complied.

6.5. Ongoing maintenance requirements

Ongoing maintenance of the private drainage system and tanks on individually owned lots will be the responsibility of the private landowners.

Ongoing maintenance of the public drainage network and the wetlands will be the responsibility of council.

7. Conclusions

- SMAF mitigation requirements for the plan change are met via retention tank and extended detention in wetlands.
- Erosive flows for streams should be assessed and detention provided to keep flows below these levels for as long as practicable.
- The 10% AEP network design event can be safety conveyed through the site via a new public drainage network.
- The 1% AEP flood event can be safely conveyed through the site.
- The proposed plan change will not increase flood risk for surrounding properties through the mitigation of peaks flows by 1% AEP detention.
- Stormwater treatment can be provided at source via Littatrap (for waste storage areas) and at downstream via artificially constructed communal wetlands (for all impervious areas).
- Life cycle costings for new developments under this SMP should be provided with Resource Consent applications for development.

8. Limitations

- This assessment contains the professional opinion of Civix Limited Staff relating to this development. Civix Limited Staff used their professional judgement and acted in accordance with the standards of care and skill normally exercised by professional engineers providing similar services in similar circumstances. No other express or implied warranty is made as to the professional advice contained in this report.
- We have prepared this report in accordance with the brief provided and following our terms of engagement. The information contained in this report has been prepared by Civix Limited for the client and is exclusively for its client use and reliance. It is not possible to make an assessment of this report without understanding the terms of engagement under which it has been prepared, including the scope of the instructions and directions given to and the assumptions made by Civix Limited. The assessment will not address issues which would need to be considered for another party if that parties' particular circumstances, requirements and experience were known and, further, may make assumptions about matters of which a third party is not aware. No responsibility or liability to any third party is accepted for any loss or damage arising out of the use of or reliance on this assessment by any third party.
- The assessment is also based on information that has been provided to Civix Limited from other sources or by other parties. The assessment has been prepared strictly on the basis that the information that has been provided is accurate, completed, and adequate. To the extent that any information is inaccurate, incomplete or inadequate, Civix Limited takes no responsibility or liability whatsoever for any loss or damage that results from any design and assessment based on information that has been provided to Civix Limited.

APPENDIX G: Wastewater servicing memo

water acumen

Memorandum 02

WA Ref: WA/012

Date: 31 March 2023

To: Hinsan Li, Development Manager, Fletcher Building Ltd

cc: Natasha Flavell, Associate Development Manager, Fletcher Building Ltd

Alastair Turnbull / Durgadevi Ragupathy, Civix

From: Robert White

Re: Silverdale – Wastewater Servicing Concept

Silverdale Commercial Wastewater Servicing

An initial concept design has been undertaken, base on the following criteria:

- Plan Change Area = 128.6 ha
- Full Wastewater Catchment = 227 ha
- Watercare Wastewater Transmission Standard adopted for > 100 ha
    - 25 L/s/ha with a peak factor of 2
- Emergency storage = 8 hours Average Dry Weather Flow (ADWF)

	ha	L/sec /100ha	YAF (L/s)	pf	Peak Flow (L/s)	Emergency Storage (m^3)	DUE
Plan Change Area	128.6	25	32.15	2	64	926	1,536
Total Catchment	227	25	56.75	2	114	1,634	2,710

The proposed wastewater pump station is to only service the wastewater gravity catchment for the area bounded by SH1, Dairy Flat Highway and Wilks Road, and is not required to service the Botanic / Build Rich area to the east of SH1 or other adjacent areas.

The flows from the area are to discharge into the existing gravity system at the gravity manhole located at the intersection of Argent Lane and Maryvale Road.

It is understood that there is an existing 560 PE100 SDR11 pipe installed from the traffic circle at the southern end of Argent Lane, over the Weiti Bridge, to the above-mentioned gravity manhole. This 560 pipe is oversized for initial flows, but the option to "slip-line" with a smaller diameter pipe has been discounted (by Watercare) due to the number of bends along the alignment. Initial flows will be relatively small and would result in very low velocities within this section of pipe if utilised.

Additionally, it is proposed that the Botanic WWPS, servicing land to the east of SH1 will also discharge into the gravity manhole at the intersection of Argent Lane and Maryvale Road.

Between the WWPS sites (both the Plan Change Area WWPS and the Botanic WWPS) and the discharge point, there is a ridge (along the alignment of Dairy Flat Highway) which is at a higher elevation than the discharge point. This would, potentially, not be an issue ultimately, with the construction of a "second" pump station within the subsequent low point (when this catchment is developed), allowing flows to be pumped up to the ridge that then gravitate to the gravity system (E) (second pump station / gravity line), before being lifted to the discharge location. The potential sites for this second pump station are not within land owned by Fletcher / Fulton Hogan, or currently proposed for development at this time.

If this second pump station was to be constructed first, there would be a potential option to construct a deep gravity sewer, up to 25 metres deep, via trenchless technology such as direct pipe, to allow the proposed plan change area to feed the "second" pump station via gravity. No geotechnical investigation has been undertaken to confirm that this option is feasible. Additionally, the route would need to pass under land outside the land owned by Fletcher (or Fulton Hogan), with the trenchless section in the order of 850 m long. This is also considered an expensive option and would need to be accepted by Watercare Operations, who are typically not keen on such deep sewers.

In the interim, two options have been identified:

Option 1: A rising main constructed with a one-way air valve (i.e., air valve only allowing air out, not in) such that the line remains charged, and does not drain down between pump cycles. Both the Botanic WWPS and the proposed pump station to service the plan change area would have separate rising mains, requiring two mains to be laid from the intersection of Dairy Flat Highway and Pine Valley Road to the gravity manhole at the intersection of Argent Lane and Maryvale Road.

Option 2: The downhill sections along Dairy Flat Highway and the section in Pine Valley Road above the level of the discharge point are designed as gravity pipelines that always run part full, with double acting air valves along the line / at the high point on the pipeline, with the subsequent section (E to I) designed as an inverted siphon. The Botanic WWPS would also discharge into the gravity pipe at the intersection of Dairy Flat Highway and Pine Valley Road, discharging to the gravity manhole via the inverted siphon.

Option 1 relies on the one-way air valve operating correctly and will need to be confirmed from a surge / water hammer perspective, whereas achieving minimum velocities within the "siphon" section of Option 2 may be a challenge.

Neither option is necessarily considered a long-term solution, but on the basis that this is an interim solution, that could be replaced / upgraded with the addition of the second pump station, it is proposed that approval be sought from Watercare for one be adopted for the initial development.

With the Botanic WWPS also discharging into the gravity manhole at the intersection of Argent Lane and Maryvale Road, there is the option to combine the two "mains" from the intersection of Dairy Flat Highway and Pine Valley Road, where they meet. Watercare's preference is that each pump station has its own rising main and that two pump stations do not pump into a single main. However, as an interim option, and to achieve higher flows and associated velocities this may be accepted by Watercare in this instance if Option 1, above, is adopted. This is not implicated by Option 2, as the system would operate as a gravity system from where the two pipe connect, with the two pump stations discharging independently into a gravity section. The connection of the two rising mains at the intersection of Dairy Flat Highway and Pine Valley Road would potentially allow higher flows to be achieved (operating both pump stations together) in early stages of development, in order to achieve sufficient flows to achieve the required velocities in the inverted siphon.

In order to meet the ultimate flows and achieve required velocities in interim phases, staging is required.

The elevation at the intersection of Dairy Flat Highway and Pine Valley Road is approximately 45m RL with the discharge manhole at approximately 28.5m RL, providing a driving head of 16.5m. Taking the elevation of Dairy Flat Highway where the Commercial Area WWPS joins as 50m RL provides a driving head of 21.5m.

Initial analysis of adopting twin 250 and 355 DN PE100 SDR11 pipes is as follows:

	DN	Self Cleansing	Slime Shear	16m Driving Head	21m Driving Head
		(L/s)	(L/s)	(L/s)	(L/s)
Stage 1	250	21	33	45	51
Stage 2	355	45	71	113	130
Stage 3	250+355	66	104	158	181
Stage 4	560	122	190	376	431

DN PE100 / SDR11

		DUE	DUE	DUE	DUE
Stage 1		501	788	1,075	1,218
Stage 2		1,075	1,696	2,699	3,104
Stage 3		1,576	2,484	3,773	4,322
Stage 4		2,913	4,537	8,979	10,293

Stage 1 would theoretically service up to ~1,200 DUE, Stage 2 up to 3,000 DUE and Stage 3 4,300 DUE, with both pump stations operating simultaneously.

Provisional Dwelling Unit Equivalents are as below:

East of SH1	~2,100 DUE
Commercial Development	~2,700 DUE
Total	~ 4,800 DUE

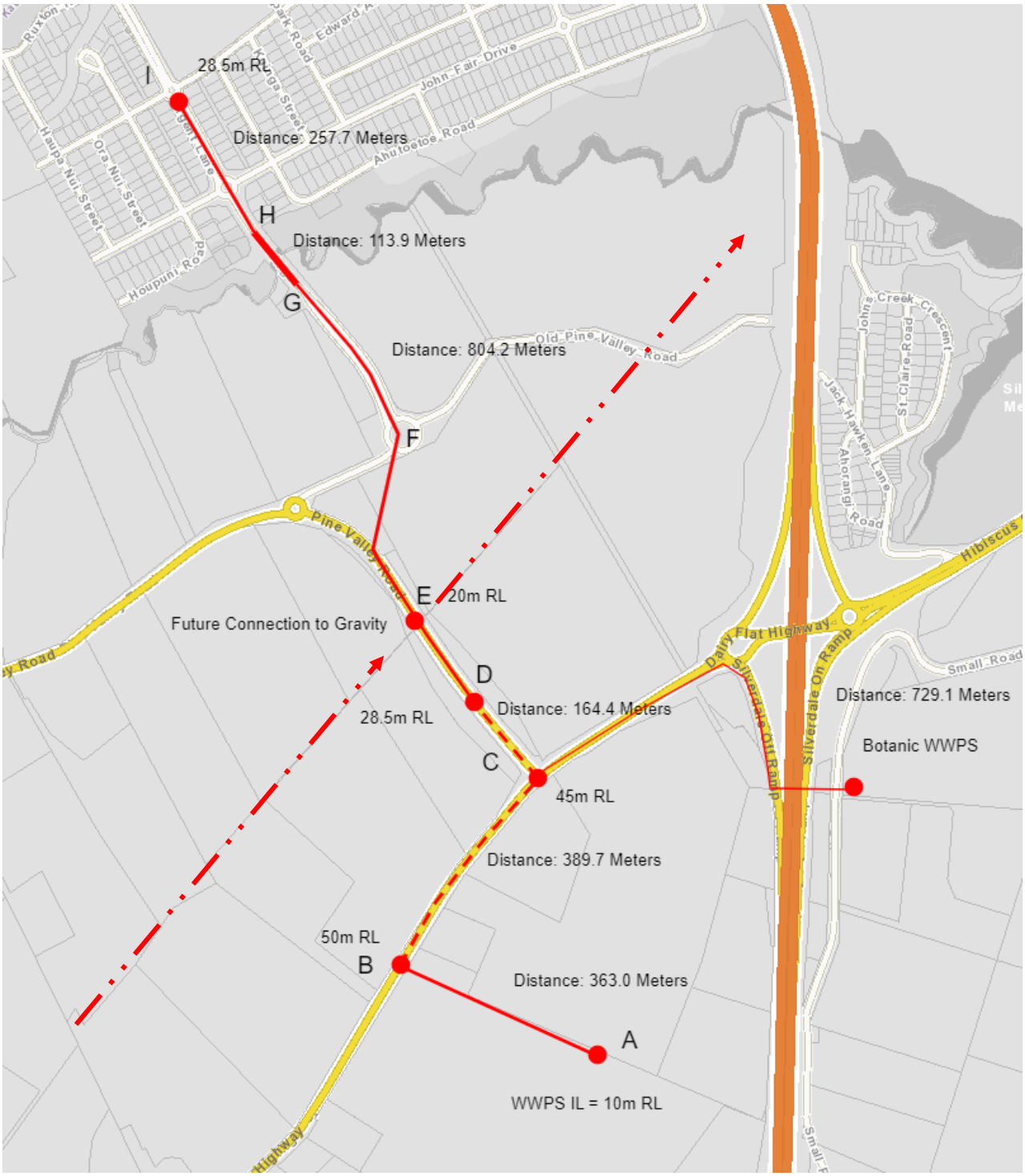
This suggests that ~90% of the anticipated development could be services via the twin 250 and 355 pipeline, with both pump stations operating at maximum flow simultaneously.

