Appendix I – Cuttriss Engineering Infrastructure Report

Engineering Infrastructure Report for Resource Consent Application – 131-155 Otaihanga Road and 48-58 Tieko Street, Otaihanga

Ref: 22208

29 June 2021

Prepared for:

Mansell Family
131 – 155 Otaihanga Road
Otaihanga

Cuttriss
Surveyors. Engineers. Planners.

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Ref: Taylor/22208 29 June 2021

OTAIHANGA ESTATES PROPOSED SUBDIVISION AT 131 – 155 OTAIHANGA ROAD AND 48 – 58 TIEKO STREET, OTAIHANGA

Cuttriss Consultants Ltd. (Cuttriss) have been engaged by the Mansell family to investigate and report on the existing and proposed infrastructure required as part of the proposed subdivision of the above site. We detail our findings and report below.

A detailed Project Description is provided in Section 3 of the AEE accompanying the resource consent applications.

In summary, the proposal involves the subdivision of a 17ha (western) portion of the Mansell Farm into 49 lots: 22 rural lifestyle lots in the northern part of the site, and 27 residential lots adjacent to Otaihanga Road in the south of the site. Access to 19 of the rural lifestyle lots in the north will be via Tieko Street, and the remainder of the rural-lifestyle and residential lots will be accessed via Otaihanga Road.

The proposed subdivision of this area involves earthworks, construction of roads, installation of services. A "water sensitive urban design" approach has been used in considering the lot layout. Inter-disciplinary collaboration has been essential throughout the preliminary stages of the project in order to balance the impacts of the proposed subdivision with the protection and enhancement of the values and functions of the natural ecosystems.

1. PREAMBLE

This report has been prepared to accompany resource consent applications to the Kapiti Coast District Council (KCDC) and Greater Wellington Regional Council (GWRC) required for the proposed subdivision and associated earthworks and infrastructure located at 131-155 Otaihanga Road and 48-58 Tieko Street, Otaihanga.

As a result of the consenting process there may be amendments to incorporate within the detailed design. As such, the servicing solutions detailed in this report should be treated as preliminary and are subject to acceptance by the Council engineering team through the engineering approvals process.

The basis for land development design within the Kapiti Coast District is the KCDC's "Subdivision and Development Principles and Requirements 2012" (SDPR). This adopts NZS4404:2010 (New Zealand Standard for Land Development and Subdivision Engineering) with some local amendments. This report provides:

- an assessment of the compliance of the proposed approach to controlling erosion and sediment from earthworks against the SDRP (section 5), and
- an assessment of available Council infrastructure, describes how the proposed development will be serviced, and demonstrates how the proposed infrastructure solutions comply with the SDPR (sections 6 – 8).

The basis for the control of erosion and sediment from earthworks is the GWRC's Best Practice Guidelines *'Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region'* (February 2021) (ESCG). This report provides an assessment of the

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proposed management of erosion and sediment control against the ESCG. Accompanying this Infrastructure Report is a Preliminary Erosion and Sediment Control Plan that provides detail on how erosion and sediment from earthworks will be controlled (section 5)

2. DOCUMENTS

The following documents and plans have been referenced or observed in the preparation of this report:

- KCDC Subdivision and Development Principles and Requirements 2012 (SDPR);
- KCDC GIS information available from the KCDC website;
- KCDC Standard Drawings;
- NZS4404:2010 - 'Land Development and Subdivision Infrastructure';
- Compliance Document for New Zealand Building Code – Clause E1: Surface Water;
- Geotechnical Investigation at Otaihanga Road, Paraparaumu prepared by RDCL;
- Mana Whenua Assessment prepared by Ātiawa ki Whakarongotai Charitable Trust;
- Whakarongotai o te moana, Whakarongotai o te wā: Ātiawa ki Whakarongotai Kaitiakitanga Plan prepared by Ātiawa ki Whakarongotai Charitable Trust;
- "Archaeological assessment of the Mansell property, proposed subdivision for Chris Hansen Consultants Ltd on behalf of Richard and Alastair Mansell" prepared by Kevin L Jones Archaeologist Ltd;
- Transportation Assessment prepared by Harriet Fraser; National Policy Statement for Freshwater (NPS-FM) & National Environmental Standards for Freshwater (NES-F);
- Greater Wellington Regional Council Te Pane Matua Taiao - Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region;
- Scheme Plan drawing set: 22208 SCH1 Rev K prepared by Cuttriss (see attached at **Appendix A**);
- Water Report entitled "Kapiti Coast District Council (KCDC) – Otaihanga Estates Development Report" prepared by Stantec (see attached at **Appendix B**);
- Preliminary Erosion & Sediment Control Plan prepared by Cuttriss (see attached at **Appendix C**); and
- "Wastewater Modelling Otaihanga Road Development Impact Assessment" prepared by HAL (see attached at **Appendix D**).

3. LOCATION AND SITE DESCRIPTION

The site is located off Otaihanga Road, Otaihanga. The southern portion of the site is bounded by the Kapiti Expressway on the east, Otaihanga Road to the south and rural-residential properties to the west. The northern portion of the site is bounded by the Kapiti Expressway to the east and the access road for 48 – 58 Tieko Road, Otaihanga to the west.

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The location of the subject site is fully detailed within the AEE accompanying the resource consent application documentation.

4. TOPOGRAPHY

The topography of the site is variable, with a dune type landscape. The height varies from approximately RL 5 to RL 25.

A low-lying area to the north of the site is shown to have ponding on the KCDC GIS Flood Hazards Map, see attached at **Appendix E**.

5. EARTHWORKS

5.1. EXISTING GROUND CONDITIONS

As detailed in the RDCL report, the soil profile has been identified as sandy/silty topsoil (0.25m deep), with loose to sense silty sand up to a depth of 16m. RDCL have indicated that there is little to no risk of liquefaction and that NZS3604:2011 shallow foundations are considered suitable for the building sites.

RDCL also recommend batter slopes of 1V:2H as a minimum for permanent batters.

As revealed by percolation testing, the soil conditions are favourable for natural infiltration.

5.2. EARTHWORKS DESIGN EVOLUTION

Earthworks as shown on Sheets 3-6 of the Scheme Plan attached at **Appendix A**, and are required to form the new roads, pedestrian and cycle linkages, notional areas suitable for building, and a constructed wetland.

Several iterations of the earthworks design have been completed throughout the preliminary planning stages of the proposed subdivision. The earthworks and roading design have been completed using 12d model, a civil engineering and surveying software package.

The initial design required significant landform modification to accommodate a gravity sewer solution as detailed in Section 6.3 below. This design resulted in a total cut volume of approximately 145,000m³.

Following the introduction of the National Environmental Standards for Freshwater, ecological investigation confirmed the presence of four natural inland wetlands within the site. A water sensitive urban design approach was subsequently adopted, and an alternative layout considered. The redesign avoids any earthworks within 10m of the four natural inland wetlands and the protection and enhancement of these wetlands has been a key factor in the subdivision layout. The scale of the earthworks was reduced to approx. 70,000m³ of cut, which is less than 50% of the initial volume. The earthworks footprint was also reduced from 89,000m² to approx. 75,000m². As these figures suggest, the revised design is more

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sympathetic to the landform, as efforts were made to preserve the landscape features and values within the site.

The earthworks have been designed to achieve a cut/fill balance, meaning that other than roading materials, no soil will be imported or removed to/from the site. The cut to fill nature of earthworks in sandy soil requires a compaction factor of approx. 30% to be applied to the cut volume. This is because the in-situ material reduces in volume as it is compacted.

Cut and fill depths vary across the site, with a maximum cut of approximately 8.2m to form the road adjacent to Lot 5, and a maximum fill of 8.2m to form areas suitable for building, and pedestrian and cycle linkage between Lots 20 & 21. For avoidance of doubt, the proposed areas suitable for building are shown as notional indicative areas where dwellings may be built in future, the Applicant is not proposing to consent building platforms for these sections as this not needed).

5.3. ANTICIPATED CONSTRUCTION METHODOLOGY

The construction methodology will depend on the staging of the development and the Contractors programme and method of works. The anticipated methodology is outlined in the Preliminary Erosion & Sediment Control Plan attached at **Appendix C**.

The initial setup works will commence following a hui with iwi to identify any areas of particular significance. The installation of site access and ESCP control measures will then progress.

A suitable access point will be established on site for each stage as required. These access points are to be located at the proposed roading access points which have been assessed in the Transportation Assessment prepared for the development. Internal haul roads will be located to suit construction methodologies and sequencing, however, shall be clear of the buffer zones, no build areas and four natural inland wetlands.

As noted in Section 5.2 above, it is anticipated that a cut to fill balance can be achieved for the site, with unsuitable material to be disposed of within the site, within areas not intended for building sites. This unsuitable material is likely to be comprised of organic material including excess topsoil and peaty material excavated in preparation of the roading subgrade. Indicative locations for the disposal of unsuitable material are shown on the Scheme Plan attached at **Appendix A**. This approach will significantly reduce construction traffic and emissions.

Topsoil will be stripped and stockpiled for reuse. The stockpiles are to be sealed off to minimise silt runoff and be located offline from overflow paths particularly in relation to the four natural inland wetlands. Indicative locations for the temporary stockpiles are shown on the Scheme Plan attached at **Appendix A**. Silt fences are to be constructed downhill of the stockpiles.

Cut to fill is likely to involve excavators, dumpers and possibly motor scrapers working within the confines of the site to lower the sand ridges and fill the low areas. Compaction of fill material is to be completed in accordance with NZS 4431:1989 and is generally achieved with loaders, dumpers and motor scrapers.

Roading material will be imported by trucks carting suitable roading aggregate from quarries. This material will be placed, spread and compacted. Preliminary calculations indicate approximately 2,500m³ compacted material will be imported.

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Sediment control measures will be required to be put in place for the duration of the earthworks, in line with the latest revision of the Greater Wellington Regional Council Te Pane Matua Taiao "*Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region*". These measures are detailed within the Preliminary Erosion & Sediment Control Plan attached at **Appendix C.**

5.4. ASSESSMENT OF EARTHWORKS COMPLAINCE WITH THE SDPR

The following section demonstrates how the proposed solution complies with the Development Requirements within Part 3 of the SDPR.

(i) General Requirements

The design constraints were identified by RDCL in their geotechnical report referenced above. It is on this basis that the design is considered to comply with the requirements of NZS 4404:2010 Section 2 as modified by Schedule 2 of the SDPR.

(ii) Geotechnical Appraisal and Design

As noted above, RDCL completed a geotechnical report prior to the commencement of the design work. It is anticipated that geotechnical monitoring of construction will be completed, and further reporting completed following construction to certify the earthworks.

(iii) Performance Criteria

Geotechnical recommendations from the RDCL report have informed the design. As such, the proposed earthworks will be stable and geotechnically sound. The landform modification will be limited to the works required to create adequate foundations for roads and services (including stormwater treatment, as well as building areas and access. Implementation of the controls outlined in the Preliminary Erosion & Sediment Control Plan attached at **Appendix C** will ensure surface water is managed through construction and that sediment, silt and dust will be managed in accordance with best practice guidelines.

(iv) Iwi Representation

A record of consultation with iwi is detailed in the Assessment of Environmental Effects to be submitted with the resource consent application. The latest design has considered the values identified by Ātiawa ki Whakarongotai Charitable Trust as described in their mana whenua assessment, as well as their proposed recommendations. The earthworks have been modelled by AWA to ensure that the increased density along Otaihanga Road does not increase the flood risk in that area, which was one of the key concerns raised in the mana whenua assessment.

Significant redesign has been completed to reduce the disturbance to the dune systems, and to ensure the layout is more sympathetic to the natural environment, including the wetland systems.

Due to the cultural significance of the area, it is anticipated that iwi will be heavily involved throughout the construction phase of the project. A pre-works hui will take place prior to the commencement of works and a site walkover will likely take place to identify any areas of particular significance.

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(v) Cultural Sites

Prior investigation works by Kevin Jones and Bree Wooller as part of their "*Archaeological assessment of the Mansell property, proposed subdivision for Chris Hansen Consultants Ltd on behalf of Richard and Alastair Mansell"* have identified a number of cultural sites within the area. Waahi tapu discovery protocols will be observed in accordance with anticipated consent conditions, as well as Appendix A of the Whakarongotai o te moana, Whakarongotai o te wā: Ātiawa ki Whakarongotai Kaitiakitanga Plan, and the Archaeological Management Plan prepared for the site.

(vi) Archaeological Sites

Given the findings within the archaeological assessment referenced above, it was anticipated that there was the potential for archaeological sites to be unearthed during works. As such, an Archaeological Authority was obtained from Pouhere Taonga Heritage New Zealand prior to the commencement of investigation ground works. The interim monitoring report prepared by Kevin Jones under this Authority confirmed the presence of archaeological artifacts within the site. All works are to be undertaken in accordance with the conditions of the approved Authority, as well as the Archaeological Management Plan.

(vii) Erosion and Sediment Control

Erosion and sediment control measures will be installed prior to the commencement of works and monitored throughout the duration of works. These control measures are described in detail in the Preliminary Erosion and Sediment Control Plan attached at **Appendix C** and below in relation to the GWRC requirements.

(viii) District Plan Provisions

The provisions within the District Plan will be addressed within the Assessment of Environmental Effects to be submitted with the resource consent application.

5.5. GWRC EROSION & SEDIMENT CONTROL GUIDE (ESCG)

GWRC's "*Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region*" (ESCG) provides technical guidance for the selection, design and use of erosion and sediment control practices and measures for land disturbance in the Wellington context. The guide is intended to assist in the implementation of methods and devices to minimise erosion and sedimentation.

The fundamental principles described in Section A2.0 of the ESCG are as follows:

- Minimise Disturbance;
- Stage Construction;
- Protect Slopes;
- Protect Receiving Environments;
- Rapidly Stabilise Exposed Areas;
- Install Perimeter Controls & Diversions;
- Employ Sediment Retention Devices;
- Get Trained and Develop Experience; and
- Adjust the ESC Plan as Needed.

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5.6. ASSESSMENT OF EROSION & SEDIMENT CONTROL APPROACH WITH THE ESCG

The Preliminary ESCP attached at **Appendix C** has been prepared in accordance with Section C1.0 of the ESCG.

The objectives of the Preliminary ESCP are as follows:

1. Establish construction methodologies to avoid the sedimentation of the four natural inland wetlands identified within the site. The Contractor is to ensure that the measures put in place achieve this primary objective.
2. Ensure the works do not accelerate erosion during both the bulk earthworks and civil works construction, and as a result of the finished earthworks.
3. Where objective 2 is not possible, the effective and efficient treatment of sediment discharges and limiting the extent and duration of any erosion or sediment generation.

These objectives will be met by implementing the control methods and practices described in Sections 3-7 of the Preliminary ESCP. The proposed control measures have been selected based on ground conditions and site constraints, including the four natural inland wetlands, and the existing drain along Otaihanga Road. The site plan within the Preliminary ESCG shows the locations of the control methods, and has been prepared in accordance with Appendix E1.0 of the ESCG. Implementation of control measures in accordance with the Preliminary ESCP will ensure best practice measures are utilised to manage erosion and sedimentation caused by the proposed bulk earthworks and civil works construction.

5.7. TREATMENT FOR TEMPORARY TOPSOIL STOCKPILES

Topsoil will be stripped and stockpiled at the initial stage of bulk earthworks. This material will then be placed over the open areas following the cut/fill earthworks as part of the stabilisation process. While temporary in nature, it has been identified that these stockpiles need to be managed in a way that avoids any sediment being discharged into the four natural inland wetlands from runoff or from winds. It is noted that the ground conditions are favourable for natural infiltration, which will minimise the velocity and volume of any sediment laden runoff generated from the stockpiles.

GWRC's ESCG outlines the fundamental principles to be applied when preparing and implementing an ESCP. These principles include "Adjust the ESC Plan as needed". This is to ensure best practice management strategies are applied based on the requirements of each specific site, and recognises the need for designers, contractors and regulatory officials to work together and take an adaptive management approach in the plan as site conditions dictate. Due to the evolving nature of earthworks and range of possible methodologies that could be employed by the contractor, it is not possible to predetermine the locations for the topsoil stockpiles at the consenting stage. To ensure the natural inland wetlands are protected from possible sedimentation, the following criteria will be used when selecting locations for these temporary stockpiles (to be incorporated into the final ESCP). Temporary stockpiles must be located:

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- Outside the natural inland wetlands and natural inland wetland buffer zones (as shown on Sheet 3 of the Scheme Plans);
- 10m beyond the edge of any drain;
- Offline from natural drainage and overflow paths;
- Shall not be located within the ponding areas identified by AWA (Figure 12 of the Flood Hazard Assessment of Effects Report; 18 May 2021);
- Avoid ridges and tops of dunes to minimise wind disturbance;
- 10m beyond the dripline of kānuka trees (as shown on Sheet 3 of the Scheme Plans);
- Avoid earthworks exclusion areas (as shown on Sheet 3 of the Scheme Plans);
- Avoid slopes greater than 1:5;
- Avoid roads and other impermeable surfaces;
- Positioned to minimise storage time and truck movements; and
- Located in areas that will remain undisturbed for the longest period of time as construction progresses.

The following management strategies shall also be employed to ensure the natural inland wetlands are protected from possible sedimentation, in addition to the general provisions included in the Preliminary ESCP (included in Appendix C of this Report):

- The stockpiles are to be sealed off to minimise sediment runoff;
- Silt fences are to be constructed downhill of the stockpiles;
- For stockpiles in active use, a stabilised designated access point shall be provided;
- If a stockpile is to be left for longer than a month, it is to be stabilised using grass seeding or hydroseeding, with silt fences to remain in place until an 80% strike is achieved; and
- Silt fences shall be inspected daily to ensure they are operating effectively.

6. WASTEWATER

6.1. EXISTING WASTEWATER INFRASTRUCTURE

KCDC GIS records (attached at **Appendix F**) show the two sewer rising mains, a 350mm diameter HDPE main and a 225mm diameter Asbestos Cement main, on Ratanui Road and Otaihanga Road north of the Ratanui Road / Otaihanga Road intersection.

A gravity sewer services Tieko Street, flowing west to Otaihanga Road, and then north along Otaihanga Road. An existing sewer manhole (KWWN002978) is located at the intersection of Otaihanga Road and Tieko Street, with an invert level of RL 5.71m.

Discussions with the KCDC infrastructure team have confirmed there is adequate capacity in the existing sewer network to cater for the proposed development. A preliminary modelling report supplied by KCDC team is attached at **Appendix D**. We understand from discussions with Council that this modelling report has now been finalised and that there are no capacity issues in the network. The final report was not available to us at the time of preparing this document.

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It is noted that the proposed solution detailed in Section 6.3 below can be configured to withhold 24 hours of flow which can be discharged offline in the event of a downstream network failure.

6.2. RESIDENTIAL DEMAND ON WASTEWATER RETICULATION

In assessing the likely demand on the existing infrastructure, we have considered design data from NZS4404:2010 and the KCDC SDPR, as well as using information captured on site by way of drone survey.

NZS4404:2010 details average dry weather design flows from residential development as being 180-250 litres/head/day. The KCDC SDPR requires the allowance for a design flow of 250 litres/head/day with an average occupancy of 2.5 people per dwelling[1].

Therefore, the increased residential average dry weather flow (ADWF) demand based on the proposed subdivision would be an additional 30,000 litres/day (48 additional dwellings x 2.5 persons per dwelling x 250 litres per head per day).

6.3. WASTEWATER OPTION EVALUATION

Several wastewater disposal options have been investigated in conjunction with the KCDC infrastructure team through the feasibility stage of the project (October 2020 - April 2021). A number of factors including existing network constraints, mana whenua values, topography, geology, cost, groundwater, ecological sensitivities and infiltration were considered as part of the option evaluation.

(i) Gravity Network

The topography of the site is such that the site cannot be serviced for wastewater reticulation by way of new gravity main connecting to the existing gravity infrastructure.

(ii) On-site Disposal

Preliminary consultation with iwi determined that on-site disposal does not align with their values for this site. The design team agreed that the increased density, especially in proximity to the wetland systems, meant this option was not viable.

(iii) Single Centralised Pump Station & Gravity Network

The first option modelled during the preliminary design utilised a new gravity wastewater network discharging to a centralised (Council owned) sanitary sewer pump station. A pumping main could connect the pump station to the existing wastewater manhole (KWWN002978) at the intersection of Otaihanga Road and Tieko Street. This existing infrastructure is shown on the KCDC GIS records (as attached at **Appendix F**).

While achieving a gravity network from the northern end of the site to the southern end was possible, approximately 145,000m³ of earthworks would have been required to achieve this. Significant alteration of the existing remnant dune network would have been required in order to make this option work.

[1] Clause 5.3.5.1 of KCDC SDPR (page 165)

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In addition, this solution would require the new sewer to be up to 4.0m deep in places. From a safety in design perspective, avoidance of a sewer this deep is preferable. Substantial shoring/benching would be required for future maintenance or if connections are made in the future. Any excavation would require closing at least one lane of the road, and extensive reinstatement work would be required. These factors have the potential to significantly increase the long-term maintenance costs. Access into deep manholes also poses a health and safety risk.

For these reasons it was determined that this option is not suitable for this site, with most weight given to the effects associated with the construction of the gravity network.

(iv) Two Centralised Pump Stations & Gravity Network

Following a complete redesign of the subdivision, a second option to service the proposed subdivision via two centralised pump stations was also investigated. The installation and ongoing costs of two pump stations were considered when assessing this option, as these would have been significant.

Due to the level of the groundwater at the location of the two possible pump stations, securing the storage tanks works would have required extensive works and possible dewatering during construction. In the event of an earthquake or differential settlement it is possible these would fail, discharging raw sewage in the vicinity of the natural inland wetland to the north, and the constructed wetland, and Council stormwater network to the south. It is also likely that the downstream ends of each network would have been lower than the groundwater level for at least part of the year. As such, the risk of infiltration into the network increases.

This option did not provide a solution that would have serviced all proposed lots, and therefore private pump stations would have been required.

It is noted that as per Section 5 (vii) of the SDPR, "*Pumping stations will only be considered and approved by Council when all other options, including pumping from individual lots to a Council rising main, are impracticable*".

It was therefore determined that this option is not suitable for this site.

(v) Low Pressure Sewer Network

The third option modelled, and the option identified by the Applicant as most appropriate to service the proposed subdivision, is to install a low pressure sewer (LPS) network. It is proposed to install a centralised pumping main within the road reserve and connecting walkway, with individual service connections being provided to the boundary of each new lot. A boundary kit is to be installed which allows the private landowner a connection point. Detailed sizing, valve locations and flushing points are to be confirmed at the detailed design stage as part of the engineering approvals stage of the project.

This option drastically reduces the environmental impact of the proposed subdivision as the earthworks footprint is minimised, which helps maintain the hydrological systems, minimise construction impact emissions, minimise the impact on the ecologically significant features – including the four natural inland wetlands and protect the landscape values as much as possible. The proposed earthworks have been reduced to approximately 70,000m³ of cut, which is an approximate 75,000m³ reduction when compared to the "single centralised pump station" option.

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An assessment using the Water New Zealand "Pressure Sewer Selection Tool" suggests that LPS is the optimal method for disposing of sewage for this specific subdivision. This tool scores gravity, vacuum and pressure sewer systems based on nine categories. This calculation is shown as attached at **Appendix G**.

The proposed LPS option improves network efficiency and resilience, helping to future proof the wider network. An increase in demand on the network can be managed through on-site attenuation, as Council can control the discharge from the individual pumps to the existing network.

Given the network is a sealed system, the risks of infiltration and sewage egress are significantly reduced. The flexible pipe is not compromised by movement caused by an earthquake, differential settlement, or seasonal variation in soil properties due to groundwater fluctuations.

The design team have been working with the KCDC infrastructure team to formalise a pressure sewer policy. This work is still ongoing, as decisions need to be made around aspects such as ownership models and approved suppliers & contractor registers. It is noted that Water NZ have prepared a template policy that has been adopted by many Councils around New Zealand. Palmerston North City Council is seen as one of the leaders in this area and discussions are ongoing with the infrastructure team to confirm the most appropriate policies are implemented in the Kāpiti District. Discussions with other Councils have determined that the implementation of LPS solutions is achievable regardless of the ownership structure. While the KCDC policy is not yet in place, the design team considers the proposed LPS solution viable as has been agreed in principle by the KCDC infrastructure team.

On the above basis, the LPS system is the preferred solution for this development.

6.4. ASSESSMENT OF WASTEWATER SOLUTION COMPLIANCE WITH THE SDPR

The following section demonstrates how the proposed solution complies with the Development Requirements within Part 3 of the SDPR. It is noted the SDPR does not include a specific wastewater strategy.

(i) Objective

The proposed LPS option is considered the most appropriate method to comply with the SDPR objective: *"Wastewater systems shall minimise environmental impacts, including erosion, pollution of waterways, coastal and marine environments and habitats."* A significant driver behind the use of this system is the need to protect the four natural inland wetlands and other ecologically significant features, such as lizard habitiat and kanuka trees. Through the use of the LPS system, the subdivision design philosophy aligns with a water sensitive urban design approach, a key outcome of which is minimising the environmental impacts.

(ii) Performance Criteria

The proposed LPS option is considered the most compliant option when assessed against the performance criteria within the SDPR. The LPS option provides for the collection of wastewater from each lot, minimises health and safety risks, and through a pressurised system prevents stormwater ingress and sewage egress.

(iii) Greater Wellington Regional Council Requirements

The design team have consulted with Greater Wellington Regional Council (GWRC) as part of the design process. As noted above, the LPS option significantly reduces the environmental impacts generated by earthworks and aligns with a "water sensitive urban design" approach required by GWRC.

(iv) Design Principles

The proposed design aligns with the requirements NZS 4404:2010 Section 5 as modified by Schedule 5 of the SDPR. Addition 19 within Schedule 5 of the SDPR specifies that common pressure sewer mains can be considered when a normal gravity system is not achievable. The SDPR also states that "*Development of alternative wastewater systems that minimise environmental concerns and/or maintenance expenditure will be encouraged.*"

Although specific pipe sizing, valve locations etc. are yet to be completed, it is anticipated that the proposed design will be in accordance with the requirements of Section 5 of NZS 4404, and Schedule 5 of the SDPR. No downstream network improvements will be required.

