

INFRASTRUCTURE REPORT



Warkworth South Plan Change, Warkworth Auckland

PROJECT INFORMATION

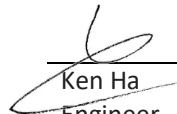
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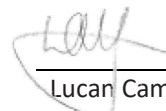
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CONTENTS

CONTENTS	0
1.0 INTRODUCTION	1
2.0 EXECUTIVE SUMMARY	4
3.0 EARTHWORKS	5
4.0 ROADING	6
4.1 STATE HIGHWAY ONE CONVERSION TO ARTERIAL ROAD	6
4.2 WIDER WESTERN LINK ARTERIAL ROAD	7
4.3 LOCAL ROAD NETWORK	7
4.3 WARKWORTH STRUCTURE PLAN	7
5.0 OVERLAND FLOW AND FLOODING	8
5.1 OVERLAND FLOW	8
5.2 FLOODING	9
5.3 RIPARIAN MARGINS AND SETBACKS	9
6.0 STORMWATER	10
6.1 STORMWATER RETICULATION	10
6.2 STORMWATER QUALITY	10
6.3 HYDRAULIC MITIGATION	10
6.4 STORMWATER MANAGEMENT PLAN	12
6.5 CONCLUSION	12
7.0 WASTEWATER	13
7.1 WARKWORTH STRUCTURE PLAN	13
7.2 WASTEWATER RETICULATION	14
7.3 WASTEWATER CAPACITY	15
7.4 CONCLUSION	15
8.0 WATER SUPPLY	16
8.1 WARKWORTH STRUCTURE PLAN	16
8.2 WATER RETICULATION	17
8.3 POTABLE WATER AND FIRE FIGHTING SUPPLY	18
8.4 CONCLUSION	18
9.0 OTHER UTILITIES	18
10.0 CONCLUSIONS	19

APPENDICES

A - MAVEN ENGINEERING PLANS

1.0 INTRODUCTION

The following report provides an assessment of infrastructure associated with the proposed Warkworth South Plan Change. The Plan Change Area (PCA) forms various properties located between Valerie Close and State Highway 1 (SH1), whilst a large land holding is also located to the east of SH1. The plan Change is split into three precincts – Waimanawa Hill, Waimanawa Valley and the Morrison Heritage Orchard Precinct. The latter provides for the retention of the current Orchard and limited development potential. Accordingly, this report focuses on the intended urbanisation of the Waimanawa Valley & Waimanawa Hill precincts.

The PCA is irregular in shape and features a total land area of approximately 164ha. The western portion of the PCA is circa 98Ha with a further 66Ha to the east of SH1. All the properties address and legal description within this PCA is listed in table 1 below:

Table 1: Property information

Existing site element	Details
Site address	<ul style="list-style-type: none"> • 1684, 1684a, 1711, 1723,1738,1768 & 1773 State Highway 1; • 8, 30, 36, 40, 46, 83, 123, 125 & 127 Valerie Close; • 43,49 & Lot 6 DP 150976 Mason Heights
Legal description	<ul style="list-style-type: none"> • Pt Allot 72 Psh of Mahurangi SO 891, Pt Allot 73 Psh of SO 891E, PT Allot 64 Psh of Mahurangi SO 891E, Pt Allot 72 Psh of Mahurangi SO 891, Pt Allot 73 Psh of Mahurangi SO 891E • Pt Allot 64 Psh of Mahurangi SO 891E, Pt Allot 72 Psh of SO 891E, Pt Allot 73 Psh of SO 891E • Lot 1-4 DP539629 • PT ALLT 64 Paro Mahurangi • Lot 4-6 DP 353748 • Lot 2 DP 451512 • Lot 3, 5 & 6 DP 155544 • Lot 1 & 2 DP 344489 • Lot 5-7 DP 150976 • Lot 1-2 DP 119449

The location of the site (in respect to the existing Warkworth Township) is shown below, within Figure 1. The eastern and western portions are clearly shown below, with the western plan change area in green and the eastern area in blue. SH1 is located between the two areas.

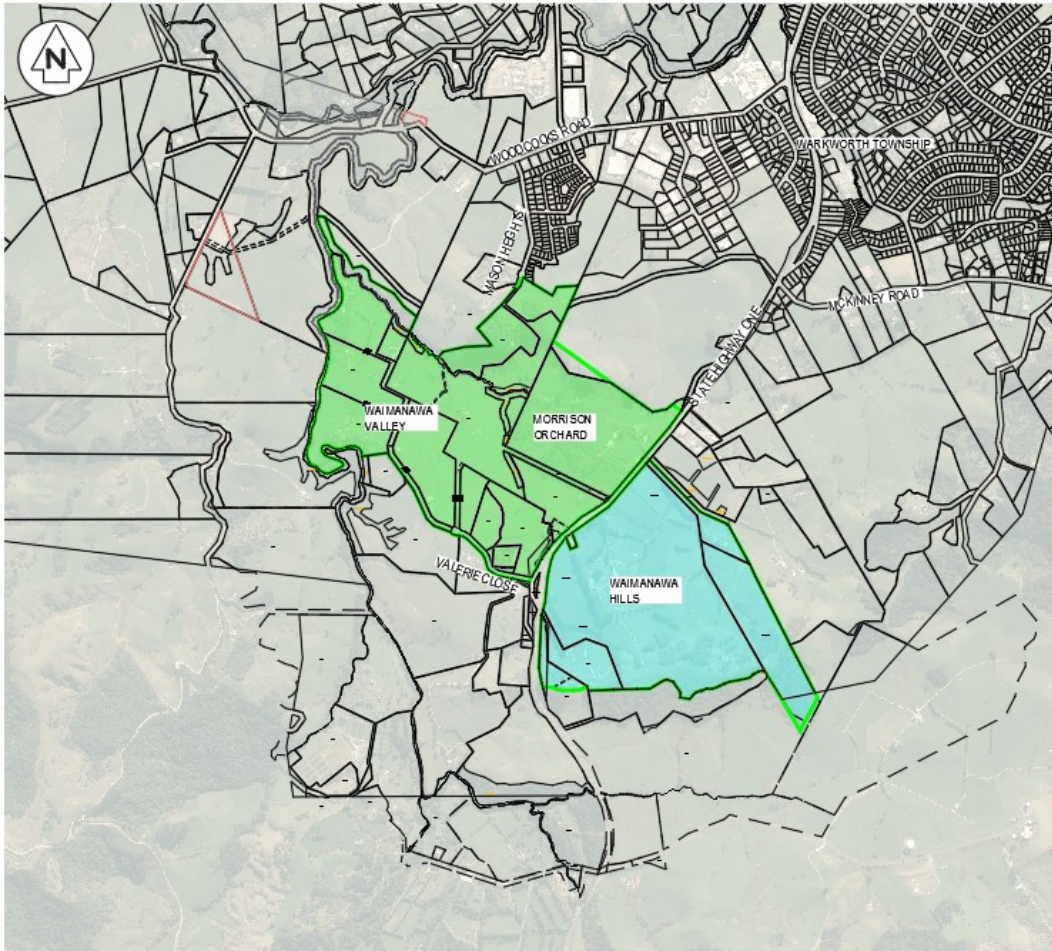


Figure 1: Site Location Plan. Western portion in green, eastern portion in blue

The majority of the Plan Change area is in pasture, which typically slopes from the southeast and northeast down to the low lying central plain. A primary tributary of the Mahurangi River adjoins the western boundary. Land gradients vary from gentle to steep. The site is characterised by prominent gullies, many of which support watercourses. These streams ultimately discharge into the unnamed stream dissecting the central plain. Native vegetation is present along the alignment of the main tributary along the western boundary and north of the mainstream running east-west within the western portion of the PCA. The southern boundary of the eastern side adjoins a public reserve which is classified as a Significant Ecological Area.

The urban design and associated concept layouts for the Warkworth South Plan change has been developed by Reset Urban for western portion and A Studio to the east. The concept layout incorporates a combination of residential zones, from Terrance Housing Apartment Building Zone, Mix Housing Urban & Suburban Zone to large lots which provide consideration of natural constraints (contour, streams, ridgeline etc), ease of servicing and connectivity to the proposed roading network. Figure 2 (Below) indicates the proposed development layout.



Figure 2: Warkworth South Concept Development Plan

The information provided herein relates to the stormwater, wastewater, water supply, roading and other service infrastructure and the potential capacity to service the proposed residential development within the precinct. This assessment relates to the scale of development enabled by the plan change. It ensures the infrastructure can service the development shown on the concept plan.

Development of the plan change also requires widespread recontouring of the site. Details of these earthworks inclusive of the proposed sediment and erosion controls and retaining walls are also provided within this report.

The calculations and assessments included in this report are a 'desktop' analysis and are preliminary in nature based on information available at time of issue. Final design plans and calculations appropriate for the application type will be provided at Resource Consent, Subdivision Consent, Engineering Plan Approval and Building Consent stages as required.

This assessment has considered the current Auckland Unitary Plan 2016 (AUP) provisions including those relevant to infrastructure, subdivision, land disturbance, water quality, stormwater, wastewater and transport. Where the current AUP provisions are not appropriate or sufficient to manage the effects of development, special provisions are recommended for inclusion within the Plan Change.

2.0 EXECUTIVE SUMMARY

The information gathered to-date confirms the site is suitable for urban development, a summary of which is provided below:

Earthworks:

Within the PCA, bulk recontouring is required to enable the construction of the roading network and to ensure suitable building platforms can be provided. Initial design plans demonstrate finished levels with a maximum 1:8 grade in places, which is considered suitable for the density proposed. The existing AUP provisions on local and regional land disturbance are appropriate to manage the effect of Earthworks including erosion and sediment control measures, which would be detailed at resource consent stage.

Roading:

The SH1 upgrading and Wider Western Link Road ('WWLR') are proposed in support of the Plan Change request and have been designed in accordance with relevant Auckland Transport standards. These works will provide access directly to the PCA. All local roads within the PCA have been designed such that vertical and horizontal alignments comply with ATCOP & TDM standards. Typical sections have been drafted for approval but are generally in accordance with design guidelines. The existing AUP provisions on infrastructure, transport and subdivision are considered appropriate to manage the transport effects of this development.

Overland Flow and Flooding:

Whilst there are known downstream flooding concerns, flooding within the site is contained to the streams and gullies. The urbanisation of the PCA can occur without creating any downstream flooding effects. This will be achieved through passing forward the 10 and 100-year flows, outlined in the appended Maven Stormwater Management Plan ('SMP'). The report recommends the PCA be classified as SMAF1. With this addition the existing AUP provisions are considered appropriate to manage overland flow and flooding.

Stormwater:

The SMP indicates that there is a need for stream hydraulic mitigation to protect existing streams within and downstream of the PCA from erosion. The inclusion of the SMAF-1 control is considered adequate to achieve this outcome. The stormwater systems within the PCA will be designed in accordance with the Stormwater Code of Practice ('SwCoP') and relevant standards & requirements. The report recommends rules to be included in the Plan Change on stormwater management consistent with an approved SMP, and a restriction on inert external building material especially roofing. Subject to the SMP being authorised alongside future resource consents, the AUP provisions on stormwater management and water quality are sufficient to control stormwater discharge from the PCA.

Wastewater:

Wastewater drainage will be provided for the PCA and wider catchment through an extension of the existing network, largely in-line with the draft Warkworth Wastewater Servicing Plan. The solution is subject to approval from WSL. Further consultation and detailed design will be undertaken in conjunction with Watercare Services limited, of which is ongoing at time of issue. Subject to the completion of the Northeast Wastewater Servicing Scheme in mid-2025, there will be sufficient capacity to service the PCA. The plan change makes particular provision for a wastewater pump station. Subject to the inclusion of this pump station, the AUP provisions are appropriate to manage the effects of wastewater.

Water:

Water reticulation can be provided for the proposed precinct, through an extension of the existing bulk water main and booster pump to a proposed reservoir within the PCA, in-line with the intended upgrades being completed by Watercare Services for Warkworth South. Subject to these upgrade works being

completed, there will be sufficient supply for potable and firefighting requirements within the PCA. The plan change makes particular provision for a water reservoir to service Warkworth South. With this modification, the AUP provisions are appropriate to manage the effects and supply of potable water.

Other services:

Power and Telecommunications networks are present in the greater Warkworth area, details of upgrades and extensions from existing network services are to be confirmed and agreed with relevant utility providers (Vector and Chorus). The existing AUP provisions are appropriate to manage the effects of these services.

3.0 EARTHWORKS

The Waimanawa Valley and Waimanawa Hills development areas require bulk earthworks and widespread recontouring to improve contours to satisfy the design and layout requirements for the development. The bulk earthworks are required for the construction of the proposed roading network and to provide suitable building platforms within the proposed lots.

Geotechnical assessments have been undertaken by CMW Geosciences for the Waimawa Hill (eastern portion) and Land Development & Engineering Ltd (LDE) for the Waimanawa Valley (western portion). The geotechnical investigations confirm suitability of the site for residential development and details the site geology and subsurface conditions. Findings from the assessment are outlined in the respective reports (CMW Report Ref: AKL2021-0235AC Rev0 & LDE Report Ref 18707). The earthworks model has been designed in accordance with the recommendations of the above-mentioned reports.