Proposed Works

It is proposed that required pipeline within Pine Valley Road and a section of Dairy Flat Highway be constructed as part of the proposed upgrade of Argent Lane, Pine Valley Road and Dairy Flat Highway, programmed to commence in October 2023.

Water and wastewater pipes on Weiti Bridge, Milldale.

Argent Lane – from Weiti Bridge looking south. Recently completed road and footpath.



Solid Line = pressure; Dashed Line = "Gravity" Section; Dash -dot -dot = Future Gravity Line

Proposed Works

Stage 1

Plan Change Area

- Wastewater Pump Station – (A) (WWPS):
    - Initial: 20 L/s @ 45m pump head (duty / standby)
    - Ultimate: 120 L/s @ 55m pump head (duty / assist / standby)
    - Emergency Storage:
        - 926 m^3 (Plan Change Area – 128.6 ha)
        - 1,600 m^3 (full 227 ha)
- WWPS (A) to Dairy Flat Highway (B): Twin 250 PE100 SDR 11 Rising Mains (or 225 /280)
- Dairy Flat Highway (B-C): 400 PE100 SDR11 "Rising" Main, laid as gravity sewer (i.e., constant down slope / no dips)

Botanic / Build Rich (East of SH1)

- Existing Wastewater Pump Station (WWPS) connected to intersection of Dairy Flat Highway and Pine Valley Road (C) with rising main.

Combined

- Pine Valley Road to intersection of Argent Lane and Maryvale Road:
    - 450 PE100 SDR11 "Rising" Main, laid as gravity sewer from the Intersection of Dairy Flat Highway (C) and Pine Valley Road to approx.. 28m RL (D)
    - Twin pipelines, 250 plus 355 PE100 SDR11 pressure main from RL 28 (D) to the end of the existing 560 rising main (F)
    - Slip line new 250 PE100 SDR11 Rising Main from the end of the existing 560 rising main (F) to the southern bank of Weiti Bridge (G)
    - Installation of a 250 pipe beside the existing "560" main across the Weiti Bridge (G TO H)
    - Slip Line 250 PE100 SDR11 Rising Main from northern bank of Weiti Bridge (H) to discharge manhole at the intersection of Argent Lane and Maryvale Road (I), inside the existing 560 future rising main.
    - Associated air valves on high points and scour valves at low points, as per Watercare standard requirements.

Stage 2 (>1,250 DUEs connected)

- Install new 355 (via open trench / directional drilling) parallel to existing 560
- Install new 300 steel pipe across Weiti Bridge
- Isolate and flush 250

Stage 3 (>2,000 DUEs connected)

- Operate both 250 and 355 pipes in parallel.

Stage 4 (>4,300 DUEs connected)

- Remove 250 slip lining of 560 and re connect / commission 560 line.

  Note: removing the 250 slip-lined pipe from within the 560 would result in an interim reduction in capacity and would need to be programmed during a low flow period.

This option has the benefit of delaying works in the relatively recently constructed Argent Lane.

Notes:

The option has only been developed to a concept design level to demonstrate that there is a feasible option to service the plan change area and would need to be developed to detailed design level as part of an Engineering Plan Approval stage and approved by Watercare.

The pipeline(s) between the intersection of Dairy Flat Highway and Pine Valley Road to the discharge location at the intersection of Argent Lane and Maryvale Road would be shared with the Botanic WWPS.

APPENDIX H: Vector supply availability

Vector Limited
101 Carlton Gore Road
PO Box 99882
Newmarket
Auckland 1149
+64 9 978 7788 / vector.co.nz

24 February 2023

Durga Ragupathy
Civix
Level 8,
99 Albert Street,
Auckland

Hi Durga

Supply Availability for 1660 Dairy Flat Highway, SH1

1. Further to your recent correspondence regarding availability of supply for an approximate 36-hectare light industrial development of unknown density at 1660 Dairy Flat Highway, SH1 at the time of this enquiry, Vector can confirm the following:

2. Electrical Reticulation

1.1 Vector Limited is the Electrical Operator of the distribution system which will provide Line Function Services to the individual Points of Supply within the development.

1.2 Vector has limited available capacity in the surrounding high voltage (HV) network and is planning a new zone substation in the area for approximately 2029.

1.3 Installation of new HV and low voltage (LV) cables and equipment will be required to provide this development with points of supply for each of the lots.

Please do not hesitate to contact me on 09 213 0265 if you have any further questions.

Regards

AJ Subramany
Customer Contracts Lead

ENGINEERING DRAWINGS

PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

DATE OF ISSUE: 31/03/23

DRAWING PURPOSE: PRELIMINARY EARTHWORKS AND INFRASTRUCTURE PLANS

DATE			31/03/23
ISSUE			FOR INFORMATION ONLY
REASON			Preliminary Earthworks and Infrastructure Plans

DRAWING NAME	LATEST REFERENCE	LATEST REVISION	31/03/23
Finished Contour Plan	22000-22004	A	A
Cut Fill Plan	30000	A	A
Earthworks Sections	32000-32001	A	A
Stormwater Plan	50000-50003	A	A
Flooding Model Results	55000-55013	A	A
Flooding Model Section	55500-55504	A	A
Wastewater Plan	60000-60004	A	A
Water Supply and Utilities Plan	70000-70001	A	A

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Level 8, 99 Albert St, Auckland

PLANNING
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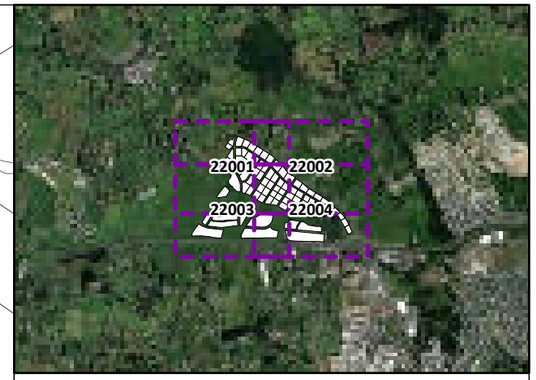


RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

MAJOR CONTOURS (5.0m)

MINOR CONTOURS (1.0m)

PROPOSED KERB LINES

STREAM CHANNEL

20m STREAM BUFFER

INDIGENOUS VEGETATION AREA

IV1 10m BUFFER

WETLANDS TO BE RETAINED

WETLAND 10m BUFFER

PLAN CHANGE AREA

BUILDINGS

IMPERVIOUS

NEW PARCELS

EXISTING KERBLINES

EXISTING IMPERVIOUS

EXISTING BUILDINGS

EXISTING PARCELS

NOTES:
1. ALL WORK TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERTOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION
2. THE CONTRACTOR IS TO PEG INFRASTUCTURE LOCATIONS AND EARTHWORKS LEVELS PRIOR TO ORDERING MATERIALS.
3. UNDERFILL DRAINAGE IS TO BE INSTALLED AT THE DIRECTION OF THE ENGINEER. IF THE CONTRACTOR ENCOUNTERS SPRINGS OR OTHER SOURCES OF WATER, THEY ARE TO NOTIFY THE ENGINEER.
4. EARTHWORKS ARE NOT TO BE EXTENDED INTO ADJOINING SITES UNLESS THE ENGINEER HAS ISSUED SPECIFIC INSTRUCTIONS
5. THE CONTRACTOR IS RESPONSIBILE FOR IDENTIFYING AND PROTECTING EXISTING SERVICES AND DRAINAGE ON SITE
6. THE CONTRACTOR SHALL CLARIFY THE AREAS AND EXTENT OF CLEARING WITH THE ENGINEER BEFORE COMMENCEMENT AND CONFIRM THAT ALL NECESSARY CONSENTS ARE IN PLACE.
7. EARTHWORKS TOLERANCES ARE TO BE +-25mm
8. ALL VOLUMES ARE SOLID MEASURE, NO BULKING FACTOR APPLIED
9. RETAINING WALL SETOUT - EXACT SETTING OUT POSITION OF RETAINING WALLS IN RELATION TO LOT BOUNDARIES AND BUILDINGS TO BE OBTAINED FROM ARCHITECT OR STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION COMMENCING.

IMAGERY CREDITS
Maxar

0 100 200 300 400 500 600 700 800 m

SCAN FOR 3D:

allsite.ai

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

LOGO: CIVIX

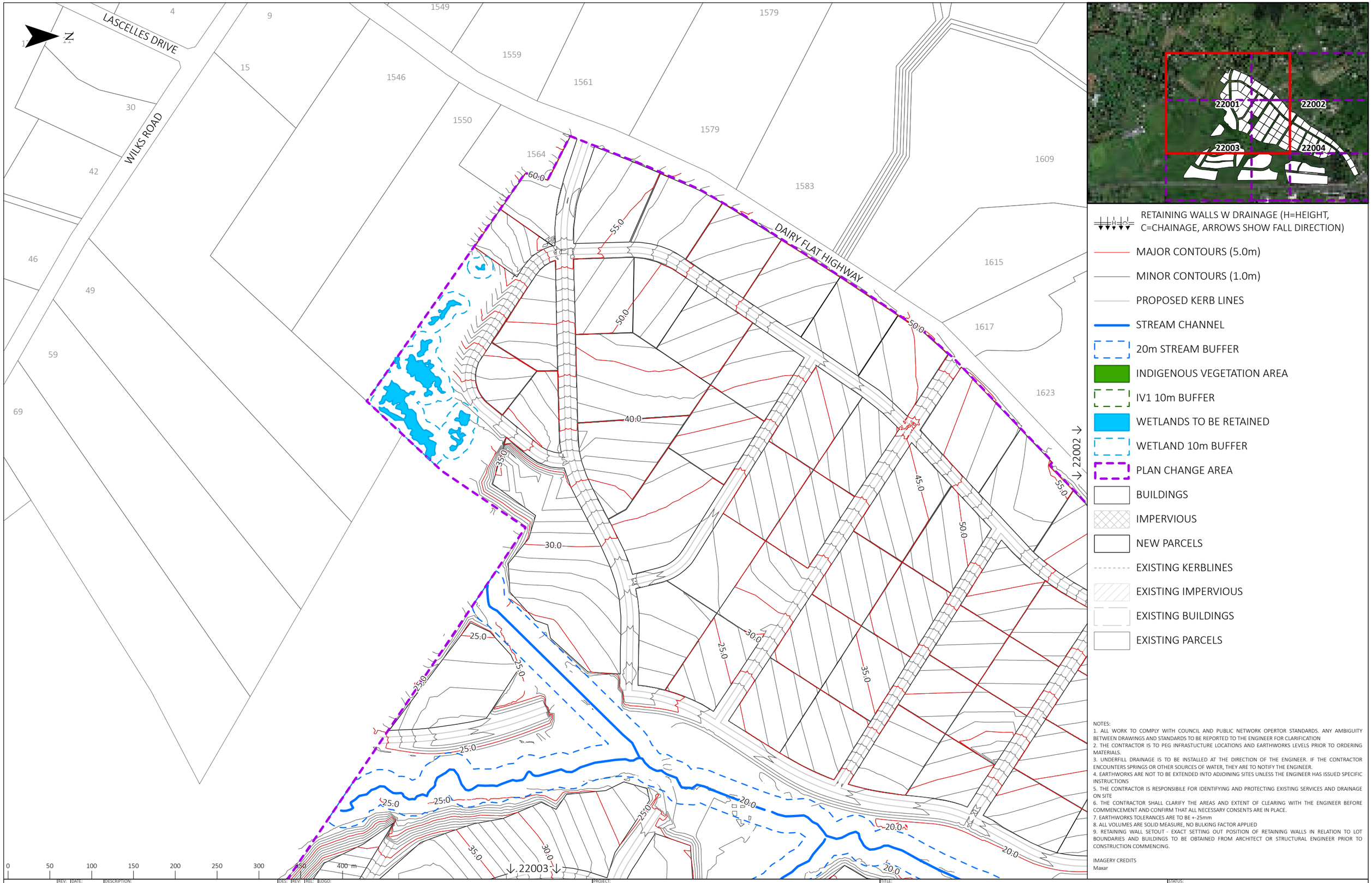
PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: FINISHED CONTOUR PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 22000