It is noted that KCDC have not yet published a pressure sewer policy, and that KCDC have no first-hand experience with these systems. The design team have been working alongside the KCDC infrastructure team on this and as mentioned above it is understood KCDC are progressing a pressure sewer policy. During the pre-application stage of this project, the KCDC infrastructure team has agreed in principle to the use of the pressure sewer option for this particular development.

As noted above, on-site wastewater disposal systems were not considered at the request of local iwi, who have a very strong expectation that on-site disposal be avoided in order to protect the wetlands and waterways.

(v) Private and Public Drains

It has been agreed with the KCDC Infrastructure team that the common rising main and individual service connections, including the boundary kit, will be publicly owned. Discussions are ongoing as to the ownership model for the "on property" equipment, with most Councils in New Zealand opting to own the rising main, pump and chamber, with the gravity connection into the chamber held in private ownership.

(vi) Alternative Wastewater Systems

The proposed LPS option is considered the most appropriate option to maintain or enhance the condition of the natural systems, ecological values, landscape, recreation, cultural and safety values. The operation of each pump is monitored using the latest technology, which can alert the pump owner in the event of failure. This alert feature can be readily integrated into Council systems and accessed via the internet.

As noted above, on-site wastewater disposal systems were not considered at the request of local iwi.

(vii) Pumping Mains and Pump Stations

Pumping stations are only to be considered when other options, including pumping from individual lots to a Council rising main are impracticable.

As demands for housing increase, land available for development is increasingly recognised as a precious resource. The requirement for any centralised pump stations to be located within publicly owned property (outside the road reserve) is not seen as an efficient use of land which could otherwise be developed for housing.

(viii) Construction

Compliance with the construction requirements of the SDPR and NZS 4404 will be addressed during the engineering approvals process and through the construction phase of the project.

(ix) Approved Contractors

Construction of the approved wastewater network will be undertaken by contractors approved by Council.

7. WATER SUPPLY

7.1. EXISTING WATER INFRASTRUCTURE

KCDC GIS records (attached at **Appendix F**) show an existing 100mm diameter watermain on the northern side of Otaihanga Road. A 375mm diameter PVC bulk watermain runs parallel to the 100mm diameter watermain from the Expressway and crosses to the southern side of Otaihanga Road near the entrance to 150 Otaihanga Road. This wider network is described in Stantec's report attached at **Appendix B**.

7.2. RESIDENTIAL DEMAND ON WATER RETICULATION

The likely demand for any new water infrastructure will be residential demand and fire-fighting demand, in accordance SNZ PAS 4509:2008 – the New Zealand Fire Service Fire Fighting Water Supplies Code of Practice. The additional residential demand has been modelled using the average demand of 1225 litres/property/day as per existing development models completed for KCDC.

7.3. PROPOSED WATER RETICULATION INFRASTRUCTURE

Network modelling completed by Stantec has confirmed no network upgrade works will be required in order to meet the minimum service requirements.

It is proposed to reticulate the proposed subdivision for water supply as shown on the appended Scheme Plan - Services (22208 SCH1 Sheet 10), noting that engineering plans will be prepared at the detailed design stage to specify the layout and connection details in accordance with the SDPR.

150mmØ & 100mmØ watermains and associated 50mmØ rider mains will be installed within the site to meet the residential demand and to provide fire-fighting supply in accordance with the SDPR and SNZ PAS 4509:2008 requirements.

The new main connection servicing Lots 22-49 will be looped off the existing water main within Otaihanga Road. The new main connection for Lots 1-19 will be via an extension of the existing main at the end of Tieko Street. Lots 20 & 21 will connect to the existing main within Otaihanga Road.

The existing 20mmØ connection for the house within the site is to be capped and abandoned, and it is anticipated the existing connection at the end of the right of way will have been capped and abandoned prior to the commencement of works.

As required by the SDPR, all new lots will be serviced with individual 20mmØ MDPE connections and a manifold box containing a water meter and backflow preventer.

Proposed new valves and connections will be installed in accordance with KCDC standard details (refer KCDC approved drawings).

7.4. ASSESSMENT OF WATER SUPPLY COMPLIANCE WITH THE SDPR

The following section demonstrates how the proposed solution complies with the Development Requirements within Part 3 of the SDPR.

(i) Water Supply Management

As detailed Stantec's report attached at **Appendix B,** Council's potable water supply network is readily available to service all lots within this development. It is anticipated that rainwater re-use tanks will be required for all new lots to improve sustainability and efficiency of the water network.

(ii) Performance Criteria

The proposed supply is compatible with the existing water supply system and as confirmed by the Stantec will provide adequate water supply to meet firefighting and domestic needs. Each lot is to have an individual connection to a Council main supply.

(iii) Design Principles

The design layout is in accordance with the requirements of Section 6 of NZS 4404:2010 as modified by Schedule 6 of the SDPR. Modelling has confirmed the pipe sizes are adequate to meet design flows required for firefighting and domestic supply requirements. The modelling also confirmed that no upgrade works will be required.

(iv) Relevant Information

The design team have worked with the Council Infrastructure team to confirm the requirements for accessing information. Water modelling has been completed by Stantec, who as Council's preferred modelling expert, used the KCDC water information as agreed with Council engineers.

(v) Pumping Stations & Reservoirs

Modelling has confirmed the development can be supplied without a new reservoir, or pumping stations.

(vi) Construction

Compliance with the construction requirements of the SDPR and NZS 4404 will be addressed during the engineering approvals process and through the construction phase of the project.

(x) Approved Contractors

Construction of the approved water network will be undertaken by contractors approved by Council.

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8. STORMWATER

8.1. EXISTING STORMWATER INFRASTRUCTURE

KCDC GIS records (see attached at **Appendix F**) show an existing 375mm diameter concrete stormwater main on the northern side of Otaihanga Road which flows from the direction of the Expressway to stormwater node KSWN002913 and discharges into an existing open channel near the road boundary of 139 and 131 Otaihanga Road. The open channel then flows into an existing 900mm diameter culvert which flows under the carriageway of Otaihanga Road from east to west, into another open channel which flows along the boundary between 110 and 120 Otaihanga Road.

8.2. STORMWATER DISPOSAL AND ATTENUATION

7 percolation tests were completed within the site to confirm the site is suited to on-site stormwater disposal. The test locations are shown at **Appendix H.** The report entitled "*Otaihanga Road Subdivision (including bulk earthworks and infrastructure) – Flood Hazard Assessment of Effects*", prepared by AWA details these findings as well as the proposed bio infiltration devices to be utilised for stormwater treatment and disposal for Lots 1-22.

Stormwater from proposed Lots 23-49 will be discharged to the kerb. Stormwater from the roading network off the new cul-de-sac connecting to Otaihanga Road will be collected via sumps and conveyed to the proposed constructed wetland. The road levels have been set to accommodate secondary overflow out to the constructed wetland in the event of a system failure. As detailed within the AWA report, the constructed wetland area has been sized to accommodate the runoff from the proposed development to ensure less than minor effects on the surrounding flood levels.

The AWA report assesses the proposed stormwater design against the requirements of the SDPR.

9. TRANSPORTATION

9.1. EXISTING NETWORK

The existing network is described in the Transportation Assessment completed by Harriet Fraser Traffic Engineering & Transportation Planning.

9.2. PROPOSED NETWORK

Preliminary plans have been discussed with the KCDC roading team through the feasibility stage of the project over the period October 2020 - February 2021. The proposed road carriageway is 5.7m wide, in accordance with NZS4404:2010. The minimum 15m legal road width has also been observed, with widening allowed for on the corners to improve sight lines.

It is noted that the levels of the proposed roading network have been set to mimic the natural stormwater system as much as possible, particularly in the northern area of the site.

A connection has been made through the site for pedestrian, equestrian and cycle linkages. The width of Lot 104 (adjacent to Lot 21) has been agreed with Council as 5.5m. Lot 104 is to

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be vested in Council as a Local Purpose Reserve (Walkway). Existing (historic) rights of way are to be surrendered, and new rights of way registered in favour of Lots 20-22. The formed access will be 4.5m wide, to accommodate both private vehicular access to Lots 20-22 as well as being suitable for pedestrians, horses and cyclists.

The four principles of CPTED, namely Surveillance, Access Management, Territorial Reinforcement and Quality Environments, have been considered in the design of the proposed Cycleway, Walkway & Bridleway (CWB). Commentary on the seven qualities outlined in the National Guidelines is listed below:

(i) Access

Clear delineation of the route (via open fencing) will ensure the CBW is readily identifiable and to help with orientation. It is anticipated the CBW will be clearly signposted to give guidance to users to ensure they do not become disoriented.

(ii) Surveillance and Sightlines

Informal surveillance is supported by the location of building sites in the vicinity of the CBW. Fencing is to be low and permeable to facilitate this passive surveillance. The CBW is not intended for night-time use so lighting will not be provided.

(iii) Layout

Visibility and sightlines are to be enhanced through generous legal and formed widths, and open fencing will minimise “concealment” opportunities. Safety within the main recreation reserve is located close to the proposed residential area, and adjacent to Otaihanga Road, which are the higher use areas. The CBW follows the path of a long-established driveway so fits with the existing site framework.

(iv) Activity Mix

The main public use space is located in the highest use area. The CBW encourages multiple uses for the site, in an area appropriate for activities such as riding bikes and horses.

(v) Sense of Ownership

The shared right of way and CBW will be clearly identified through street numbering and low, permeable fencing.

(vi) Quality Environments

Fencing and landscaping will help to form a good quality public area. The large flat space will be easy to maintain, while it is anticipated no maintenance will be carried out on the dunes, to keep with the character of the existing area. Features will be designed in conjunction with the KCDC Place and Space team.

(vii) Physical Protection

Bollards will be installed at the entrances to the CBW to prevent vehicular through traffic, enhancing the safety for the CBW users.

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9.3. TRANSPORTATION COMPLIANCE ASSESSMENT

A Transportation Assessment has been completed by Harriet Fraser Traffic Engineering & Transportation Planning which includes "*a review of the local traffic environment, the internal traffic arrangement and compliance with the Proposed Kapiti Coast District Plan (Proposed District Plan) transportation provisions. In summary the findings of the review show that the proposed subdivision and its associated traffic can be appropriately, safely and efficiently accommodated within the local road network.*"

Compliance against NZS4404:2010 is also discussed in the Transportation Assessment.

The following section reviews the proposal against the Development Requirements within Part 3 of the SDPR.

(i) Sustainable Transport Strategy

The proposed CWB through the site enhances connectivity between Otaihanga Road and Tieko Street, which is currently a dead-end street. This central CWB enhances not only physical connection through the site, but also allows connection to the history and cultural significance of the area. The CWB follows the path of a possible dray track identified in the archaeological report. In addition, the network has been designed to be sympathetic with the existing landform to mimic the natural flow of water.

The CWB also enhances the values of two natural inland wetlands identified within the site. This is considered an important aspect of the design as the connection between people and wetlands is one way to enhance the health of these important ecosystems.

(ii) Network Hierarchy

Tables 3.1 & 3.2 of NZS4404:2010 have been used as the basis for the design. An assessment against table 3.2 is included within the Transportation Assessment completed by Harriet Fraser. Both new roads are considered Neighbourhood Access Routes under the table within this section of the SDPR. The design has considered the local character and cyclist connections.

(iii) Performance Criteria

Given the connection between the two separate roads through the CWB, the design provides for good connections and promotes the use of sustainable transport modes. Car parking can be provided within Lot 105 to promote the use of the reserve and CWB, and to formalise the existing situation. The Transportation Assessment confirms the proposed network can cope with the design loads and confirms the gradient meets the minimum requirements. The stormwater treatment from the proposed roads is in line with best practice low impact stormwater drainage principles.

(iv) Design Principles

As noted above, the design standards of NZS4404:2010 have formed the basis of the design. The design team have considered the principles outlined in the SDPR including residential amenity, connectivity, safety, manoeuvring, earthworks minimisation, and in a way that retains as much of the natural features as much as possible.

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Through the design process, connection of Tieko Street to the new road to the south was considered. This layout was eventually disregarded due to the environmental and cultural sensitivities identified through the design process, as well as complications due to easements registered over the three strips of land which bisect the site.

(v) Design and Access Statement

As per the SDPR requirements, a Design and Access Statement shall be provided through the engineering approvals phase of the project.

(vi) Road Safety Audits

The Transportation Assessment prepared by Harriet Fraser considers the proposal against the design standards in the SDPR and the Austroads Guides to Road Design. This assessment considers intersection safety and concludes that the proposed intersection can be appropriately, safely and efficiently accommodated.

It is anticipated that further audits will be completed through the detailed design stage and following the completion of works, and that consent conditions will be issued to reflect this requirement.

(vii) Means of Compliance

The proposed network has been discussed with the KCDC Transportation Team through the preliminary stages of the design and adjustments made to take into consideration the concerns raised. Harriet Fraser's Transportation Assessment identifies a minor non-compliance in relation to the footpaths, however the assessment concludes that the proposed solution is "*considered a balanced approach well matched to the local environment".*

10. PONDING

KCDC GIS records (as attached at **Appendix E**) indicates that the northern part of the site is subject to ponding in proposed Lots 5-7. This has been assessed by AWA in their "*Otaihanga Road Subdivision (including bulk earthworks and infrastructure) – Flood Hazard Assessment of Effects*". Displacement of the modelled flood hazard adjacent to Otaihanga Road is also addressed in the above report.

11. POWER & TELECOMMUNICATIONS

Chorus and Scanpower have each confirmed that while upgrade works will be required, the site can be adequately serviced. It is anticipated that underground service connections will be made available to each of the proposed lots in accordance with the requirements of the SDPR. Refer to attachments at **Appendix I**.

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12. RECOMMENDATIONS

We would recommend any proposed water, wastewater and stormwater design be carried out in accordance with KCDC SDPR and the requirements of NZS4404:2010, and any erosion and sediment control measures be in accordance with the requirements of the GWRC ESCG and generally in accordance with the Preliminary ESCP accompanying this Infrastructure Report.

Consideration will need to be given during the detailed design process to 'safety in design' in relation to the confined space entry into the sewer manhole located on the existing sewer main.

13. CONCLUSION

This report has been prepared to provide a summary of the infrastructure capacity constraints and identify possible solutions for the proposed subdivision of the site at 131 – 155 Otaihanga Road and 48 – 58 Tieko Street, Otaihanga.

Confirmation of the final layout, and finished roading and platform levels will determine the required grades and pipe sizing of the necessary wastewater and stormwater infrastructure.

Based on our assessment of the existing infrastructure and discussions with KCDC, service providers and other stakeholders, we are satisfied that the proposed subdivision can be adequately serviced and will meet the requirements of the SDPR. Furthermore, we consider the measures proposed to control erosion and sediment control meet the requirements of the GWRC's ESCG requirements.

Prepared by:

Nick Taylor
Director
CUTTRISS CONSULTANTS LTD

Approved for release by:

Neil Johnstone
Chartered Professional Engineer
CUTTRISS CONSULTANTS LTD

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APPENDIX A

DEVELOPMENT SCHEME PLAN

NOTES:

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5. NOT ALL INTERESTS ON THE RECORD OF TITLE MAY BE SHOWN ON THIS PLAN, AND SHOULD BE INVESTIGATED FURTHER
6. SERVICES HAVE BEEN LOCATED ON SITE WHERE POSSIBLE, OTHERWISE SHOWN FROM KCDC RECORDS, AND SHOULD BE VERIFIED ON SITE
7. CONTOUR INTERVAL: 1.0m
8. SURVEYED BY: N TAYLOR & S TURKINGTON, 18 JULY 2019
9. INSTRUMENT USED: TRIMBLE GPS RTK R10 VRS & DJI PHANTOM 4 PRO
10. BOUNDARY LEVELS FOR DETERMINATION OF CRITICAL RECESSION PLANES MUST BE CONFIRMED PRIOR TO ANY APPLICATION FOR BUILDING CONSENT
11. BOUNDARY INFORMATION HAS BEEN SOURCED FROM INFORMATION PROVIDED BY LINZ XML & HAS NOT BEEN VERIFIED ON SITE
12. ALL ELECTRONIC CAD DATA MUST BE READ IN CONJUNCTION WITH THESE NOTES
13. NATURAL WETLAND EXTENT & KĀNUKA EXTENT TAKEN FROM INFORMATION SUPPLIED BY WILDLANDS ECOLOGY, RECEIVED 22-09-2020.

LEGEND

- BOUNDARY
- EASEMENT
- 40m OFFSET FROM EDGE OF HIGHWAY
- 80m OFFSET FROM EDGE OF HIGHWAY
- DEVELOPMENT SITE
- NOTIONAL 20m BUILDING CIRCLE
- NATURAL WETLAND EXTENT

Sec 32 SO 505428
Sec 3 SO 520369
22 SO 505428
1 DP 534361
6 DP 534361
100 DP 378541
101 TO VEST IN KCDC OR BE DEDICATED AS ROAD
21 SO 505428
1 DP 78267
TIEKO STREET
STATE HIGHWAY 1
104 TO VEST IN KCDC / ROW TO LOTS 20,21 & 22
29 SO 505428
17 SO 505428
15 SO 505428
28 SO 505428
13 SO 505428
13 DP 51041
105 TO VEST IN KCDC AS RECREATION RESERVE
100 TO VEST IN KCDC OR BE DEDICATED AS ROAD
26 SO 505428
12 SO 505428
102 TO VEST IN KCDC OR BE DEDICATED AS ROAD (WIDENING)
200 TO VEST IN KCDC AS LOCAL PURPOSE RESERVE (STORMWATER)
OTAIHANGA ROAD
10 SO 505428
9 SO 505428
24 SO 505428
103 TO VEST IN KCDC OR BE DEDICATED AS ROAD (WIDENING)

ISSUED

	REVISION DETAILS	NAME	DATE
G	STOCKPILES RELOCATED, SHEET1 DETAIL ADDED	NHT	05/21
H	NOTES AMENDED, LANDSCAPE DETAIL UPDATED	NHT	05/21
I	EARTHWORKS INFORMATION UPDATED	NHT	05/21
J	INFORMATION UPDATED	NHT	06/21
K	INFORMATION UPDATED	JLG	06/21

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PROJECT
PROPOSED SUBDIVISION
PT LOT 6 DP 53191, LOTS 2-4 & PT LOT 5 DP 84524, PT LOTS 1 & 2 DP 303764, SECS 5, 7 & 12 SO 404971, SECS 25, 27 & 31 SO 505428, 131-155 OTAIHANGA RD & 48-58 TIEKO ST, OTAIHANGA
SCHEME PLAN - DEVELOPMENT OVERVIEW

CLIENT
MANSELL

SCALE A1 1:1250
REDUCED SCALE A3 - 1:2500

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	11/20
DRAWN	NHT	11/20
CHECKED	NKT	11/20

DRAWING NUMBER 22208 SCH1
SHEET 1 OF 13 SHEETS
REVISION K

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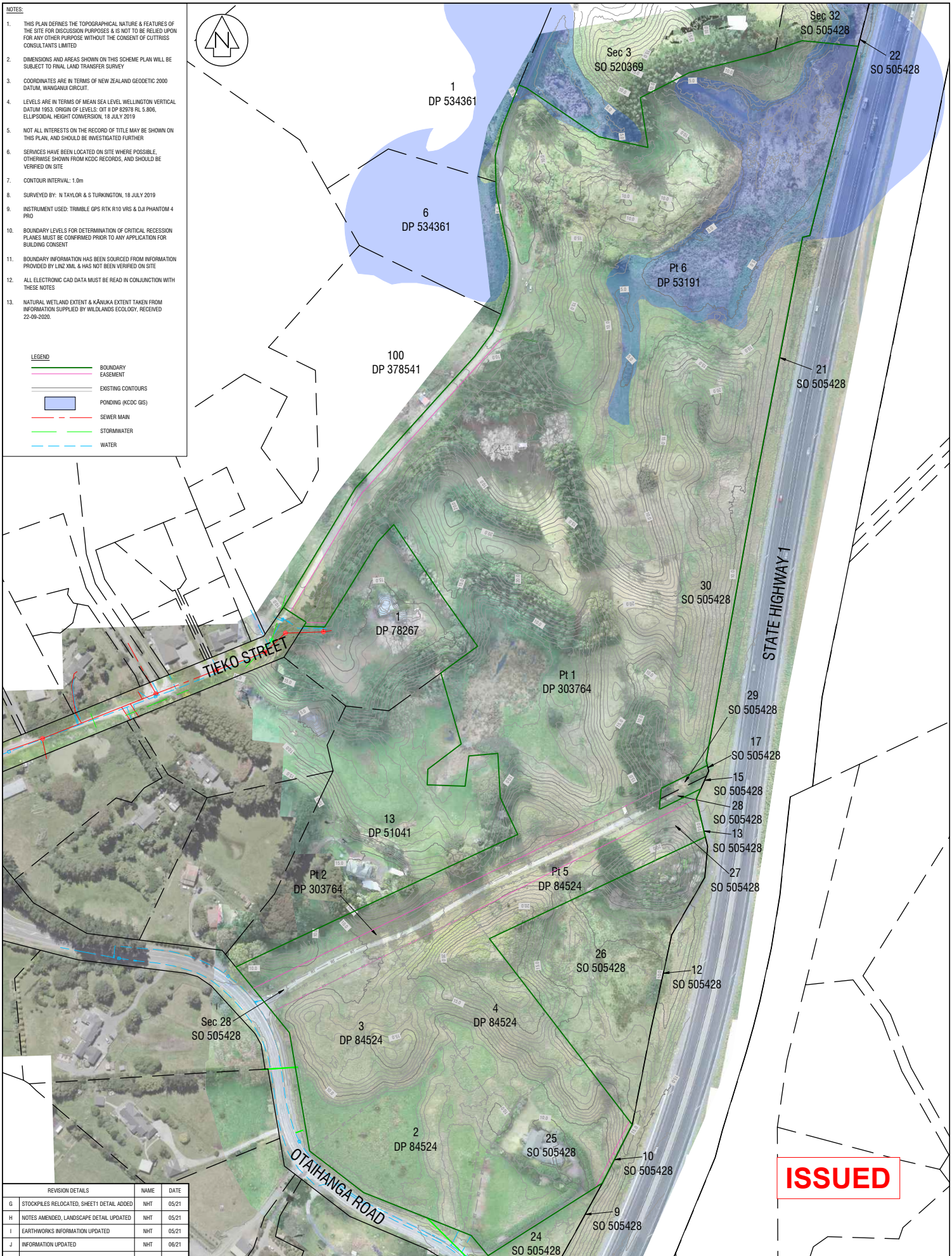
LEGEND

- BOUNDARY
- EASEMENT
- EXISTING CONTOURS
- PONDING (KCDC GIS)
- SEWER MAIN
- STORMWATER
- WATER



ISSUED

REVISION DETAILS		NAME	DATE
G	STOCKPILES RELOCATED, SHEET1 DETAIL ADDED	NHT	05/21
H	NOTES AMENDED, LANDSCAPE DETAIL UPDATED	NHT	05/21
I	EARTHWORKS INFORMATION UPDATED	NHT	05/21
J	INFORMATION UPDATED	NHT	06/21
K	INFORMATION UPDATED	JLG	06/21

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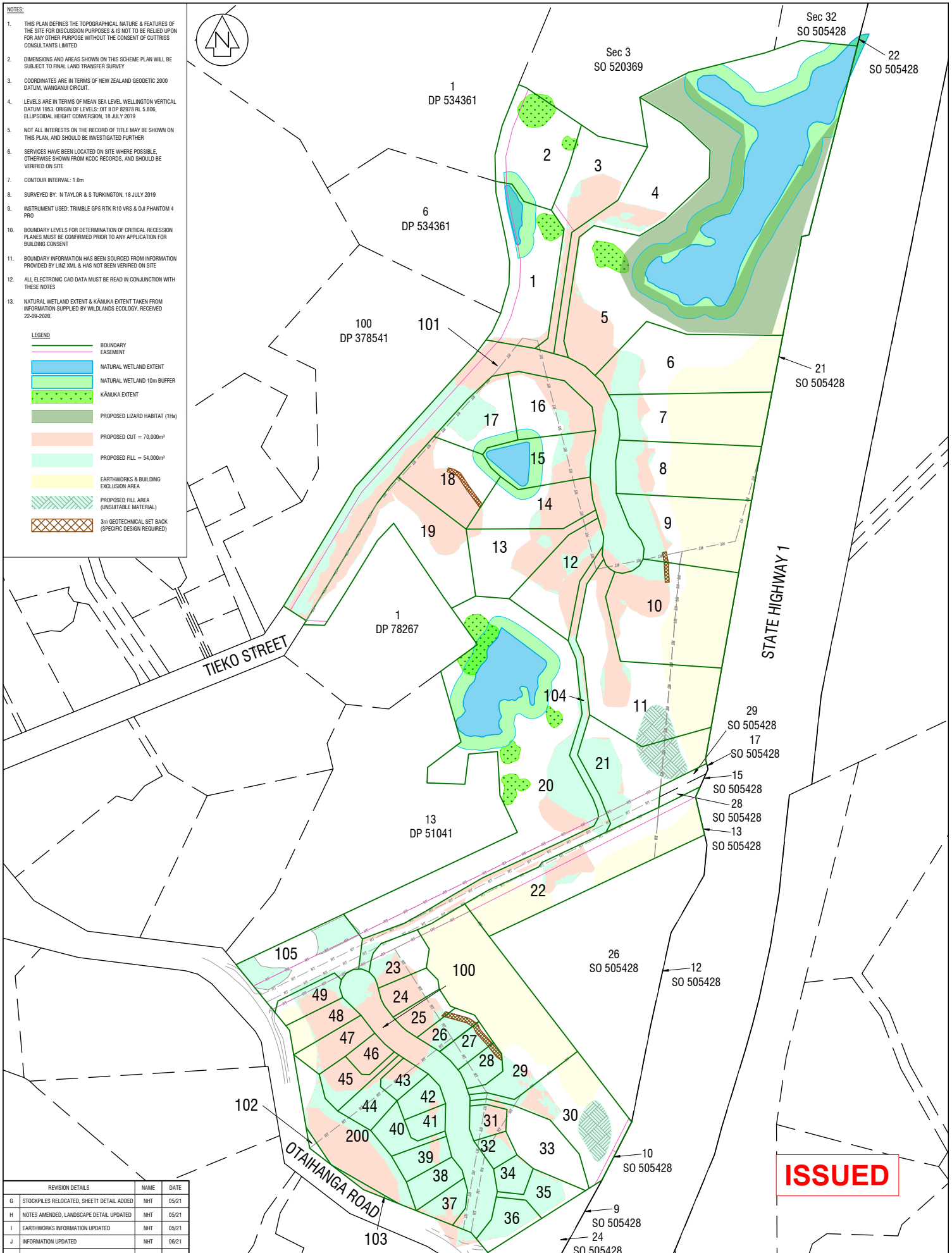
PT LOT 6 DP 53191, LOTS 2-4 & PT LOT 5 DP 84524, PT LOTS 1 & 2 DP 303764, SECS 5, 7 & 12 SO 404971, SECS 25, 27 & 31 SO 505428, 131-155 OTAIHANGA RD & 48-58 TIEKO ST, OTAIHANGA
SCHEME PLAN - EXISTING SITE