The average gradient across the site is approximately 1V:5H. In some areas the site features grade up to 1V:3H. To demonstrate that the site can be developed for residential purposes, Maven Associates have developed a bulk earthwork design which features maximum finished gradients of 1V:8H. This design limit (1V:8H) ensures compliant public road gradients throughout the site, regardless of the horizontal orientation.

This design maximum also limits the height of required retaining walls, both in support of the public roading network and building platforms. The developed site contours have been designed, as far as practicable, to tie in with existing ground levels at the top of the site, reducing risk and increasing stability.

In accordance with the CMW geotechnical investigation report for the Waimanawa Hill development area, there are potential remedial works required to address the land stability and to enable suitable residential building platforms for development. These issues will require further investigation and will be addressed at resource consent stage.

An ecological constraints survey has been undertaken by Bioresearches Ltd. There are several streams, both permanent and intermittent, that are proposed to be either kept, reclaimed, or lost to enable the development of the site. Adequate streams and wetland setbacks are proposed to provide protection to existing streams and wetlands.

Permanent earthworks will need to be carried out in accordance with NZS 4404, and with Auckland Council's Standards of Engineering Design and Construction. Regional and District Land Use consents will need to be obtained from Auckland Council.

All earthworks within the site will be supported by measures for erosion and sediment control to ensure all adverse effects are mitigated. Proposed measures for erosion and sediment control will be designed in accordance with Auckland Council design manual GD05 Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region.

Due to the size of the development, earthworks will be staged, with exposed surfaces progressively stabilised. The general principles adopted during the earthworks phase will be detailed within an Erosion and Sediment Control Plan (ESCP) which will support any future application for resource consent. The general principles adopted within the ESCP will include the following:

- Minimise the disturbance area, due to earthwork activities, as practically possible while satisfying all requirements for development of the site.
- Ensure site staff are aware of the requirements of the ESCP and the relevant resource consent conditions prior to commencing works.
- Where possible, stage earthworks and progressively stabilise exposed areas following completion.
- Divert all cleanwater runoff away from the site, minimising the catchment to the exposed earthwork areas.
- Intercept and divert sediment-laden runoff from exposed areas to specifically designed treatment devices prior to discharging into the downstream environment.
- Implement measures to prevent construction traffic exiting the construction area onto public roads.
- Regularly inspect the erosion and sediment control measures and undertake any maintenance necessary to maximise the potential retention of sediment on the site.
- In the event of forecast heavy rain, stabilise the site as far as practically possible and close works down.
- Ongoing assessment of the erosion and sediment control measures and, if required, amend the ESCP as works progresses.
- Ensure site staff are aware of the requirements of the ESCP and the relevant resource consent conditions prior to the works commencing.
- Provide streams and wetland setbacks to prevent earthworks within or near to stream margins.
- Ensure adequate procedures are in place if any earthworks are required within or near to riparian setbacks.

All these methods and controls are already enabled and controlled through the AUP provisions on Land Disturbance and subdivision. There are no additional or different controls/standard required in this precinct.

4.0 ROADING

4.1 STATE HIGHWAY ONE CONVERSION TO ARTERIAL ROAD

The new Puhoi to Warkworth motorway is nearing completion and is due to open in June-2023. Once this motorway is open to the public, the existing SH1 between Puhoi and Warkworth will be transformed into a two-lane arterial road with cycling and walking options.

The Warkworth South Plan Change has been proactive with this news and seeks to include the conversion of the existing SH1 section within the PCA as part of the proposal. The former SH1 will be progressively upgraded throughout the development of this precinct.

SH1 is the main access point for the PCA. A new, primary intersection on SH1 and the WWLR will be built in support of the development. This will provide the primary access for both the Waimanawa Valley and Hills areas.

To enable improved pedestrian and cycling option to the wider Warkworth area, a temporary footpath and cycle lane will be installed between the Waimanawa Hill & Valley development areas to McKinney Road.

4.2 WIDER WESTERN LINK ARTERIAL ROAD

The Warkworth Structure Plan identified the Wider Western Link Road (WWLR) as a future arterial road required to deliver the intended growth of Warkworth and hinterland areas. The WWLR has been identified as the key road within the Waimanawa Valley area. Extensive consultation with Supporting Growth (SGA) and Auckland Transport has been carried out during the preliminary design of the PCA. The final location of the WWLR shown in the Plan Change documents are therefore generally aligned with SGA.

4.3 LOCAL ROAD NETWORK

New public roads will be constructed to provide access to the development. A single point of access will be provided from SH1. The intersection will be suitably designed for expected traffic movements and will be detailed as part of the future resource consent process. The local roads for the western area will stem from the proposed WWLR alignment. The local roading networks to the east of SH1 will be extended from the intersection mentioned above.

All future public roads will need to be constructed to public standards, with allowance for stormwater management, services, landscaping, and pedestrian movements.

The maximum longitudinal gradient of the public roads will be 1 in 8 (12.5%) in accordance with Auckland Council and Auckland Transport standards. New public roads will likely be formed as a flexible pavement. On-street parking will be provided, and roading cross sections will be developed as part of the Resource Consent process.

4.4 WARKWORTH STRUCTURE PLAN

We have reviewed the Structure Plan transport maps and associated Integrated Transport Assessment. IN our view, the Plan Change design and layout is in general accordance with the Plan which addressed the wider needs in terms of infrastructure.

The local roading network will cross identified streams, both intermittent and permanent. This will have ecological effects which require consideration. It is not reasonable nor practical for all roads to avoid these streams. A baseline ecology assessment has been undertaken by Bioreseachers, and future resource consents will outline the specifics in more detail.

The Plan Change makes provision for key transport related infrastructure including intersection locations, arterial road alignments and restricted vehicle access areas. Aside from these listed items, all roading matters can be successfully managed under the existing AUP provisions, and the subsequent EPA processes.

5.0 OVERLAND FLOW AND FLOODING

5.1 OVERLAND FLOW

The site is affected by numerous Overland Flowpaths (OLFPs) which for the most part follow the alignment of the natural gullies and streams within the site. The existing OLFP locations are indicated within Figure 3, below:

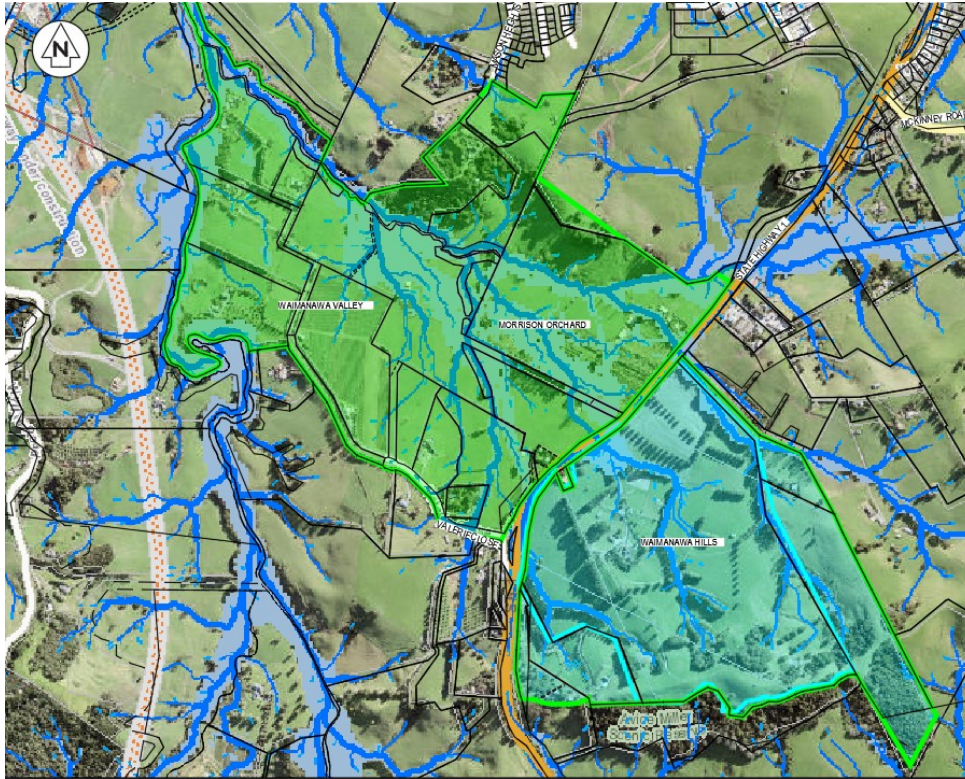


Figure 3: Existing OLFPs and flood plain (PCA area are hatched in green and cyan)

As part of the bulk earthworks proposed, a number of these OLFPs will be modified and/or redirected. Consents will be required for any reclamation and/or diversion of entry and exit points. These future consents shall also require environmental & ecological assessment to appropriately address the existing AUP provisions. The bulk of these OLFPs originate within the site for which diversion shall have no upstream effects.

Any piping of the OLFPs will be done in accordance with the Stormwater Code of Practice (Section 4.3.5.6), including allowances for blockages of the primary network during a 100-year ARI event. All outfalls will be supported by a designed energy dissipating outlet structure as per Auckland Council standards.

Engineered OLFPs within the development will be contained to road reserves, as far as practicable, with overland flows conveyed away from building platforms. Minimum freeboard as required by in Auckland Councils Stormwater Code of Practice will be provided. These requirements are summarised below:

- 500mm freeboard for OLFP flow rates above 2.0m³/s.
- 500mm freeboard for OLFP less than 2.0m³/s with average flow depths of 100mm when inundation is against the building.
- 150mm freeboard for OLFP less 2.0m³/s

5.2 FLOODING

The Warkworth Structure Plan Preliminary Stormwater Management Plan ('SMP') is a high-level document prepared by Tonkin and Taylor that provides a framework for stormwater management specific to the Future Urban zoned land of Warkworth. The report provides information for the public consultation process on future land use changes and initiates discussion between key disciplines in the structure plan process on stormwater management issues and the high-level management approaches required in that area.

There are known flooding issues downstream of the site, as identified within the Mahurangi Catchment model. According to the Tonkin and Taylor SMP, flooding within the existing Warkworth urban area is limited to several pockets of buildings where flood depth exceeds 100mm. These include the industrial area around Morrison Drive, the residential areas around Coquette Street and State Highway 1 and the commercial area around Queen Street.

A site-specific flood modelling report prepared by Maven Associates has been provided in support of the Warkworth South Plan Change application. The flood model has been calibrated with the information provided by Healthy Waters, who are also preparing a flood model for the entire Mahurangi River Catchment. The key finding from the flood model is that the peak run-off from the upstream catchment arrives at the PCA confluence over two hours after the peak run-off generated from the PCA. Any attenuation to the stormwater run-off post development generated from site will likely increase downstream flooding risks by prolonging and combining peak flows. As the result of this, a 'pass it forward' approach has been adopted for larger storm events.

The increase in 10-year flow and volume generated from the PCA is also recommended to be discharged unattenuated or 'passed forward' due to the fact that the detention of the 10-year rainfall event will delay and increase the 100-year event peak flows. The ultimate discharge point of the PCA is to the southern branch of the Mahurangi River, ensuring downstream capacity is not an issue for the future public networks.

Maven Associates have completed preliminary flood modelling of the existing site, the findings confirm that flood extents are confined to the streams and associated riparian margins both within the PCA and immediately downstream.

All buildings within the site will be provided with freeboard clearances in accordance with the criteria as stipulated in Auckland Councils Stormwater Code of Practice, and will be removed from the identified flood plains. With the adoption of the appropriate critical freeboard, the flooding risk to the proposed future buildings will be sufficiently mitigated.

5.3 RIPARIAN MARGINS AND SETBACKS

For the residential zones of the AUP, there is a requirement for a 10m riparian yard from the edge of any stream, regardless of width. Where lots less than 4ha are created, esplanade provisions of s.230 of the RMA will be required if the stream widths exceed 3m.

6.0 STORMWATER

The Auckland Council Stormwater Code of Practice sets out design and construction standards for stormwater and requires all land development projects to be provided with a means of stormwater disposal.

6.1 STORMWATER RETICULATION

Auckland Council Geomaps and site investigation works completed to date have not identified any stormwater network within the PCA. A small area near Mason Height Road could be serviced from a network extension. Stormwater disposal for most of the Waimanawa Hill and Waimanawa Valley precincts are to be provided via a new public stormwater network (to be vested to Council) with discharge points into the Mahurangi South tributaries within the site. The public network will be designed to convey the 10-year ARI (cc) event, as required by the Auckland Council SWCoP.

The piped network will be subject to detailed design for Resource Consent and will subsequently require Engineering Plan Approval. The discharge of stormwater to the stream will also require stormwater discharge consents, of which will be covered by Council's Region Wide NDC, subject to demonstrating compliance with Schedule 4. These matters are appropriately addressed in the existing AUP Provisions

6.2 STORMWATER QUALITY

Stormwater quality treatment is required for certain land uses as determined by Chapter E10 of the AUP – OP. Stormwater quality is required for all high use roads (5000 vehicles per day) and for car parks which support 30+ spaces. The Region Wide NDC requires treatment of all impervious surfaces, with the site being considered a greenfield development.