SCALE:	SIZE:	REVISION:	DATE:
1:8,000	A3	A	31/03/23



- RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)
- MAJOR CONTOURS (5.0m)
- MINOR CONTOURS (1.0m)
- PROPOSED KERB LINES
- STREAM CHANNEL
- 20m STREAM BUFFER
- INDIGENOUS VEGETATION AREA
- IV1 10m BUFFER
- WETLANDS TO BE RETAINED
- WETLAND 10m BUFFER
- PLAN CHANGE AREA
- BUILDINGS
- IMPERVIOUS
- NEW PARCELS
- EXISTING KERBLINES
- EXISTING IMPERVIOUS
- EXISTING BUILDINGS
- EXISTING PARCELS

NOTES:
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4. EARTHWORKS ARE NOT TO BE EXTENDED INTO ADJOINING SITES UNLESS THE ENGINEER HAS ISSUED SPECIFIC INSTRUCTIONS
5. THE CONTRACTOR IS RESPONSIBILE FOR IDENTIFYING AND PROTECTING EXISTING SERVICES AND DRAINAGE ON SITE
6. THE CONTRACTOR SHALL CLARIFY THE AREAS AND EXTENT OF CLEARING WITH THE ENGINEER BEFORE COMMENCEMENT AND CONFIRM THAT ALL NECESSARY CONSENTS ARE IN PLACE.
7. EARTHWORKS TOLERANCES ARE TO BE +-25mm
8. ALL VOLUMES ARE SOLID MEASURE, NO BULKING FACTOR APPLIED
9. RETAINING WALL SETOUT - EXACT SETTING OUT POSITION OF RETAINING WALLS IN RELATION TO LOT BOUNDARIES AND BUILDINGS TO BE OBTAINED FROM ARCHITECT OR STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION COMMENCING.

IMAGERY CREDITS
Maxar

REV:	DATE:	DESCRIPTION:	DES:	REV:	RES:
A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

SCAN FOR 3D:

allsite.ai

LOGO: CIVIX

PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: FINISHED CONTOUR PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 22001

SCALE:	SIZE:	REVISION:	DATE:
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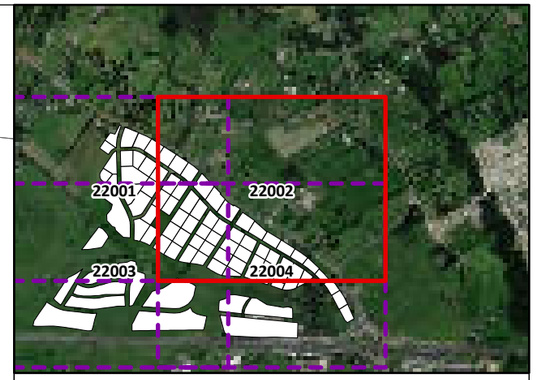

RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

MAJOR CONTOURS (5.0m)

MINOR CONTOURS (1.0m)

PROPOSED KERB LINES

STREAM CHANNEL

20m STREAM BUFFER

INDIGENOUS VEGETATION AREA

IV1 10m BUFFER

WETLANDS TO BE RETAINED

WETLAND 10m BUFFER

PLAN CHANGE AREA

BUILDINGS

IMPERVIOUS

NEW PARCELS

EXISTING KERBLINES

EXISTING IMPERVIOUS

EXISTING BUILDINGS

EXISTING PARCELS

NOTES:
1. ALL WORK TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERTOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION
2. THE CONTRACTOR IS TO PEG INFRASTUCTURE LOCATIONS AND EARTHWORKS LEVELS PRIOR TO ORDERING MATERIALS.
3. UNDERFILL DRAINAGE IS TO BE INSTALLED AT THE DIRECTION OF THE ENGINEER. IF THE CONTRACTOR ENCOUNTERS SPRINGS OR OTHER SOURCES OF WATER, THEY ARE TO NOTIFY THE ENGINEER.
4. EARTHWORKS ARE NOT TO BE EXTENDED INTO ADJOINING SITES UNLESS THE ENGINEER HAS ISSUED SPECIFIC INSTRUCTIONS
5. THE CONTRACTOR IS RESPONSIBILE FOR IDENTIFYING AND PROTECTING EXISTING SERVICES AND DRAINAGE ON SITE
6. THE CONTRACTOR SHALL CLARIFY THE AREAS AND EXTENT OF CLEARING WITH THE ENGINEER BEFORE COMMENCEMENT AND CONFIRM THAT ALL NECESSARY CONSENTS ARE IN PLACE.
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8. ALL VOLUMES ARE SOLID MEASURE, NO BULKING FACTOR APPLIED
9. RETAINING WALL SETOUT - EXACT SETTING OUT POSITION OF RETAINING WALLS IN RELATION TO LOT BOUNDARIES AND BUILDINGS TO BE OBTAINED FROM ARCHITECT OR STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION COMMENCING.

IMAGERY CREDITS
Maxar

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

SCAN FOR 3D:

allsite.ai

LOGO: CIVIX

PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: FINISHED CONTOUR PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 22002

SCALE:	SIZE:	REVISION:	DATE:
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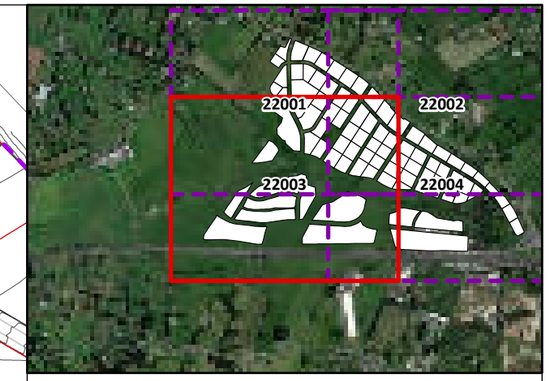

RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

MAJOR CONTOURS (5.0m)

MINOR CONTOURS (1.0m)

PROPOSED KERB LINES

STREAM CHANNEL

20m STREAM BUFFER

INDIGENOUS VEGETATION AREA

IV1 10m BUFFER

WETLANDS TO BE RETAINED

WETLAND 10m BUFFER

PLAN CHANGE AREA

BUILDINGS

IMPERVIOUS

NEW PARCELS

EXISTING KERBLINES

EXISTING IMPERVIOUS

EXISTING BUILDINGS

EXISTING PARCELS

NOTES:
1. ALL WORK TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERTOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION
2. THE CONTRACTOR IS TO PEG INFRASTUCTURE LOCATIONS AND EARTHWORKS LEVELS PRIOR TO ORDERING MATERIALS.
3. UNDERFILL DRAINAGE IS TO BE INSTALLED AT THE DIRECTION OF THE ENGINEER. IF THE CONTRACTOR ENCOUNTERS SPRINGS OR OTHER SOURCES OF WATER, THEY ARE TO NOTIFY THE ENGINEER.
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8. ALL VOLUMES ARE SOLID MEASURE, NO BULKING FACTOR APPLIED
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IMAGERY CREDITS
Maxar

AUCKLAND-WAIWERA MOTORWAY

STATE HIGHWAY 1

0 50 100 150 200 250 300 350 400 m

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

SCAN FOR 3D:

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LOGO: CIVIX

PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: FINISHED CONTOUR PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 22003

SCALE:	SIZE:	REVISION:	DATE:
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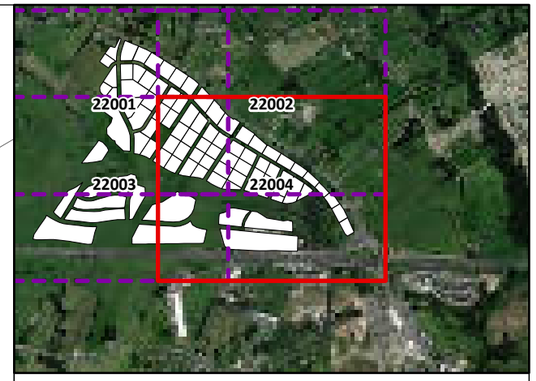

RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

MAJOR CONTOURS (5.0m)

MINOR CONTOURS (1.0m)

PROPOSED KERB LINES

STREAM CHANNEL

20m STREAM BUFFER

INDIGENOUS VEGETATION AREA

IV1 10m BUFFER

WETLANDS TO BE RETAINED

WETLAND 10m BUFFER

PLAN CHANGE AREA

BUILDINGS

IMPERVIOUS

NEW PARCELS

EXISTING KERBLINES

EXISTING IMPERVIOUS

EXISTING BUILDINGS

EXISTING PARCELS

NOTES:
1. ALL WORK TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERTOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION
2. THE CONTRACTOR IS TO PEG INFRASTUCTURE LOCATIONS AND EARTHWORKS LEVELS PRIOR TO ORDERING MATERIALS.
3. UNDERFILL DRAINAGE IS TO BE INSTALLED AT THE DIRECTION OF THE ENGINEER. IF THE CONTRACTOR ENCOUNTERS SPRINGS OR OTHER SOURCES OF WATER, THEY ARE TO NOTIFY THE ENGINEER.
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5. THE CONTRACTOR IS RESPONSIBILE FOR IDENTIFYING AND PROTECTING EXISTING SERVICES AND DRAINAGE ON SITE
6. THE CONTRACTOR SHALL CLARIFY THE AREAS AND EXTENT OF CLEARING WITH THE ENGINEER BEFORE COMMENCEMENT AND CONFIRM THAT ALL NECESSARY CONSENTS ARE IN PLACE.
7. EARTHWORKS TOLERANCES ARE TO BE +-25mm
8. ALL VOLUMES ARE SOLID MEASURE, NO BULKING FACTOR APPLIED
9. RETAINING WALL SETOUT - EXACT SETTING OUT POSITION OF RETAINING WALLS IN RELATION TO LOT BOUNDARIES AND BUILDINGS TO BE OBTAINED FROM ARCHITECT OR STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION COMMENCING.