CLIENT
MANSELL

SCALE A1 1:1250
REDUCED SCALE A3 - 1:2500

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	11/20
DRAWN	NHT	11/20
CHECKED	NKT	11/20

DRAWING NUMBER
22208 SCH1
SHEET 2 OF 13 SHEETS
REVISION K



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J	INFORMATION UPDATED	NHT	06/21
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SCHEME PLAN - ECOLOGICAL CONSTRAINTS & EARTHWORKS

CLIENT
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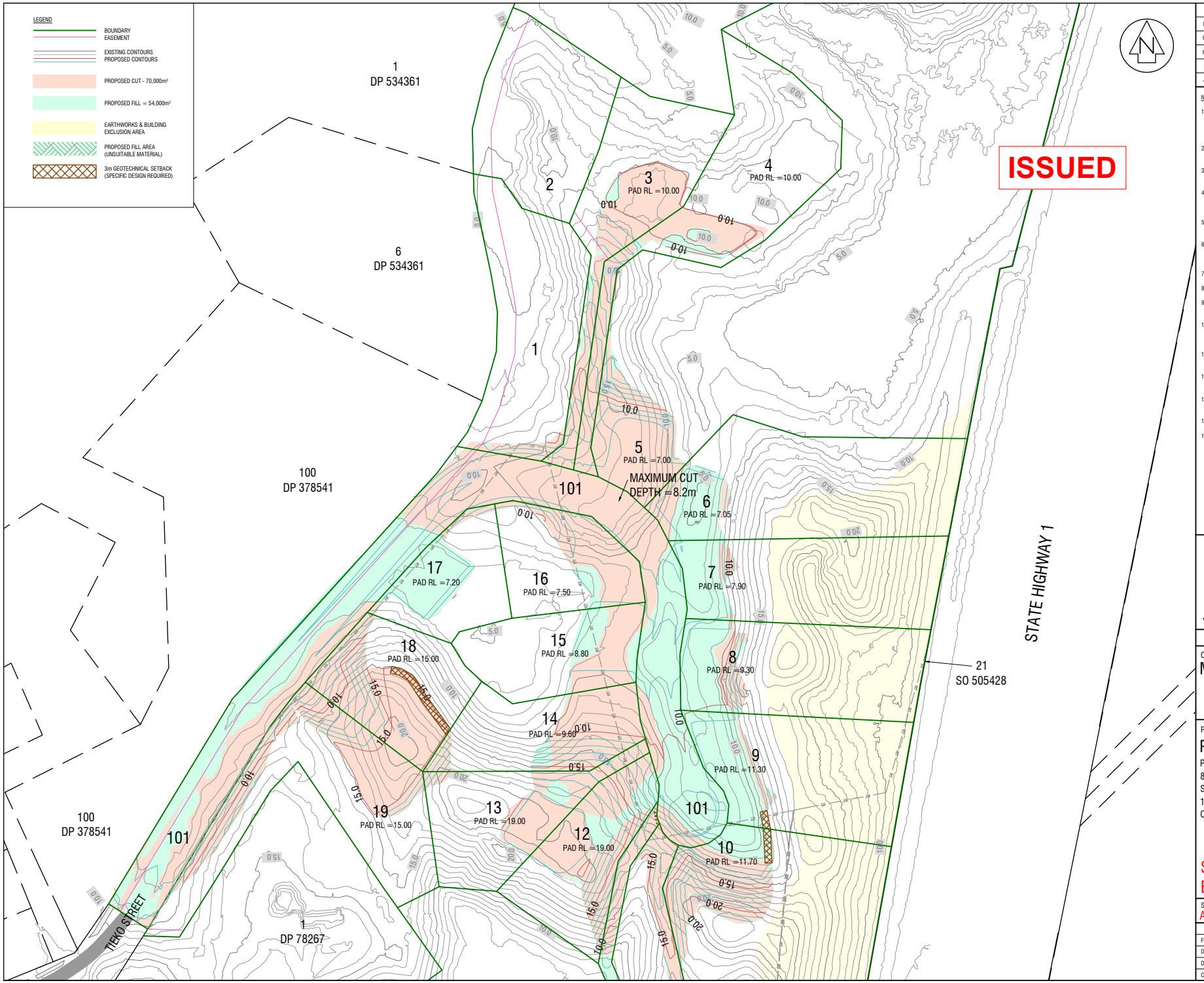
SCALE	A1 1:1250	REDUCED SCALE A3 - 1:2500	
	NAME	DATE	DRAWING NUMBER
FIELDWORK	NHT	07/19	22208 SCH1
DESIGNED	NHT	11/20	
DRAWN	NHT	11/20	SHEET 3 OF 13 SHEETS
CHECKED	NKT	11/20	REVISION K



	REVISION DETAILS	NAME	DATE
F	LAYOUT AMENDED, GEOTECH DETAIL ADDED	NHT	04/21
G	STOCKPILES RELOCATED, SHEET1 DETAIL ADDED	NHT	05/21
H	NOTES AMENDED, LANDSCAPE DETAIL UPDATED	NHT	05/21
I	EARTHWORKS INFORMATION UPDATED	NHT	05/21
J	INFORMATION UPDATED	NHT	06/21

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13. WETLAND EXTENT & KĀNUKA EXTENT TAKEN FROM INFORMATION SUPPLIED BY WILDLANDS ECOLOGY, RECEIVED 22-09-2020.
14. EXISTING EASEMENTS TO BE SURRENDERED AS NECESSARY.
15. EXTENT OF UNSUITABLE MATERIAL DISPOSAL AREAS TO BE CONFIRMED DURING CONSTRUCTION.

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CLIENT
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131-155 OTAIHANGA RD & 48-58 TIEKO ST, OTAIHANGA

SCHEME PLAN EARTHWORKS

SCALE	REDUCED SCALE
A1 - 1:750	A3 - 1:1500

	NAME	DATE
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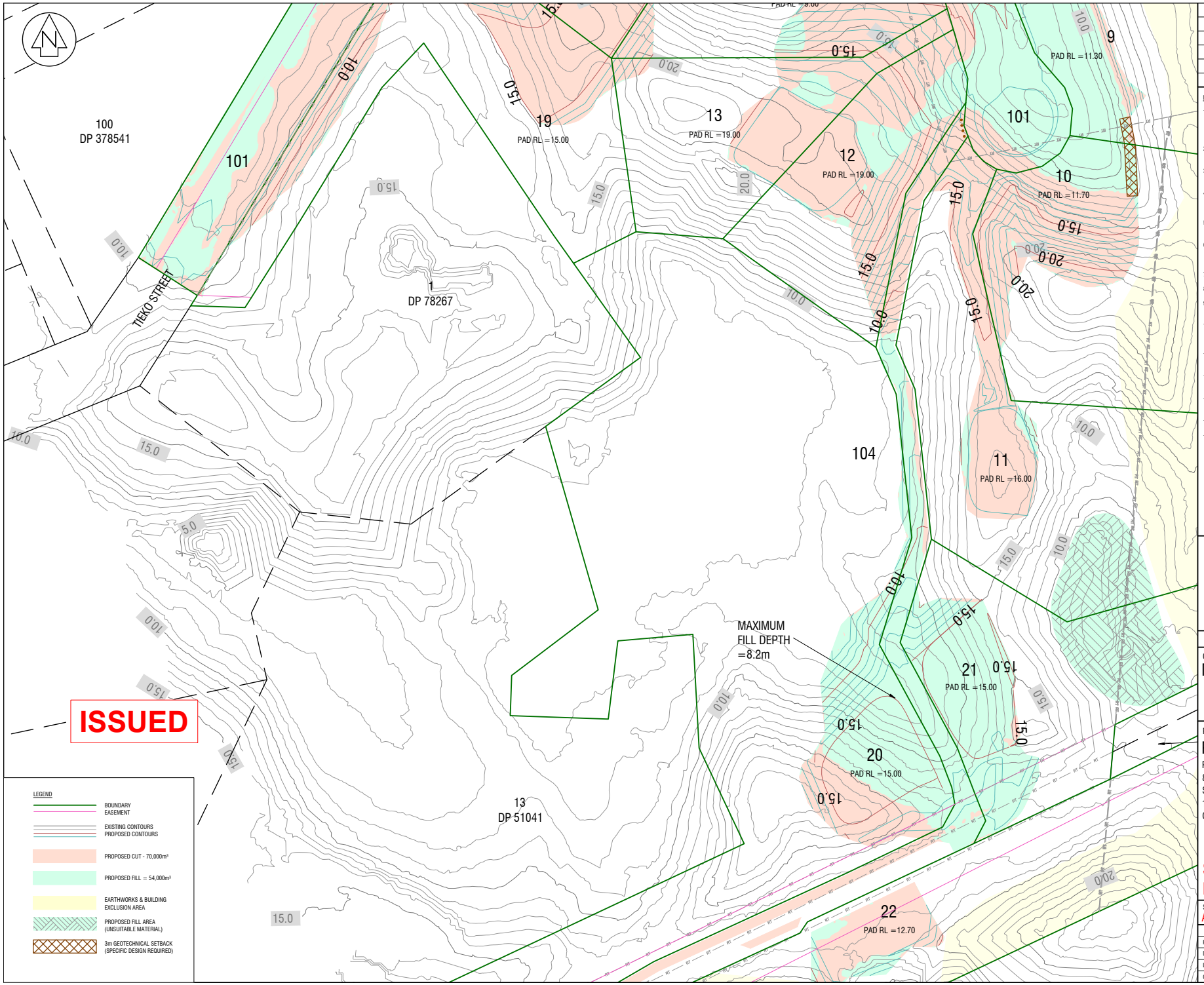
DESIGNED	NHT	11/20
DRAWN	NHT	11/20
CHECKED	NKT	11/20

DRAWING NUMBER 22208 SCH
SHEET 4 OF 13 SHEETS
REVISION K



REVISION DETAILS		NAME	DATE
F	LAYOUT AMENDED, GEOTECH DETAIL ADDED	NHT	04/21
G	STOCKPILES RELOCATED, SHEET1 DETAIL ADDED	NHT	05/21
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11. BOUNDARY INFORMATION HAS BEEN SOURCED FROM INFORMATION PROVIDED BY LINZ XML & HAS NOT BEEN VERIFIED ON SITE
12. ALL ELECTRONIC CAD DATA MUST BE READ IN CONJUNCTION WITH THESE NOTES
13. WETLAND EXTENT & KĀNUKA EXTENT TAKEN FROM INFORMATION SUPPLIED BY WILDLANDS ECOLOGY, RECEIVED 22-09-2020.
14. EXISTING EASEMENTS TO BE SURRENDERED AS NECESSARY.
15. EXTENT OF UNSUITABLE MATERIAL DISPOSAL AREAS TO BE CONFIRMED DURING CONSTRUCTION.

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MANSELL

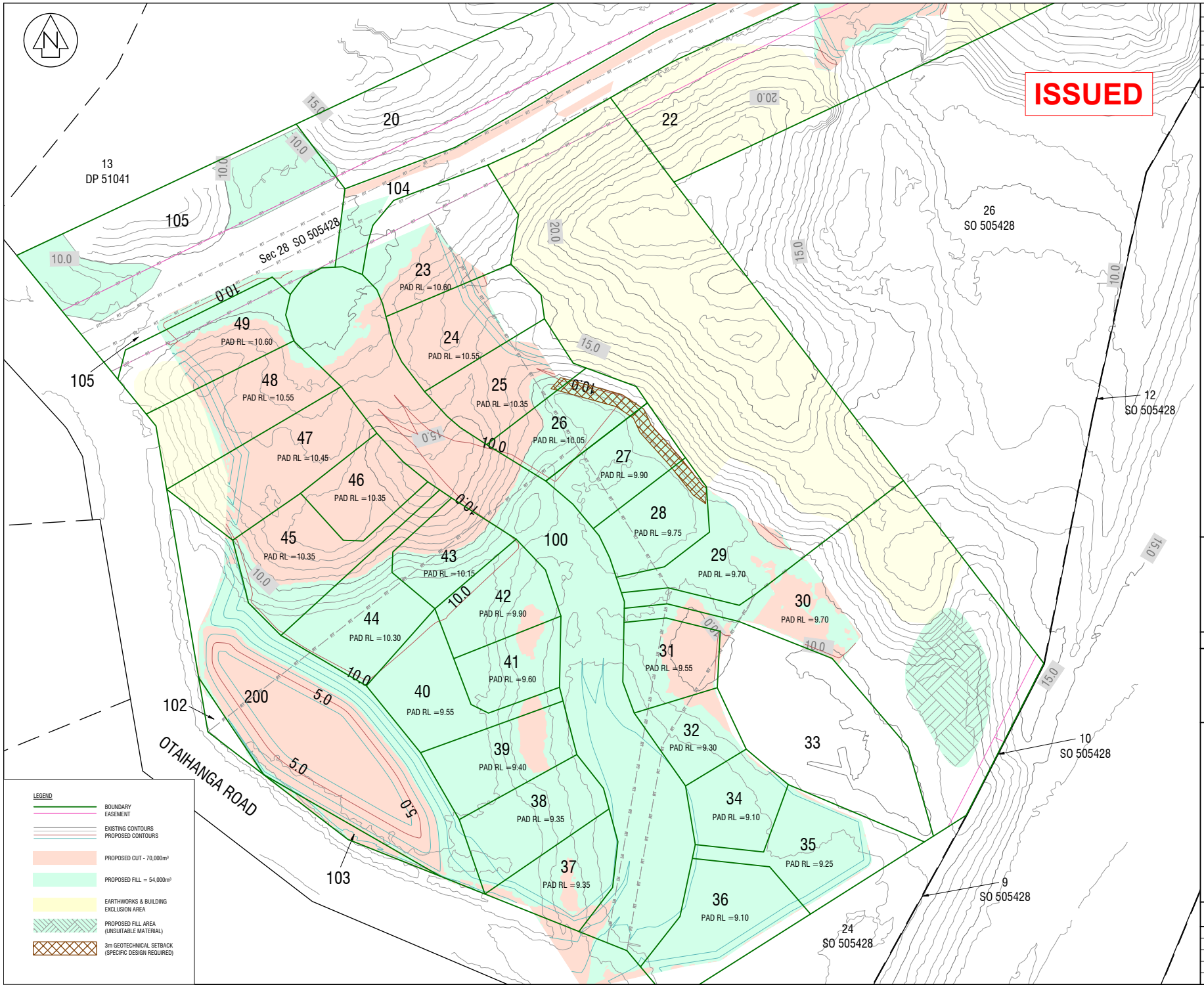
PROJECT
PROPOSED SUBDIVISION
PT LOT 6 DP 53191, LOTS 2-4 & PT LOT 5 DP 84524, PT LOTS 1 & 2 DP 303764, SECS 5, 7 & 12 SO 404971, SECS 25, 27 & 31 SO 505428
131-155 OTAIHANGA RD & 48-58 TIEKO ST, OTAIHANGA

SCHEME PLAN
EARTHWORKS

SCALE	REDUCED SCALE
A1 - 1:500	A3 - 1:1000

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	11/20
DRAWN	NHT	11/20
CHECKED	NKT	11/20

DRAWING NUMBER
22208 SCH
SHEET 5 OF 13 SHEETS
REVISION K



	REVISION DETAILS	NAME	DATE
F	LAYOUT AMENDED, GEOTECH DETAIL ADDED	NHT	04/21
G	STOCKPILES RELOCATED, SHEET1 DETAIL ADDED	NHT	05/21
H	NOTES AMENDED, LANDSCAPE DETAIL UPDATED	NHT	05/21
I	EARTHWORKS INFORMATION UPDATED	NHT	05/21
J	INFORMATION UPDATED	NHT	06/21

NOTES:

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2. DIMENSIONS AND AREAS SHOWN ON THIS SCHEME PLAN WILL BE SUBJECT TO FINAL LAND TRANSFER SURVEY
3. COORDINATES ARE IN TERMS OF NEW ZEALAND GEODETIC 2000 DATUM, WANGANUI CIRCUIT.
4. LEVELS ARE IN TERMS OF MEAN SEA LEVEL WELLINGTON VERTICAL DATUM 1953. ORIGIN OF LEVELS: OIT II DP 82978 RL 5.806, ELLIPSOIDAL HEIGHT CONVERSION, 18 JULY 2019
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PROJECT
PROPOSED SUBDIVISION
PT LOT 6 DP 53191, LOTS 2-4 & PT LOT 5 DP 84524, PT LOTS 1 & 2 DP 303764, SECS 5, 7 & 12 SO 404971, SECS 25, 27 & 31 SO 505428
131-155 OTAIHANGA RD & 48-58 TIEKO ST, OTAIHANGA

SCHEME PLAN
EARTHWORKS

SCALE
A1 - 1:500
REDUCED SCALE
A3 - 1:1000

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	11/20
DRAWN	NHT	11/20
CHECKED	NKT	11/20

DRAWING NUMBER
22208 SCH
SHEET 6 OF 13 SHEETS
REVISION K

NOTES:

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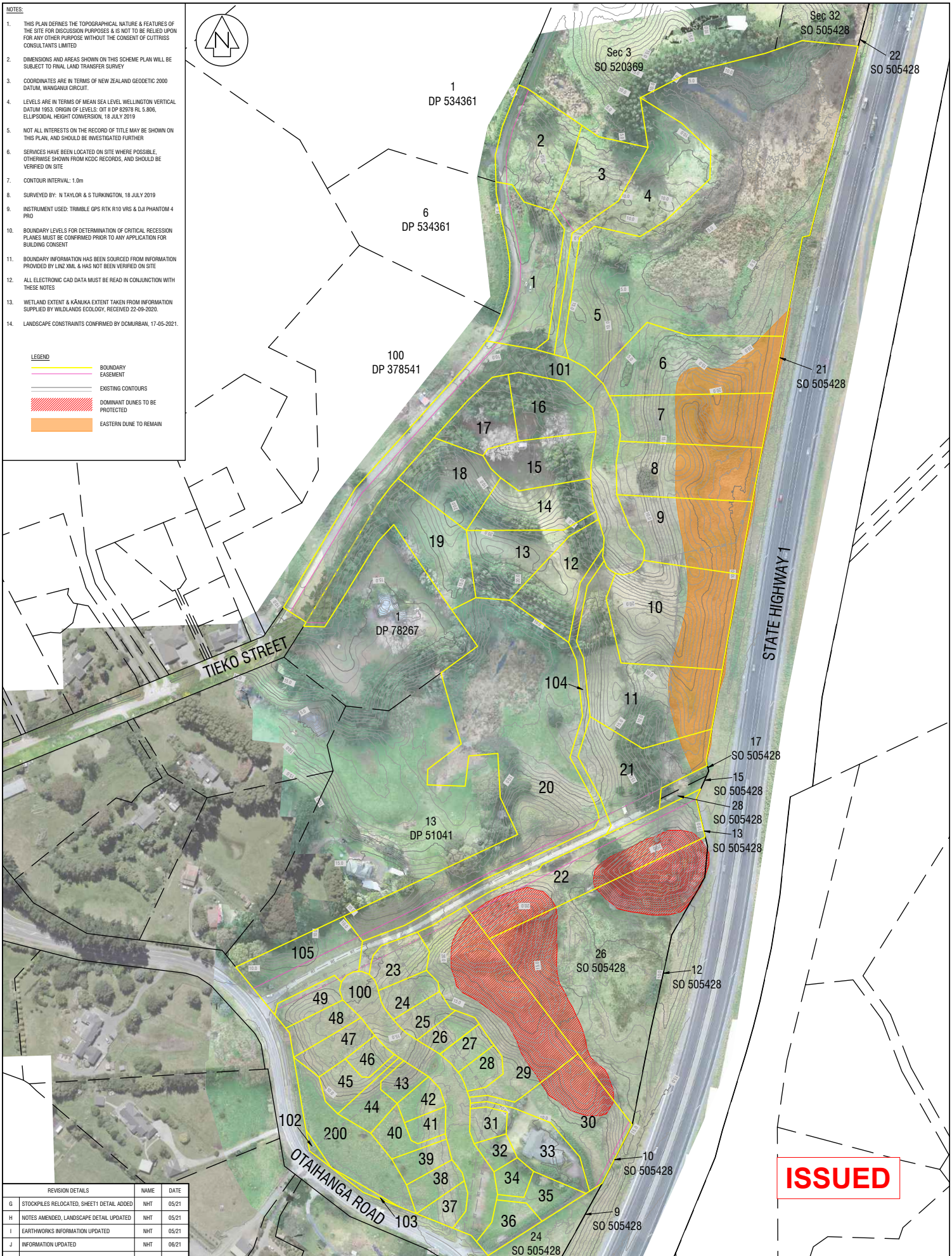
13. WETLAND EXTENT & KĀNUKA EXTENT TAKEN FROM INFORMATION SUPPLIED BY WILDLANDS ECOLOGY, RECEIVED 22-09-2020.
14. LANDSCAPE CONSTRAINTS CONFIRMED BY DCMURBAN, 17-05-2021.

LEGEND

- BOUNDARY
- EASEMENT
- EXISTING CONTOURS
- DOMINANT DUNES TO BE PROTECTED
- EASTERN DUNE TO REMAIN



ISSUED

	REVISION DETAILS	NAME	DATE
G	STOCKPILES RELOCATED, SHEET1 DETAIL ADDED	NHT	05/21
H	NOTES AMENDED, LANDSCAPE DETAIL UPDATED	NHT	05/21
I	EARTHWORKS INFORMATION UPDATED	NHT	05/21
J	INFORMATION UPDATED	NHT	06/21
K	INFORMATION UPDATED	JLG	06/21

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PROJECT
PROPOSED SUBDIVISION
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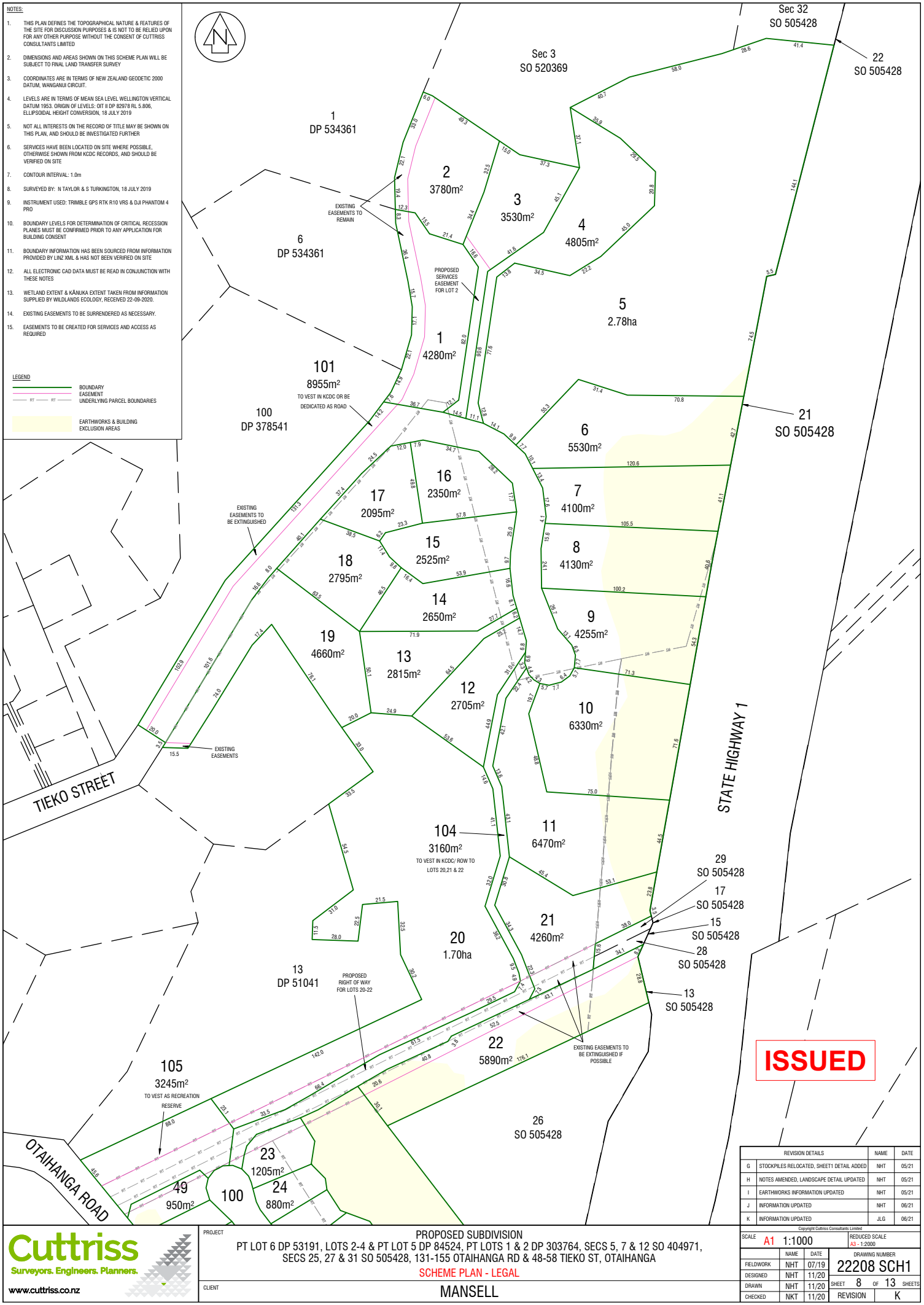
SCHEME PLAN - LANDSCAPE CONSTRAINTS