Consideration of the required treatments and the inclusion of water sensitive urban design parameters will be considered as part of the detailed design phase as per the requirements of GD01 and GD04. The design of the Plan Change allows sufficient flexibility in ensuring compliance with Schedule 4. There is a range of options which can provide for treatment, including catchment wide solutions (bioretention devices) or at source options such as such as rain gardens, swales or proprietary filter systems.

The details of which will need to be investigated and agreed with Auckland Council Healthy Waters. The Maven SMP prepared for the Plan Change request provides additional information on the likely treatment solutions.

6.3 HYDRAULIC MITIGATION

The Warkworth Structure Plan documentation provides little detail on the intended stormwater management for large lot areas. The stormwater assessment does, however, identify possible issues around on-site stormwater management within steeper areas of the submission areas, noting that:

The proposed large lot zones are generally located on ridgelines and areas that contain steep slopes. The steep slopes may preclude the use of stormwater infiltration devices, especially for the large lot zone to the north of western portion and south of eastern portion.

These issues have also been identified by CMW and LDE, within their Geotech reporting. A specific on-site stormwater solution shall be provided at resource consent stage for the subdivision of these larger lot areas.

The catchment of this PCA is relatively confined - generally the subject PCA and a portion of the property to the northeast defines the upper extents of the catchment. The current Warkworth township located

downstream is overlaid by a SMAF 1 control zone, although part of the contributing catchment to the northwest, zoned for light industry is excluded.

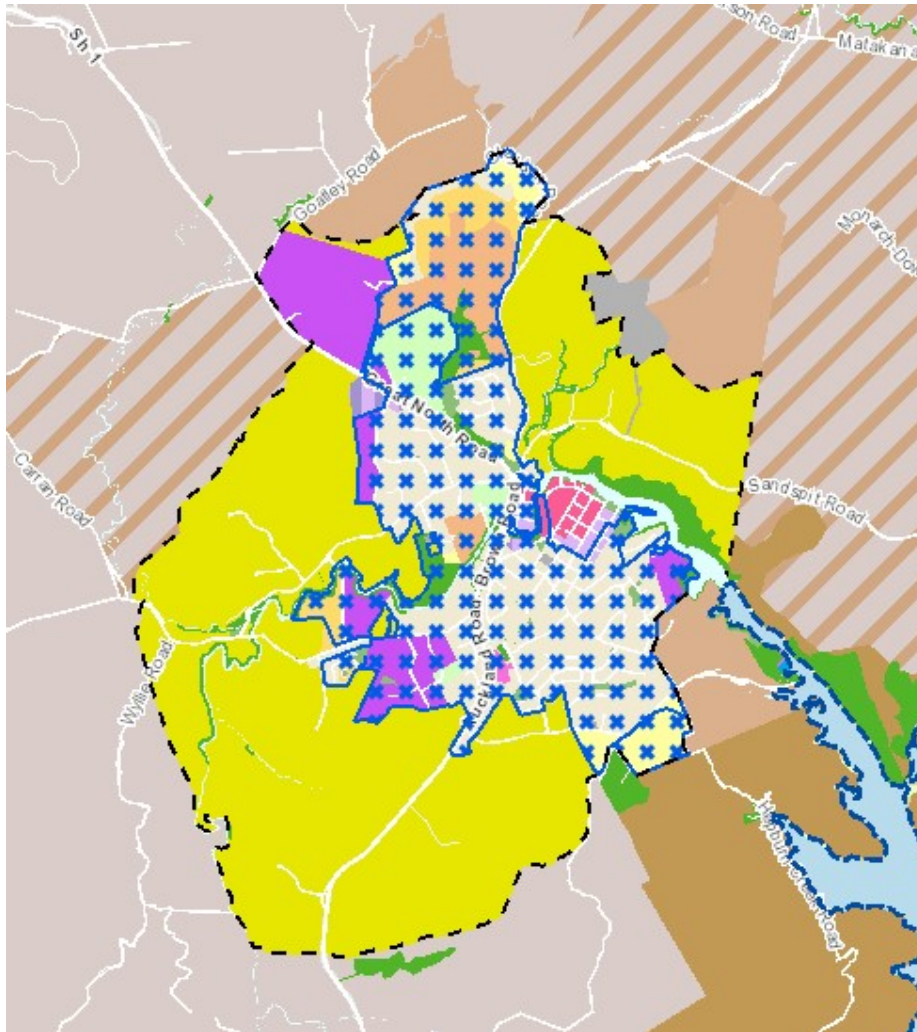


Figure 4: Current AUP Stormwater Control Zone.

The attached Maven Stormwater Management Plan details the high-level stormwater management framework that will support the future development of the PCA. The key provisions are summarised below:

- Apply SMAF 1 control for the entire PCA:
 - retention (where applicable) and;
 - detention of runoff from Urban Development for the 95th Percentile Storm event in accordance with AUP E10.6.3.
- Use bioretention devices at or near source for Public Road sized in accordance with GD01, to provide both treatment of runoff from trafficable and contaminant generating areas and attenuation of flows from 95th percentile flows.
- Use bioretention devices or other proprietary devices in private land – sized in accordance with GD01, to provide both at source treatment of runoff from trafficable and contaminant generating areas and attenuation of flows from 95th percentile flows.

The conversion of land use from rural to urban will produce more stormwater run-off in any rain fall event. The AUP has recognised this adverse effect of urbanisation. Hence the chapter E10 was written to provide

controls that protect the existing stream networks in the Auckland region. The principal behind the SMAF control is that smaller and more frequent rain fall events tend to generate more in-stream erosion than the larger, less common rainfall events.

SMAF 1 control is deemed to be adequate to mitigate the stormwater effects of development. This is confirmed with the flood modelling which confirms storm flows should be passed forward to avoid coinciding with upstream peaks. The stream which receives the run-off generated from the PCA is a significant river with a wide channel and good base flows. There is plenty of capacity within the river to convey this flow without increasing the risk of erosion. The stream networks within the PCA will be enhanced with riparian planting and stormwater outfalls designed in accordance with TR2013/018.

6.4 STORMWATER MANAGEMENT PLAN

A specific stormwater management plan for this PCA has been drafted for consideration by Healthy Waters. It is noted that this SMP is a high-level guidance document, and more detailed SMPs will be prepared and lodged alongside future resource consents. The future SMPs will adhere to the stormwater framework outlined within the Maven Plan Change SMP but will provide resource consent detail which is not required for a Plan Change process. Upon consideration the future SMP(s) will be adopted into the Auckland Region Wide NDC upon approval.

The Maven SMP details the PCA stormwater management approach and summarises the results of stormwater modelling and investigation works to ensure compliance Auckland Council guidance documents, required outcomes and mitigation strategies. Details and assessment of compliance of the proposed SMP against schedule 2 and 4 of the NDC can be found appended to this report for reference.

6.4.1 National Policy Statement for Freshwater Management 2020

The National Policy Statement for Fresh Water Management 2020 (Freshwater NPS) applies to the management of freshwater through a framework that considers and recognizes Te Mana o te Wai as an important part of management. This is considered a matter of national significance.

To ensure compliance with statutory requirements, engineering standards and guidelines have been implemented by Auckland Council. Given the recent release of the Freshwater NPS 2020, an update to the NDC requirement it is expected to match the latest standard. However, this information is not available at the time this report is prepared.

Auckland Council's primary tool for ensuring compliance with the NPS is via the Region Wide Stormwater NDC, allowing both council and private developers to discharge stormwater provided the requirements of the NDC are followed. This is checked and approved by the development of a specific stormwater management plan for the subject site.

In summary, as the SMP objectives have been developed to comply with the current AUP, SWCoP and Auckland Council GD01/GD04 guidelines, and as no departures have been identified, no further assessment against the National Policy Statement is considered necessary.

6.5 CONCLUSION

The PCA can discharge future stormwater through public networks which will discharge into the existing streams network within the site, before flowing into the southern tributary of the Mahurangi River. Stormwater quality and Water Sensitive Urban Design principals will be adopted and incorporated into the future detailed design. The plan change will apply the SMAF1 overlay to the PCA. Flood modelling confirms flows should be passed forward to avoid coinciding with the upstream peaks. The Maven SMP outlines the high-level stormwater management approach. Detailed SMPs will be provided in support of future resource consent application(s) and will ensure compliance with Schedule 4 of the Region Wide NDC.

7.0 WASTEWATER

The Watercare Code of Practice for Land Development and Subdivision sets out the design principles for wastewater and requires any development project to be provided with a means of wastewater disposal.

7.1 WARKWORTH STRUCTURE PLAN

The Warkworth Structure Plan has provided a high-level guidance on the main trunk wastewater networks which are going to service the entire Future Urban zoned land contained within Warkworth. The layout of this trunk networks is shown in Figure 5, below:

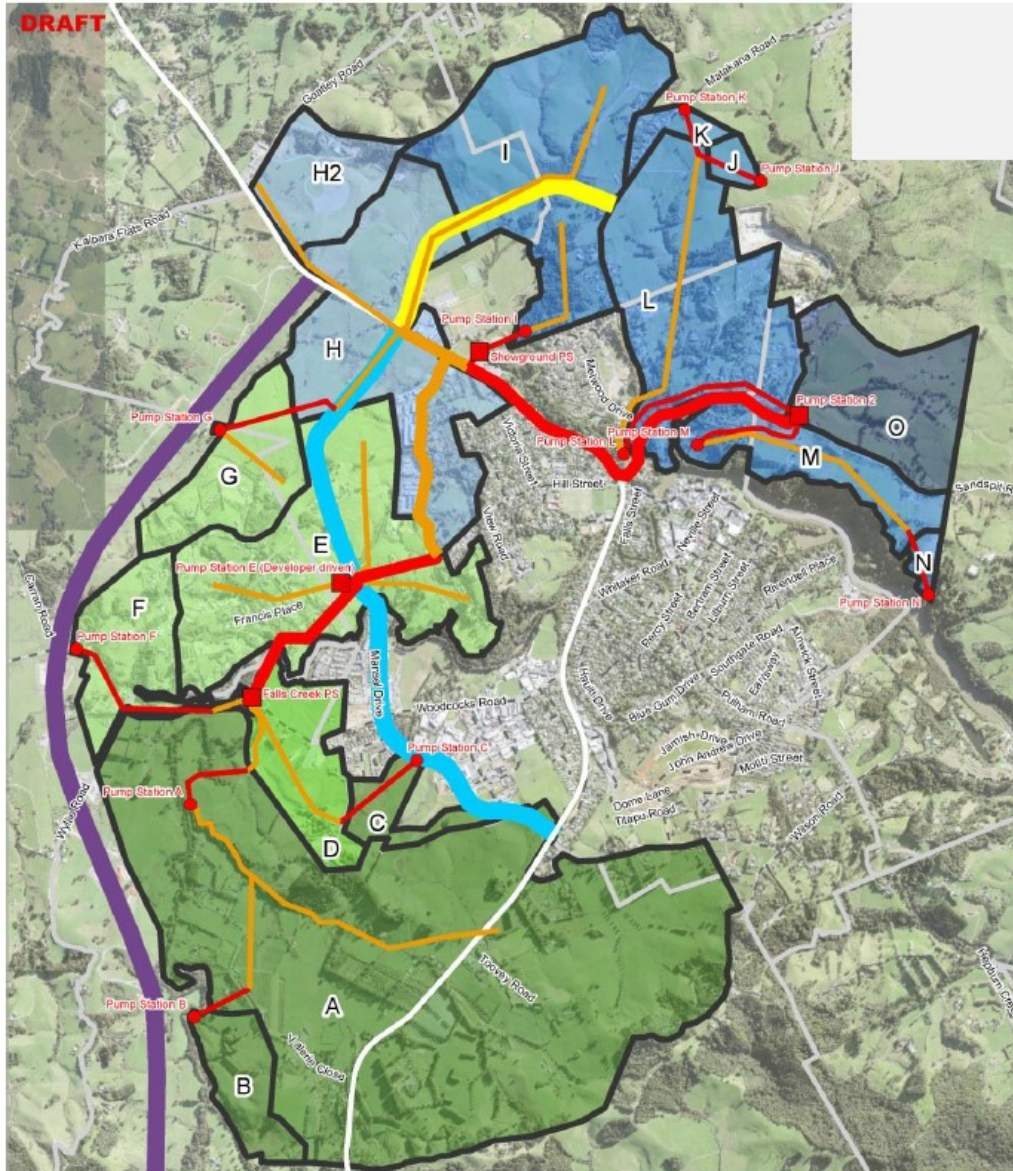


Figure 5: Extract from Indicative Warkworth Wastewater Servicing Plan

The PCA is located within Catchment A which will be gravity fed to pump station A located in the northwest of the PCA. This is then conveyed through a series of pump stations (Fall Creek Pump Station, Pump Station E, Showground Pump Station and eventually Pump Station 2) and gravity mains. The wastewater from Pump Station 2 will be conveyed through a new Snell Beach Wastewater Treatment Plant and

discharge through a new ocean outfall. The final location of Pump Station 2 has been finalised and it is under construction at Lucy Moore Memorial Park.