IMAGERY CREDITS
Maxar

0 50 100 150 200 250 300 350 400 m

SCAN FOR 3D:

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REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

LOGO: CIVIX

PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: FINISHED CONTOUR PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 22004

SCALE:	SIZE:	REVISION:	DATE:
1:4,000	A3	A	31/03/23

LEGEND:

RETAINING WALLS W DRAINAGE (H=HEIGHT, C=CHAINAGE, ARROWS SHOW FALL DIRECTION)

- EARTHWORKS SECTIONS
- PROPOSED KERB LINES
- CUT FILL CONTOURS
- 20m STREAM BUFFER
- INDIGENOUS VEGETATION AREA
- IV1 10m BUFFER
- WETLANDS TO BE RETAINED
- WETLAND 10m BUFFER
- PLAN CHANGE AREA
- EARTHWORKS EXTENT
- PAVEMENT
- BUILDINGS
- NEW PARCELS
- EXISTING KERBLINES
- EXISTING PARCELS
- EXISTING IMPERVIOUS
- EXISTING BUILDINGS

CUTFILL

CUTFILL

- -20.00--15.00m
- -15.00--10.00m
- -10.00--5.00m
- -0.05--5.00m
- -0.05-0.05m
- 0.05-5.00m
- 5.00-10.00m
- 10.00-15.00m
- 15.00-20.00m
- NZ_Roads
- Address_Points

EW ID	UNITS	EW001	TOTAL
AREA	**m²**	**1,051,492**	**1,051,492**
CUT	m³	1,286,925.4	1,286,925.4
BULK TOT. CUT	**m³**	**1,286,925.4**	**1,286,925.4**
MAX. CUT DEPTH	**m**	**15.5**	**15.5**
FILL	m³	1,375,396.4	1,375,396.4
FILL +15% BF.	m³	1,581,705.8	1,581,705.8
BULK TOT. FILL	**m³**	**1,581,705.8**	**1,581,705.8**
BULK CUT OFFSITE	m³	-	0.0
BULK CUT TO FILL	m³	-	1,286,925.4
BULK FILL IMPORT	m³	-	294,780.5
BULK TOT. VOL.	**m³**	**2,868,631.2**	**2,868,631.2**
MAX. FILL HEIGHT	**m**	**10.6**	**10.6**
BULK TRUCKS	Trucks	-	49,131
TOPSOIL TOT. PLACE	m³	210,298.4	210,298.4
TOPSOIL TOT. VOL.	**m³**	**210,298.4**	**210,298.4**
TOPSOIL TRUCKS	Trucks	-	35,050
EW TOT. VOL.	**m³**	**3,078,929.6**	**3,078,929.6**
EW TOT. TRUCKS	Trucks	-	84,181

Existing Surf. is finished ground level

Proposed Surf. is Finished Surface

NOTES:

1. ALL WORKS TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERATOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER FOR CLARIFICATION.
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7. EARTHWORKS TOLERANCES ARE TO BE +-25mm.
8. ALL VOLUMES ARE SOLID MEASURE, NO BULKING FACTOR APPLIED UNLESS OTHERWISE NOTED.
9. RETAINING WALL SETOUT - EXACT SETTING OUT POSITION OF RETAINING WALLS IN RELATION TO LOT BOUNDARIES AND BUILDINGS TO BE OBTAINED FROM ARCHITECT OR STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION COMMENCING.

IMAGERY CREDITS

Earthstar Geographics, LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

0 90 180 270 360 450 540 630 720 m

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

SCAN FOR 3D:

allsite.ai

LOGO: CIVIX

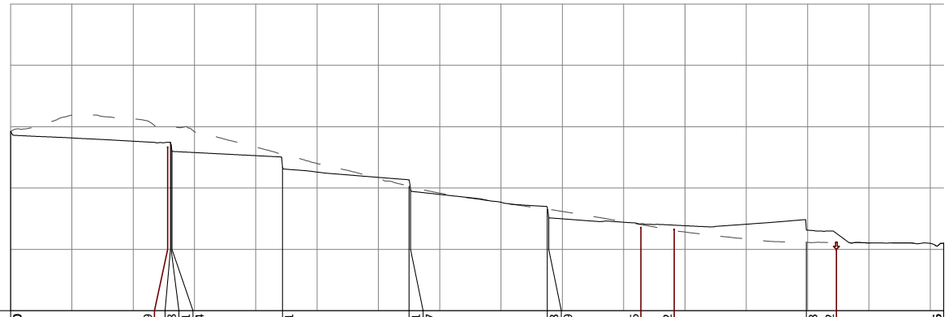
PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: CUT FILL PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 30000

SCALE:	SIZE:	REVISION:	DATE:
1:7,000	A3	A	31/03/23



LEGEND:
EXISTING SURFACE — — —
PROPOSED SURFACE ———
WASTEWATER PROPOSED ———

CHAINAGE	**0.00**	WW128.09	130.38	131.01	131.64	221.71	325.01	326.27	437.73	438.99	WW514.06	WW541.22	649.03	WW673.52	**760.96**
DESIGN LEVEL	**58.46**	PUB.	54.94	54.04	52.01	46.82	42.70	39.43	33.78	30.29	PUB.	PUB.	26.34	PUB.	**22.00**
CUT(-) FILL(+) DEPTH	**0.04**	DIA. 0.150	-4.84	-5.78	-7.81	-4.11	2.07	-1.07	0.65	-2.76	DIA. 0.150	DIA. 0.225	4.05	DIA. 0.300	
EXISTING LEVEL	**58.42**		59.79	59.82	59.82	50.93	40.62	40.50	33.13	33.06			22.29		**22.00**
DESCRIPTION															

EWSEC01

SCALE H1:5000 V1:2000

CHAINAGE	**0.00**	WW107.47	109.59	224.85	225.48	316.18	406.25	496.32	496.95	WW512.90	**652.52**
DESIGN LEVEL	**49.74**	PUB.	48.40	41.79	39.51	33.93	29.01	25.73	24.25	PUB.	**22.96**
CUT(-) FILL(+) DEPTH	**-0.02**	DIA. 0.150	4.09	-3.06	-5.30	-2.00	0.31	4.12	2.67	DIA. 0.375	
EXISTING LEVEL	**49.76**		44.31	44.84	44.81	35.93	28.70	21.61	21.58		**21.78**
DESCRIPTION											

EWSEC02

SCALE H1:5000 V1:2000

CHAINAGE	**0.00**	WW107.14	108.91	109.54	186.97	256.85	WW407.33	**471.52**
DESIGN LEVEL	**50.12**	PUB.	46.25	44.31	41.85	35.92	PUB.	**18.85**
CUT(-) FILL(+) DEPTH	**-0.05**	DIA. 0.150	-1.31	-3.19	3.70	2.52	DIA. 0.375	
EXISTING LEVEL	**50.17**		47.56	47.49	38.15	33.40		**18.85**
DESCRIPTION								

EWSEC03

SCALE H1:5000 V1:2000

CHAINAGE	**0.00**	WW105.29	176.24	177.49	247.36	WW335.80	**409.12**
DESIGN LEVEL	**49.94**	PUB.	32.68	29.28	24.09	PUB.	**17.57**
CUT(-) FILL(+) DEPTH	**-0.00**	DIA. 0.150	5.78	2.47	1.79	DIA. 0.225	
EXISTING LEVEL	**49.95**		26.90	26.81	22.30		**17.59**
DESCRIPTION							

EWSEC04

SCALE H1:5000 V1:2000

SCAN FOR 3D:

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REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	**31/03/23**	**PRELIMINARY EARTHWORKS AND INFRASTRUCTURE**	**CT**	**AT**	**DSR**

LOGO:

PROJECT:
SILVERDALE WEST PRIVATE
PLAN CHANGE

TITLE:
EARTHWORKS SECTIONS

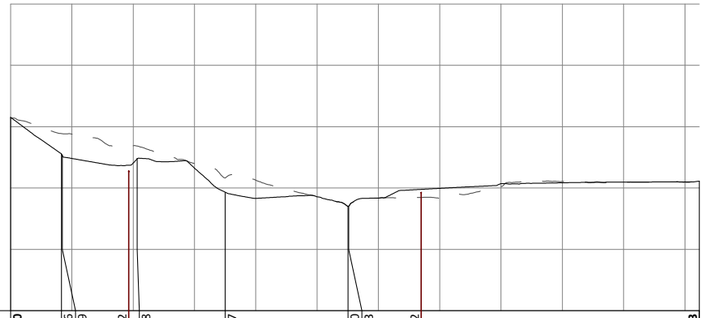
STATUS:
FOR INFORMATION ONLY

DRAWING NO:
32000

SCALE:	SIZE:	REVISION:	DATE:
1:5,000	A3	A	31/03/23

LEGEND:

EXISTING SURFACE	— — —
PROPOSED SURFACE	———
WASTEWATER PROPOSED	———



CHAINAGE	**0.00**	41.56	42.19	96.42	103.28	175.07	275.20	275.83	334.92	**561.73**
DESIGN LEVEL	**43.03**	31.12	30.71	WW PUB.	29.59	18.64	13.98	14.09	WW PUB.	**22.21**
CUT(-) FILL(+) DEPTH	**0.01**	-6.63	-7.01	DIA. 0.150	-4.09	-4.65	0.02	-0.01	DIA. 0.150	
EXISTING LEVEL	**43.02**	37.75	37.72		33.68	23.29	13.96	14.09		**22.25**
DESCRIPTION										

EWSEC05

SCALE H1:5000 V1:2000

SCAN FOR 3D:

allsite.ai

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	31/03/23	**PRELIMINARY EARTHWORKS AND INFRASTRUCTURE**	CT	AT	DSR

LOGO:

PROJECT:

SILVERDALE WEST PRIVATE
PLAN CHANGE

TITLE:

EARTHWORKS SECTIONS

STATUS:

FOR INFORMATION ONLY

DRAWING NO:

32001

SCALE:	SIZE:	REVISION:	DATE:
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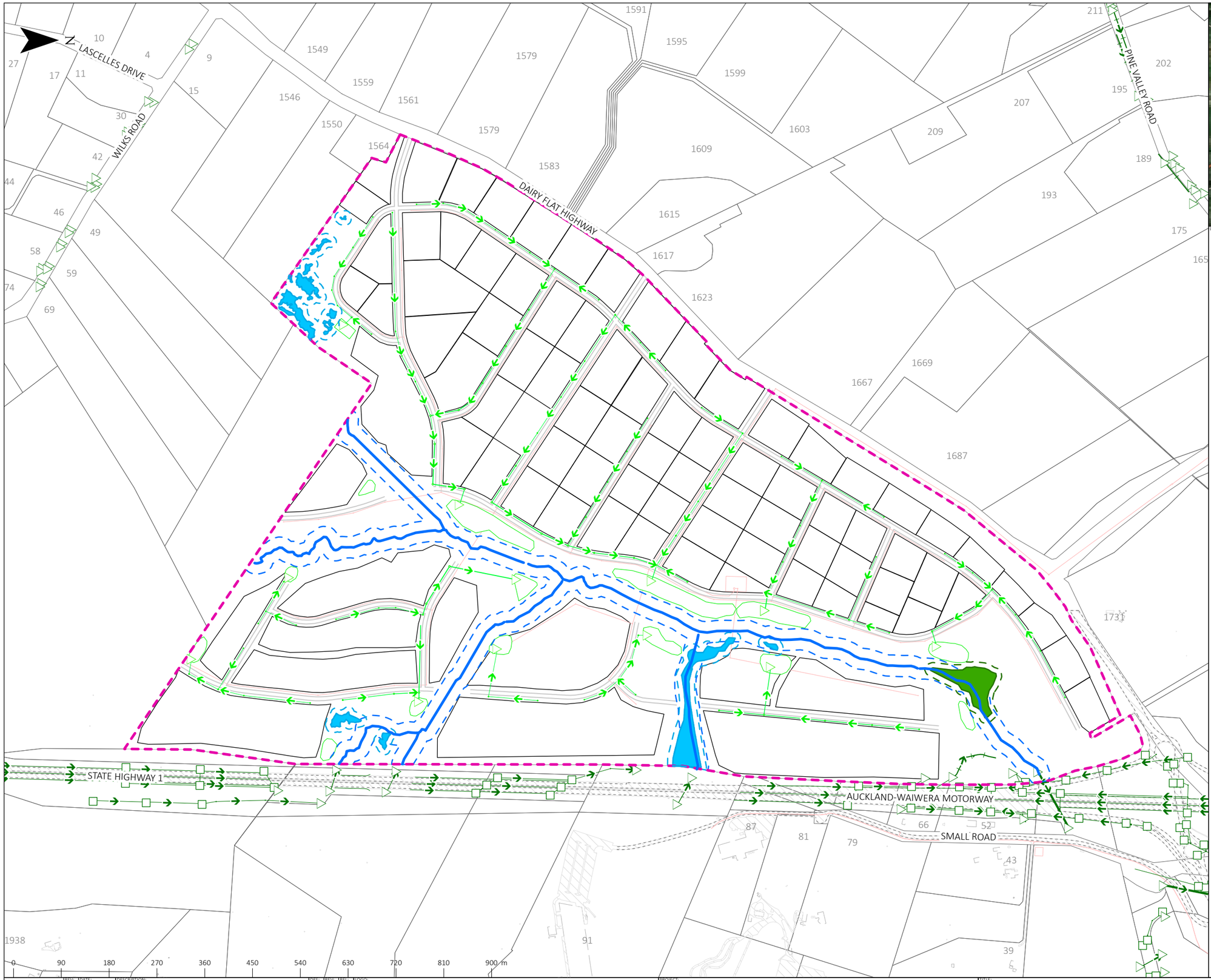
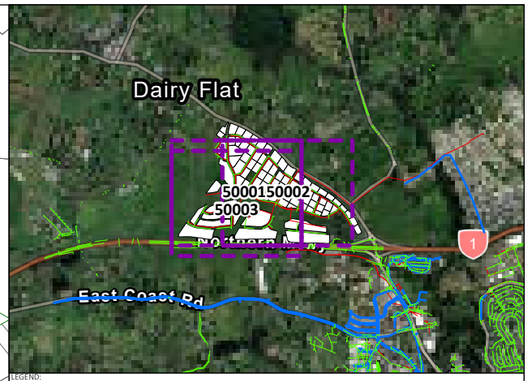




LEGEND:

- SW NEW INLET/OUTLET
- SW NEW DEVICE
- SW NEW MANHOLE
- SW EX. CATCHPIT
- SW EX. INLET OR OUTLET
- SW EX DEVICE
- SW EX MANHOLE
- SW ABANDONED MANHOLE
- SW NEW PVT PIPE
- Meters
- SW EX PVT PIPE
- SW EX PUB PIPE
- SW EX CHANNEL
- SW ABANDON PUB PIPE
- SW ABANDON PVT PIPE
- STORMWATER DEVICE
- alt ww node
- alt ww pvt pipe
- alt ww pub pipe
- alt ws pvt pipe
- alt ws pub pipe
- PROPOSED KERB LINES
- STREAM CHANNEL
- 20m STREAM BUFFER
- INDIGENOUS VEGETATION AREA
- IV1 10m BUFFER
- WETLANDS TO BE RETAINED
- WETLAND 10m BUFFER
- PLAN CHANGE AREA
- NEW PARCELS
- EXISTING KERBLINES
- EXISTING PARCELS
- EXISTING IMPERVIOUS
- EXISTING BUILDINGS

GENERAL NOTES:
1.1 PIPES AND MANHOLES MUST BE CONSTRUCTED IN THE LOCATIONS SHOWN, DWG FILES OF THE DESIGN WILL BE PROVIDED ON REQUEST.
1.2 HORIZONTAL AND VERTICAL CONSTRUCTION TOLERANCES ARE 50mm. ANY CHANGES TO THE DESIGN BY MORE THAN THE TOLERANCE ARE TO BE SUBMITTED TO THE ENGINEER IN WRITING. NO ASSETS ARE TO BE CONSTRUCTED ON SITE OUTSIDE OF TOLERANCE WITHOUT WRITTEN APPROVAL OF THE ENGINEER.
1.3 IN ADDITION TO 1.2, WHERE THE DESIGN UTILISES MINIMUM GRADES/MINIMUM FALLS THROUGH MANHOLES FOLLOWING THE RELEVANT COP DOCUMENTS, NO REDUCTION IN GRADE OR FALL THROUGH MANHOLE IS PERMITTED.
1.4. ALL WORK TO COMPLY WITH COUNCIL AND PUBLIC NETWORK OPERATOR STANDARDS. ANY AMBIGUITY BETWEEN DRAWINGS AND STANDARDS TO BE REPORTED TO THE ENGINEER IN WRITING FOR CLARIFICATION
1.5. THE CONTRACTOR IS TO PEG AND MEASURE INFRASTUCTURE AND UTILITY LOCATIONS, LEVELS AND EARTHWORKS LEVELS PRIOR TO ORDERING MATERIALS. ANY CONFLICT BETWEEN THE LEVELS MEASURED ON SITE AND THE ENGINEERING PLANS IS TO BE SUBMITTED TO THE ENGINEER IN WRITING PRIOR TO THE ORDERING OF MATERIALS.
1.6 CONTRACTOR TO COMPLY WITH HEALTH AND SAFETY AT WORK ACT (HSWA) 2015
1.7 BOTH CONTRACTORS AND CONSULTANTS ARE TO TAKE ALL NECESSARY CARE AND PRECAUTION AT THE CONSTRUCTION SITE TO AVOID ACCIDENT AND INJURY FROM FALLING INTO EXCAVATIONS, CRUSHING BY SUBSIDING EXCAVATIONS AND THE MOVEMENT OF PLANT AND MATERIALS ON THE SITE.
1.8 VERTICAL LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946
1.9 WHERE PIPES CROSS, IF CROSSOVER OF PIPES IS LESS THAN 500mm, USE POLYSTYRENE BETWEEN PIPES, OTHERWISE HARDFILL TO BE PLACED IN TRENCH BETWEEN PIPES WHERE DRAINAGE LINES CROSS. EXTEND 0.5m EACH SIDE OF PIPE REGARDLESS OF SEPARATION DISTANCE.
1.10 APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL ROAD CROSSINGS AND VEHICLE CROSSINGS.
1.11 HEAVY DUTY TRAFFICABLE MANHOLE LIDS AND FRAMES TO BE USED IN ALL AREAS.
1.12 PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A LONDON JUNCTION AND CAP.
1.13 ALL LINES TO BE ABANDONDED SHALL BE SEALED AT EACH END. TIMING OF ALL SEALING TO BE COORDINATED WITH COUNCIL STAFF.
1.14 BENDS ON PRIVATE INFRASTRUCTURE TO BE LONG RADIUS BENDS UNLESS OTHERWISE SPECIFIED.
1.15 FOR RETAINING WALL DRAINAGE DETAILS, PLEASE REFER TO STRUCTURAL ENGINEERING DESIGN OF WALLS
1.16 ALL INFRASTRUCTURE TO BE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS, ANY DEVIATION FROM THIS TO BE NOTIFIED TO THE ENGINEER IN WRITING PRIOR TO CONSTRUCTION.
1.17 UNDERGROUND TANK LOCATIONS SHOULD BE ASSESSED BY A STRUCTURAL ENGINEER TO ENSURE ADJACENT STRUCTURES DO NOT APPLY LOADINGS TO THE TANKS THAT EXCEED MANUFACTURER REQUIREMENTS.

WASTEWATER NETWORK NOTES:
2.1. PROPOSED PUBLIC WW PIPE AND CONNECTIONS SHALL BE uPVC SN16 IF OPEN TRENCHED OR PE100 SDR17 IF DIRECTIONALLY DRILLED.
2.2. WORKS OVER APPROVAL SHALL BE APPLIED FOR BEFORE BUILDING CONSENT WHERE BUILDINGS ARE WITHIN 2.0m OF THE SANITARY NETWORK
2.3. WW CONNECTIONS SHALL COMPLY WITH PUBLIC NETWORK OPERATOR STANDARDS
2.4. MANHOLE COVERS AND SAFETY GRILLS SHALL COMPLY WITH PUBLIC NETWORK OPERATOR STANDARDS

WATER SUPPLY NETWORK NOTES
3.1 WATER METERS TO BE INSTALLED OUSIDE OF PAVED DRIVEWAY TRAFFICED AREA.
3.2 ALL PROPOSED WATER SUPPLY PIPES ARE 25mm ODPE UNLESS OTHERWISE SPECIFIED
3,3 ANY SECTIONS OF PUBLIC WATER MAIN TO BE UPGRADED SHALL INCLUDE PROVISION TO CONNECT EXISTING CONNECTIONS TO THE NEW LINE AND ABANDONING THE EXISTING MAIN.

IMAGERY CREDITS:
LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Maxar

SCAN FOR 3D:

allsite.ai

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

LOGO: CIVIX

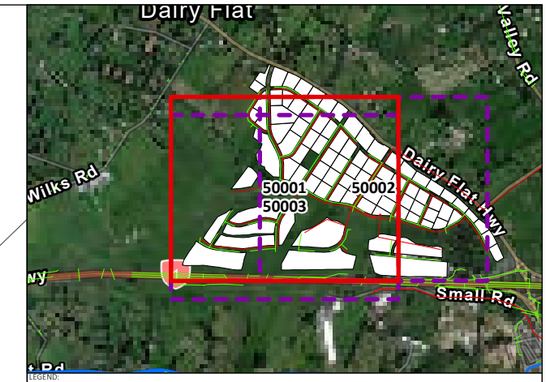
PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: STORMWATER PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 50000

SCALE:	SIZE:	REVISION:	DATE:
1:7,000	A3	A	31/03/23



LEGEND:

- SW NEW INLET/OUTLET
- SW NEW DEVICE
- SW NEW MANHOLE
- SW EX. CATCHPIT
- SW EX. INLET OR OUTLET
- SW EX DEVICE
- SW EX MANHOLE
- SW ABANDONED MANHOLE
- SW NEW PVT PIPE
- Meters
- SW EX PVT PIPE
- SW EX PUB PIPE
- SW ABANDON PUB PIPE
- SW ABANDON PVT PIPE
- STORMWATER DEVICE
- alt ww node
- alt ww pvt pipe
- alt ww pub pipe
- alt ws pvt pipe
- alt ws pub pipe
- PROPOSED KERB LINES
- PROPOSED CONTOURS
- STREAM CHANNEL
- 20m STREAM BUFFER
- WETLANDS TO BE RETAINED
- WETLAND 10m BUFFER
- PLAN CHANGE AREA
- NEW PARCELS
- EXISTING KERBLINES
- EXISTING PARCELS
- EXISTING IMPERVIOUS
- EXISTING BUILDINGS