CLIENT
MANSELL

SCALE A1 1:1250 | REDUCED SCALE A3 - 1:2500

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	11/20
DRAWN	NHT	11/20
CHECKED	NKT	11/20

DRAWING NUMBER 22208 SCH1
SHEET 7 OF 13 SHEETS
REVISION K



REVISION DETAILS		NAME	DATE
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H	NOTES AMENDED, LANDSCAPE DETAIL UPDATED	NHT	05/21
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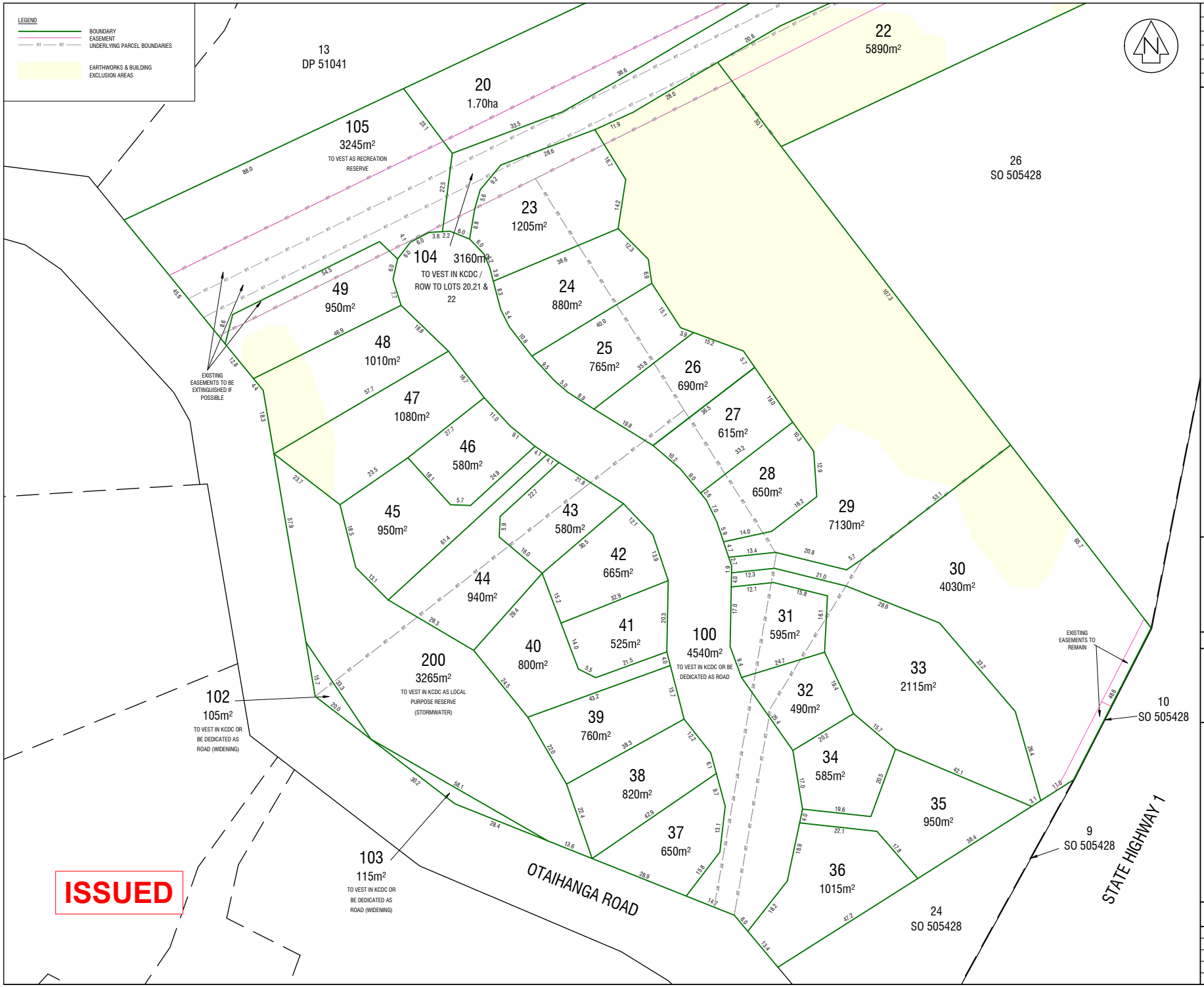
SCHEME PLAN - LEGAL

CLIENT
MANSELL

SCALE A1 1:1000
REDUCED SCALE A3 - 1:2000

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	11/20
DRAWN	NHT	11/20
CHECKED	NKT	11/20

DRAWING NUMBER 22208 SCH1
SHEET 8 OF 13 SHEETS
REVISION K



	REVISION DETAILS	NAME	DATE
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I	EARTHWORKS INFORMATION UPDATED	NHT	05/21
J	INFORMATION UPDATED	NHT	06/21

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15. EASEMENTS TO BE CREATED FOR SERVICES AND ACCESS AS REQUIRED

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PROJECT
PROPOSED SUBDIVISION
PT LOT 6 DP 53191, LOTS 2-4 & PT LOT 5 DP 84524, PT LOTS 1 & 2 DP 303764, SECS 5, 7 & 12 SO 404971, SECS 25, 27 & 31 SO 505428
131-155 OTAIHANGA RD & 48-58 TIEKO ST, OTAIHANGA

SCHEME PLAN
LEGAL

SCALE	REDUCED SCALE
A1 - 1:500	A3 - 1:1000

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	11/20
DRAWN	NHT	11/20
CHECKED	NKT	11/20

DRAWING NUMBER
22208 SCH
SHEET 9 OF 13 SHEETS
REVISION K

NOTES:

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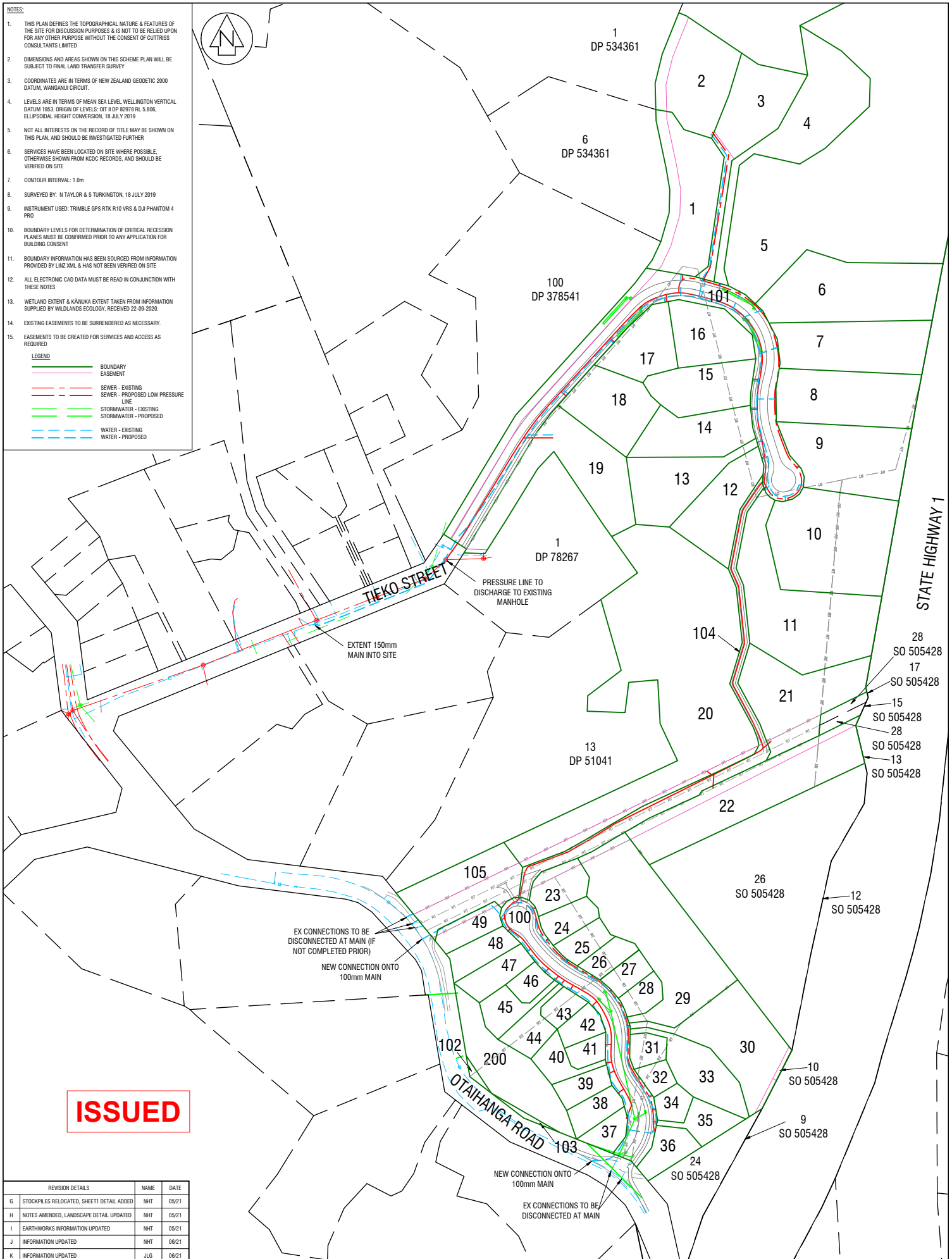
LEGEND

- BOUNDARY
- EASEMENT
- SEWER - EXISTING
- SEWER - PROPOSED LOW PRESSURE LINE
- STORMWATER - EXISTING
- STORMWATER - PROPOSED
- WATER - EXISTING
- WATER - PROPOSED



ISSUED

	REVISION DETAILS	NAME	DATE
G	STOCKPILES RELOCATED, SHEET1 DETAIL ADDED	NHT	05/21
H	NOTES AMENDED, LANDSCAPE DETAIL UPDATED	NHT	05/21
I	EARTHWORKS INFORMATION UPDATED	NHT	05/21
J	INFORMATION UPDATED	NHT	06/21
K	INFORMATION UPDATED	JLG	06/21

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PROJECT
PROPOSED SUBDIVISION
PT LOT 6 DP 53191, LOTS 2-4 & PT LOT 5 DP 84524, PT LOTS 1 & 2 DP 303764, SECS 5, 7 & 12 SO 404971, SECS 25, 27 & 31 SO 505428, 131-155 OTAIHANGA RD & 48-58 TIEKO ST, OTAIHANGA
SCHEME PLAN - SERVICES

CLIENT
MANSELL

SCALE A1 1:1250 | REDUCED SCALE A3 - 1:2500

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	11/20
DRAWN	NHT	11/20
CHECKED	NKT	11/20

DRAWING NUMBER 22208 SCH1
SHEET 10 OF 13 SHEETS
REVISION K

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LEGEND

- BOUNDARY
- EASEMENT
- PROPOSED/EXISTING ROAD/RIGHT OF WAY
- PROPOSED FOOTPATH
- PROPOSED BIOFILTRATION SWALE

1 DP 534361
6 DP 534361
100 DP 378541
1 DP 78267
13 DP 51041
13 DP 51041

TIEKO STREET
STATE HIGHWAY 1
OTAIHANGA ROAD

LOW POINT
2.5m WIDE CYCLEWAY, WALKWAY & BRIDLEWAY
EXISTING SEALED DRIVEWAY TO REMAIN AS SHARED CYCLEWAY, WALKWAY & BRIDLEWAY
BOLLARDS TO PREVENT VEHICULAR THROUGH TRAFFIC
CONNECTION TO EXISTING SEALED DRIVEWAY
EXISTING SEALED DRIVEWAY TO BE WIDENED FOR PASSING BAYS
CONNECTION TO EXISTING SEALED DRIVEWAY
5.5m WIDE ENTRANCE
BOLLARDS TO PREVENT VEHICULAR THROUGH TRAFFIC, WHILST ALLOWING CONNECTION TO EXISTING CYCLEWAY AND FOOTPATH NETWORK
KERB & CHANNEL
LOW POINT

26 SO 505428
12 SO 505428
10 SO 505428
9 SO 505428
24 SO 505428
29 SO 505428
17 SO 505428
15 SO 505428
28 SO 505428
13 SO 505428

ISSUED

	REVISION DETAILS	NAME	DATE
G	STOCKPILES RELOCATED, SHEET1 DETAIL ADDED	NHT	05/21
H	NOTES AMENDED, LANDSCAPE DETAIL UPDATED	NHT	05/21
I	EARTHWORKS INFORMATION UPDATED	NHT	05/21
J	INFORMATION UPDATED	NHT	06/21
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SCHEME PLAN - ROADING

CLIENT
MANSELL

SCALE A1 1:1250
REDUCED SCALE A3 - 1:2500

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	11/20
DRAWN	NHT	11/20
CHECKED	NKT	11/20

DRAWING NUMBER 22208 SCH1
SHEET 11 OF 13 SHEETS
REVISION K

	REVISION DETAILS	NAME	DATE
F	LAYOUT AMENDED, GEOTECH DETAIL ADDED	NHT	04/21
G	STOCKPILES RELOCATED, SHEET1 DETAIL ADDED	NHT	05/21
H	NOTES AMENDED, LANDSCAPE DETAIL UPDATED	NHT	05/21
I	EARTHWORKS INFORMATION UPDATED	NHT	05/21
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LEGEND

BOUNDARY
EASEMENT
SIGHT LINES - TURNING IN
SIGHT LINES - TURNING OUT

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PROPOSED SUBDIVISION
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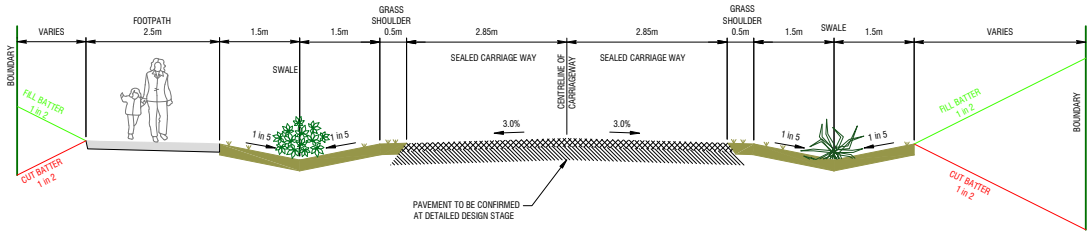
131-155 OTAIHANGA RD & 48-58 TIEKO ST, OTAIHANGA

SCHEME PLAN
OTAIHANGA RD SIGHT LINES

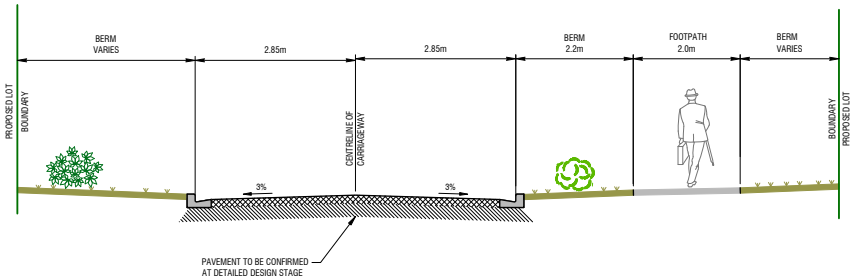
SCALE
A1 - 1:500
REDUCED SCALE
A3 - 1:1000

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	11/20
DRAWN	NHT	11/20
CHECKED	NKT	11/20

DRAWING NUMBER
22208 SCH
SHEET 12 OF 13 SHEETS
REVISION K



A 11 TYPICAL ROAD CROSS SECTION - SWALE
1:50 (1:100 @ A3)



B 11 TYPICAL ROAD CROSS SECTION - KERB & CHANNEL
1:50 (1:100 @A3)

ISSUED

	REVISION DETAILS	NAME	DATE
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6. SERVICES HAVE BEEN LOCATED ON SITE WHERE POSSIBLE, OTHERWISE SHOWN FROM KCDC RECORDS, AND SHOULD BE VERIFIED ON SITE
7. CONTOUR INTERVAL: 1.0m
8. SURVEYED BY: N TAYLOR & S TURKINGTON, 18 JULY 2019
9. INSTRUMENT USED: TRIMBLE GPS RTK R10 VRS & DJI PHANTOM 4 PRO
10. BOUNDARY LEVELS FOR DETERMINATION OF CRITICAL RECESSION PLANES MUST BE CONFIRMED PRIOR TO ANY APPLICATION FOR BUILDING CONSENT
11. BOUNDARY INFORMATION HAS BEEN SOURCED FROM INFORMATION PROVIDED BY LINZ XML & HAS NOT BEEN VERIFIED ON SITE
12. ALL ELECTRONIC CAD DATA MUST BE READ IN CONJUNCTION WITH THESE NOTES
13. PLANTING DETAIL TO BE CONFIRMED BY LANDSCAPE ARCHITECT

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CLIENT
MANSELL

PROJECT
PROPOSED SUBDIVISION
PT LOT 6 DP 53191, LOTS 2-4 & PT LOT 5 DP 84524, PT LOTS 1 & 2 DP 303764, SECS 5, 7 & 12 SO 404971, SECS 25, 27 & 31 SO 505428
131-155 OTAIHANGA RD & 48-58 TIEKO ST, OTAIHANGA

SCHEME PLAN
TYPICAL CROSS SECTIONS

SCALE
A1 - 1:50
REDUCED SCALE
A3 - 1:100

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	11/20
DRAWN	NHT	11/20
CHECKED	NKT	11/20

DRAWING NUMBER
22208 SCH
SHEET 13 OF 13 SHEETS
REVISION K

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APPENDIX B

STANTEC WATER REPORT

Kapiti Coast District Council (KCDC) – Otaihanga Estates Development Report

This report has been prepared for the benefit of Kapiti Coat District Council. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

Rev. No.	Date	Description	Prepared By	Checked By	Reviewed By	Approved By
0	01/04/2021	Draft	A Brotherston	B Davies	B Davies	B Davies
1	21/04/2021	Developer/Council Feedback	A Brotherston	B Davies	B Davies	B Davies

1 Introduction

KCDC has engaged Stantec to report on the water supply available at the proposed development of 49 properties at Otaihanga Estates, Paraparaumu. The location of the development is shown in Figure 1-1 below. 21 properties are proposed at Tieko Street, with the remaining 28 properties at Otaihanga Road.

This document describes the requirements for water supply at the development site.

Figure 1-1: Location of Proposed Development

1.1 Network Configuration

The proposed development lies within the Waikanae, Paraparaumu and Raumati (WPR) Network. The WPR network is supplied from the Waikanae River Water Treatment Plant (WTP), where it is pumped along separate mains – North to Waikanae, and South to Paraparaumu and Raumati. The proposed development is located within Mazengarb DMA, which is highlighted in the network schematic below in Figure 1-2.

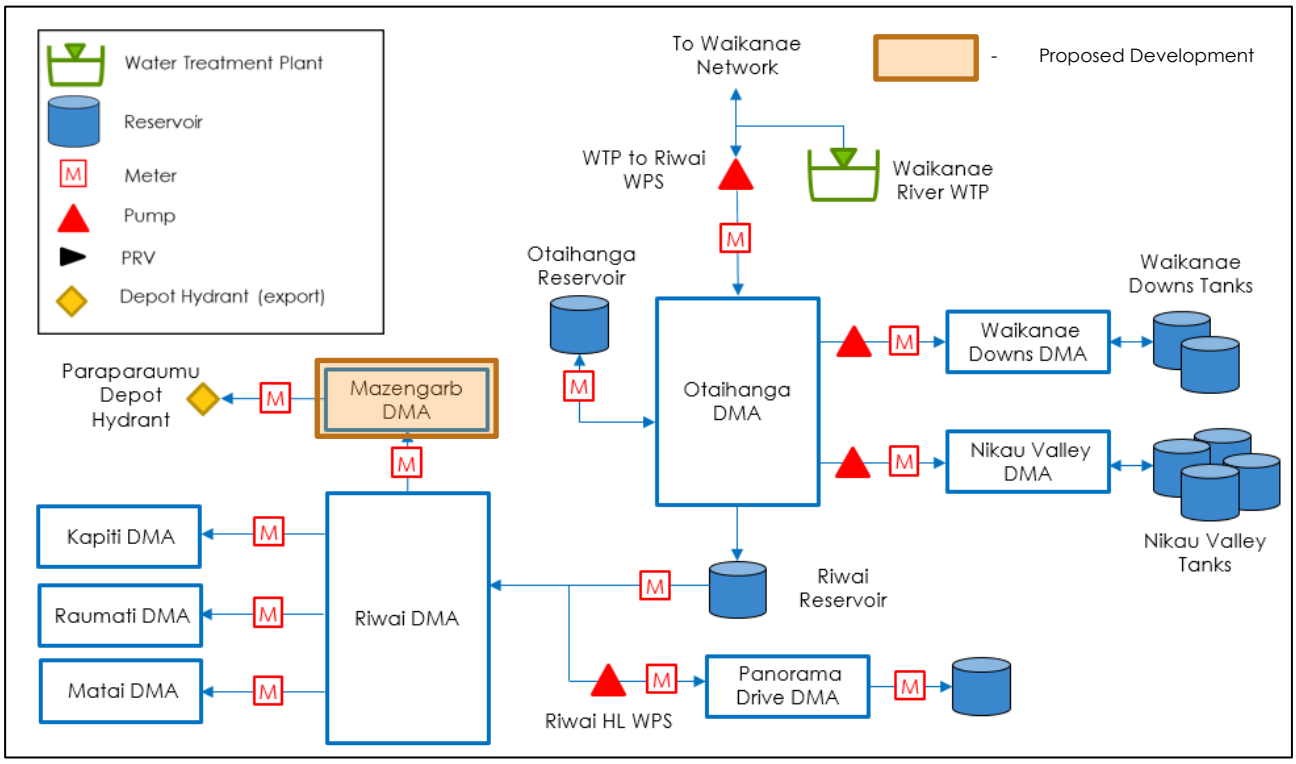

Figure 1-2: Paraparaumu Network Schematic

2 Water Supply Requirements

2.1 Design Pressure

Schedule 6 of the Kapiti Coast District Councils Subdivision and Development Principles and Requirements, 2012 (SDPR), states that the design pressure (i.e. during Average Day Peak Week demand) shall be between 250kPa and 900kPa (25m to 90m head) at the point of supply.

2.2 Available Fire Flow

Table 2 of SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice (Fire Code) states that the minimum firefighting water required is a minimum of 25l/s from a maximum of two hydrants within 270m, of which a minimum of 12.5l/s must be from a single hydrant within 135m. This flow must be achieved while maintaining a residual pressure of at least 10m at each source during 60% of annual peak demand.

3 Network Modelling

For reference, the modelling is based on the master planning model KCDC WS MPL05, using the 2018 and 2047 upgraded scenarios. A variation named "KCDC WS MPL05 C08 Otaihanga Estates, Paraparaumu" has been created for this assessment. As there have been no recent assessments of developments in this part of the network, none have been added to the base model.

3.1 Proposed Water Supply Network

The proposed development consists of 49 properties shown in the preliminary development layout plan provided by the developer (Figure 3-1).

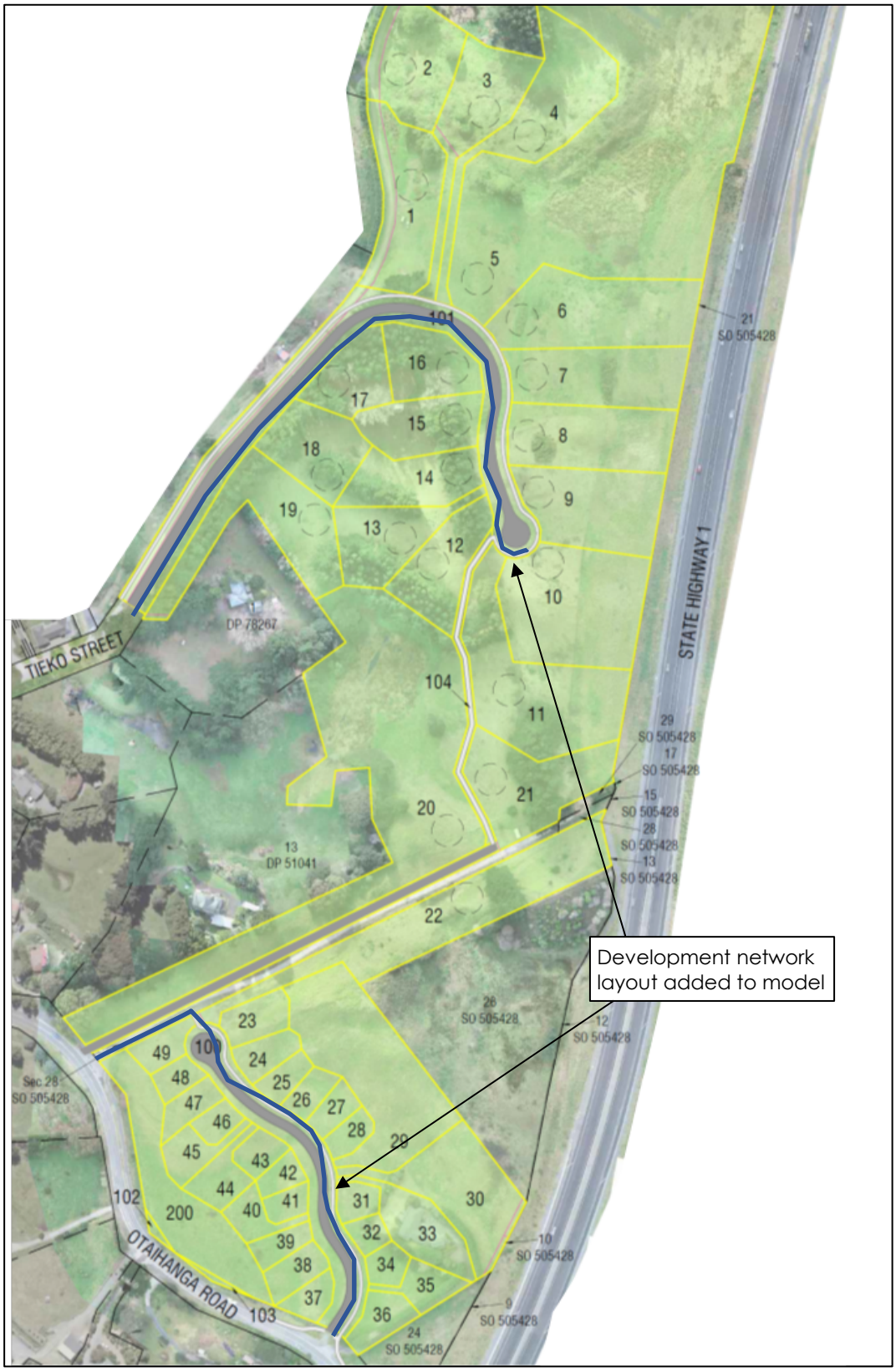

Figure 3-1: Development Layout Plan

Using this plan, pipes have been added to the model following the road layouts.