Maven has provided a preliminary investigation in terms of implementing the Warkworth Wastewater Servicing Plan. There is concern over the practical implementation of this alignment. The bulk wastewater networks will need to cross through private land in multiple locations and will rely on consent from multiple land holders to upgrade this network in order to service the PCA.

In support of this Plan Change request, revised wastewater network alignments are suggested. A pressure system (along SH1 & McKinney Road alignments) is proposed from the PCA to a proposed discharge manhole located at Wilson Road. From there, wastewater will be gravity fed to the new Lucy Moore Pump Station which is currently under construction by Watercare. This new pumpstation will collect the wastewater generated from Warkworth area and convey it to the Snells Beach treatment plant. The existing wastewater treatment plant for Warkworth is going to be decommissioned once the Snells Beach treatment plant upgrade works are completed. Watercare has been consulted regarding this preferred wastewater transmission alignment.

The proposed bulk wastewater layout to service this PCA is shown in Figure 6, below:

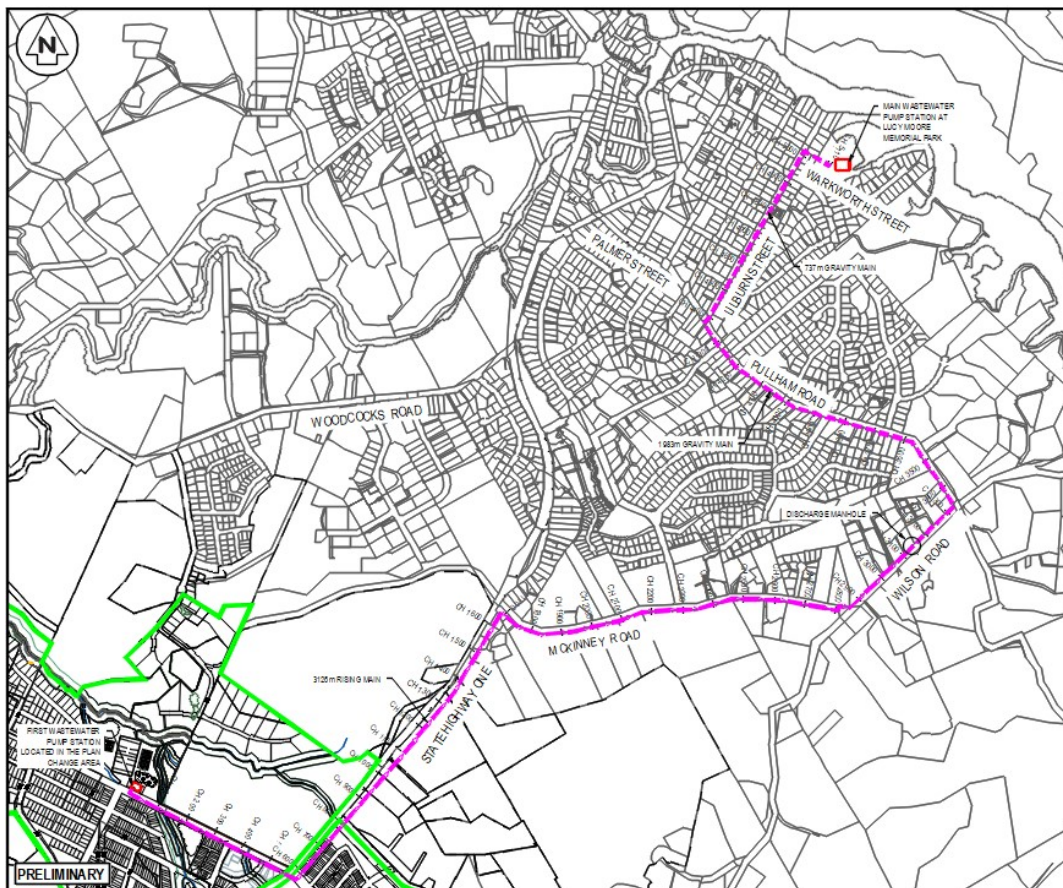


Figure 6: Proposed preferred wastewater trunk main alignment.

7.2 WASTEWATER RETICULATION

A public wastewater network will be constructed to service the development. Due to the site topography, initial design work indicates that the network and site connection should be gravity based with a main pump station located at the centre of the western side of the PCA.

A low-pressure wastewater network is located near the northern boundary of the PCA. A small portion of the PCA can be serviced via the extension of this public low pressure wastewater network. The additional flow generated from this area is minimal and the effect to the existing public wastewater network will be assessed and addressed during resource consent stage.

The proposed wastewater network will generally follow the road alignments or at the back of properties to provide each lot with a public connection. The ultimate connection point or points are being investigated with WSL currently.

The proposed internal wastewater reticulation will be designed to have capacity for the peak wet weather flows from the proposed development and will be subject to engineering consent approval from Auckland Council & Watercare Services.

The proposed Large Lot area is generally based upon on-site treatment and disposal of wastewater. Given that these larger lots are located within the upper catchment, it is advisable to make allowance for new public wastewater network connections where possible.

7.3 WASTEWATER CAPACITY

As part of the Warkworth Structure Plan, provision for wastewater infrastructure to service the Future Urban Zone has been planned and is in the process of being implemented by Watercare Services, with a delivery date of mid-2025.

The scheme, called the 'Northeast Wastewater Servicing Scheme', provides a bulk wastewater connection point on Sandspit Road, called Pump Station No.2. The overall scheme includes:

- A new transfer pipeline between Warkworth and a new Snells Beach Wastewater Treatment Plan ('WWTP') consisting of approximately 10 km of pipeline and three pump stations.
- New Snells Beach WWTP with a capacity for a population of 18,000, expandable to 30,000 (future project).
- A new outfall from the Snells-Algies WWTP to the Hauraki Gulf consisting of a pump station, 9 km of pipeline and a marine outfall.

7.4 CONCLUSION

Wastewater drainage can be provided for the PCA, through an extension of the existing network, largely in-line with the draft Warkworth Wastewater Servicing Plan. The piped network will be subject to detailed design for Resource Consent and will require Engineering Plan Approval. Further consultation and detailed design will be undertaken in conjunction with Watercare Services Limited.

Subject to the completion of the Northeast Wastewater Servicing Scheme in mid-2025, there will be sufficient capacity to service the proposed development. It is considered that the proposed on-site wastewater for the large lot zoning could increase the risk of ground water contamination and slope stability, and it is considered advisable to service the lots by a public network where possible.

This plan change makes particular provision for the new primary pumping station. All other wastewater matters are appropriately addressed by the existing AUP provisions. The plan change is compatible with the current Watercare strategy and does not seek any connections before the planned upgrades are operational.

8.0 WATER SUPPLY

The Watercare Code of Practice for Land Development and Subdivision sets out the design principles for water supply and requires assessment against SNZPAS 4509:2008 NZ Fire Service Fire Fighting Water Supply Code of Practice.

8.1 WARKWORTH STRUCTURE PLAN

The Warkworth Structure Plan outlined an indicative layout of the main trunk water supply networks required to service the Future Urban zone. The layout of this trunk network is shown in Figure 7, below:



Figure 7: Extract from Indicative Warkworth Water Servicing Plan

In accordance with the Water Servicing Plan, the bulk water supply line will be extended from the western reservoir traversing south via the WWLR alignment to service the PCA with a new Southern Reservoir

before looping back along SH1 before connecting to the existing 225mm diameter watermain located south of the existing Warkworth township. The same concern held around right of entry applies.

Hence the water supply for the PCA is proposed to be progressively upgraded as the development takes place between the PCA and the Western Reservoir. To service the PCA, the bulk water supply is proposed to be extended from the current extent of the Warkworth township with a 315mm diameter OD HDPE within SH1, connecting with the existing Thompson Road Reservoir feed on McKinney Road.

The bulk water supply main will be upgraded to 450mm OD HDPE south of McKinney Road. The trunk main will be extended to the PCA and connect to the proposed Southern Water Reservoir located within the southeast of the PCA. The water supply main will be progressively extended west as development takes place along the WWLR corridor. Please refer to the Figure 8, below for a summary of the bulk water supply strategy.

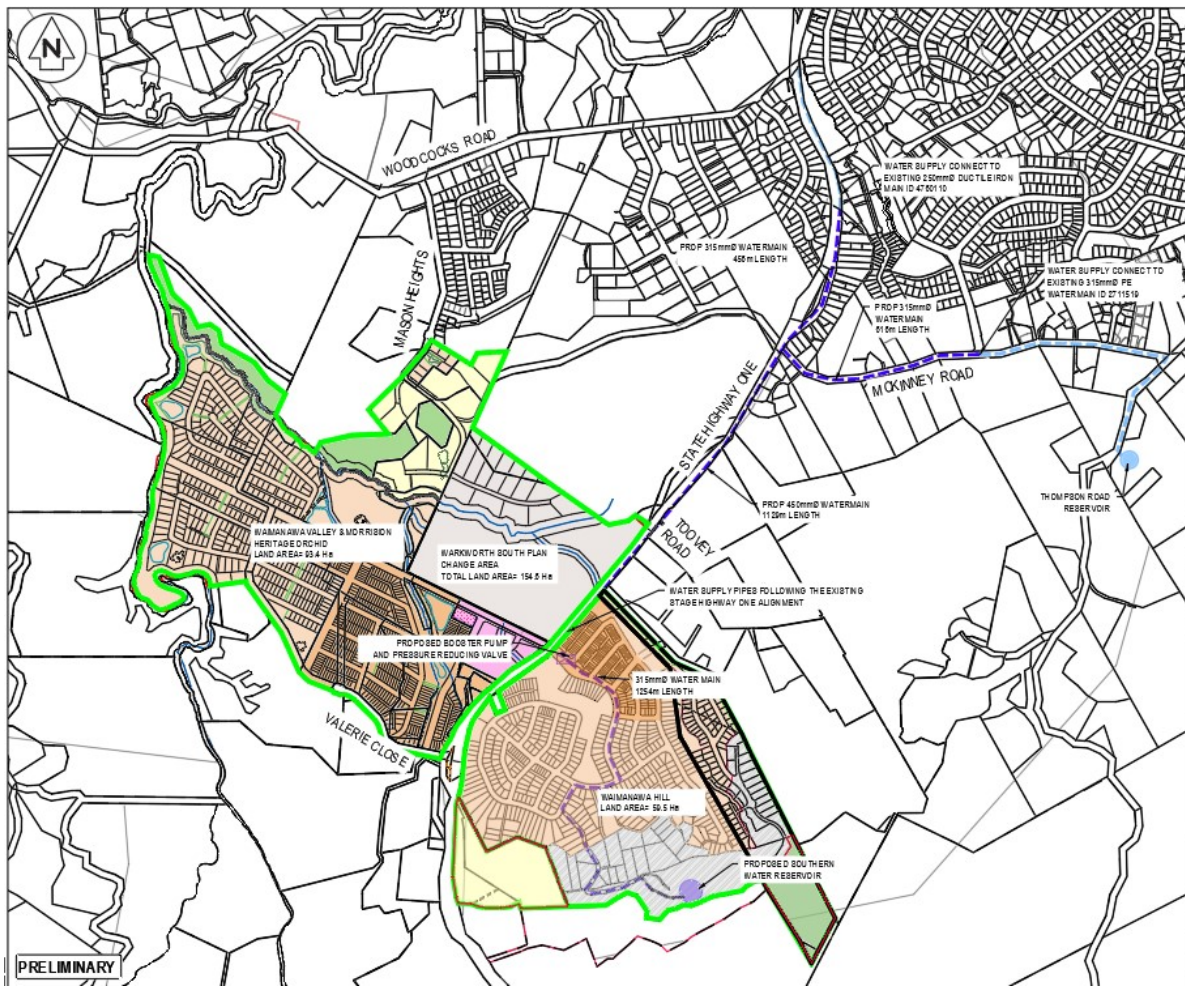


Figure 8: Proposed water trunk main alignment

8.2 WATER RETICULATION

The proposed development will be serviced by a new public water network consistent with the intended upgrades identified within Watercare’s scheme. The development requires upgrades to the existing network consisting of a new reservoir, watermains, fire hydrants and other fittings to comply with the Watercare Water Code of Practice and firefighting standards. All new pipelines will consider surrounding development potential when being designed and constructed.

The northern areas of the PCA will be serviced via extensions of existing water supply networks located within Mason Heights. The detailed design for this will be addressed through the resource consent and engineering plan approval stages.

All new infrastructure will be designed to have capacity to cater for the proposed development and will be subject to Engineering Approval from Auckland Council and Watercare Services. The existing and proposed network provide suitable water connection points for the proposed development.