GENERAL NOTES:
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LOGO: CIVIX

PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: STORMWATER PLAN

STATUS: FOR INFORMATION ONLY

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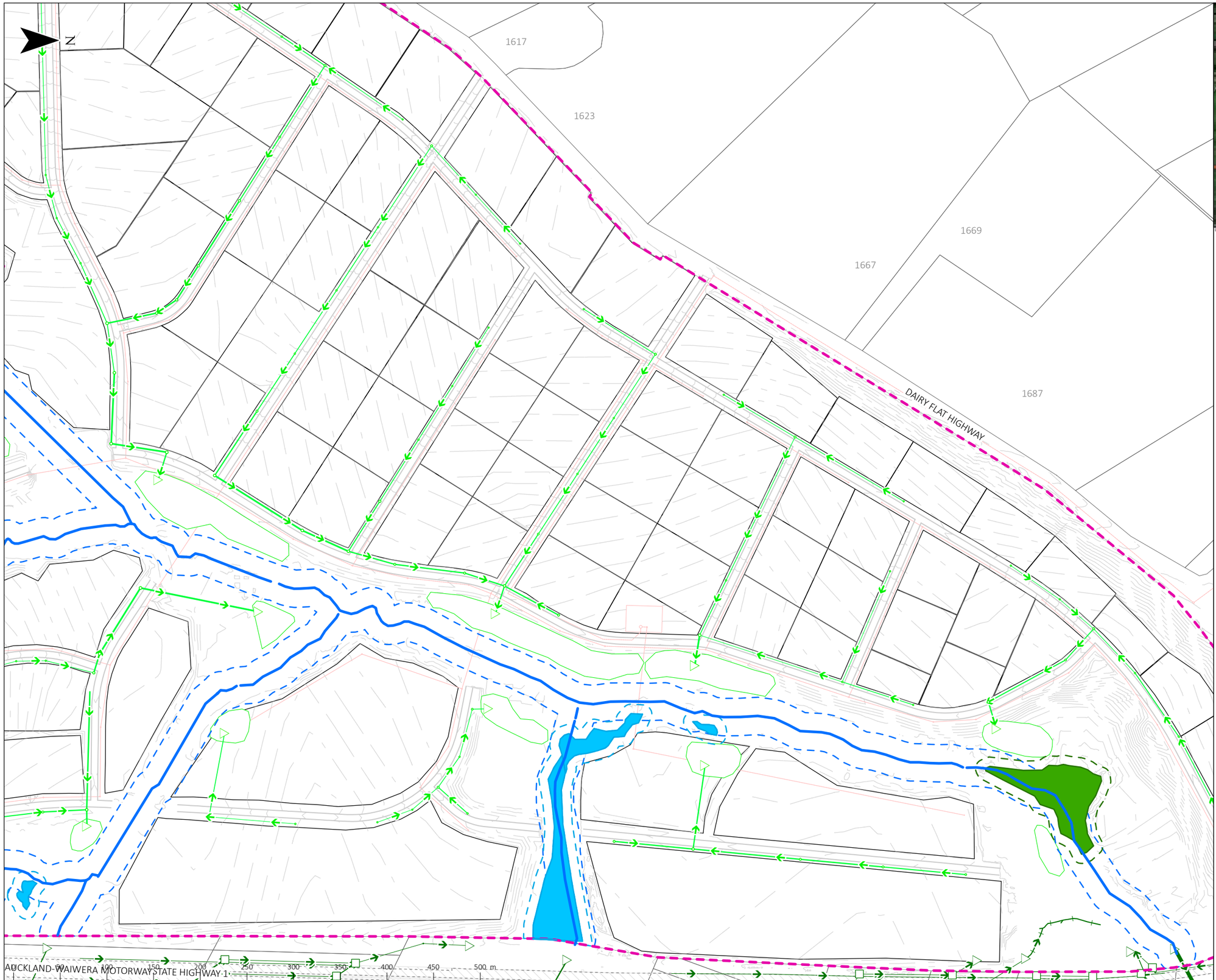

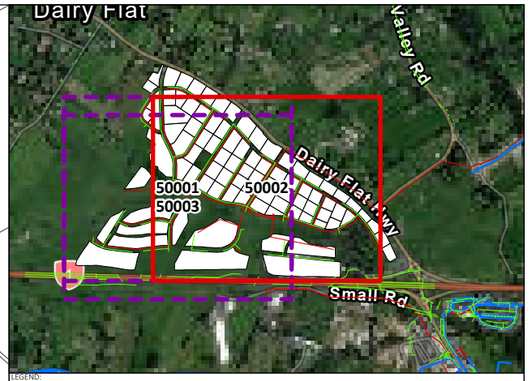

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A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

LOGO: CIVIX

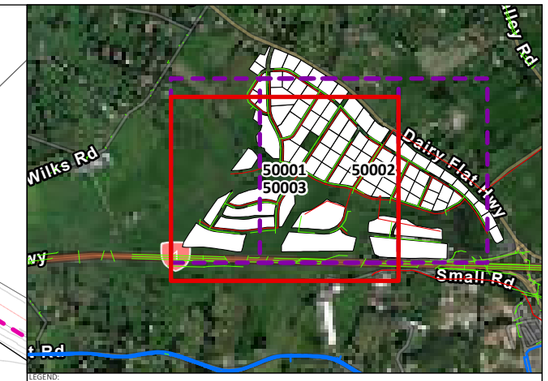
PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: STORMWATER PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 50002

SCALE:	SIZE:	REVISION:	DATE:
1:4,000	A3	A	31/03/23



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SCAN FOR 3D:

allsite.ai

LOGO: CIVIX

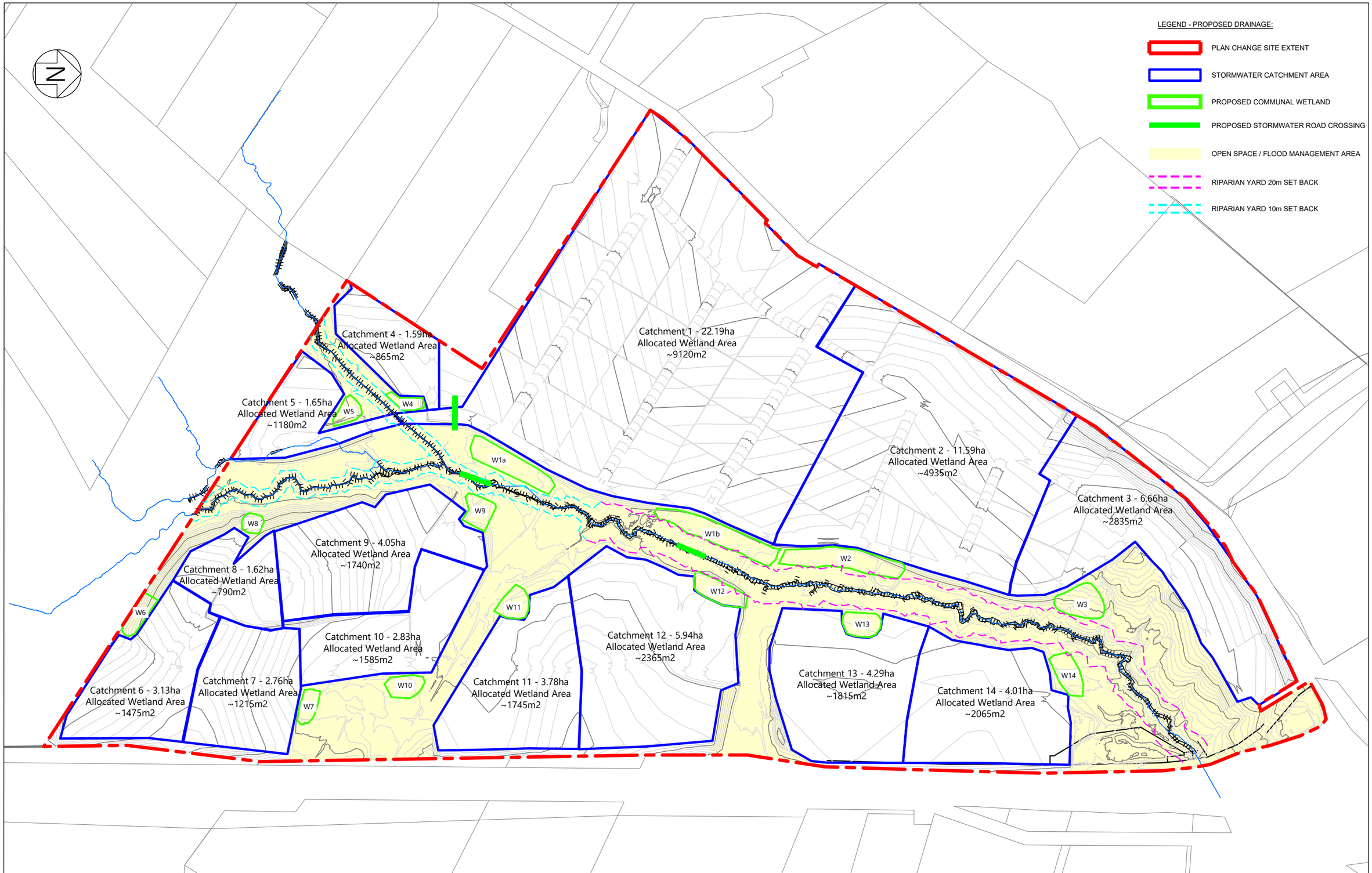
PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: STORMWATER PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 50003

SCALE:	SIZE:	REVISION:	DATE:
1:4,000	A3	A	31/03/23



REVISION	AMENDMENT	BY
_	_	_
_	_	_
_	_	_
_	_	_
_	_	_

DESIGNED: MO
DRAWN: MO
RELEASED: BK

CIVIX

PROJECT: SILVERDALE WEST PLAN CHANGE

TITLE: CATCHMENT AREAS

STATUS: FOR INFORMATION ONLY
DRAWING NO: 30001
SCALE & SIZE: - A3
REV: 21/05/2024

LEGEND:

- WW NEW DEVICE
- WW NEW MANHOLE
- PUMPSTATION
- WW EX. ENDCAP/ROD. EYE
- WW EX. FITTING
- WW EX DEVICE
- WW EX MANHOLE
- WW ABANDONED MANHOLE
- WW NEW PVT GRAVITY PIPE
- Meters
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SCAN FOR 3D:

allsite.ai

LOGO: CIVIX

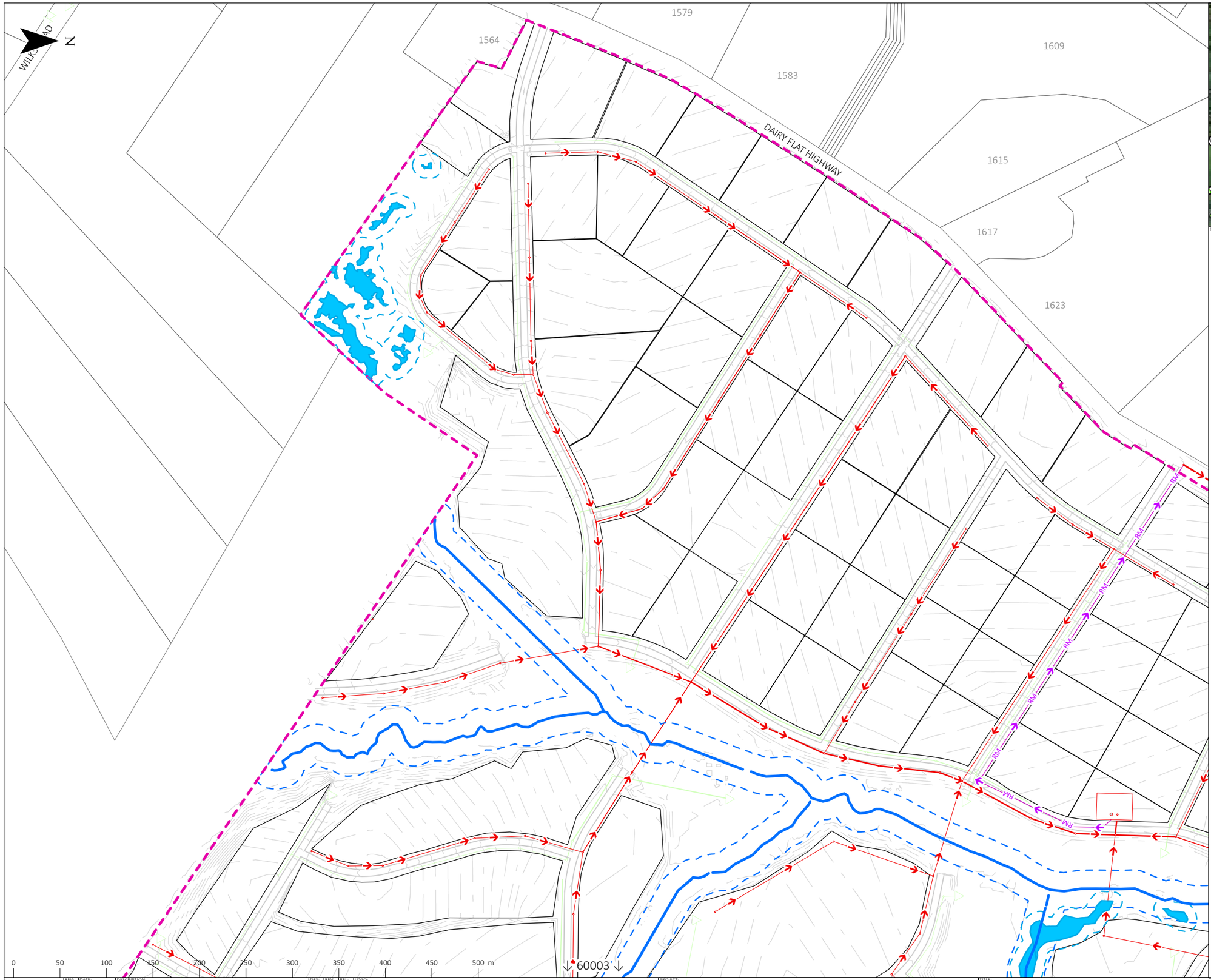
PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

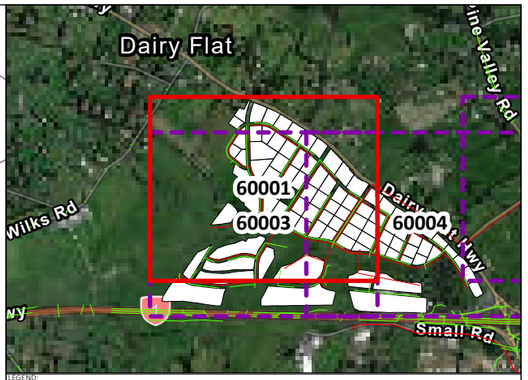
TITLE: WASTEWATER PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 60000

SCALE:	SIZE:	REVISION:	DATE:
1:12,000	A3	A	31/03/23





LEGEND:

- WW NEW DEVICE
- WW NEW MANHOLE
- PUMPSTATION
- WW EX DEVICE
- WW EX MANHOLE
- WW ABANDONED MANHOLE
- WW NEW PVT GRAVITY PIPE
- Meters
- WW NEW PUB RISING MAIN
- WW EX PVT PIPE
- WW EX PUB PIPE
- WW ABANDON PVT PIPE
- alt ws pub pipe
- alt ws pvt pipe
- alt sw pub pipe
- alt sw pvt pipe
- alt sw node
- alt sw outlet
- PROPOSED KERB LINES
- STREAM CHANNEL
- 20m STREAM BUFFER
- WETLANDS TO BE RETAINED
- WETLAND 10m BUFFER
- PLAN CHANGE AREA
- NEW PARCELS
- EXISTING PARCELS
- EXISTING IMPERVIOUS
- EXISTING BUILDINGS

GENERAL NOTES:

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WASTEWATER NETWORK NOTES:

2.1. PROPOSED PUBLIC WW PIPE AND CONNECTIONS SHALL BE uPVC SN16 IF OPEN TRENCHED OR PE100 SDR17 IF DIRECTIONALLY DRILLED.
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2.3. WW CONNECTIONS SHALL COMPLY WITH PUBLIC NETWORK OPERATOR STANDARDS
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WATER SUPPLY NETWORK NOTES

3.1 WATER METERS TO BE INSTALLED OUSIDE OF PAVED DRIVEWAY TRAFFICED AREA.
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IMAGERY CREDITS:
LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Maxar

SCAN FOR 3D:

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REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

LOGO: CIVIX

PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: WASTEWATER PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 60001

SCALE:	SIZE:	REVISION:	DATE:
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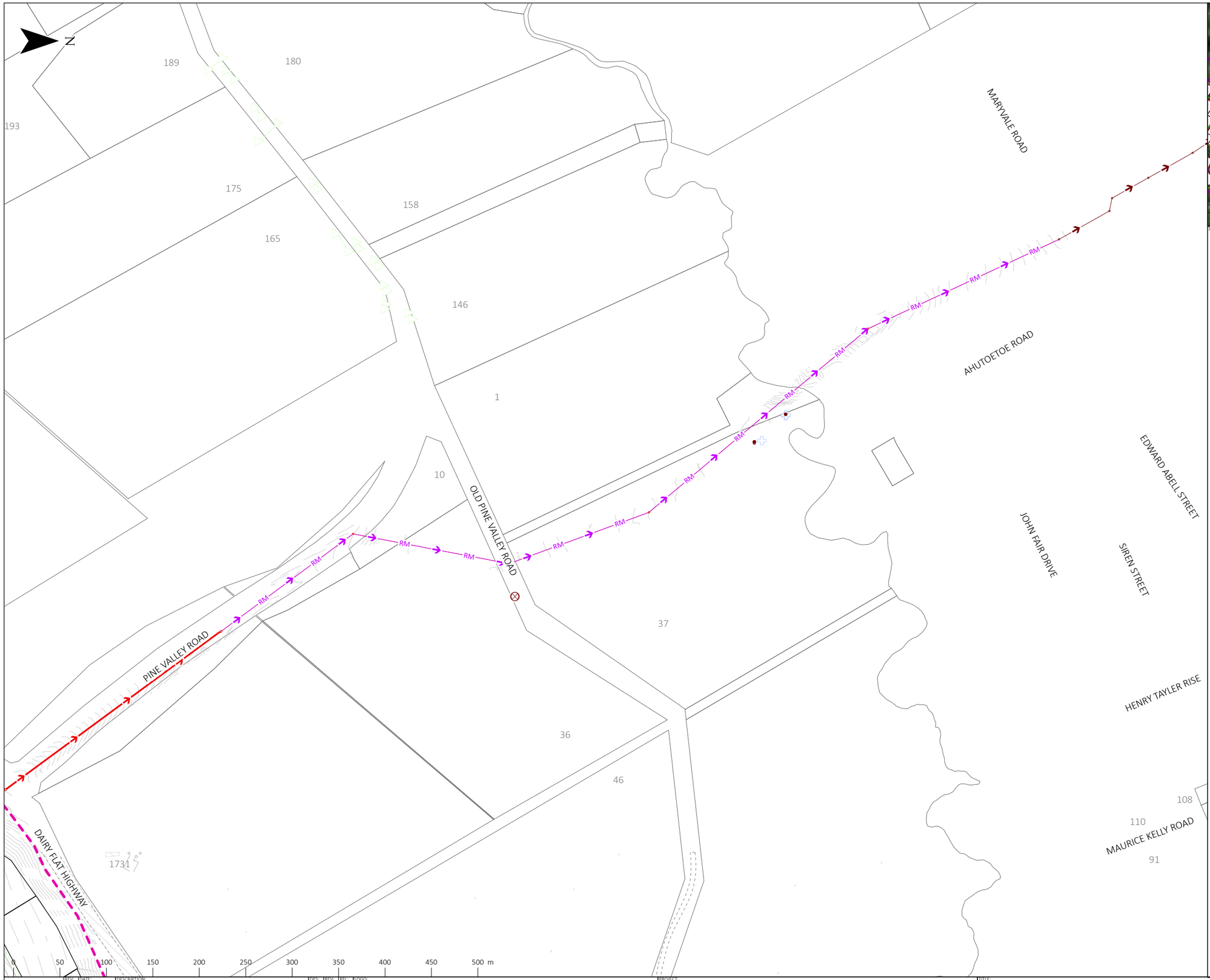

LEGEND:

- WW NEW DEVICE
- WW NEW MANHOLE
- WW EX. ENDCAP/ROD. EYE
- WW EX. FITTING
- WW EX DEVICE
- WW EX MANHOLE
- WW ABANDONED MANHOLE
- WW NEW PVT GRAVITY PIPE
- Meters
- WW NEW PUB RISING MAIN
- WW EX PVT PIPE
- WW EX PUB PIPE
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- alt ws pub pipe
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- alt ws valve
- alt sw pub pipe
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IMAGERY CREDITS:
LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Maxar

REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

SCAN FOR 3D:

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LOGO: CIVIX

PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: WASTEWATER PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 60002

SCALE:	SIZE:	REVISION:	DATE:
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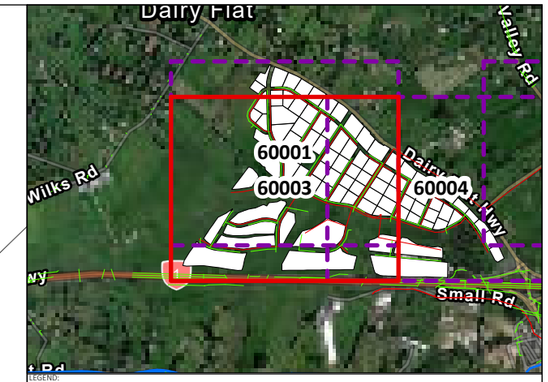

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- WW NEW MANHOLE
- PUMPSTATION
- WW EX DEVICE
- WW EX MANHOLE
- WW ABANDONED MANHOLE
- WW NEW PVT GRAVITY PIPE
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- alt ws pub pipe
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IMAGERY CREDITS:
LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Maxar

N

↑ 60001 ↑

1617

1623

DAIRY FLAT HIGHWAY

RM

→ 60004 ←

STATE HIGHWAY 1

AUCKLAND-WAIWERA MOTORWAY

0 50 100 150 200 250 300 350 400 450 500

SCAN FOR 3D:

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REV:	DATE:	DESCRIPTION:	DES:	REV:	REL:
A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

LOGO: CIVIX

PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: WASTEWATER PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 60003