The network along Tieko Street (lots 1-21) is proposed to be connected to the existing 150mm AC main along Tieko Street. The proposed point of connection is shown below in Figure 3-2. 150mm pipe is proposed as the diameter for the onsite mains, with 50mm diameter rider mains proposed where necessary to avoid property service lines crossing the road. 100mm mains were considered but did not provide sufficient fire flow at the last hydrant.

The network along Otaihanga Road (lots 22-49) is proposed to be connected from both sides of the development to the existing 100mm PVC main along Otaihanga Road to form a loop. The proposed points of connection are shown below in Figure 3-3. 100mm pipe is proposed as the size for the onsite mains, with 50mm diameter rider mains proposed where necessary to avoid property service lines crossing the road.

Hydrants are proposed at 135m distance as per requirements of The Fire Code of Practice (described in 2.2).

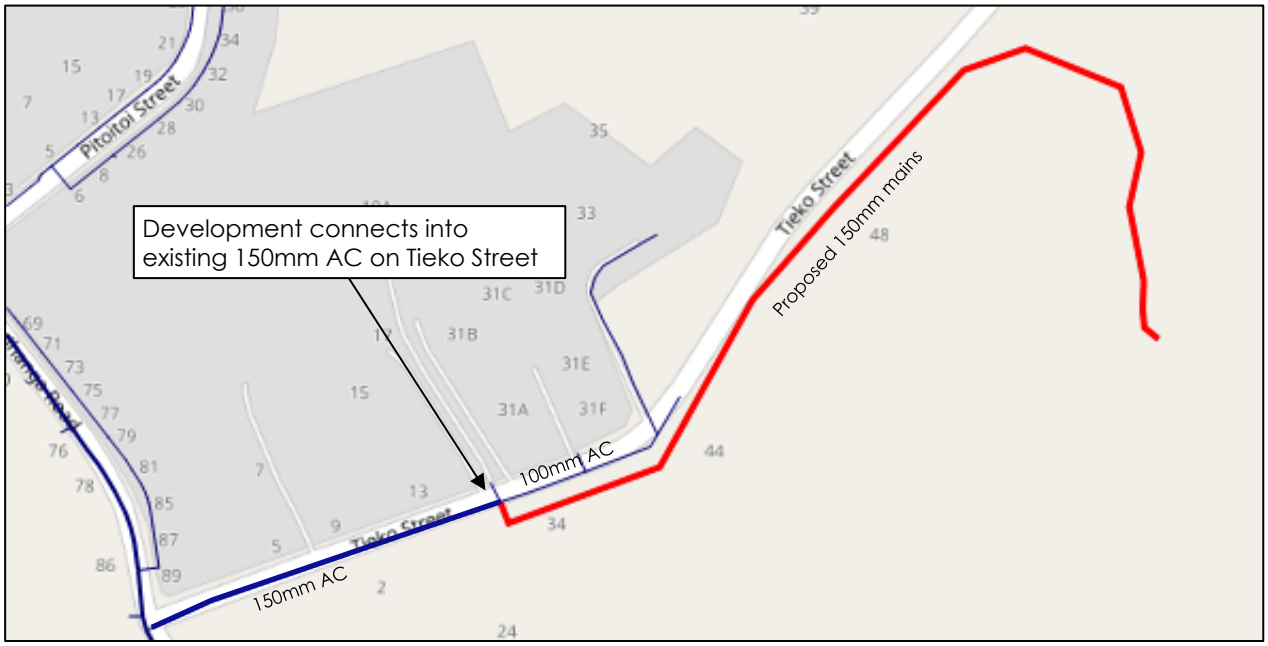

Figure 3-2: Tieko Street Connection

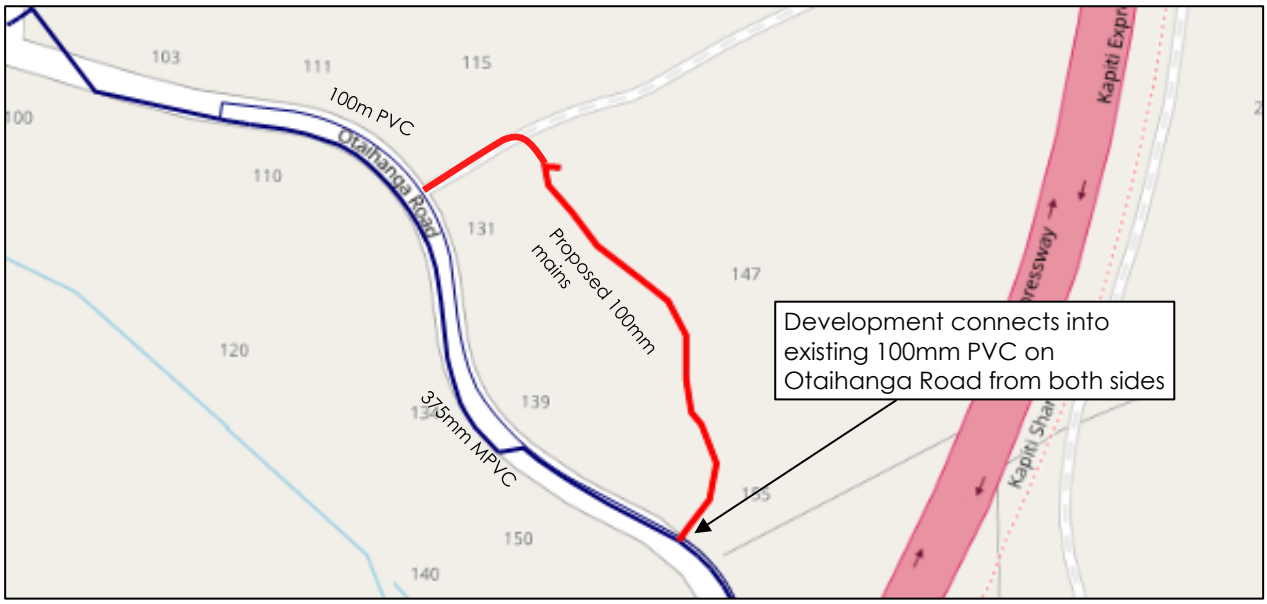

Figure 3-3: Otaihanga Road Connection

3.2 Demands

In both current and future peak demand models, demand has been allocated to 49 properties around the proposed route of the onsite mains.

Elevations of properties have been taken from the contour shapefile provided by the developer. The developer has confirmed that the elevations of properties in the proposed development range between 7m and 19m.

As this study includes assessment of network-wide effects, a standard greenfield demand for Kapiti Coast water network assessments of 1,225 l/prop/day has been assigned to each dwelling. This is assigned with a peaking factor based on the existing residential demand profile – "DMA_Mazengarb". This ensures that the peak demand from the proposed development is consistent with the demands elsewhere in the model and ensures a realistic wider network analysis.

For internal network design, NZS 4404 sets out a demand figure of 625 l/prop/day and a peaking factor of up to 5. With the small size of these developments these flows are insignificant in comparison to the fire flows, so if fire flow requirements are met in the development internal network, then pipe sizes will be more than sufficient for this demand. This aspect of design has therefore not been modelled.

4 System Performance

4.1 Current Peak Day Scenario (2018)

In the current peak day scenario (2018), minimum pressure of at least 25m can be met at all points on the network with the addition of the proposed development. Minimum pressure predicted at the development site is 40m (Figure 4-1).

The addition of proposed development has a small impact on the pressures at the existing properties as seen in the pressure comparison graph close to the point of supply (Figure 4-2).

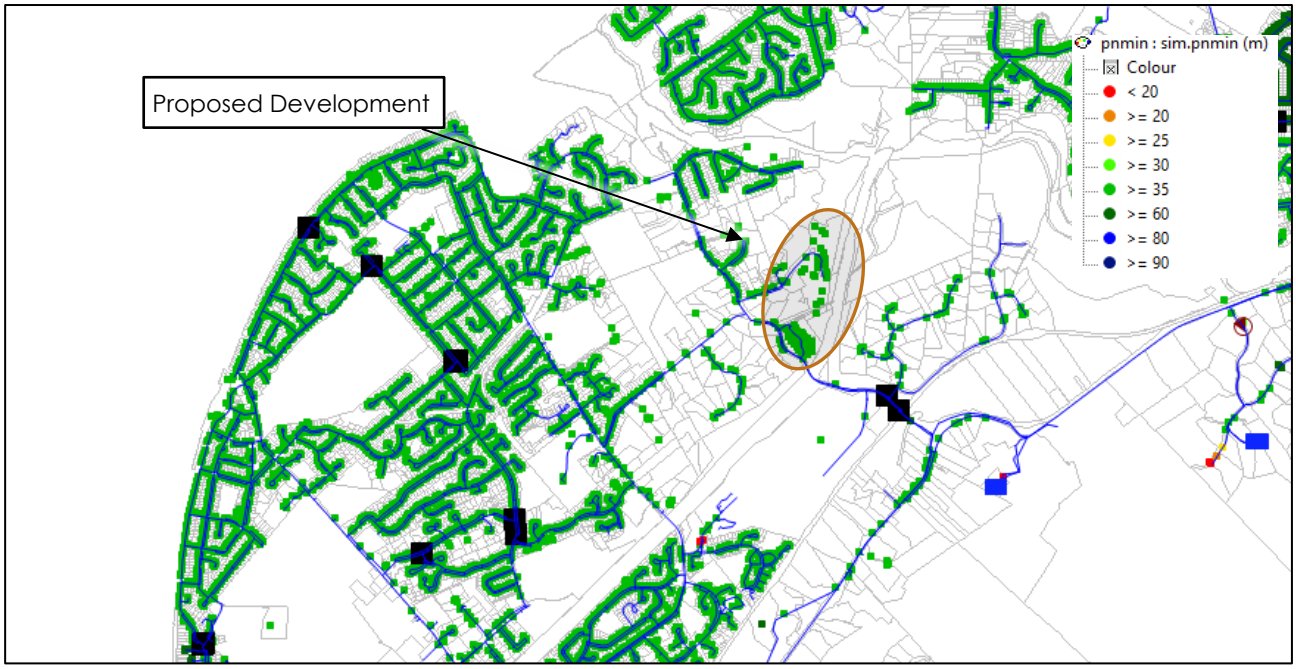

Figure 4-1: Minimum pressures in the WPR network after development (Current Peak Day)

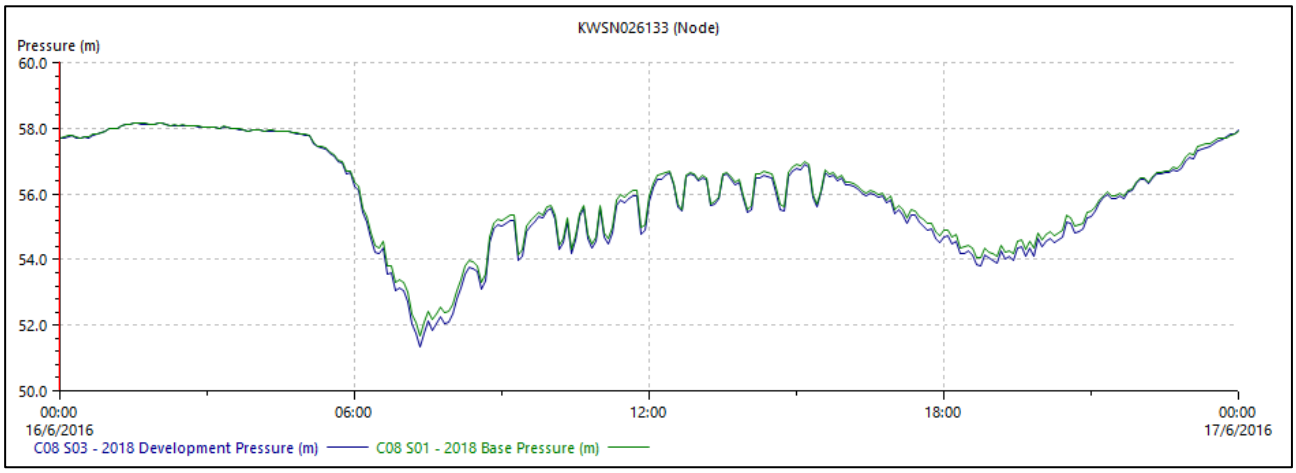

Figure 4-2: Pressure comparison close to point of supply

The available fire flow has been assessed at the onsite hydrants while maintaining a residual pressure of 10m. The fire flow requirement of 25 l/s can be met at all properties supplied by either a single hydrant within 135m or two hydrants within 270m (Figure 4-3). For the connection at Tieko Street, 100mm mains were tested, but do not provide adequate fire flow to meet the requirements of the Fire Code.

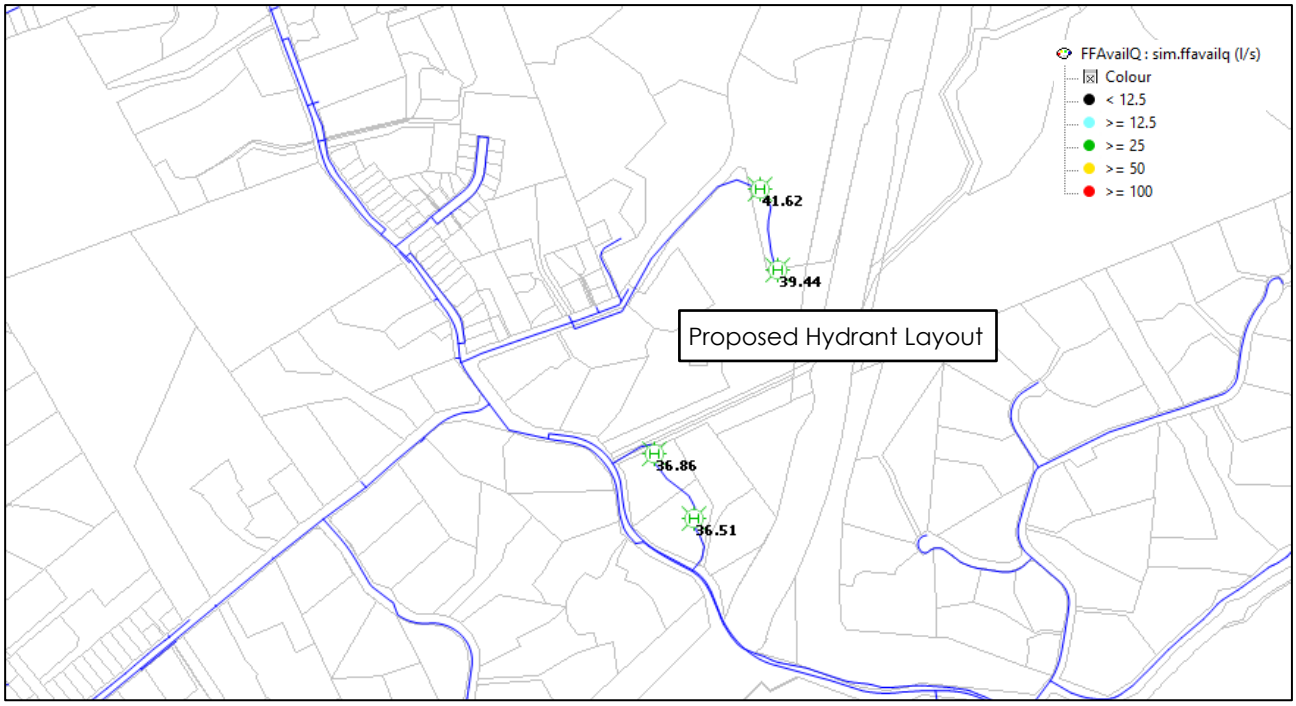

Figure 4-3: Available Fire Flow at hydrants with development (Current Peak Day)

4.2 Future Peak Day Scenario (2047)

In the future peak day scenario 2047, the upgraded network has been used for assessment. Currently, there are no upgrades planned which will have an impact on the proposed development.

The 2047 scenario also includes anticipated growth in Paraparaumu which is expected to grow to a population of 24,096. Although the proposed development forms part of this anticipated growth, for simplicity the Otaihanga Estates development has been modelled in addition to the growth already in the model. This assessment therefore forms a conservative view of the 2047 network.

The addition of the proposed development has negligible impact on the pressures at the existing properties and the minimum pressures on site are expected to remain above the 25m level of service, including properties at higher elevations (Figure 4-4).

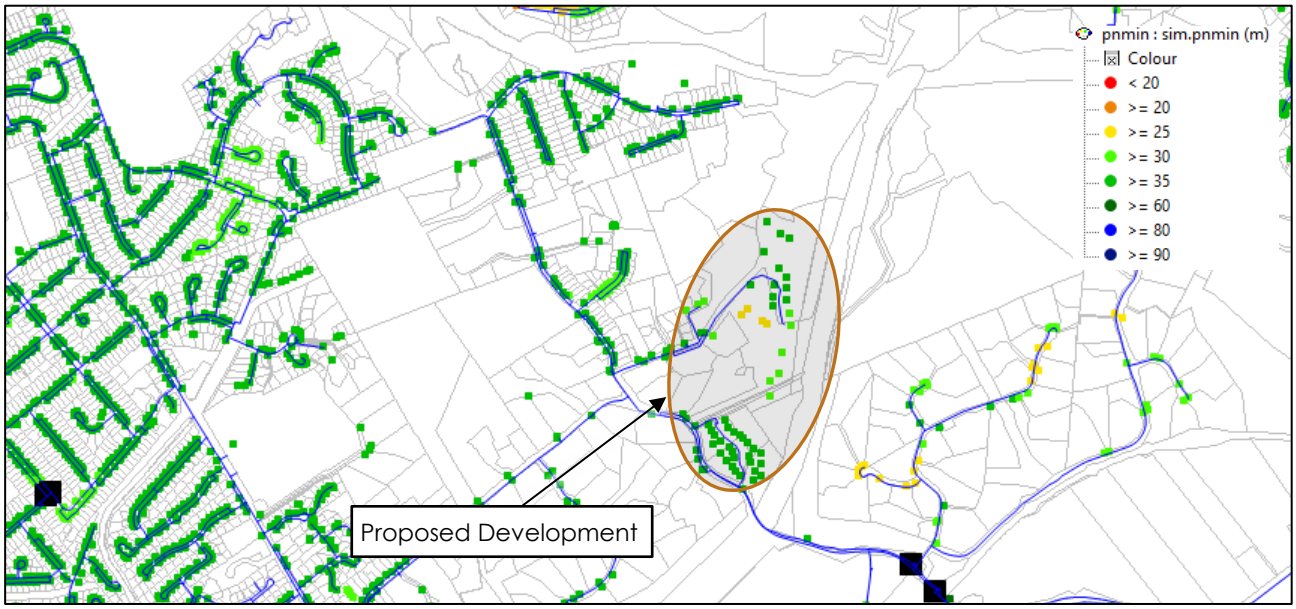

Figure 4-4: Minimum pressures in the WPR network after development (Future Peak Day)

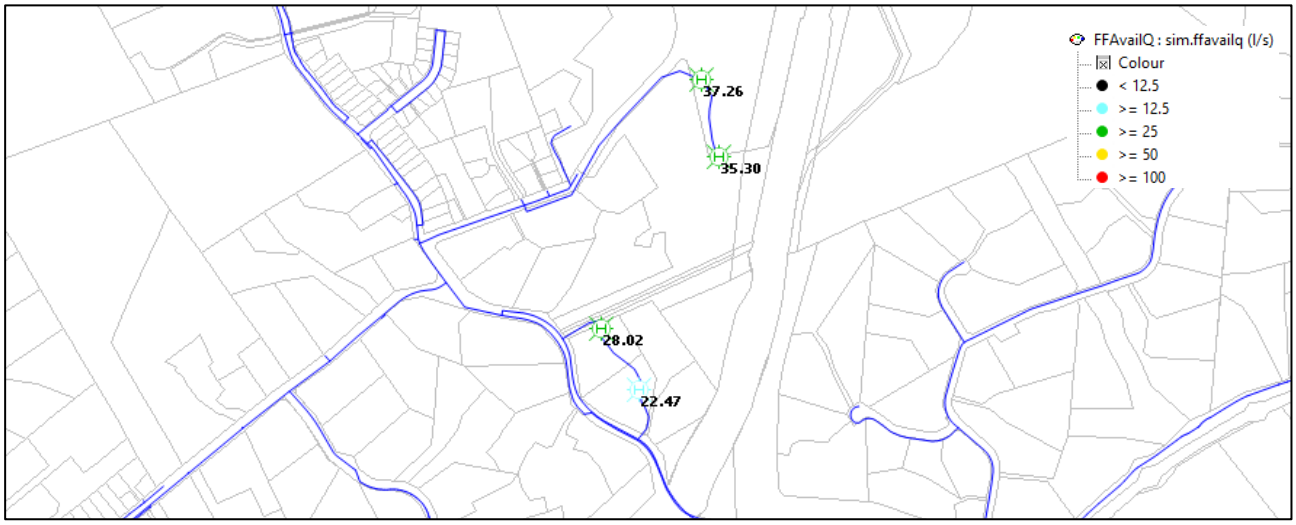

Figure 4-5: Available Fire Flow at hydrants with development (Future Peak Day)

This assessment shows that although the impact of the proposed development on the network is expected to be minor for the current peak day scenario, future development in the network is predicted to reduce pressures approaching the level of service.

This shows that the additional demand from the proposed development together with overall anticipated growth across the network (of which the development is a small part) could result in the need for wider upgrades on the network in the future.

5 Conclusion

A network layout has been proposed for the Otaihanga Estates development, and modelling results suggest that the network will continue to meet the Level of Service for minimum pressure and fire flow.

Assessment in the 2047 scenario show that continued development without network upgrades may result in network performance approaching levels of service.

Upgrades have not been recommended at this stage, however, we recommend a review of upgrades or network changes to ensure this type of development can continue to be implemented.

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APPENDIX C

PRELIMINARY EROSION AND SEDIMENT CONTROL PLAN

Preliminary Erosion & Sediment Control Plan
131-155 Otaihanga Road and 48-58 Tieko Street, Otaihanga

Ref: 22208

29 June 2021

Prepared for:

Mansell Family
131 – 155 Otaihanga Road
Otaihanga

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Ref: Taylor/22208 29 June 2021

OTAIHANGA ESTATES PROPOSED SUBDIVISION AT 131 – 155 OTAIHANGA ROAD AND 48 – 58 TIEKO STREET, OTAIHANGA

This preliminary Erosion & Sediment Control Plan (ESCP) has been prepared in accordance with Greater Wellington Regional Council's (GWRC's) "*Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region*" (ESCG). Implementation of controls in accordance with this ESCP will ensure best practice measures are utilised to manage erosion and sedimentation caused by the proposed bulk earthworks and civil works construction. This document is intended as a preliminary version for consenting purposes and is to be treated as a "living" document as the project progresses.

The objectives of this preliminary ESCP are as follows:

1. Establish construction methodologies to avoid the sedimentation of the four natural inland wetlands identified within the site. The Contractor is to ensure that the measures put in place achieve this primary objective.
2. Ensure the works do not accelerate erosion during both the bulk earthworks and civil works construction, and as a result of the finished earthworks.
3. Where objective 2 is not possible, the effective and efficient treatment of sediment discharges and limiting the extent and duration of any erosion or sediment generation.

This document shall be reviewed and discussed with GWRC and the Contractor prior to the commencement of works. The proposed ESCP control measures are to be monitored during construction for their effectiveness. If construction methodology or soil conditions dictate, they are to be upgraded or modified as required to provide the required level of treatment or additional measures installed. Any changes are to be confirmed with the Engineer and Council before being implemented.

1. PROJECT DESCRIPTION

A detailed Project Description is provided in Section 3 of the AEE accompanying the resource consent applications.

In summary, the proposal involves the subdivision of a 17ha (western) portion of the Mansell Farm into 49 lots: 22 rural lifestyle lots in the northern part of the site, and 27 residential lots adjacent to Otaihanga Road in the south of the site. Access to 19 of the rural lifestyle lots in the north will be via Tieko Street, and the remainder of the rural-lifestyle and residential lots will be accessed via Otaihanga Road.

The proposed subdivision of this area involves earthworks, construction of roads and installation of services.

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1.1. EXISTING SITE

The topography of the site is variable, with a dune type landscape. The height varies from approximately RL 5 to RL 25. A low-lying area to the north of the site is shown to have ponding on the KCDC GIS Flood Hazards Map.

RDCL have completed ground testing and have prepared a geotechnical report for the site. The soil profile has been identified as sandy/silty topsoil (0.25m deep), with loose to dense silty sand up to a depth of 16m. RDCL have indicated that there is little to no risk of liquefaction and that NZS3604:2011 shallow foundations are considered suitable for the building sites.

RDCL also recommend batter slopes of 1V:2H as a maximum for permanent batters.

As revealed by percolation testing, the soil conditions are favourable for natural infiltration, with an average raw soakage rate calculated between 92mm/hr and 462mm/hr.

The existing site includes ecologically significant areas, and in particular, four natural inland wetlands which are shown the plan "22208 ESCP Rev C", attached at **Appendix A**. It is expected that by constructing and stabilising the works in stages and by utilising the natural filtration of the existing sandy soils, surface runoff velocities will be kept to a minimum. As a result, the risk of sedimentation outside of the earthwork areas will be minimal.