8.3 POTABLE WATER AND FIRE FIGHTING SUPPLY

The minimum firefighting water supply classification for development in urban areas is FW2. Therefore, any future residential development must meet the following water supply requirements:

- A primary water flow of 12.5 litres/sec within a radial distance of 135m
- An additional secondary flow of 12.5 litres/sec within a radial distance of 270m
- The required flow must be achieved from a maximum of one or two hydrants operating simultaneously.
- A minimum running pressure of 100kPa

Flow rates and pressures will need to be designed to ensure the minimum requirements for the water supply classification stipulated in SNZPAS 4509:2008 can be achieved.

New groundwater abstraction bores at Hudson Road and a new water treatment plant at Sanderson Road are operational. The plant is designed to treat the consented abstraction volume limit, which caters for approximately 16,000 people. This will provide sufficient capacity for the potable and firefighting requirements of the PCA.

8.4 CONCLUSION

Water reticulation can be provided for the proposed development, through an extension of the existing rising main and booster pump to a proposed reservoir within the PCA. This is consistent with the intended upgrades being completed by Watercare Services for Warkworth South. Subject to these upgrade works being completed, there will be sufficient supply for potable and firefighting requirements. The plan change makes specific provision for the new potable water reservoir. All other water matters can be appropriately addressed through AUP provisions.

9.0 OTHER UTILITIES

Network upgrades/extensions will be required to support future residential and commercial development which will be undertaken in agreement with local utility providers. Services will be connected to the proposed development as per respective service agreements. Telecommunications in the area are managed by Chorus, power is managed by Vector and there is no known gas reticulation within the area.

Further investigation works will be undertaken and works required to service the developments planned and implemented in co-ordination with both Chorus and Vector and their specified sub-contractors/consultants. To date correspondence with Vector and Chorus have been positive:

- Vector have indicated that their planning is based on the unitary plan zoning, although Vector already have large infrastructure in Warkworth – a existing 11kV reticulation along SH1 alignment. Vector has indicated that a new substation is required to service the PCA. Subsequently, extensions into any subdivision will be detailed as scheme plans are developed in coordination with Vector and Northpower.

- Chorus have also preliminarily confirmed that they have infrastructure suitable in the general land area and road networks surrounding the proposed precinct, further detail, indicative lots numbers and staging of the development were requested to further the design and ensure serviceability to and beyond the precinct extents.

All power and telecommunication utilities are appropriately addressed through the existing AUP provisions.

10.0 CONCLUSIONS

The information gathered to-date confirms the site is suitable for residential development.

Bulk recontouring is required to enable the construction of a complying roading network and to ensure suitable building platforms can be provided. Initial design plans demonstrate finished levels of 1:8 grade, considered suitable for the density proposed. The earthworks will be supported by engineered retaining walls. Initial locations are indicated, and geotechnical input confirms these walls can be constructed.

The proposed road network and upgrades for WWLR and SH 1 will provide suitable access to the PCA. Upgrade details are being designed in coordination with Auckland Transport and will be designed to accommodate expected future traffic volumes.

Existing overland flow and flood plains have been modelled to determine the extents of flooding and flow as a baseline for the pre-development situation. Design checks of finished levels ensure minimum freeboard levels can be achieved for all future buildings and the overland flow can be safely conveyed within the road network, drainage reserves or natural watercourses where applicable.

Flood modelling undertaken by Maven Associates confirms that there is a need to pass forward the 10 and 100-yr flows to ensure flows do not coincide with the upstream peaks and worsen downstream flooding. As such, stormwater attenuation for new impervious areas is proposed to be avoided. The Maven SMP suggests the inclusion of the SMAF 1 control and enhancing the stream riparian yard via planting.

Stormwater drainage can be provided for the proposed development. Discharge from the public network will be to the Mahurangi South tributary in accordance with the NDC requirements. Final stormwater details will require further approvals and the preparation of SMPs which will be considered and adopted by Healthy Waters under the Region Wide NDC. All future SMPs prepared in support of future resource consent application(s) will adhere to the governing principles of the plan change SMP prepared by Maven Associates.

Wastewater drainage will be provided through an extension of the existing network, largely consistent with the draft Warkworth Wastewater Servicing Plan. Further consultation and detailed design will be undertaken in conjunction with Watercare Services limited. Dates are to be coordinated to align with the projected completion of the Northeast Wastewater Servicing Scheme in mid-2025 which will provide sufficient capacity to service the proposed development upon completion.

Water reticulation can be provided for the proposed development, through an extension of the existing rising main and booster pump to a proposed reservoir within the PCA, in-line with the intended upgrades being completed by Watercare Services for Warkworth South. Subject to these upgrade works being completed, there will be sufficient supply for potable and firefighting requirements.

Power and Telecommunications networks and infrastructure already exists within the general vicinity of the proposed precinct extents, details of upgrades and extensions from existing network services are to be confirmed and agreed with relevant utility providers as the scheme plan and lot numbers are developed and confirmed.



APPENDIX A – ENGINEERING PLANS



REFER C051

REFER C052

MASON HEIGHT

STATE HIGHWAY ONE

MORRISON HERITAGE ORCHARD

WAIMANAWA VALLEY

VALERIE CLOSE

WAIMANAWA HILLS

- Notes
1. All works to be in accordance with Auckland council standards.
 2. Co-ordinates in terms of NZ Geodetic Datum Mt Eden 2000
 3. Levels in terms of the Auckland Vertical Datum 1946.
 4. Origin of Levels = CA 97 (ABLQ)
Published RL=43.36, sourced from The LINZ Digital Geodetic Database.
 5. Boundaries are subject to final survey.
 6. Refer to Bioresearches Baseline Ecology Report for stream classification.

- Legend
- EX BDY
 - EX EASEMENT
 - EX COVENANT
 - EX TITLE BDY
 - PLAN CHANGE BDY
 - EX MAJOR CONTOUR
 - EX MINOR CONTOUR
 - EX PERM. STREAM
 - EX INT. STREAM
 - EX WETLAND

B	PC EXTENT UPDATE	KH	12/22
A	PPC	KH	08/22
Rev	Description	By	Date
Survey	PARALAX & MAVEN		03/21
Design			
Drawn	KH		08/22
Checked	GB		08/22

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Project
**WARKWORTH SOUTH
PLAN CHANGE FORE
KA WAIMANAWA LP &
STEPPING TOWARDS
FAR LTD**

Title
**TOPOGRAPHICAL
SURVEY OVERVIEW
PLAN**

Project no.	211001
Scale	1:7500 @ A3
Cad file	211001-COMBINED PC EW.DWG
Drawing no.	C050
Rev	B



- Notes
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Legend

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	EX TITLE BDY
	PLAN CHANGE BDY
	EX MAJOR CONTOUR
	EX MINOR CONTOUR
	EX PERM. STREAM
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	EX WETLAND

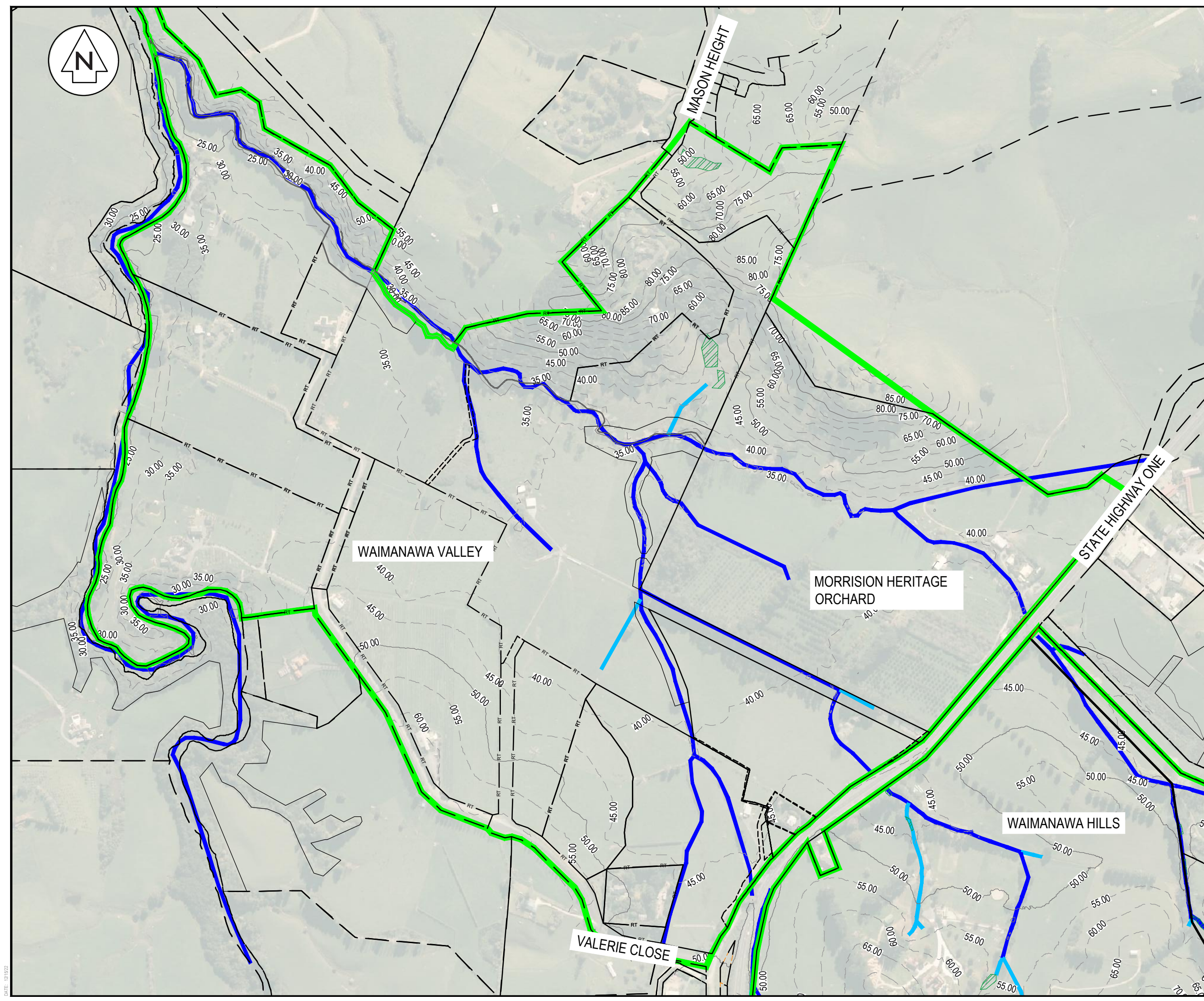
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A	PPC	KH	08/22
Rev	Description	By	Date
Survey	PARALAX & MAVEN	03/21	
Design			
Drawn	KH	08/22	
Checked	GB	08/22	

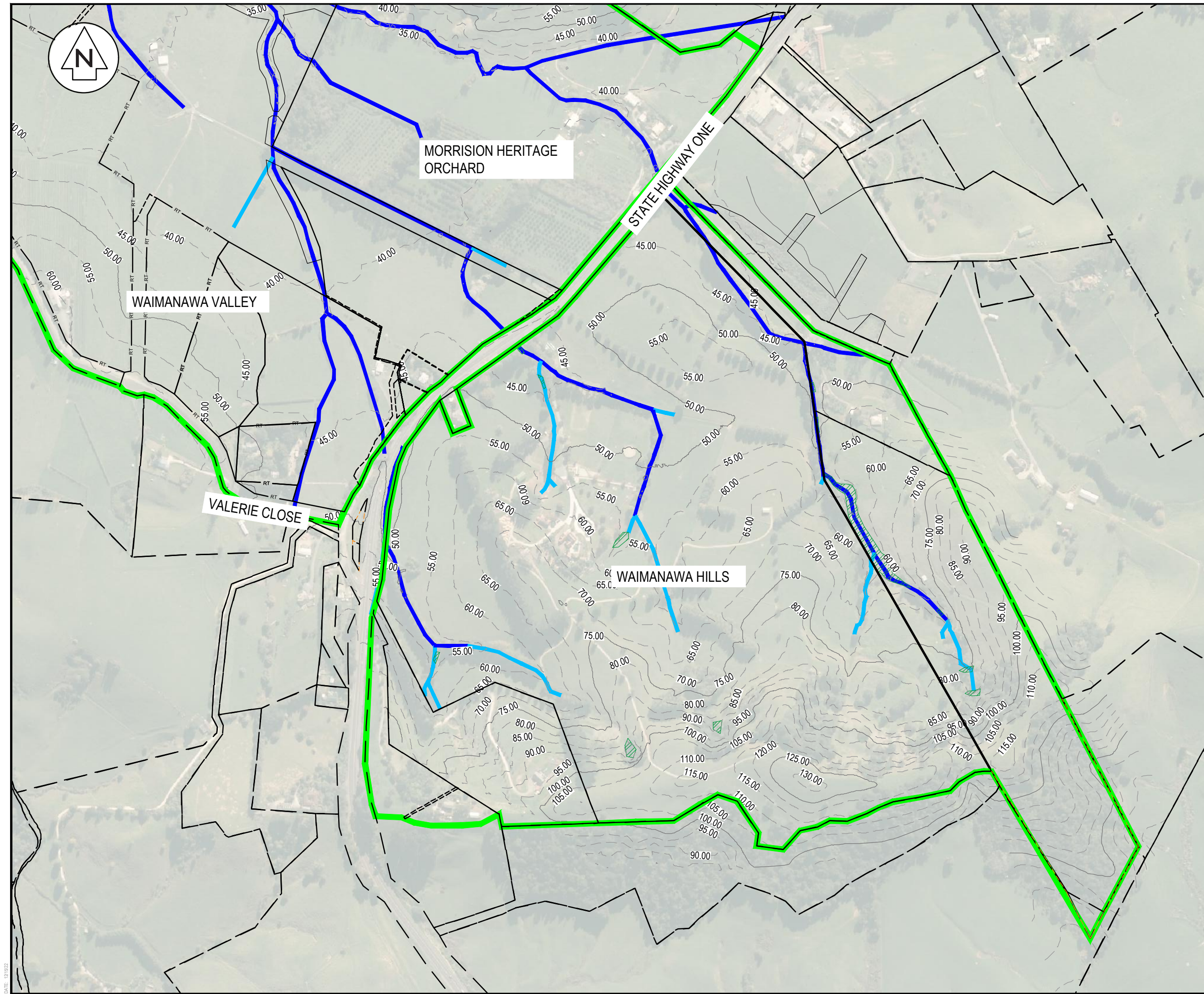
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Title
**TOPOGRAPHICAL
 SURVEY
 PLAN**