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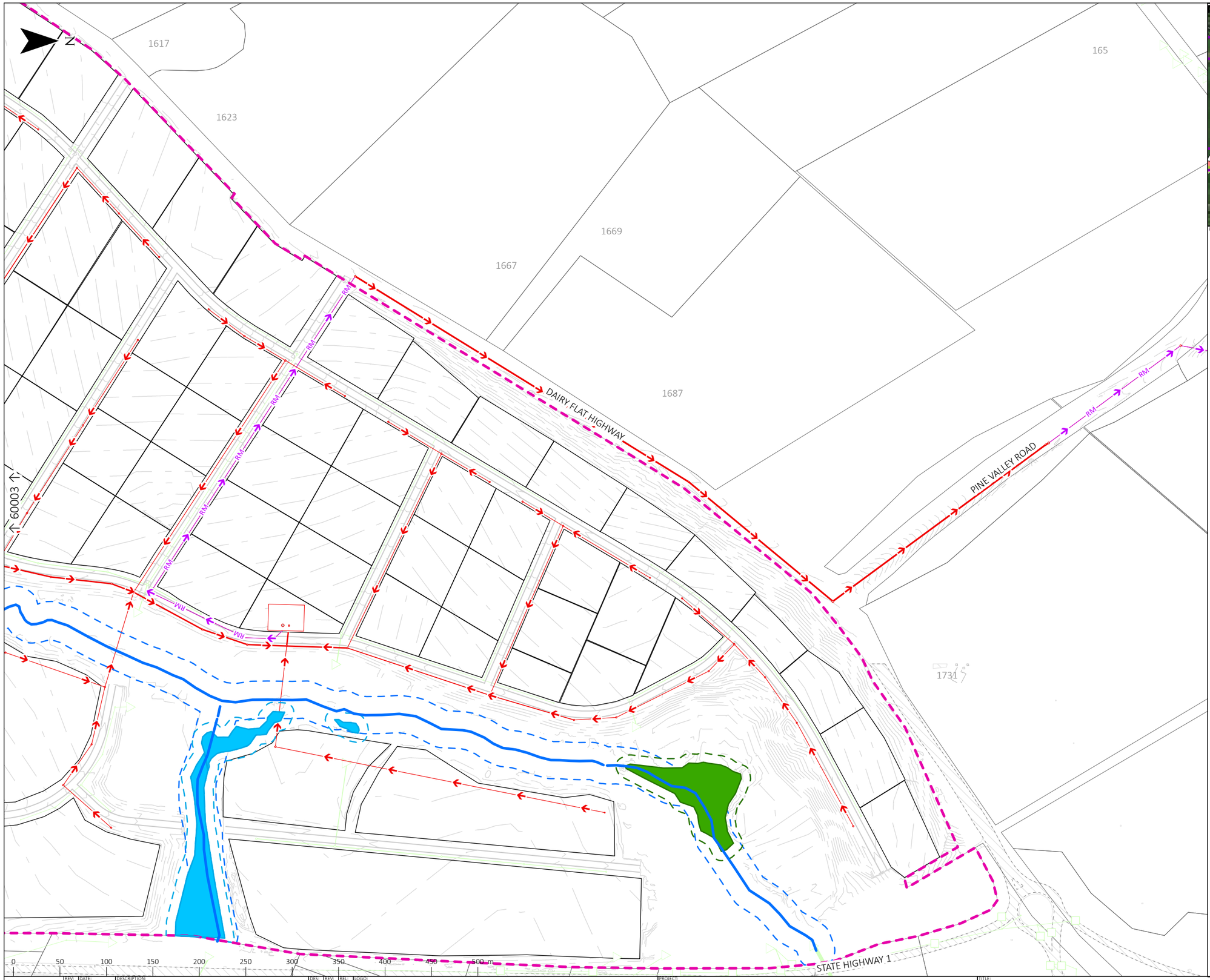

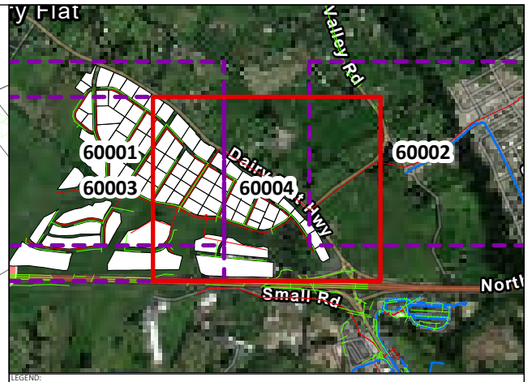

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- alt sw pub pipe
- alt sw pvt pipe
- alt sw node
- alt sw catchpit
- alt sw outlet
- PROPOSED KERB LINES
- STREAM CHANNEL
- 20m STREAM BUFFER
- INDIGENOUS VEGETATION AREA
- IV1 10m BUFFER
- WETLANDS TO BE RETAINED
- WETLAND 10m BUFFER
- PLAN CHANGE AREA
- NEW PARCELS
- EXISTING KERBLINES
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A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

LOGO: CIVIX

PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: WASTEWATER PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 60004

SCALE:	SIZE:	REVISION:	DATE:
1:4,000	A3	A	31/03/23

LEGEND

- NEW PARCELS
- FUTURE CONNECTION
- EXISTING WATER MAIN
- PROPOSED CONNECTION OPTION 1
- PROPOSED CONNECTION OPTION 2
- STREAM CHANNEL
- PLAN CHANGE AREA
- EXISTING PARCELS
- EXISTING KERBLINES
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- EXISTING BUILDINGS

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1.5. THE CONTRACTOR IS TO PEG AND MEASURE INFRASTUCTURE AND UTILITY LOCATIONS, LEVELS AND EARTHWORKS LEVELS PRIOR TO ORDERING MATERIALS. ANY CONFLICT BETWEEN THE LEVELS MEASURED ON SITE AND THE ENGINEERING PLANS IS TO BE SUBMITTED TO THE ENGINEER IN WRITING PRIOR TO THE ORDERING OF MATERIALS.
1.6 CONTRACTOR TO COMPLY WITH HEALTH AND SAFETY AT WORK ACT (HSWA) 2015
1.7 BOTH CONTRACTORS AND CONSULTANTS ARE TO TAKE ALL NECESSARY CARE AND PRECAUTION AT THE CONSTRUCTION SITE TO AVOID ACCIDENT AND INJURY FROM FALLING INTO EXCAVATIONS, CRUSHING BY SUBSIDING EXCAVATIONS AND THE MOVEMENT OF PLANT AND MATERIALS ON THE SITE.
1.8 VERTICAL LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946
1.9 WHERE PIPES CROSS, IF CROSSOVER OF PIPES IS LESS THAN 500mm, USE POLYSTYRENE BETWEEN PIPES, OTHERWISE HARDFILL TO BE PLACED IN TRENCH BETWEEN PIPES WHERE DRAINAGE LINES CROSS. EXTEND 0.5m EACH SIDE OF PIPE REGARDLESS OF SEPARATION DISTANCE.
1.10 APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL ROAD CROSSINGS AND VEHICLE CROSSINGS.
1.11 HEAVY DUTY TRAFFICABLE MANHOLE LIDS AND FRAMES TO BE USED IN ALL AREAS.
1.12 PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A LONDON JUNCTION AND CAP.
1.13 ALL LINES TO BE ABANDONDED SHALL BE SEALED AT EACH END. TIMING OF ALL SEALING TO BE COORDINATED WITH COUNCIL STAFF.
1.14 BENDS ON PRIVATE INFRASTRUCTURE TO BE LONG RADIUS BENDS UNLESS OTHERWISE SPECIFIED.
1.15 FOR RETAINING WALL DRAINAGE DETAILS, PLEASE REFER TO STRUCTURAL ENGINEERING DESIGN OF WALLS
1.16 ALL INFRASTRUCTURE TO BE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS, ANY DEVIATION FROM THIS TO BE NOTIFIED TO THE ENGINEER IN WRITING PRIOR TO CONSTRUCTION.
1.17 UNDERGROUND TANK LOCATIONS SHOULD BE ASSESSED BY A STRUCTURAL ENGINEER TO ENSURE ADJACENT STRUCTURES DO NOT APPLY LOADINGS TO THE TANKS THAT EXCEED MANUFACTURER REQUIREMENTS.

WASTEWATER NETWORK NOTES:
2.1. PROPOSED PUBLIC WW PIPE AND CONNECTIONS SHALL BE uPVC SN16 IF OPEN TRENCHED OR PE100 SDR17 IF DIRECTIONALLY DRILLED.
2.2. WORKS OVER APPROVAL SHALL BE APPLIED FOR BEFORE BUILDING CONSENT WHERE BUILDINGS ARE WITHIN 2.0m OF THE SANITARY NETWORK
2.3. WW CONNECTIONS SHALL COMPLY WITH PUBLIC NETWORK OPERATOR STANDARDS
2.4. MANHOLE COVERS AND SAFETY GRILLS SHALL COMPLY WITH PUBLIC NETWORK OPERATOR STANDARDS

WATER SUPPLY NETWORK NOTES
3.1 WATER METERS TO BE INSTALLED OUSIDE OF PAVED DRIVEWAY TRAFFICED AREA.
3.2 ALL PROPOSED WATER SUPPLY PIPES ARE 25mm ODPE UNLESS OTHERWISE SPECIFIED
3,3 ANY SECTIONS OF PUBLIC WATER MAIN TO BE UPGRADED SHALL INCLUDE PROVISION TO CONNECT EXISTING CONNECTIONS TO THE NEW LINE AND ABANDONING THE EXISTING MAIN.

IMAGERY CREDITS:
Earthstar Geographics, LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

SCAN FOR 3D:

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REV:	DATE:	DESCRIPTION:	DES:	REV.	REL:
A	31/03/23	PRELIMINARY EARTHWORKS AND INFRASTRUCTURE	CT	AT	DSR

LOGO: CIVIX

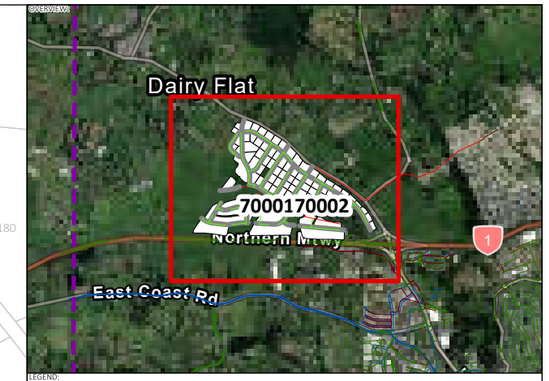
PROJECT: SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE: WATER SUPPLY AND UTILITIES PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 70000

SCALE:	SIZE:	REVISION:	DATE:
1:16,000	A3	A	31/03/23



LEGEND:

- NEW PARCELS
- WS EX FITTING
- WS EX. PUB PIPE
- FUTURE CONNECTION
- PROPOSED CONNECTION OPTION 1
- PROPOSED CONNECTION OPTION 2
- STREAM CHANNEL
- PLAN CHANGE AREA
- EXISTING PARCELS
- EXISTING KERBLINES
- EXISTING IMPERVIOUS
- EXISTING BUILDINGS

GENERAL NOTES:
1.1 PIPES AND MANHOLES MUST BE CONSTRUCTED IN THE LOCATIONS SHOWN, DWG FILES OF THE DESIGN WILL BE PROVIDED ON REQUEST.
1.2 HORIZONTAL AND VERTICAL CONSTRUCTION TOLERANCES ARE 50mm. ANY CHANGES TO THE DESIGN BY MORE THAN THE TOLERANCE ARE TO BE SUBMITTED TO THE ENGINEER IN WRITING. NO ASSETS ARE TO BE CONSTRUCTED ON SITE OUTSIDE OF TOLERANCE WITHOUT WRITTEN APPROVAL OF THE ENGINEER.
1.3 IN ADDITION TO 1.2, WHERE THE DESIGN UTILISES MINIMUM GRADES/MINIMUM FALLS THROUGH MANHOLES FOLLOWING THE RELEVANT COP DOCUMENTS, NO REDUCTION IN GRADE OR FALL THROUGH MANHOLE IS PERMITTED.
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CIVIX

PROJECT:
SILVERDALE WEST PRIVATE PLAN CHANGE

TITLE:
WATER SUPPLY AND UTILITIES PLAN

STATUS: FOR INFORMATION ONLY

DRAWING NO: 70001

SCALE:	SIZE:	REVISION:	DATE:
1:7,000	A3	A	31/03/23