In addition, the site has a rich cultural history and has been identified as having a high likelihood of a range of archaeological sites on the property. An authority has been obtained from Pouhere Taonga Heritage New Zealand for the earthworks associated with the subdivision. All works must be completed in accordance with this Authority, including the accidental discovery protocol in the Archaeological Management Plan as well as Appendix A of the Whakarongotai o te moana, Whakarongotai o te wā: Ātiawa ki Whakarongotai Kaitiakitanga Plan, and consideration given to any specific cultural needs identified following consultation with iwi.

1.2. PROPOSED EARTHWORKS

The proposed earthworks footprint is approximately 75,000m² with a total cut volume of approximately 70,000m³ and total fill volume of approximately 54,000m³. The earthworks have been designed to achieve a cut/fill balance, meaning that other than roading materials, no soil will be imported or removed to/from the site. The cut to fill nature of earthworks in sandy soil requires a compaction factor of approx. 30% to be applied to the cut volume. This is because the in-situ material reduces in volume as it is compacted, as reflected in the cut/fill figures.

Cut and fill depths vary across the site, with a maximum cut of approximately 8.2m to form the road adjacent to Lot 5, and a maximum fill of 8.2m to form the building pads and pedestrian and cycle linkage between Lots 20 & 21.

Suitable access points will be established for machinery to enter and exit the site. The anticipated accesses are shown on the plan 22208 ESCP Rev C. These access points are located at the proposed roading access points which have been assessed in the Transportation Assessment prepared for the development. Internal haul roads will be located

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to suit construction methodologies and sequencing, however, shall be clear of the buffer zones, no build areas and four natural inland wetlands.

As above, it is anticipated that a cut to fill balance can be achieved for the site, with unsuitable material to be disposed of within the site, within areas not intended for building sites. This approach will significantly reduce construction traffic and emissions.

Topsoil will be stripped and stockpiled for reuse. The stockpiles are to be sealed off with an excavator bucket or other appropriate technique to minimise silt runoff and be located offline from overflow paths particularly in relation to the four natural inland wetlands and no build areas. Silt fences are to be constructed downhill of the stockpiles.

Cut to fill is likely to involve excavators, dumpers and possibly motor scrapers working within the confines of the site to lower the sand ridges and fill the low areas. Compaction of fill material is generally achieved with loaders, dumpers, and motor scrapers.

The importation of roading material will involve trucks carting suitable roading aggregate from quarries. This material will be placed, spread, and compacted. Preliminary calculations indicate approximately 2,500m³ compacted aggregate material will be imported to site.

Catchment analysis has been completed and is shown on sheet 4 of the plan 22208 ESCP Rev C.

The earthworks have been designed to be completed in one operation but could be developed in two stages. Either way the works will be progressively constructed and stabilised in various stages. Care will be taken to ensure runoff from stabilised areas does not discharge over areas under construction.

2. PRINCIPLES TO MINIMISE EFFECTS

The key principles in this plan for minimising sediment discharges and effects are outlined below. These have been taken from Section A2.0 of the GWRC's (ESCG), with additions based on our experience with similar projects on the Kāpiti Coast.

This approach has been successfully implemented for the earthworks recently completed on other sites on the Greater Wellington Region, including the Kāpiti Coast.

The principles will be as follows:

- Minimise Disturbance – Keep the total earthworks area to a minimum as necessary to achieve the design outcome;
- Stage Construction - Completing the earthworks in stages as appropriate for each stage of the construction methodology;
- Protect Slopes – Protect existing slopes wherever possible and intercept clean water runoff and divert away from exposed slopes;
- Protect Receiving Environment – Identify receiving environments, especially water courses, and limit disturbance in the vicinity. In this case earthworks need to be

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managed in a way to avoid any adverse effects on the four identified natural inland wetlands on site;

- Stabilisation – Progressively stabilise after each earthworks stage;
- Buffer Zones – Utilise silt fences to delineate buffer zones around natural inland wetlands and drain;
- Install Perimeter Controls & Diversions – Control "clean water" to minimise the flow of water across the earthworks site;
- Minimise External Effects - Metalling of construction access tracks;
- Inspections - Regular inspections, audits, and monitoring of ESCP measures;
- Coordination – Working with GWRC, the Contractor & Engineer to ensure best practice approach is applied throughout duration of works, ensuring regular meetings to discuss effectiveness of ESCP measures; and
- Modify the ESCP if Required - In response to experience gained on site.

3. CONTROL METHODS

The measures outlined below, where applicable, will be constructed in accordance with GWRC's ESCG. These measures must be implemented prior to the commencement of other site earthworks as appropriate to the control. The land disturbance area must be clearly identified before the commencement of works.

Not all the measures outlined below will necessarily be implemented for this project but give a guide to the types of measures that me be used if deemed necessary as construction progresses.

3.1. CLEAN WATER DIVERSION CHANNELS AND BUNDS

In critical locations indicated on the plan 22208 ESCP Rev C, such as along the existing drain adjacent to Otaihanga Road, clean water diversion channels and bunds will be constructed around earthwork areas to channel clean water away from disturbed areas.

The bunds shall be a minimum of 2m wide, and the external sides no steeper than 2:1. These are to be constructed using in-situ material and stabilised using existing grass.

The upstream "clean water" catchment has been considered in the selection of this control. The AWA Report entitled *"Otaihanga Road Subdivision (including bulk earthworks and infrastructure) – Flood Hazard Assessment of Effects*" assesses the flood hazard posed from the existing open drain, concluding "*there is no flooding from the open channel adjacent to the site due to the throttling of flow from upstream restricting the volume and peak discharge into the channel*". As such, the upstream catchment is effectively limited by the existing culvert network.

The channels will utilise the natural infiltration of the sandy soils to dispose of runoff into the ground. The raw soakage rate has been calculated between 92mm/hr and 462mm/hr. Given the infiltration rates and limited catchments, pipe-drop structures and flumes are not considered necessary.

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3.2. DIRTY WATER DIVERSION CHANNELS AND BUNDS

At the low points in the land disturbance areas as indicated on the plan 22208 ESCP Rev C, dirty water diversion channels and bunds are to be constructed. The channels will also act as soakage devices to treat the dirty water.

The bunds shall be a minimum of 2m wide, and the external sides no steeper than 2:1. These are to be constructed using in-situ material and stabilised using existing grass.

For each dirty water diversion channel and bund, the catchment has been considered. None of these catchments exceed 5ha. As such, the standard diversion arrangement in Figure 19 of the ESCG shall be used.

As above, the channels will utilise the natural infiltration of the sandy soils to dispose of runoff into the ground. The raw soakage rate has been calculated between 92mm/hr and 462mm/hr. Given the infiltration rates, pipe-drop structures and flumes, and check dams are not considered necessary.

3.3. CONTOUR DRAINS

Given the limited catchment areas and natural infiltration rates, it is unlikely contour drains will be required for day-to-day operations. However, should site conditions dictate, these should be constructed to break up the overland flow draining over disturbed slopes.

The contour drains should be at least 500mm deep, with a compacted bank height of 250mm and width of 2m. The catchment upstream of the contour drain should be less than 0.5ha. The spacing shall be as per Table 5 of the ESCG. Contour drains should be tyre/track rolled to limit sedimentation.

3.4. STABILISED ENTRANCES AND HAUL ROAD

Stabilised entrances shall be constructed at each of the entrance points as shown on the plan 22208 ESCP Rev C. These shall be constructed using 50-150mm washed aggregate, shall be 150mm thick, 10m long and 4m wide (minimums). It is anticipated that earthworks vehicles will work within the confines of the site, so a shaker ramp is not deemed necessary.

Haul roads will be located clear of the buffer zones and four natural inland wetlands. All truck movement areas will be metalled to provide all weather access. The condition of the metal access tracks will be monitored for condition and maintained as required.

Any dirt tracked onto Otaihanga Road or Tieko Street will be swept up daily, and not washed into open drains and the downstream stormwater network.

3.5. SURFACE ROUGHENING

Surface roughening shall be completed on sloping surfaces by tracking horizontal grooves into the bare soil. This method reduces the velocity of water travelling across the exposed soil, increases infiltration, allows for sediment to be captured in the hollows, and enhances the

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establishment of vegetation. The finished platforms are effectively flat which ensures the water velocity is kept to a minimum.

3.6. SILT FENCES

Silt fences will be installed around the works area as detailed on the plan 22208 ESCP Rev C. Particular care will be taken to ensure the silt fences are beyond the 10m buffer of the natural inland wetlands. These will remain in place until the area is fully stabilised.

The toe of silt fences is to be buried and compacted in 100mm wide and 200mm deep trenches. The fence will have waratahs/posts at spacings 2-4m apart to maintain its structure and integrity. Supporting waratahs/posts should be embedded to a minimum depth of 400mm.

Due to the high infiltration rates of the existing soil, it is not anticipated that water will pond regularly behind the silt fences. Returns shall be constructed as per Table 13 of GWRC's ESCG.

3.7. SUPER SILT FENCES

Super silt fences will be installed around the works area as detailed on the plan 22208 ESCP Rev C, to ensure a higher level of protection for the natural inland wetlands. These will remain in place until the area is fully stabilised.

The super silt fence shall be constructed in accordance with Figure 88 of GWRC's ESCG.

Due to the high infiltration rates of the existing soil, it is not anticipated that water will pond regularly behind the super silt fences. Returns shall be constructed as per Table 14 of GWRC's ESCG.

3.8. SEDIMENT RETENTION PONDS

Given the limited catchment areas and natural infiltration rates, sediment retention ponds are not considered necessary for this site.

3.9. PROGRESSIVE CONSTRUCTION OF CONSTRUCTED WETLAND

The constructed wetland is to be constructed from west to east and will help form a natural overflow area for runoff in large events. This constructed wetland has been designed to cater for the post-development runoff from Lots 23-49 and as such will be able to cater for the runoff from the earthworks area in a 1% AEP event during construction.

The clean water cut off bund and silt fence along the southern side of the constructed wetland are to remain in place until the attenuation area has been completed, and the earthworks areas in lots 23-49 have been stabilised. Once this area has been stabilised and the outlet constructed, the clean water bund is to be removed, and the drain realigned into the constructed wetland.

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3.10. DUST CONTROL

Dust control will form a critical component of the ESCP measures to ensure the works do not generate nuisance effects or discharge to the environment. It is anticipated construction will likely be carried out in dry conditions; which, due to the nature of the in-situ sandy material, means there is a high chance of dust. This will be managed through the following controls as deemed necessary:

- Water Sprinkling – utilising a water cart or sprinkler system to ensure the ground remains moist;
- Soil Binders – Form a protective crust to reduce windblown dust generation (not suitable in trafficable areas);
- Progressive Stabilisation (refer Section 4 below);
- Consolidate loose surface material;
- Avoid loading material into trucks in windy conditions;
- Limit Traffic Movements – Establish haul roads and minimise traffic movements when planning works methodology;
- Control Vehicle Speeds – Keep to a minimum to minimise dust generation;
- Maintain Road Surfaces and Entrances – Reduce material tracked onto roads; and
- Geotextiles – Only if the above measures are deemed impractical or inadequate;

3.11. TREATMENT FOR TEMPORARY TOPSOIL STOCKPILES

Topsoil will be stripped and stockpiled at the initial stage of bulk earthworks. This material will then be placed over the open areas following the cut/fill earthworks as part of the stabilisation process. While temporary in nature, it has been identified that these stockpiles need to be managed in a way that avoids any sediment being discharged into the four natural inland wetlands from runoff or from winds. It is noted that the ground conditions are favourable for natural infiltration, which will minimise the velocity and volume of any sediment laden runoff generated from the stockpiles.

GWRC's ESCG outlines the fundamental principles to be applied when preparing and implementing an ESCP. These principles include "Adjust the ESC Plan as needed". This is to ensure best practice management strategies are applied based on the requirements of each specific site, and recognises the need for designers, contractors and regulatory officials to work together and take an adaptive management approach in the plan as site conditions dictate. Due to the evolving nature of earthworks and range of possible methodologies that could be employed by the contractor, it is not possible to predetermine the locations for the topsoil stockpiles at the consenting stage. To ensure the natural inland wetlands are protected from possible sedimentation, the following criteria will be used when selecting locations for these temporary stockpiles (to be incorporated into the final ESCP). Temporary stockpiles must be located:

- Outside the natural inland wetlands and natural inland wetland buffer zones (as shown on Sheet 3 of the Scheme Plans);
- 10m beyond the edge of any drain;
- Offline from natural drainage and overflow paths;

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- Shall not be located within the ponding areas identified by AWA (Figure 12 of the Flood Hazard Assessment of Effects Report; 18 May 2021);
- Avoid ridges and tops of dunes to minimise wind disturbance;
- 10m beyond the dripline of kānuka trees (as shown on Sheet 3 of the Scheme Plans);
- Avoid earthworks exclusion areas (as shown on Sheet 3 of the Scheme Plans);
- Avoid slopes greater than 1:5;
- Avoid roads and other impermeable surfaces;
- Positioned to minimise storage time and truck movements; and
- Located in areas that will remain undisturbed for the longest period of time as construction progresses.

The following management strategies shall also be employed to ensure the natural inland wetlands are protected from possible sedimentation, in addition to the general provisions included in the Preliminary ESCP (included in Appendix C of this Report):

- The stockpiles are to be sealed off to minimise sediment runoff;
- Silt fences are to be constructed downhill of the stockpiles;
- For stockpiles in active use, a stabilised designated access point shall be provided;
- If a stockpile is to be left for longer than a month, it is to be stabilised using grass seeding or hydroseeding, with silt fences to remain in place until an 80% strike is achieved; and
- Silt fences shall be inspected daily to ensure they are operating effectively.

3.12. DECANTING EARTH BUNDS (ADDITIONAL MEASURE IF REQUIRED)

Although it is anticipated that runoff will drain away through the in situ sandy material, Decanting Earth Bunds (DEB's) may be required to capture runoff at critical points such as along the existing drain at Otaihanga Road, especially if peaty subsoil conditions, or conditions less favourable for natural infiltration, are encountered.

If required, the DEB will be sized to 2% of the catchment area and will have a 100mm T-bar decant in accordance with Figure 67 of GWRC's ESCG. This will discharge to the existing drain along Otaihanga Road. It is not anticipated geotechnical design will be required as the base of the bund will be lower than the surrounding ground levels.

Due to the lack of clay content and high natural filtration of the in-situ material, it is not anticipated that coagulant or flocculant treatment will be required.

3.13. SILT SOCKS OR METAL BUNDS (ADDITIONAL MEASURE IF REQUIRED)

Silt socks or metal bunds will be used for stormwater runoff control across the access road if required and as an additional measure in diversion channels to slow water velocity if required. The existing sump in Otaihanga Road shall also be monitored and if required silt socks placed around the sump grate to reduce the chance of sediment entering the stormwater network. If socks are used, they will be removed during truck movement times to avoid damage.

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4. SITE STABILISATION

Progressive stabilisation of the site will be critical as this ensures the site is resistant to erosion as soon as possible. Stabilisation methods are to be constructed in accordance with Section E3 of GWRC's ESCG. This methodology will minimise the extent of exposed earthworks at any one time thus reducing the risk of sedimentation and erosion.

The contractor shall ensure the works are planned to stabilise as much of the site as possible before 31 May, refer Section 6 below. It is noted that additional mulching may be required if an 80% strike is not achieved prior to this date.

4.1. TOPSOILING AND GRASSING

Disturbed areas will be progressively topsoiled and revegetated as the design platform levels are achieved. Vegetated cover of at least 80% of the surface is required before the area is considered stabilised. The grass seed mix is to be 85% drought tolerant, amenity turf ryegrass and 15% red fescue, unless specified otherwise in the contract specifications. Permanent seeding shall be applied at a rate of 200-400kg/ha.

This method is considered most appropriate for this site as once the vegetation cover is established it provides long term erosion control for the disturbed areas. In addition, topsoil protects the subsoil layer and increases the absorption capacity of the soil.

Topsoil stockpiles are to be progressively rolled off to reduce scour. If these stockpiles are to be left for longer than a month, they are to be stabilised using grass seeding or hydroseeding, with silt fences to remain in place until an 80% strike is achieved.

4.2. HYDROSEEDING

Hydroseeding shall be applied if the slope of the finished surface is deemed too steep to achieve a satisfactory strike with conventional hand seeding. In addition, hydroseeding may be applied in areas near the natural inland wetlands (beyond the buffer zones) and existing drain if it is deemed that rapid germination is required to reduce the risk of sediment runoff. Application rates will be confirmed following consultation with a hydroseeding contractor.

4.3. MULCHING

Mulching is to be used to rapidly stabilise the disturbed areas near the natural inland wetlands and existing drain. In addition, any areas to be landscaped are to be topsoiled and mulched in accordance with the specifications of the landscape architect.

4.4. TURFING, GEOTEXTILES AND EROSION CONTROL BLANKETS

It is not anticipated that turfing, geotextiles, and erosion control blankets will be required for this site. Notwithstanding the above, diversion channels should be monitored for scouring to ensure a geotextile lining is not required at the base and inside bank of the channel.

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5. MAINTENANCE, MONITORING & REPORTING

5.1. MAINTENANCE

The following table identifies the maintenance requirements for ESCP controls. Maintenance is based on daily inspections, prediction of wet weather or as a response to effects of wet weather.

Structure	Trigger	Maintenance Action
Haul Road	Dirt on haul road	Clean off and add new metal. Monitor truck movements and ensure trucks stay on metal.
	Become rutted	Clean off, regrade, add extra metal.
Pipes	Debris build up at inlet	Remove debris.
	Scour at inlet	Place rock armour at inlet.
Pipes	Scour at outlet	Place rock armour at outlet.
Silt Fence	Fence flapping in wind	Reattach, increase number of fabric locks, install additional waratahs and wires if necessary.
	Sediment build up straining structure	Remove sediment.
	Bottom of fence not anchored correctly	Reconstruct fence bottom as required to standard detail.
	Under cutting of fence	Identify options to avoid concentrated flow.
DEB	Silt build up > 20%	Remove sediment.
	Scour at exit point	Armour outlet.
	Insufficient capacity	Enlarge or construct additional DEB.
Clean/Dirty Water Channels	Silt build up	Remove silt.
	Washed out	Reform bund to correct profile, install geotechnical lining if necessary.
Metalled access	Dirt on Access and Otaihanga Road or Tieko Street	Clean access and add additional metal. Monitor truck movements and ensure trucks stay on metal. Sweep Otaihanga Road or Tieko Street if dirt is tracked down the road.

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5.2. INSPECTIONS & AUDITS

The Contractor shall inspect the sediment control structures daily and the general measures on a weekly basis. Where any diversion drains or other measures have been temporarily removed to allow construction works to be carried out, they will be reinstated prior to leaving site at the end of the day. The contractor will also inspect the measures immediately prior to and after any predicted wet weather event.

The Engineer to the Contract, or their representative will complete an audit of all ESCP measures on a weekly basis or as required under the GWRC conditions. If at any stage breaches are identified which could potentially impact on the primary objective of this ESCP, all works are to cease until this breach is remedied.

Weekly audits are to be completed by the Engineer or Engineer's Representative and shall include, but not be limited to:

- Date;
- Name of Auditor;
- Site Condition;
- Weather Conditions;
- Condition of sediment control measures;
- Sediment management issues;
- Maintenance required;
- Contractor responsible for maintenance; and
- General comments.

Particular attention shall be given to the controls in the vicinity of the four natural inland wetlands, and existing drain. It is not anticipated that water quality monitoring will be required.

The frequency of these audits may be reduced if agreed in writing with Regional Council.

5.3. FORTNIGHTLY ESCP MEETINGS

The Engineer or Engineer's Representative will hold a fortnightly meeting on site with the Contractor after the audit to discuss ESCP issues and progress. Any matters arising from the audit will be discussed and remedial actions required will be confirmed and actioned. As noted in Section 5.2 above, site inspections and checking of erosion and sediment control measures will be carried out by the Engineer or Engineer's Representative between meetings.

6. HEAVY WEATHER RESPONSE & CONTINGENCIES

Earthworks should be planned to minimise construction through winter if possible, which is when most heavy weather events occur. If works are to continue through the winter (1 June – 1 October), the Contractor shall progressively stabilise the site to ensure the minimum amount of open ground as is practicable with ongoing operations. Due to the sandy properties and high infiltration rates of the in-situ material, it is not anticipated that winter works approval will

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be required to carry out bulk earthworks between 1 June and 1 October. Controls will be monitored in the lead up to this period to confirm they are functioning adequately.

6.1. PREDICTED WET WEATHER

The contractor will be required to monitor the weather daily, and in advance of any wet weather ensure that all ESCP controls are in place and fully operational. Heavy weather is defined as 7mm in 1 hour or 20mm over 24 hours.

If site works are to cease for a period of greater than 24 hours the contractor will take the following measures:

- Inspect all ESCP controls and carry out maintenance if required;
- Ensure diversion bunds and channels are in place as required by each stage;
- Construct contour drains on all exposed slopes;
- Track roll exposed surfaces to seal off and increase roughness; and
- Seal topsoil stockpiles.

6.2. CONTINGENCIES

In the event of natural hazards, extreme climatic events and prolonged dry weather the following contingency actions may need to be undertaken:

Cause	Effect	Contingency Action
Earthquake	Slope failure	Geotechnical engineer to inspect failure and advise remedial action. Provided there are no health and safety risks, construct diversion channel at top of failure & silt fence at the toe of the failure.
	Failure of DEB	Determine extent of loss of sediment, direct water away temporarily, repair and then redirect water back to DEB.
Extreme rainfall event	Failure of DEB	Determine extent of loss of sediment, direct water away temporarily, repair and then, redirect water back to DEB.
	Scour of drains	Repair and line if required.
	Scour of slopes	Redirect water and repair slopes.
	Failure of silt fence	Clean out and repair or replace.
	Slope failure	Construct diversion channel at top of failure & silt fence at the toe of the failure. Geotechnical engineer to inspect failure and advise remedial action.

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Prolonged dry weather	80% grass strike not achieved	Establish watering programme. Use mulch or geofabric to stabilise surfaces.

7. REVIEW & MODIFICATION OF ESCP

Following the issue of Resource Consents, and engagement of a Contractor, this document is to be reviewed with the Engineer to confirm construction methodologies and ESCP control measures. As the construction of the earthworks progresses, additional or modified ESCP control measures may be required to respond to ground conditions or construction methodologies. The Engineer or Engineer's Representative will consult with GWRC and discuss the reasons for these measures and how these are to be implemented.

GWRC approval must be obtained in writing before implementing any amendments to the approved ESCP.

8. SITE RESPONSIBILITIES

The following table sets out site responsibilities:

Name/Company	Position	Responsibilities	Contact Details
Neil Johnstone TBC Cuttriss Consultants Ltd	Chartered Professional Engineer Engineer's Representative	Regular inspections of site to ensure work being undertaken in accordance with design. Fortnightly audit and meeting with contractor. Resolution of any issues. Reporting to GWRC.	04 904 5420 029 200 1657 neil@cuttriss.co.nz
TBC	Contractor	Installation and maintenance of ESCP measures. Daily inspection of structures. Weekly inspection of all measures. Weekly meeting with engineer. Implementation of any actions or remedial works as a result of audit.	TBC
Kevin Jones	Archaeologist	Undertake monitoring of	kenx1000@gmail.com

		the site works in accordance with the Archaeological Management Plan and Pouhere Taonga Heritage New Zealand Authority.	
Richard Mansell	Landowner Contact	As required by conditions of consent.	rmansell@coastlands.co.nz

The Contractor is to comply with this ESCP, and any subsequently approved variations. Failure to do so may result in the Principal being able to claim damages. The Engineer or Engineer's Representative is to inspect the measures to check for compliance and is responsible for reporting back to GWRC as required by the consent.

Following notice of the installation of control measures by the Contractor, and prior to commencement of bulk earthworks, the Engineer or Engineer's Representative is to give GWRC and KCDC 48hours notice of commencement of works, to allow for any required inspections to take place. The Contractor is not to commence works until receiving written certification that the controls outlined in the approved ESCP have been installed, and this certification has been sent to the Manager, GWRC.

9. CONSTRUCTION TIMELINE & METHODOLOGY

The earthworks are scheduled to commence upon receipt of all required consents and following engagement of a Contractor. Specific staging of works will be discussed with the Contractor prior to the commencement of works. It is anticipated that earthworks can be completed in one operation, and that the site can be stabilised prior to June of any given year.

9.1. ANTICIPATED CONSTRUCTION METHODOLOGY

Sequencing of works and timing for construction stages will be discussed with the Contractor prior to the commencement of works and discussed with GWRC prior to "for construction" approval of this ESCP.

The earthworks consist of stripping topsoil and temporarily stockpiling, cut to fill earthworks, and stabilising with topsoil and grassing.

The initial setup works will commence following a hui with iwi to identify any areas of particular significance. The installation of site access and ESCP control measures will then progress, including:

- Install ESCP measures around natural inland wetlands and buffer areas before any ground disturbance takes place;
- Stabilised site entrances;
- Site office and parking hardstand area;
- Silt fences and super silt fences; and

- Clean water diversion drains/bunds.

Once these measures are in place and checked by the Engineer, and any nominated representatives of GWRC and KCDC, the first stage of works will commence.