Project no.	211001
Scale	1:5000 @ A3
Cad file	211001-COMBINED PC EW.DWG
Drawing no.	C051
Rev	B





- Notes
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	EX TITLE BDY
	PLAN CHANGE BDY
	EX MAJOR CONTOUR
	EX MINOR CONTOUR
	EX PERM. STREAM
	EX INT. STREAM
	EX WETLAND

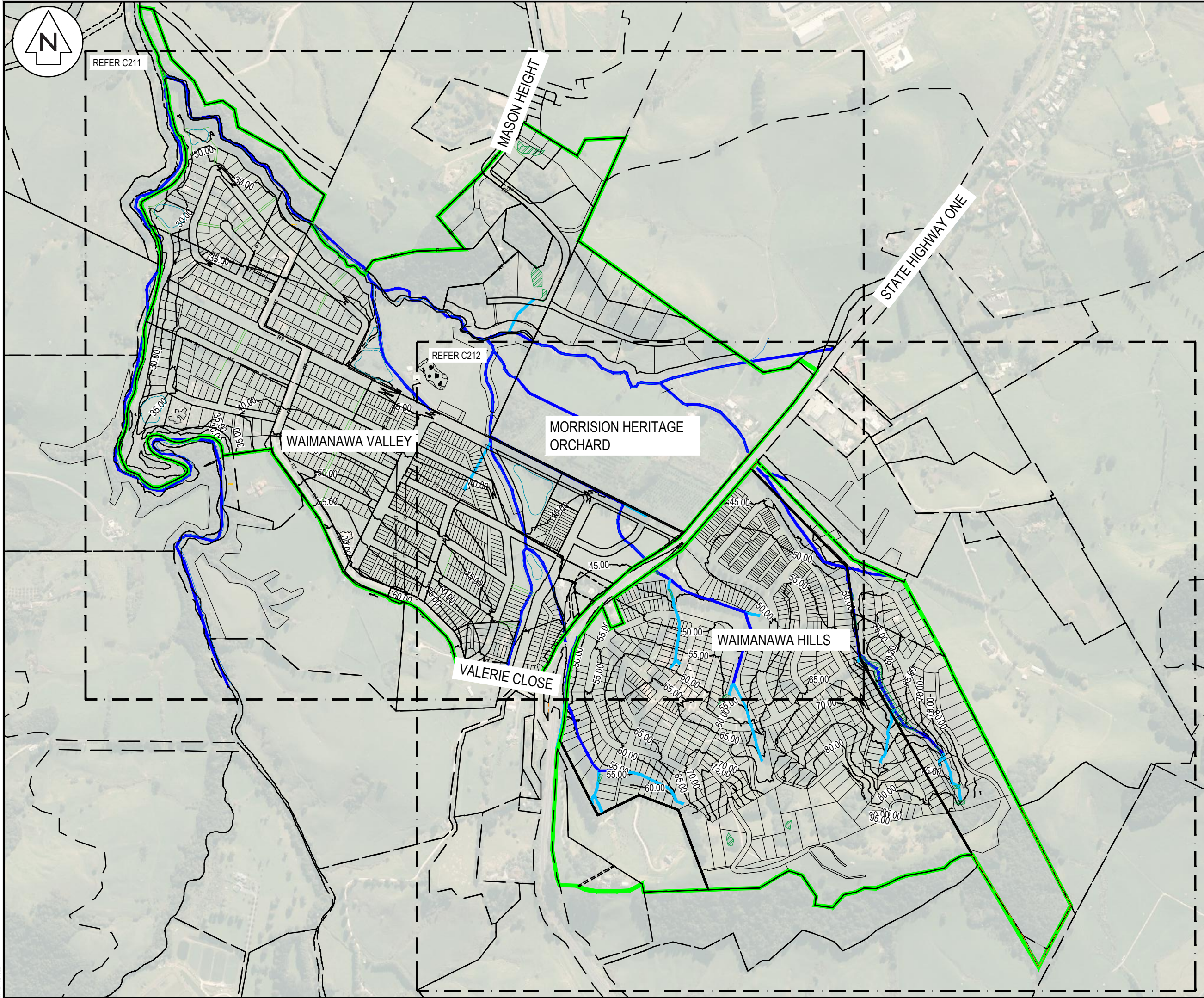
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A	PPC	KH	08/22
Rev	Description	By	Date
Survey	PARALAX & MAVEN	03/21	
Design			
Drawn	KH	08/22	
Checked	GB	08/22	

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Title
**TOPOGRAPHICAL
 SURVEY
 PLAN**

Project no.	211001
Scale	1:5000 @ A3
Cad file	211001- COMBINED PC EW.DWG
Drawing no.	C052
Rev	B



- Notes
1. All works to be in accordance with Auckland council standards.
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Legend

	EX BDY
	PROP BDY
	EX TITLE BDY
	PLAN CHANGE BDY
	PR MAJOR CONTOUR
	PR MINOR CONTOUR
	EX PERM. STREAM
	EX INT. STREAM
	EX WETLAND

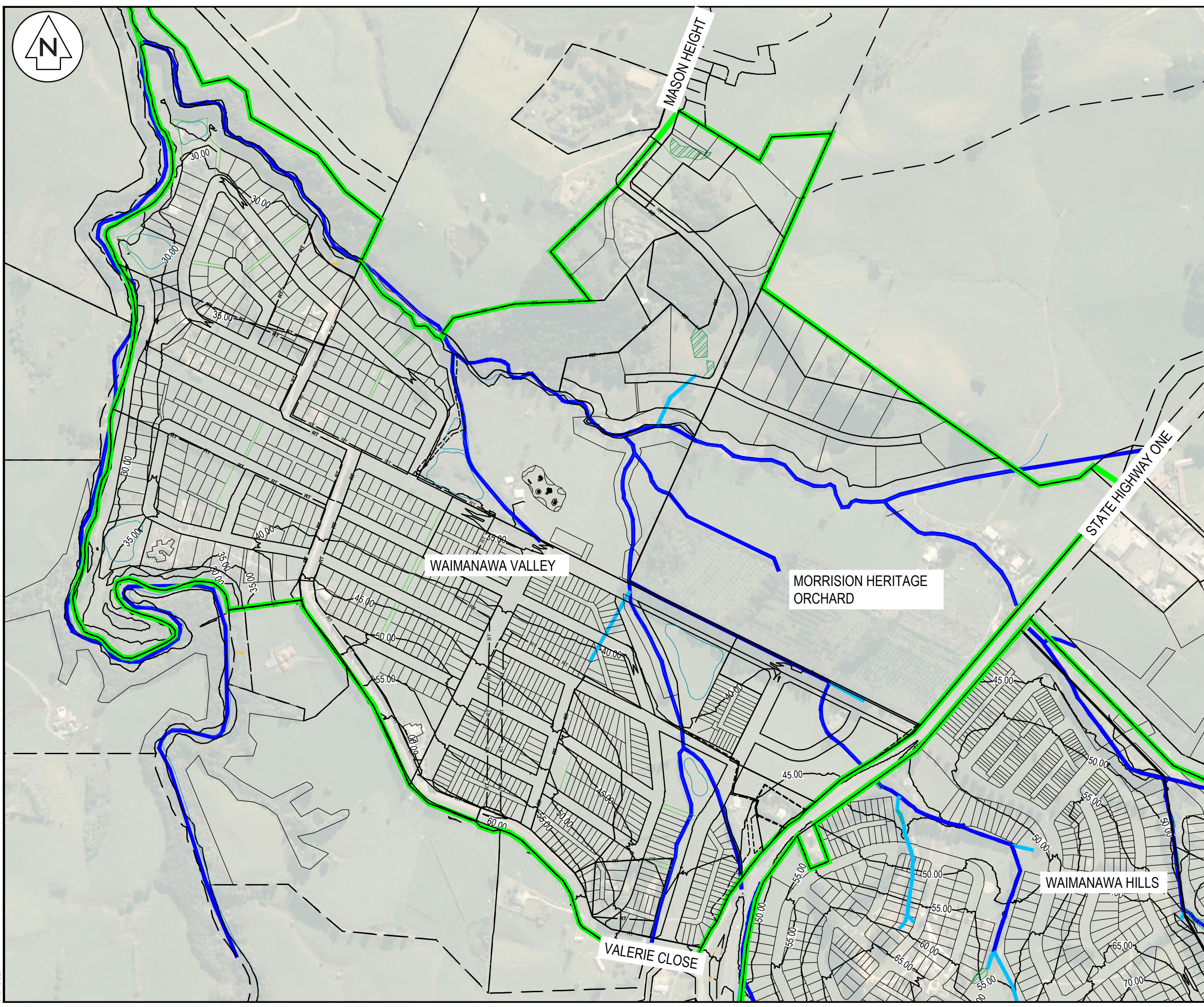
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A	PPC	KH	08/22
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Title
**PROPOSED
 CONTOURS OVERVIEW
 PLAN**

Project no.	211001
Scale	1:7500 @ A3
Cad file	211001- COMBINED PC EW.DWG
Drawing no.	C210
Rev	B



- Notes
1. All works to be in accordance with Auckland council standards.
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Legend

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	PROP BDY
	EX TITLE BDY
	PLAN CHANGE BDY
	PR MAJOR CONTOUR
	PR MINOR CONTOUR
	EX PERM. STREAM
	EX INT. STREAM
	EX WETLAND

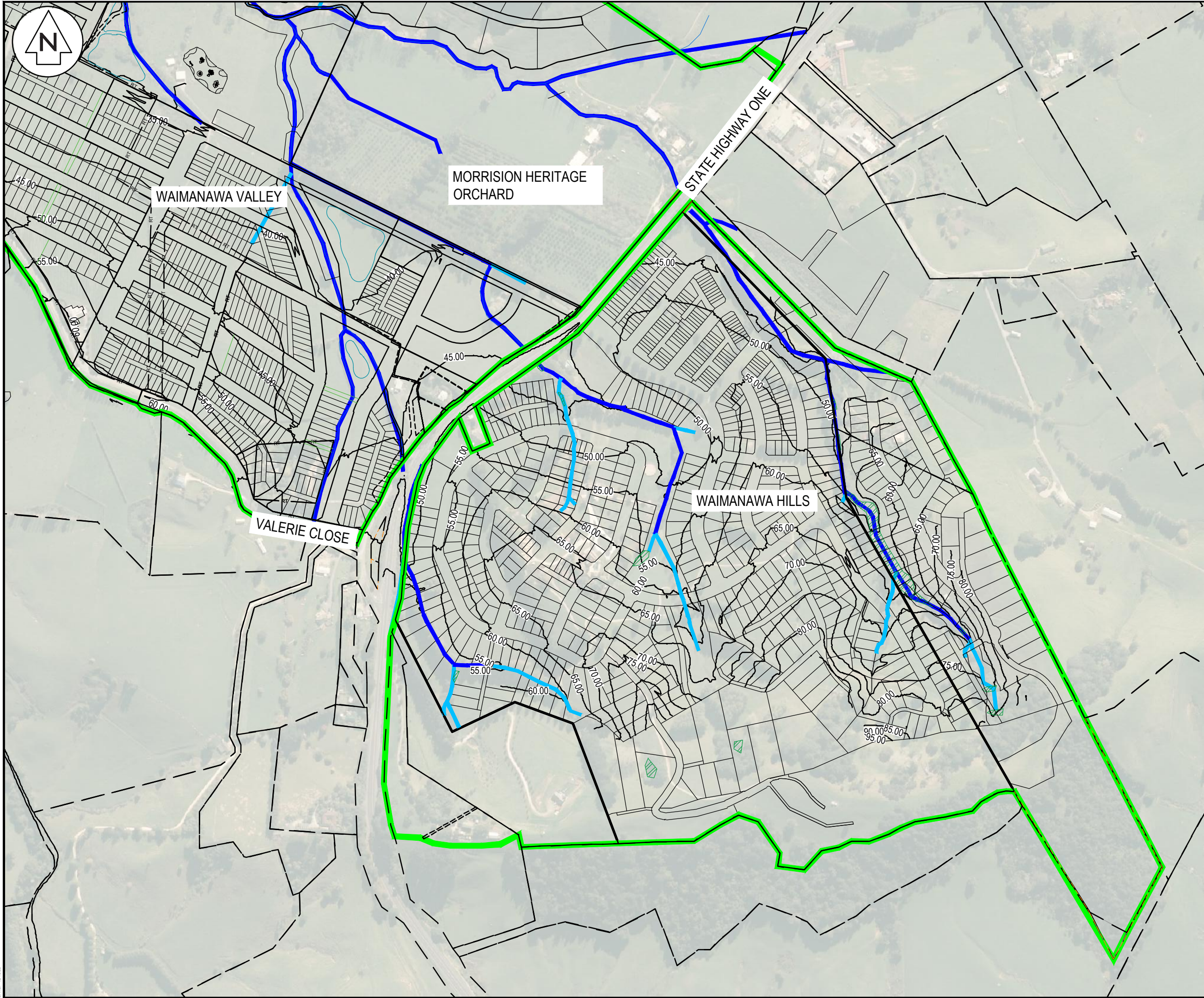
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A	PPC	KH	08/22
Rev	Description	By	Date
Survey	PARALAX & MAVEN		03/21
Design	KH		03/22
Drawn	KH		08/22
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STEPPING TOWARDS
FAR LTD**

Title
**PROPOSED
CONTOURS
PLAN**

Project no.	211001		
Scale	1:5000 @ A3		
Cad file	211001-COMBINED PC EW.DWG		
Drawing no.	C211	Rev	B



- Notes
1. All works to be in accordance with Auckland council standards.
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- Legend
- EX BDY
 - PROP BDY
 - EX TITLE BDY
 - PLAN CHANGE BDY
 - PR MAJOR CONTOUR
 - PR MINOR CONTOUR
 - EX PERM. STREAM
 - EX INT. STREAM
 - EX WETLAND

B	PC EXTENT UPDATE	KH	12/22
A	PPC	KH	08/22
Rev	Description	By	Date
Survey	PARALAX & MAVEN		03/21
Design	KH		03/22
Drawn	KH		08/22
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Title
**PROPOSED
 CONTOURS
 PLAN**

Project no.	211001
Scale	1:5000 @ A3
Cad file	211001-COMBINED PC EW.DWG
Drawing no.	C212
Rev	B



REFER C221

REFER C222

EARTH WORKS (SURFACE EX-GL COMPARISON WITH SURFACE PROP- GL)	
CUT VOLUME	355000m ³
FILL VOLUME	444000 m ³
NET FILL	89000 m ³
TOPSOIL STRIPPED (200mm) =	163000m ³
EARTHWORKS AREA =	81.3 Ha

- Notes
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Legend

	EX BDY
	PROP BDY
	PLAN CHANGE BDY
	EX PERM. STREAM
	EX INT. STREAM
	EX WETLAND

Cut/Fill Table			
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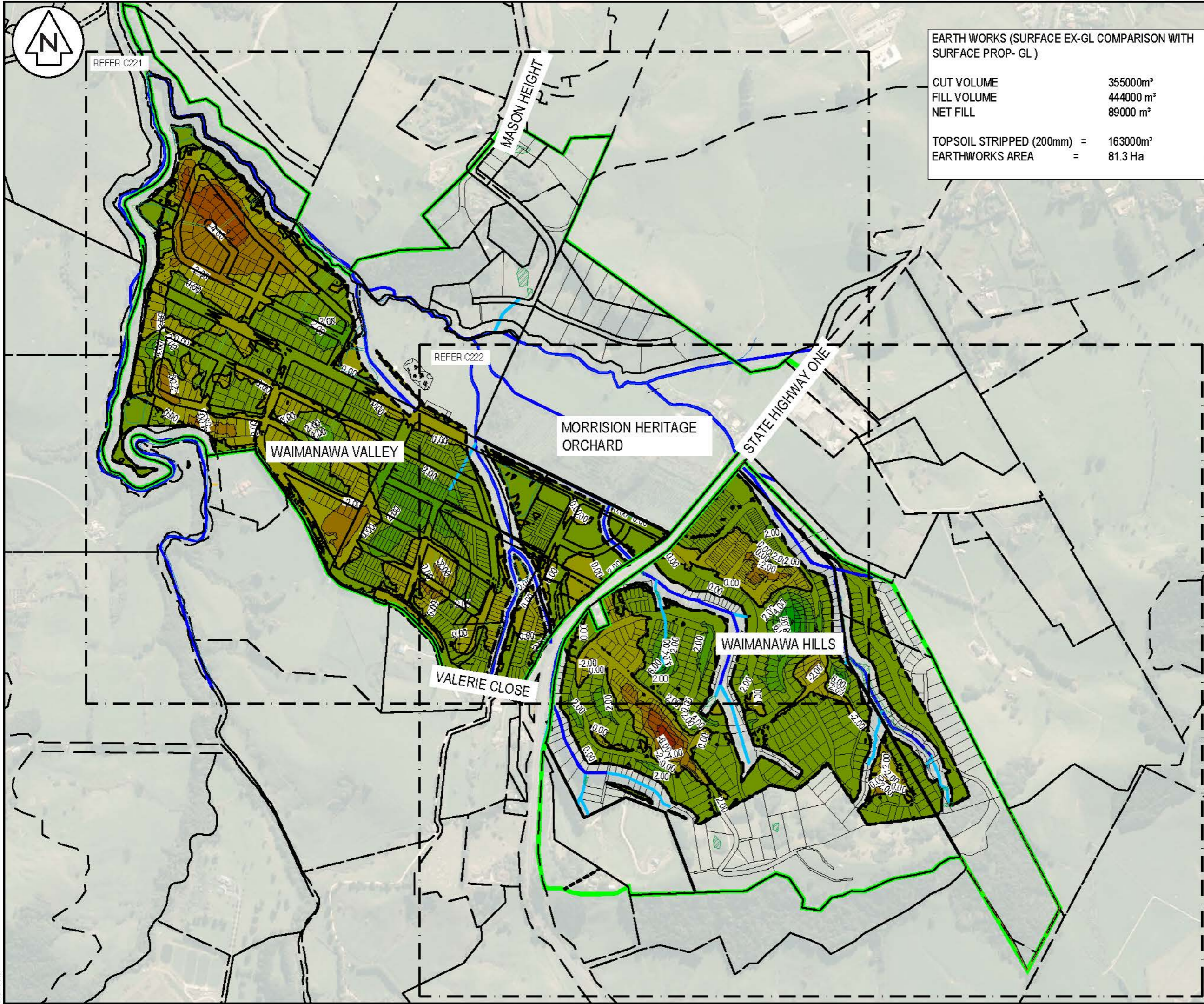
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Design	KH		07/22
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Title
**PROPOSED
 CUT/FILL OVERVIEW
 PLAN**

Project no.	211001
Scale	1:7500 @ A3
Cad file	211001-COMBINED_PC_EW.DWG
Drawing no.	C220
Rev	B





EARTH WORKS (SURFACE EX-GL COMPARISON WITH SURFACE PROP- GL)

CUT VOLUME	355000m ³
FILL VOLUME	444000 m ³
NET FILL	89000 m ³
TOPSOIL STRIPPED (200mm) =	163000m ²
EARTHWORKS AREA =	81.3 Ha

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	EX WETLAND

Cut/Fill Table

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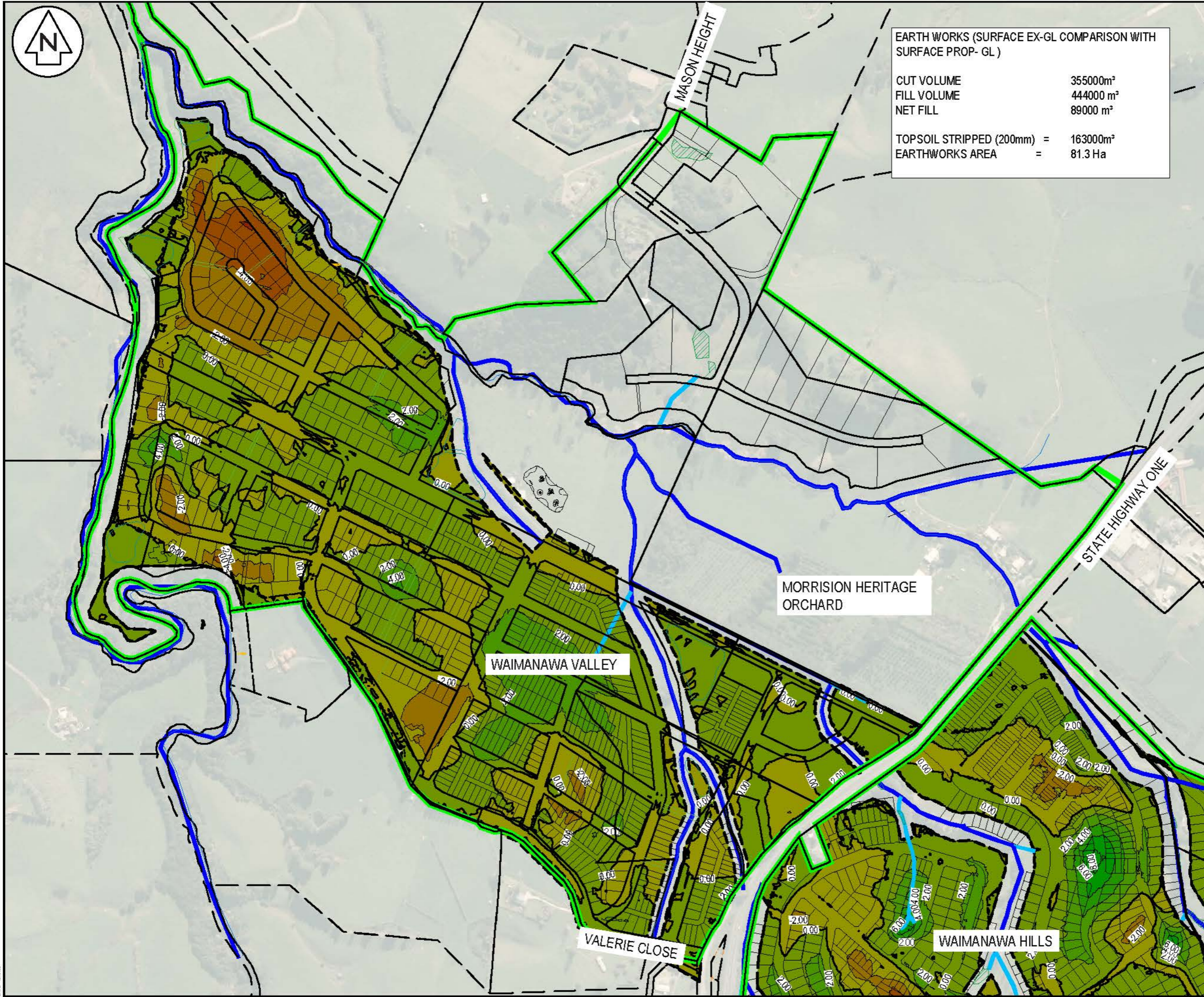
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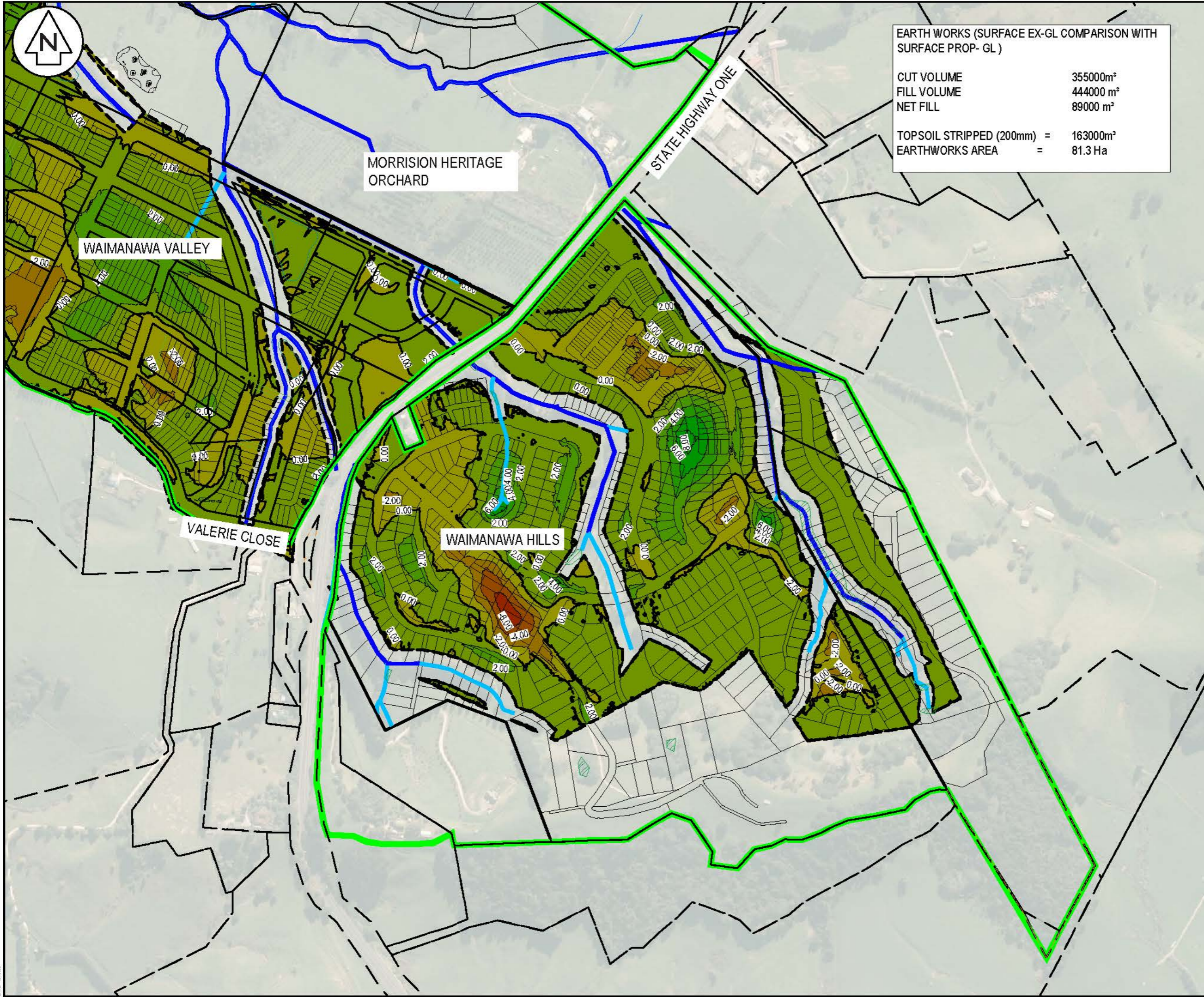
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Title
**PROPOSED
 CUT/FILL
 PLAN**