Earthwork processes recommended to be carried out are as follows:

- Progressively form stabilised haul road to works area;
- Install additional ESCP measures;
- Obtain approval of ESCP measures;
- Strip topsoil and stockpile (location to be determined on site by contractor to suit operations, but clear of natural inland wetland flow path);
- Cut and fill to proposed earthworks platform levels;
- Place topsoil and revegetate as soon as possible following cut/fill operations;
- The Contractor shall visit the site every day during operations and dry or windy days during non-working days to assess the dust nuisance. Where necessary, the Contractor shall arrange to dampen down areas of exposed sand to reduce dust. Where wet suppression by watering is used as a mitigating measure, the consent holder shall not use water from the council water mains. During periods of high winds, it is recommended that the loading of soils should not be undertaken;
- The earthworks shall be undertaken in such a way as to ensure that construction noise shall not exceed the permitted noise limits on the District Plan;
- If waahi tapu or other cultural sites are unearthed during earthworks the contractor and/or owner shall follow the accidental discovery protocols as listed below:
    - Work shall cease immediately within 100 metres of the site of discovery;
    - The contractor and subcontractor(s) must shut down all machinery, isolate and secure the site, and advise the project manager;
    - No materials relating to the artefacts or site shall be removed;
    - The project manager shall promptly advise Ātiawa ki Whakarongotai Charitable Trust;
    - If skeletal remains are uncovered, the project manager will also advise New Zealand Police;
    - An archaeologist approved by Ātiawa ki Whakarongotai Charitable Trust shall be employed at the expense of the land owner to examine and record the site;
    - Ātiawa ki Whakarongotai Charitable Trust will at their discretion contact other iwi groups and organise a site inspection by appropriate tangata whenua advisors and the archaeologist;
    - If as a result of the site inspection and investigation there is a need for an appropriate ceremony, Ātiawa ki Whakarongotai Charitable Trust will arrange such at the land owner's expense;
    - Materials discovered will be handled and removed by the Ātiawa ki Whakarongotai Charitable Trust representatives responsible for the tikanga appropriate to their removal and preservation, or re-interment; and
    - Works affecting the archaeological site shall not resume until Ātiawa ki Whakarongotai Charitable Trust, and the New Zealand Police in the case of skeletal

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remains, have given the appropriate consent, approval or authority for work to continue.

Topsoil will be temporarily stockpiled prior to being respread. Stockpiles will be located by the contractor to best suit their construction methodology but are to be located outside the drainage flow paths of the natural inland wetlands. Silt fences will be placed downhill of the stockpiles which will be sealed off to minimise silt runoff.

10. SPILLS

Machinery shall be stored and refuelled outside the flow paths of the natural inland wetlands. In the event of a spill of fuel, hydraulic fluid, or other potential liquid contaminants, immediate steps shall be taken to contain the spilt contaminant. The spilt contaminant and any material used to contain it shall be removed from the site and disposed of at an authorised landfill. The consent holder shall also immediately notify the Engineer and the appropriate representative of GWRC, confirming the scale and location of the spill, and any actions taken.

11. TEMPORARY REINSTATEMENT

Some measures, such as filter socks and cut off drains across haul roads will be removed during the day while trucks and machinery are accessing the site. If required they will be put back in position at the end of the day as part of the site close up procedure, or prior to a heavy rain event.

12. DECOMISSIONING

Decommissioning of the ESCP control measures will only be undertaken once approval to do so is received from GWRC and/or the Engineer. Decommissioning of ESCP controls will be completed in accordance with the procedures outlined in GWRC's ESCG. Decommissioning will only be permitted after the site, or relevant parts of the site, are fully stabilised and that there is no evidence of sediment leaving the area upstream of the control.

13. COMPLAINTS PROCEEDURE

If any personnel are made aware of a complaint, the matter should be passed on to the Engineer to the Contract or the Engineers Representative (contact details are included within this document). A written record of the complaint shall include (but not be limited to):

- Name and address of complainant (if provided);
- Date and time that the complaint was received;
- Details of the alleged event;
- Weather conditions at the time of complaint; and
- Any measures taken to mitigate/remedy the complaint.

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The matter can then be discussed with the Engineer, Project Manager, Principal, and the complainant. All complaints will be reported to GWRC within 24 hours of receiving the complaint.

Additional control measures can then be implemented, or remedial works undertaken if necessary.

14. CONCLUSION

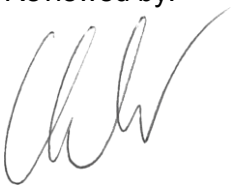
This Erosion and Sediment Control Plan has been prepared in accordance with Greater Wellington Regional Council's "*Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region*" and is intended as a preliminary version for consenting purposes.

The control measures and procedures within this ESCP have been described to demonstrate compliance with the above document. Implementation in accordance with this ESCP will ensure best practice measures are utilised to manage erosion and sedimentation caused by the proposed bulk earthworks and civil works construction.

Prepared by:

Nick Taylor
Director
CUTTRISS CONSULTANTS LTD

Reviewed by:



Chris Barber
Civil Engineer
CUTTRISS CONSULTANTS LTD

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APPENDIX A

EROSION & SEDIMENT CONTROL SITE PLAN

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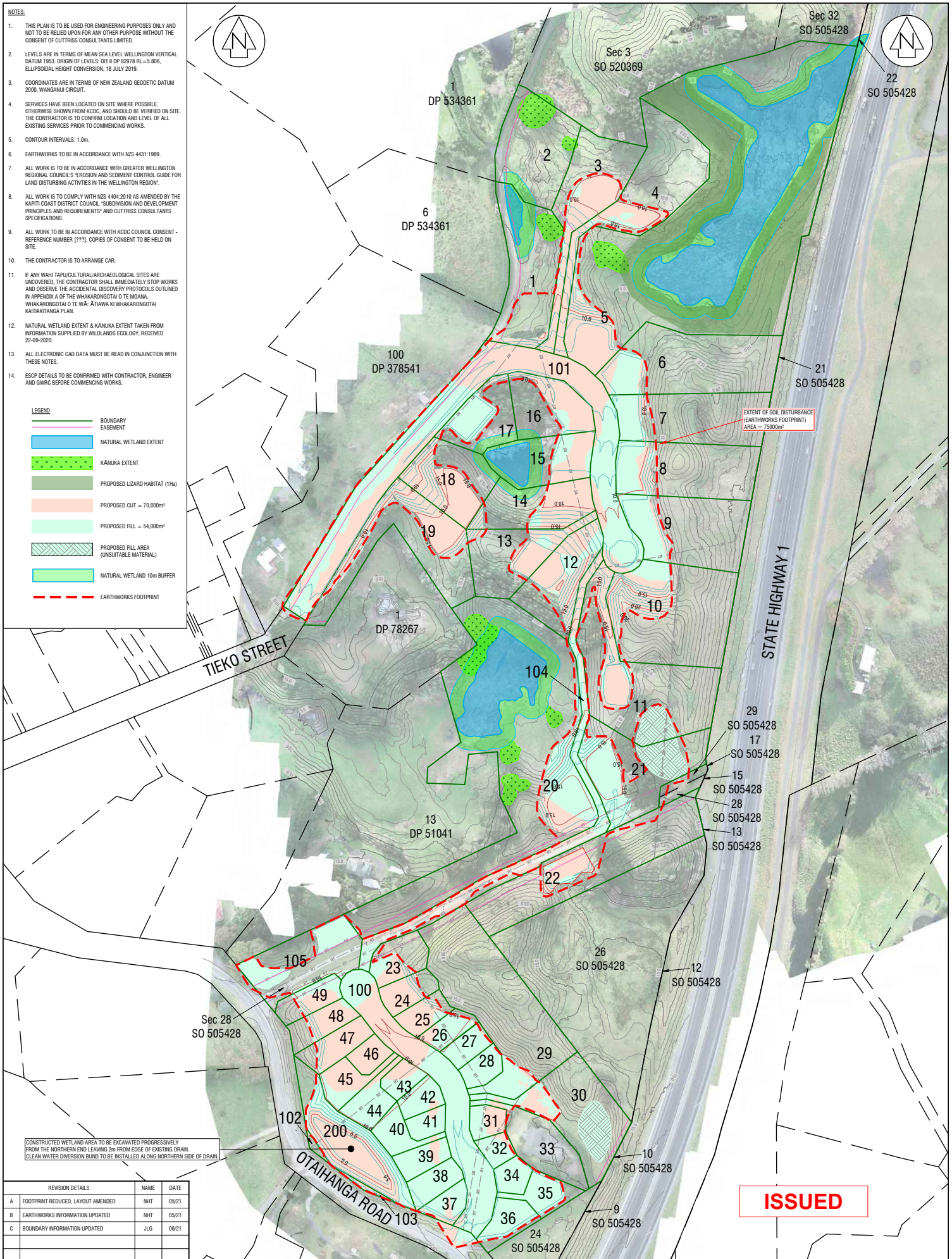

REVISION DETAILS		NAME	DATE
A	FOOTPRINT REDUCED, LAYOUT AMENDED	NHT	05/21
B	EARTHWORKS INFORMATION UPDATED	NHT	05/21
C	BOUNDARY INFORMATION UPDATED	JLG	06/21

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PROJECT
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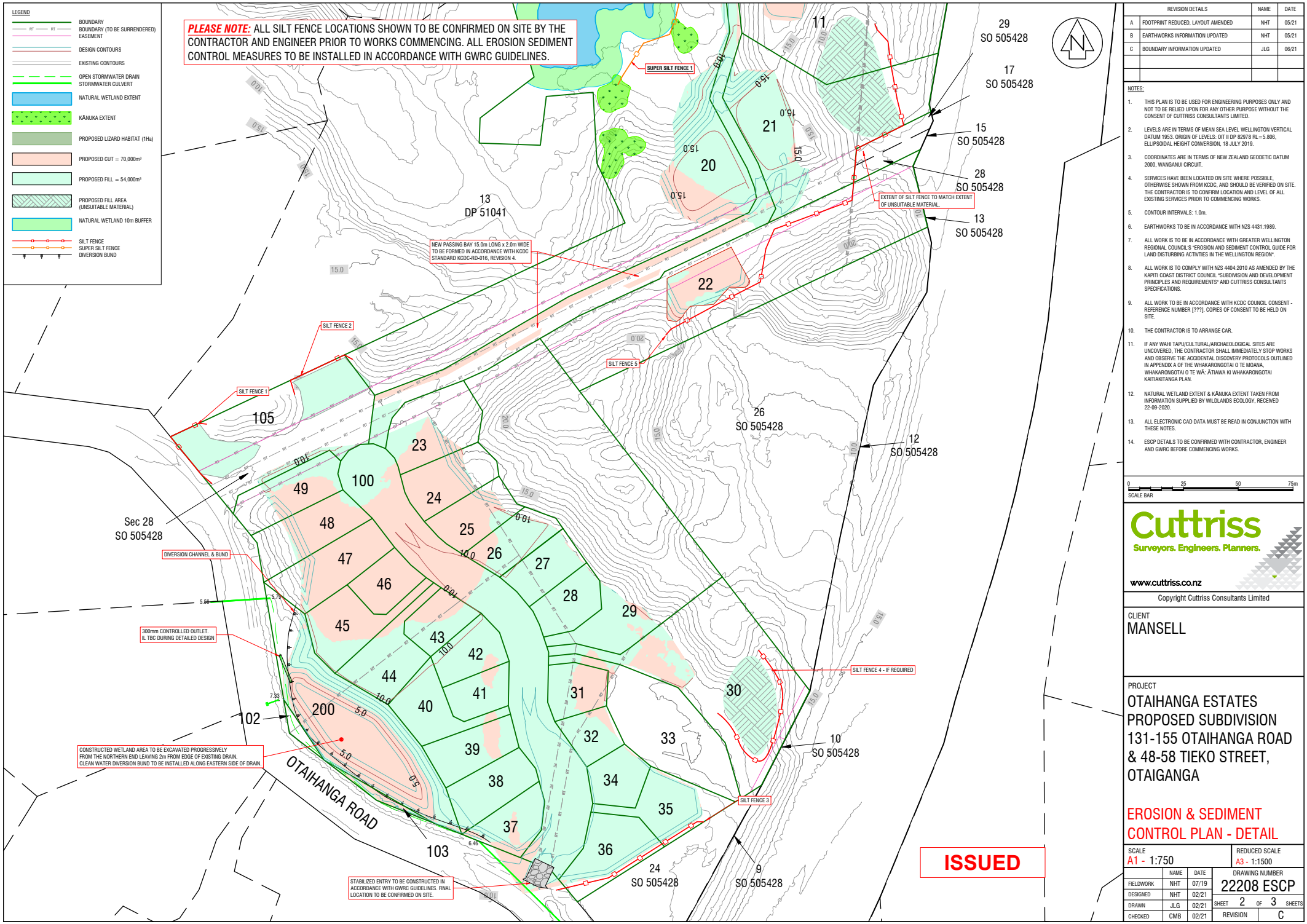
131-155 OTAIHANGA ROAD & 48-58 TIEKO STREET, OTAIHANGA
EROSION & SEDIMENT CONTROL PLAN - OVERVIEW

CLIENT
MANSELL

SCALE	A1 1:1250	REDUCED SCALE A3 - 1:2500	
	NAME	DATE	DRAWING NUMBER
FIELDWORK			22208 ESCP
DESIGNED	NHT	02/21	SHEET 1 OF 4 SHEETS
DRAWN	JLG	02/21	
CHECKED	NHT	02/21	REVISION C



REVISION DETAILS		NAME	DATE
A	FOOTPRINT REDUCED, LAYOUT AMENDED	NHT	05/21
B	EARTHWORKS INFORMATION UPDATED	NHT	05/21
C	BOUNDARY INFORMATION UPDATED	JLG	06/21

NOTES:

1. THIS PLAN IS TO BE USED FOR ENGINEERING PURPOSES ONLY AND NOT TO BE RELIED UPON FOR ANY OTHER PURPOSE WITHOUT THE CONSENT OF CUTTRISS CONSULTANTS LIMITED.
2. LEVELS ARE IN TERMS OF MEAN SEA LEVEL WELLINGTON VERTICAL DATUM 1953. ORIGIN OF LEVELS: OIT II DP 82978 RL = 5.806, ELLIPSOIDAL HEIGHT CONVERSION, 18 JULY 2019.
3. COORDINATES ARE IN TERMS OF NEW ZEALAND GEODETIC DATUM 2000, WANGANUI CIRCUIT.
4. SERVICES HAVE BEEN LOCATED ON SITE WHERE POSSIBLE, OTHERWISE SHOWN FROM KCDC, AND SHOULD BE VERIFIED ON SITE. THE CONTRACTOR IS TO CONFIRM LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO COMMENCING WORKS.
5. CONTOUR INTERVALS: 1.0m.
6. EARTHWORKS TO BE IN ACCORDANCE WITH NZS 4431:1989.
7. ALL WORK IS TO BE IN ACCORDANCE WITH GREATER WELLINGTON REGIONAL COUNCIL'S "EROSION AND SEDIMENT CONTROL GUIDE FOR LAND DISTURBING ACTIVITIES IN THE WELLINGTON REGION".
8. ALL WORK IS TO COMPLY WITH NZS 4404:2010 AS AMENDED BY THE KAPITI COAST DISTRICT COUNCIL "SUBDIVISION AND DEVELOPMENT PRINCIPLES AND REQUIREMENTS" AND CUTTRISS CONSULTANTS SPECIFICATIONS.
9. ALL WORK TO BE IN ACCORDANCE WITH KCDC COUNCIL CONSENT - REFERENCE NUMBER [???]. COPIES OF CONSENT TO BE HELD ON SITE.
10. THE CONTRACTOR IS TO ARRANGE CAR.
11. IF ANY WAHI TAPU/CULTURAL/ARCHAEOLOGICAL SITES ARE UNCOVERED, THE CONTRACTOR SHALL IMMEDIATELY STOP WORKS AND OBSERVE THE ACCIDENTAL DISCOVERY PROTOCOLS OUTLINED IN APPENDIX A OF THE WHAKARONGOTAI O TE MOANA, WHAKARONGOTAI O TE WĀ: ĀTIAWA KI WHAKARONGOTAI KAITIAKITANGA PLAN.
12. NATURAL WETLAND EXTENT & KĀNUKA EXTENT TAKEN FROM INFORMATION SUPPLIED BY WILDLANDS ECOLOGY, RECEIVED 22-09-2020.
13. ALL ELECTRONIC CAD DATA MUST BE READ IN CONJUNCTION WITH THESE NOTES.
14. ESCP DETAILS TO BE CONFIRMED WITH CONTRACTOR, ENGINEER AND GWRC BEFORE COMMENCING WORKS.

0 25 50 75m
SCALE BAR

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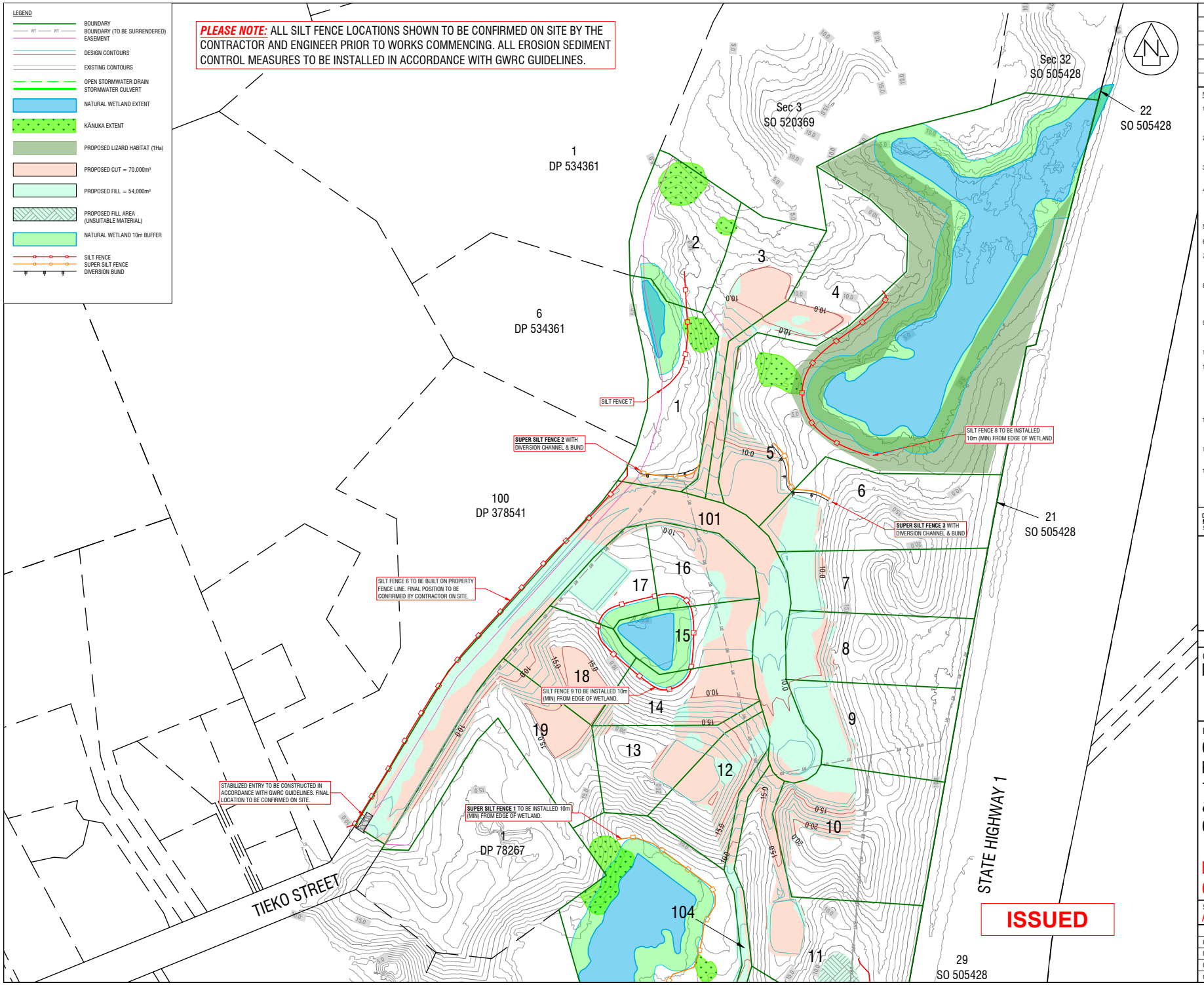
& 48-58 TIEKO STREET,
OTAIGANGA

EROSION & SEDIMENT CONTROL PLAN - DETAIL

SCALE	REDUCED SCALE
A1 - 1:750	A3 - 1:1500

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	02/21
DRAWN	JLG	02/21
CHECKED	CMB	02/21

DRAWING NUMBER 22208 ESCP
SHEET 2 OF 3 SHEETS
REVISION C



REVISION DETAILS		NAME	DATE
A	FOOTPRINT REDUCED, LAYOUT AMENDED	NHT	05/21
B	EARTHWORKS INFORMATION UPDATED	NHT	05/21
C	BOUNDARY INFORMATION UPDATED	JLG	06/21

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14. ESCP DETAILS TO BE CONFIRMED WITH CONTRACTOR, ENGINEER AND GWRC BEFORE COMMENCING WORKS.

0 20 40 60 80 100m
SCALE BAR

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EROSION & SEDIMENT CONTROL PLAN - DETAIL

SCALE	REDUCED SCALE
A1 - 1:1000	A3 - 1:2000

	NAME	DATE
FIELDWORK	NHT	07/19
DESIGNED	NHT	02/21
DRAWN	JLG	02/21
CHECKED	CMB	02/21

DRAWING NUMBER 22208 ESCP
SHEET 3 OF 3 SHEETS
REVISION C

NOTES:

1. THIS PLAN IS TO BE USED FOR ENGINEERING PURPOSES ONLY AND NOT TO BE RELIED UPON FOR ANY OTHER PURPOSE WITHOUT THE CONSENT OF CUTTRISS CONSULTANTS LIMITED.
2. LEVELS ARE IN TERMS OF MEAN SEA LEVEL WELLINGTON VERTICAL DATUM 1953. ORIGIN OF LEVELS: OIT II DP 82978 RL=5.806, ELLIPSOIDAL HEIGHT CONVERSION, 18 JULY 2019.
3. COORDINATES ARE IN TERMS OF NEW ZEALAND GEODETIC DATUM 2000, WANGANUI CIRCUIT.
4. SERVICES HAVE BEEN LOCATED ON SITE WHERE POSSIBLE. OTHERWISE SHOWN FROM KCDC, AND SHOULD BE VERIFIED ON SITE. THE CONTRACTOR IS TO CONFIRM LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO COMMENCING WORKS.
5. CONTOUR INTERVALS: 1.0m.
6. EARTHWORKS TO BE IN ACCORDANCE WITH NZS 4431:1989.
7. ALL WORK IS TO BE IN ACCORDANCE WITH GREATER WELLINGTON REGIONAL COUNCIL'S "EROSION AND SEDIMENT CONTROL GUIDE FOR LAND DISTURBING ACTIVTIES IN THE WELLINGTON REGION".
8. ALL WORK IS TO COMPLY WITH NZS 4404:2010 AS AMENDED BY THE KAPITI COAST DISTRICT COUNCIL "SUBDIVISION AND DEVELOPMENT PRINCIPLES AND REQUIREMENTS" AND CUTTRISS CONSULTANTS SPECIFICATIONS.
9. ALL WORK TO BE IN ACCORDANCE WITH KCDC COUNCIL CONSENT - REFERENCE NUMBER [???]. COPIES OF CONSENT TO BE HELD ON SITE.
10. THE CONTRACTOR IS TO ARRANGE CAR.
11. IF ANY WAHI TAPU/CULTURAL/ARCHAEOLOGICAL SITES ARE UNCOVERED, THE CONTRACTOR SHALL IMMEDIATELY STOP WORKS AND OBSERVE THE ACCIDENTAL DISCOVERY PROTOCOLS OUTLINED IN APPENDIX A OF THE WHAKARONGOTAI O TE MOANA, WHAKARONGOTAI O TE WĀ: ĀTIAWA KI WHAKARONGOTAI KAITIAKITANGA PLAN.
12. NATURAL WETLAND EXTENT & KĀNUKA EXTENT TAKEN FROM INFORMATION SUPPLIED BY WILDLANDS ECOLOGY, RECEIVED 22-09-2020.
13. ALL ELECTRONIC CAD DATA MUST BE READ IN CONJUNCTION WITH THESE NOTES.
14. ESCP DETAILS TO BE CONFIRMED WITH CONTRACTOR, ENGINEER AND GWRC BEFORE COMMENCING WORKS.

LEGEND

- BOUNDARY
- EASEMENT
- PROPOSED CUT = 70,000m³
- PROPOSED FILL = 54,000m³
- PROPOSED FILL AREA (UNSUITABLE MATERIAL)
- CATCHMENT AREAS

CATCHMENT AREA A AREA = 42900m²
CATCHMENT AREA B AREA = 9000m²
CATCHMENT AREA C AREA = 12500m²
CATCHMENT AREA D AREA = 13600m²
CATCHMENT AREA E AREA = 31300m²

TIEKO STREET
STATE HIGHWAY 1
OTAIHANGA ROAD

REVISION DETAILS		NAME	DATE
A	FOOTPRINT REDUCED, LAYOUT AMENDED	NHT	05/21
B	EARTHWORKS INFORMATION UPDATED	NHT	05/21
C	BOUNDARY INFORMATION UPDATED	JLG	06/21

ISSUED

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PROJECT
OTAIHANGA ESTATES - PROPOSED SUBDIVISION
131-155 OTAIHANGA ROAD & 48-58 TIEKO STREET, OTAIHANGA
EROSION & SEDIMENT CONTROL PLAN - CATCHMENTS

CLIENT
MANSELL

SCALE A1 1:1250
REDUCED SCALE A3 - 1:2500

	NAME	DATE
FIELDWORK		
DESIGNED	NHT	02/21
DRAWN	JLG	02/21
CHECKED	NHT	02/21

DRAWING NUMBER 22208 ESCP
SHEET 4 OF 4 SHEETS
REVISION C

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APPENDIX D

KAPITI COAST DISTRICT COUNCIL PRELIMINARY SEWER MODELLING REPORT

KAPITI COAST DISTRICT COUNCIL

Paraparaumu Wastewater Modelling
Otaihanga Road Development Impact Assessment

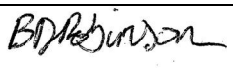
October 2017 – DRAFT

QUALITY SECTION

Author

Name	Title	Organisation	Signature
Rebecca Ellmers	Civil Engineer	Hydraulic Analysis Ltd	

Reviewed

Name	Title	Organisation	Signature
Brian Robinson	Director	Hydraulic Analysis Ltd	

Revision History

Revision	Publication Date
Draft	26 October 2017
Final	

CONTENTS

1. INTRODUCTION

1.1. OBJECTIVE

The objective of this study is to utilise the existing hydraulic model (Watershed updated model, 2016) of the Paraparaumu wastewater network to assess the impact of the proposed Otaihanga Road development on the network. Two future growth scenarios have been considered: a 2013 growth scenario and a 2061 growth scenario

1.2. BACKGROUND

Paraparaumu is the largest township in the Kapiti region with a population of 26,800 (2013 census), including the settlements of Paraparaumu Beach, Raumati, Raumati Beach and Otaihanga. The Paraparaumu wastewater catchment which covers these settlements is predominantly located on coastal dunes, with relatively flat topography, with the exception of the area to the east of SH1 which lies on the lower foothills of the Tararua's.