Project no.	211001
Scale	1:5000 @ A3
Cad file	211001-COMBINED PC EW.DWG
Drawing no.	C221
Rev	B





EARTH WORKS (SURFACE EX-GL COMPARISON WITH SURFACE PROP- GL)

CUT VOLUME	355000m ³
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TOPSOIL STRIPPED (200mm) =	163000m ²
EARTHWORKS AREA =	81.3 Ha

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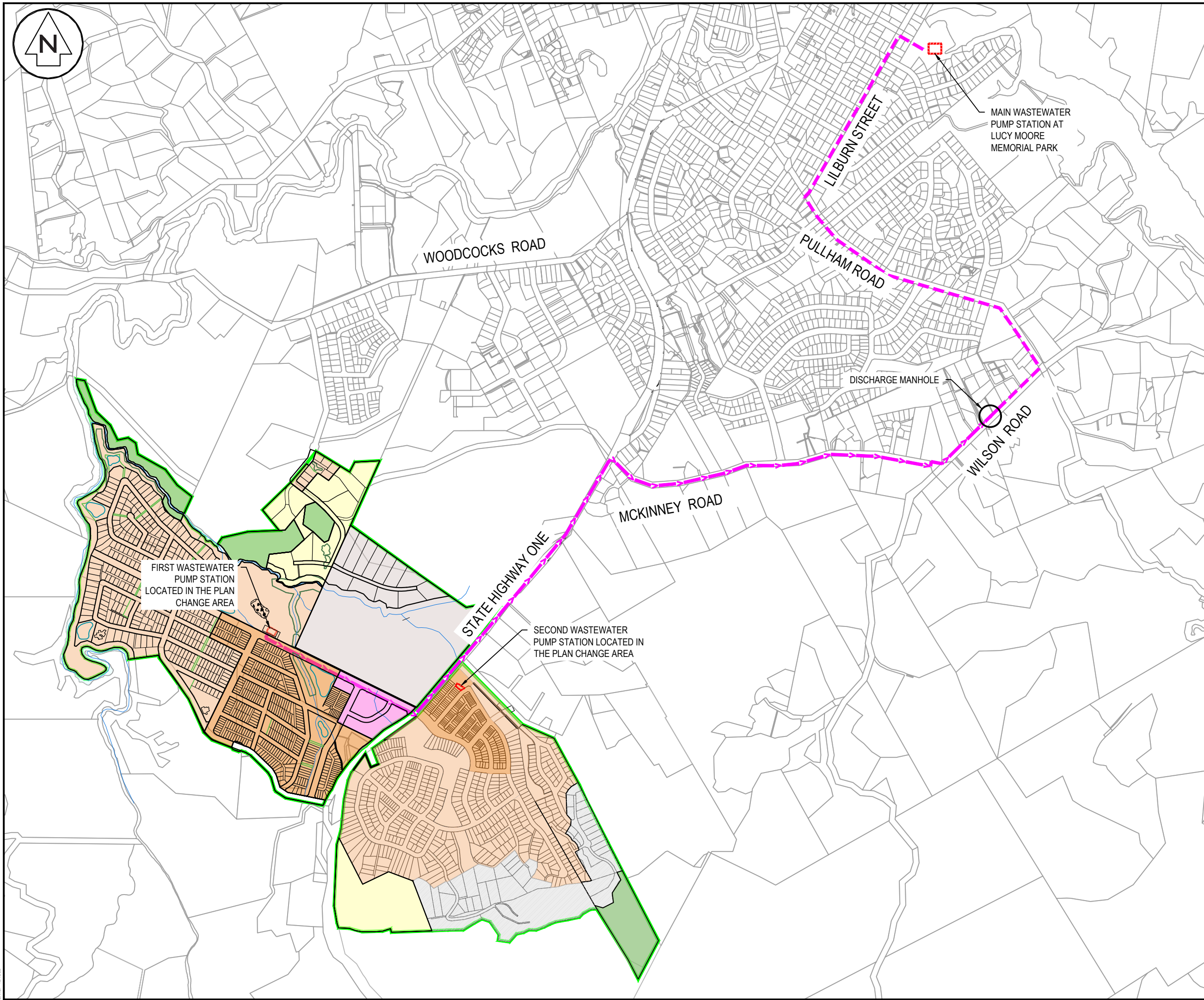
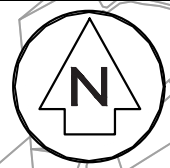
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Title
**PROPOSED
 CUT/FILL
 PLAN**

Project no.	211001
Scale	1:5000 @ A3
Cad file	211001-COMBINED PC EW.DWG
Drawing no.	C222
Rev	B



- Notes
1. All works to be in accordance with Auckland council standards.
 2. Co-ordinates in terms of NZ Geodetic Datum Mt Eden 2000. Levels in terms of the Auckland Vertical Datum 1946.
 3. Existing ground level is based on Auckland Council Geomaps level.
 4. This is a preliminary wastewater trunk main layout based on desktop study only.
 5. The location of proposed wastewater pump station is indicative only. Final location subject to detail design

Legend

	EX BDY
	PROP PLAN CHANGE AREA BDY
	GRAVITY WW LINE
	RASING MAIN WW LINE
	PUMP STATION
	EX BDY FROM GIS

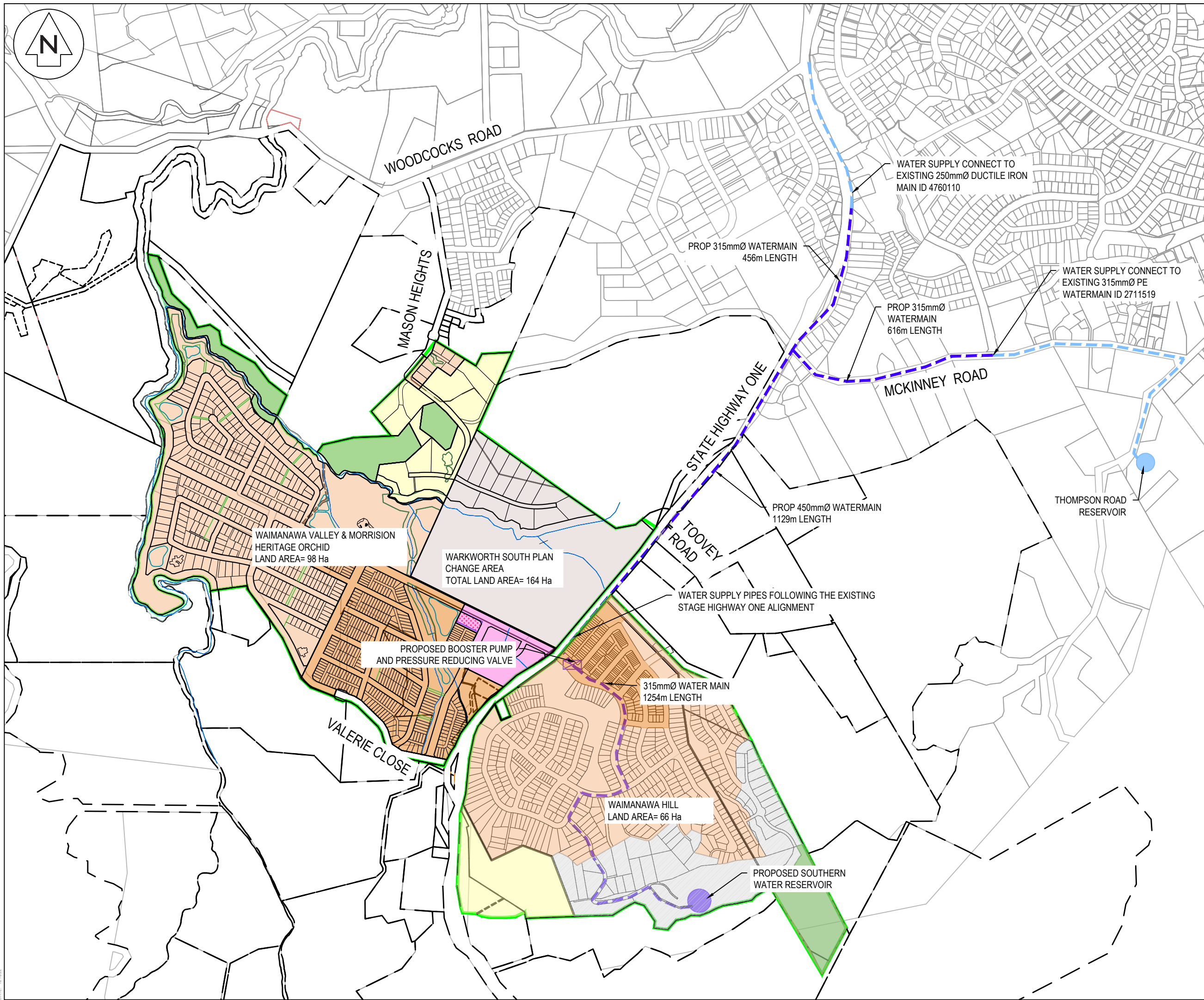
C	PC EXTENT UPDATE	KH	12/22
B	PPC REV B	KH	09/22
A	PPC	KH	07/22
Rev	Description	By	Date
Survey	GIS		06/22
Design	KH		06/22
Drawn	KH		06/22
Checked	GB		06/22

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Project
**WARKWORTH SOUTH
 PLAN CHANGE FOR
 KA WAIMANAWA LP &
 STEPPING TOWARDS FAR
 LTD**

Title
**WASTEWATER
 SERVICES
 DIAGRAM**

Project no.	211001
Scale	1:12000 @ A3
Cad file	211001 WW TRUNK MAIN OPTIONS.DWG
Drawing no.	C501
Rev	C



- Notes
1. All works to be in accordance with Auckland council standards.
 2. Co-ordinates in terms of NZ Geodetic Datum Mt Eden 2000
 3. Existing ground level is based on Auckland Council Geomaps level.
 4. This is a preliminary water supply trunk main layout based on the desktop study only. Final layout subject to details design.
 5. All watermain diameters are OD with pressure rating of PN12.5 unless noted otherwise.

Legend

- EX BDY
- PCA BDY
- EX WATER SUPPLY
- BULK WATER SUPPLY MAIN
- BOOSTER PUMP
- WATER SUPPLY RESERVOIR

Rev	Description	By	Date
C	PC EXTENT UPDATE	KH	12/22
B	PPC REV B	KH	09/22
A	PPC	KH	07/22

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Project
**WARKWORTH SOUTH
 PLAN CHANGE FOR
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 STEPPING TOWARDS FAR
 LTD**

Title
**SHARED WORKS
 WATER SUPPLY
 DIAGRAM**

Project no.	211001
Scale	1:10000 @ A3
Cad file	BULK INFRASTRUCTURAL.DWG
Drawing no.	C600
Rev	C