The bulk of the wastewater network servicing the Paraparaumu catchment was laid in 1980, and incorporates 98 sewage pumping stations, many of which serve only a handful of properties. All wastewater flows are conveyed to the Paraparaumu Wastewater Treatment Plant (WWTP), located to the North-east of the town, via one of four major pumping stations located at the downstream end of the catchment.

Moderate development and growth is expected in Paraparaumu over the next 30 years, with KCDC's latest 'medium growth scenario' estimates showing a projected population of the Paraparaumu catchment of 29,600 in 2046.

The proposed 33 lot residential at xxxxx Otaihanga Road development is located to the north of the Paraparumu wastewater network, in the Otaihanga Catchment. It should be noted that the site is outside the area currently serviced by KCDC's wastewater network, and hence would require an extension to the network to enable this development to be connected. This would need to be approved by KCDC, but this assessment considers the impact of this development if a connection was approved. Due to the location and elevation of the site, it is proposed the development is connected via a new pump station and rising main to the Otaihanga Pump Station (PSP00006), which pumps to the Ratanui pump station (PSP00004) upstream network, which in turn pumps to the Paraparaumu WWTP.

2. SCOPE

The following tasks have undertaken as part of this assessment:

- Calculation of design flows for the Otaihanga Road development
- Assessment of Otaihanga Road development impact on the existign network for an existing and future development scenario

Each of these tasks is discussed in more detail in the following sections.

3. OTAIHANGA ROAD DESIGN FLOWS

3.1. OVERVIEW

The Otaihanga Road proposal seeks to develop three existing vacant sites at at xxxxx Otaihanga Road into 33 single residential house sites, as shown in Figure 3-1 below.

FIGURE 3-1 OTAIHANGA ROAD SUBDIVISION LAYOUT STAGE 1

The site is outside the area currently serviced by KCDC's wastewater network, and hence would require an extension to the network to enable this development to be connected.

Due to the elevation of the site, it is proposed the development is connected via a new pump station and rising main to the existing gravity network close to the intersection of Otaihanga Road and Ratanui Road, as shown in Figure 3-2 below.

The connecting network flows north via gravity to Otaihanga pump station (PSP00006) which pumps up to a short section of gravity sewer to Ratanui pump station (PSP00004) which in turn pumps to Paraparaumu WWTP for treatment.

3.2. OTAIHANGA ROAD DESIGN FLOWS

Following the KCDC 'Subdivision and Development – Principles and Requirements' code the design flow calculations as shown below in Table 3-1 have been used for this assessment.

TABLE 3-1: OTAIHANGA ROAD DESIGN FLOWS

Number of Units	33
Type of Units	Standard Dwellings
Occupancy	@ 2.5 EP/dwelling
ADWF (l/p/day)	225
ADWF (l/s)	0.21
DWF Peaking Factor	2.5
PDWF (l/s)	0.537
WWF Peaking Factor	5
PWWF (l/s)	1.07

4. OTAIHANGA ROAD DEVELOPMENT IMPACT

4.1. POST-DEVELOPMENT SCENARIO

The Paraparaumu wastewater model (updated in September 2017) was run under both the existing (2013) and future (2046) scenarios (with an additional peak wet weather flow of 1.07 l/s from the proposed Otaihanga Road development added) for a series of 24 hour nested design storms ranging from a 2 year ARI to 10 year ARI to assess how the local network performs in storms of this magnitude. No overflows were predicted from the

wastewater netowrk in this area for any of these events. The standard design storm at 5 year ARI has been used as the level of service for this assessment.

The long-sections in and below show the capacity in the local 150mm/225mm network running north along Otaihanga Road from the proposed rising main connection point to PSP00006. In both the existing and future scenarios, the local network line has sufficient capacity for the additional flows resulting from the proposed Otaihanga Rd development.

FIGURE 4-1 OTAIHANGA FLOWS (2013) LONG SECTION – 5 YEAR ARI DESIGN STORM

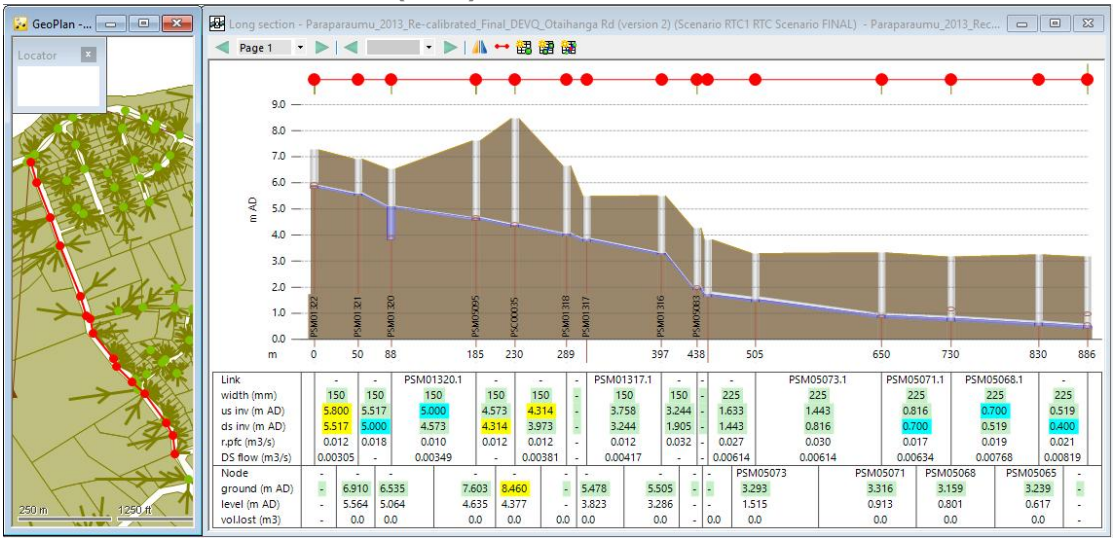
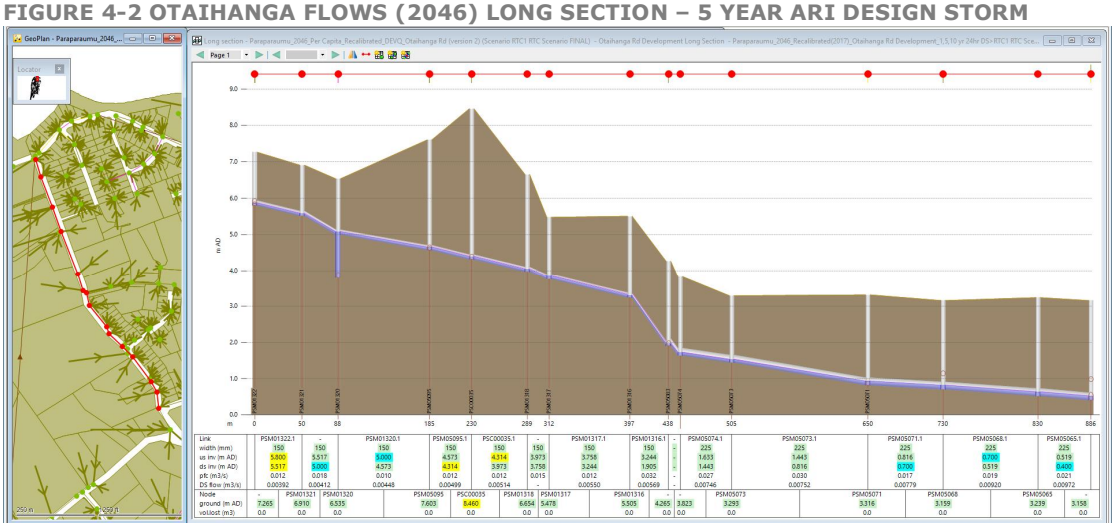


FIGURE 4-2 OTAIHANGA FLOWS (2046) LONG SECTION – 5 YEAR ARI DESIGN STORM



4.2. **PUMP STATION ASSESSMENT**

The local network flows north via gravity to Otaihanga pump station (PSP00006) which has a modelled capacity of 31 l/s (based on KCDC records). With a modelled peak inflow of 23 l/s in the 5 year design storm for the existing scenario, including flows from this development (increasing to 25 l/s for the future development scenario), this pump station has ample capacity to receive the additional Otaihanga Road development flows without any upgrade required.

From the Otaihanga pump station, flows are pumped up to a short section of gravity sewer which flows to Ratanui pump station (PSP00004) which has a modelled capacity of 35 l/s. With a modelled peak inflow of 35 l/s in the 5 year design storm for the existing scenario, (including flows from this development), this pump station also has sufficient capacity to receive the additional Otaihanga Road development flows without any upgrade required.

5. MODEL ASSUMPTIONS AND LIMITATIONS

The following assumptions should be read in conjunction with the following reports.

- Aurecon's report 'Paraparaumu Wastewater System – Model Build and Calibration Report, June 2009)
- Watershed's Model Update Report (2016).
- Watershed's Model Recalibration and System Performance Report (2017)

The following limitations apply to the modelling undertaken as part of these studies:

- The model has been verified (and recalibrated) against flows developed from KCDC pump station SCADA data, and as such has an inherent limitation to the degree of accuracy able to be achieved.
- The distribution of the modelled population is an approximation based on the population increase between the 2006 and 2013 census. No allowance has been made for additional growth since 2013 which is considered to be minor.
- Future growth has been distributed within the currently modelled extent, based on KCDC's projections at an area unit level. It is unlikely to accurately represent specific locations of large future developments, which will need to be considered on a case by case basis.
- Flows from new development have been applied at the same rate as existing flows in the adjoining areas.
- No allowance has been made for future increased inflow/infiltration in existing areas due to deterioration of existing sewers.
- Pump station model parameters are based on information provided by KCDC operations, and its accuracy has not been validated as part of these studies.

6. CONCLUSION

The objective of this study was to utilise the existing hydraulic model of the Paraparaumu wastewater network to assess the impact of the proposed Otaihanga Road 33 lot residential development.

It should be noted that the site is outside the area currently serviced by KCDC's wastewater network, and hence would require an extension to the network to enable this development to be connected which would need to be approved by KCDC.

The model was run under both the 2013 and 2046 scenarios (with additional flows from the proposed development) for a series of 24 hour nested design storms ranging from a 2 year ARI to 10 year ARI to assess how the local network performs in storms of this magnitude. The standard design storm at 5 year ARI was used as the level of service for this assessment.

The local 150mm/225mm network running north along Otaihanga Road from the proposed development connection point to Otaihanga pump station (PSP00006) was shown to have sufficient capacity for the additional peak wet weather flow of 1.07 l/s resulting from the proposed development in both the existing and future development scenarios.

An assessment of the local network pump station capacity showed both Otaihanga pump station (PSP00006) at 31 l/s and Ratanui pump station (PSP0004) at 35 l/s (and associated rising/gravity mains) have sufficient capacity to receive the additional Otaihanga Road development flows without any upgrades required.

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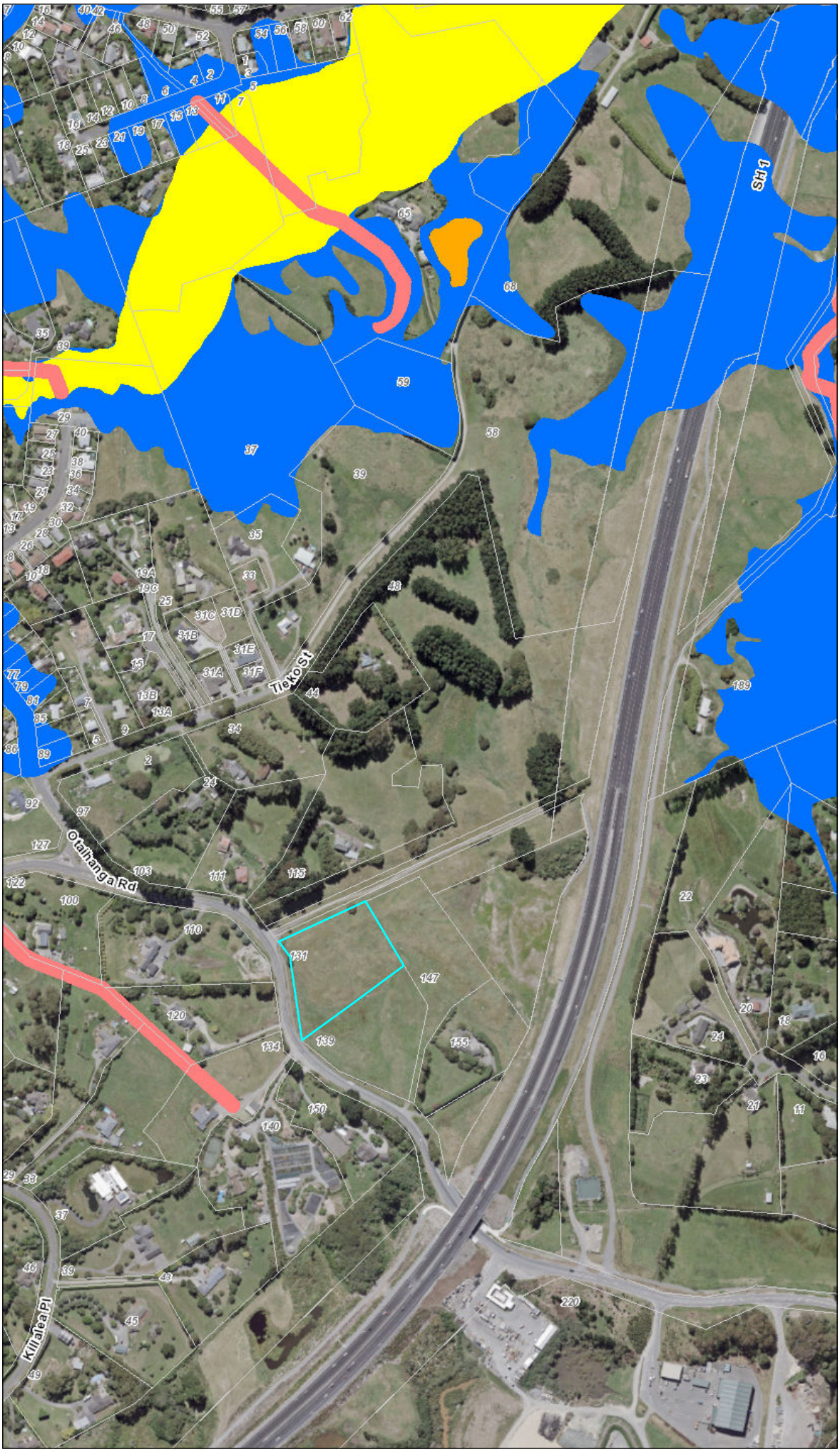
APPENDIX E

KAPITI COAST DISTRICT COUNCIL GIS FLOOD HAZARD

Date Printed: November 28, 2019

Otaihanga Road, Otaihanga

NORTH



Legend

- District Boundary
- River Corridor
- Stream Corridor
- Overflow Path
- Residual Overflow
- Fill Control
- Storage
- Ponding
- Residual Ponding
- Shallow Surface Flow

Scale @ A3 - 1:4,000

0 45 90 180 Metres

Kāpiti Coast DISTRICT COUNCIL

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APPENDIX F

KAPITI COAST DISTRICT COUNCIL GIS RECORDS

Date Printed: November 27, 2019

Otaihanga Road, Otaihanga

NORTH

Legend

- District Boundary

WS

- Valve
- Hydrant
- Bulk
- Fitting
- Pump
- Tank

WS

- Service
- Fire
- Rider
- Reticulation Main
- Trunk
- Other
- Ws Plant - Polygon

WS Node Private

- Valve
- Hydrant
- Bulk
- Fitting
- Pump
- Tank

WS Pipe

- Service
- Fire
- Rider
- Reticulation Main
- Trunk
- Other
- Ws Plant Private

SW

- Other
- Sump
- Soakpit
- Valve
- Pump
- Inlet/Outlet
- Service

SW

- Other
- Gravity
- Rising
- Soak

SW

- Culvert
- Open
- Stream

SW

- Other
- Pond
- Soakage
- Pump

Private SW

- Other
- Sump
- Well-up
- Soakpit
- Valve
- Pump
- Inlet/Outlet
- Private SW Service
- Private SW Pipe

Private SW Polygon

- Other
- Pond
- Soakage
- Pump

Scale @ A3 - 1:2,000

0 25 50 100 Metres

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APPENDIX G

WATER NEW ZEALAND ”PRESSURE SEWER SELECTION” CALCULATIONS

Current

Select client:
Otaihanga Estates

Instructions:
1. Select client from drop-down list on the left
2. Make sure all answer fields are blank before starting
3. Start answering from the top. If unsure or question does not apply, simply skip
   Some questions are mutually exclusive and will automatically indicate that they should be skipped (make sure answer field is clear before continuing)

Lower score is better.

System	Score
Gravity sewer	355
Pressure sewer	280
Vacuum sewer	315

Question			Answer
ID	Category	Description	Yes / No
1	Construction and design	Does the proposed asset owner have experience with pressure systems?	No
2	Construction and design	Does the proposed asset owner have experience with vacuum systems?	No
3	General	Can the development be serviced by a gravity sewer with pipes no deeper than 4m and connect to an existing gravity manhole?	no
4	General	Same as above, but with just one pump/lift station?	Yes
5	General	~~Same as above, but with just two pump/lift stations?~~ Skip	~~Yes~~
6	General	~~Same as above, but with less than one pump/lift station every 500 (?) houses?~~ Skip	
7	General	~~Was the previous answer "No"?~~ Skip	
8	Geotech	Is there a high water table?	Yes
9	Geotech	Are there rocky soils or poor ground condition?	yes
10	Topography	Is terrain topography steep and flow generally downhill to existing sewer network?	No
11	Topography	Is terrain topography steep and flow generally uphill to existing sewer network?	no
12	Topography	Is terrain topography steep and undulating?	no
13	Topography	Is terrain topography moderate and flow generally downhill to existing sewer network?	no
14	Topography	Is terrain topography moderate and flow generally uphill to existing sewer network?	no
15	Topography	Is terrain topography moderate and undulating?	yes
16	Topography	~~Is terrain topography mild/flat?~~ Skip	
17	Topography	~~Is terrain topography mild/flat and undulating?~~ Skip	
18	Topography	Is the road reserve generally at a higher elevation than the properties?	Yes
19	Development	Is this project at an area currently served by septic tanks?	Yes
20	Development	~~Is this a bronwfield project?~~ Skip	
21	Development	Is development large (> 2000 properties)?	No
22	Development	Is development medium sized (500 - 2000 properties)?	No
23	Development	Is development small sized (150 - 500 properties)?	no
24	Development	Is development minor (< 150 properties)?	yes
25	Development	Is development area elongated/extended?	Yes
26	Development	~~Is development area compact/centered?~~ Skip	~~yes~~
27	Population density	Is development density high (> 15 properties/ha)?	No
28	Population density	Is development density medium (4 - 15 properties/ha)?	No
29	Population density	Is development density low (< 4 properties/ha)?	Yes
30	Risks and safety	If a Safety in Design (SiD) risk register been performed: Does the gravity sewer system have significant risks above the other systems?	Yes
31	Risks and	~~Does the pressure sewer system have significant risks above the other systems?~~ Skip	
32	Risks and	~~Does the vacuum sewer system have significant risks above the other systems?~~ Skip	
33	Risks and	Are power outages above 6 hours anticipated?	No
34	Risks and	Is terrain prone to flooding or other sources of high inflow and infiltration?	No
35	Risks and	Is the area prone to earthquakes?	Yes
36	Risks and	Is there a possibility of liquefaction during an earthquake?	Yes
37	Risks and safety	Is there a special restriction (stricter than normal) to environmental contamination from damaged pipes and/or overflows?	Yes
38	Construction and design	Is construction time importantly restricted? (shorter than average times for construction of a gravity system)	no
39	Construction and design	Will there be future expansion of the system? Will system be operating in different stages? Is catchment subject to seasonal flows? (e.g. mainly vacation homes) Are expected flows lower than average? (e.g. areas with restricted water supply) Answer "Yes" if any of the above applies.	yes
40	Construction and design	Is there limited availability of specialised contractors? (question aimed at vacuum and pressure sewers)	yes
41	Infrastructure	Is capacity of downstream infrastructure (pump stations or treatment plants) close to its limit (currently or with expected flows)?	No
42	Infrastructure	Is the proposed system adjacent to an existing gravity sewer network?	No
43	Infrastructure	Is the proposed system adjacent to an existing pressure sewer network?	no
44	Infrastructure	Is the new system going to be connected to a downstream existing vacuum sewer network?	No
45	Infrastructure	Was the previous answer "No"?	Yes
46	Infrastructure	If pressure system is a viable option, would the water agency take ownership and O&M responsibilities of infrastructure on private properties?	Yes
47	Infrastructure	~~If pressure system is a viable option, would the customers take ownership and O&M responsibilities of infrastructure on their properties?~~ Skip	~~No~~
48	Costs	If a NPV analysis has been undertaken: Does the gravity sewer system offer the lowest NPV?	Yes
49	Costs	~~Does the pressure sewer system offer the lowest NPV?~~ Skip	
50	Costs	~~Does the vacuum sewer system offer the lowest NPV?~~ Skip	
51	Costs	Average Annual Cost (Totex over the full life of asset, concrete 100 years- PVC 50 years)	Yes

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APPENDIX H

PERCOLATION TEST LOCATIONS

AMENDMENT		NAME	DATE
A	BOUNDARIES UPDATED	NHT	06/21

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JOB

PROPOSED SUBDIVISION
OTAIHANGA ROAD, OTAIHANGA
SOAKAGE TEST LOCALITY PLAN

CLIENT

MANSELL

SCALE	A1 1:1250	REDUCED SCALE	1:2500 - A3
	NAME	DATE	DRAWING NUMBER
FIELDWORK	JLG	02/21	22208 ST
DESIGNED			SHEET 1 OF 1 SHEETS
DRAWN	JLG	02/21	REVISION A
CHECKED	NHT	02/21	

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APPENDIX I

UTILITIES CONFIRMATION

Nick Taylor

From: Allen Hutchison <allenh@scanpower.co.nz>
Sent: Thursday, 18 February 2021 7:56 am
To: Nick Taylor
Subject: [#CCL22208] Mansell - Development Overview
Attachments: 20210217152538524.pdf; 20210217152546868.pdf

Hi Nick

I understand that at this stage there is no need to finalise any design to reticulate the proposed scheme plan as per the attached, however, you would like an high level overview of what is available that could be utilised should a subdivision proceed.

Looking at the proposed scheme plan it would appear that any development could be staged given the layout. Lots 1 - 22 could be a stage and lots 23 - 49 could be another stage.

I've attached a copy of the existing Electra network taken from their GIS system. There is an existing 11kV aerial line that follows the access track that would be between lots 20, 21 & 22 that originates from Otaihanga Road. At pole 103493A there is an underground cable that goes under the Expressway to the east and continues on to a couple of properties. In Tieko Street the 11kV aerial line ends at pole 22915H while there appears to be a 400V underground line from pillar 24824H to 10983A which according to Electra's GIS is just north of lot 2.

Lots 1 - 22 would require at least a 100kVA transformer as will lots 23 - 49, this size of capacity is not readily available from the existing Electra network. The options available is either extending the network from Tieko Street, the access track or Otaihanga Road depending on the location. I believe that extending from the access track with new 11kV underground cable from pole 23258F into lot 101 through what looks like an access that beside lot 20 & 12 and through lots 21 & 11. The actual position of the transformer would be determined once we carried out a detailed design and KCDC would specify whether streetlights would be needed.

For lots 23 - 49 I would suggest that we would extend from existing pole 23281F in the access track into lot 100 through what looks like an access in the south west corner of lot 22. The actual position of the transformer would be determined once we carried out a detailed design and KCDC would specify whether streetlights would be needed. We could also find when working on the detailed design that we could get away with installing a 100kVA pole mount transformer on pole 23281F and install 400V cabling into lot 100, should this be the case it would help reduce the overall cost for this stage.

As a budgetary cost per lot I would err on the higher side and allow $7K plus GST per lot.

We can when required carry out designs to help finalise costs based on the additional information that no doubt will come available as planning proceeds.

Cheers

Hutch

Allen Hutchison
Powerline Contracting Divison Manager
Paraparaumu
Scanpower Limited

Chorus Property Development Team
PO Box 9405
Waikato Mail Centre
Hamilton 3200
Telephone: 0800 782 386
Email: develop@chorus.co.nz

19 February 2021

Chorus Ref #: PRM62640
Your Ref #: CCL22208

Mansell

Attention: **Nick Taylor**
Dear Sir / Madam

Property Development – PRM: Tieko Street & Otaihanga Road, Otaihanga. 49 Lots (Lots 1-49) Estimate

Thank you for your enquiry regarding the above subdivision.

Chorus is pleased to advise that, as at the date of this letter, we would be able to provide ABF telephone reticulation for this property development. In order to complete this reticulation, we require a contribution from you to Chorus' total costs of reticulating the development. Chorus' costs include the cost of network design, supply of telecommunications specific materials and supervising installation. At the date of this letter, our estimate of the contribution we would require from you is $90,160.00 (including GST).

We note that (i) the contribution required from you towards reticulation of the development, and (ii) our ability to connect the subdivision to the Chorus network, may (in each case) change over time depending on the availability of Chorus network in the relevant area and other matters.

If you decide that you wish to undertake reticulation of this property development, you will need to contact Chorus (see the contact details for Chorus Property Development Team above). We would recommend that you contact us at least 3 months prior to the commencement of construction at the subdivision. At that stage, we will provide you with the following:

- confirmation of the amount of the contribution required from you, which may change from the estimate as set out above;

- a copy of the Contract for the Supply and Installation of Telecommunications Infrastructure, which will govern our relationship with you in relation to reticulation of this property development; and

- a number of other documents which have important information regarding reticulation of the property development, including - for example - Chorus' standard subdivision lay specification.

Yours faithfully

Toko Taitua
Property Development Coordinator