Aurecon New Zealand Limited
Spark Central
Level 8, 42-52 Willis Street
Wellington 6011

PO Box 1591
Wellington 6140
New Zealand

T +64 4 472 9589
F +64 4 472 9922
E wellington@aurecongroup.com
W aurecongroup.com

Memorandum

To	**Ministry for the Environment**	From	**Aurecon**
Copy	**Stephanie Blick, Aaron Portland**	Reference	**510632**
Date	**07 February 2023**	Pages (including this page)	**13**
Subject	**Infrastructure and Earthworks Summary - Plimmerton Farms Development Stage 1 – MfE Referral for Fast Track Consent**		

1 Background

The wider Plimmerton Farms development covers 384 hectares of land in Plimmerton (shown in Figure 1) that currently comprises pastureland with areas of bush and natural wetlands. The farm area has undergone a plan change process (PC18) with Porirua City Council to rezone the site from a Rural Zone to a new Plimmerton Farm Zone (**PFZ**) – this plan change was approved in 2020. The development is proposed to create approximately 2,000 new homes, including a retirement village, school, and commercial centre. It has been broken into three Precincts for development and staging, whilst retaining, restoring and enhancing indigenous biodiversity including high value wetlands. The Stage 1 development consists of approximately 880-1050 dwellings.

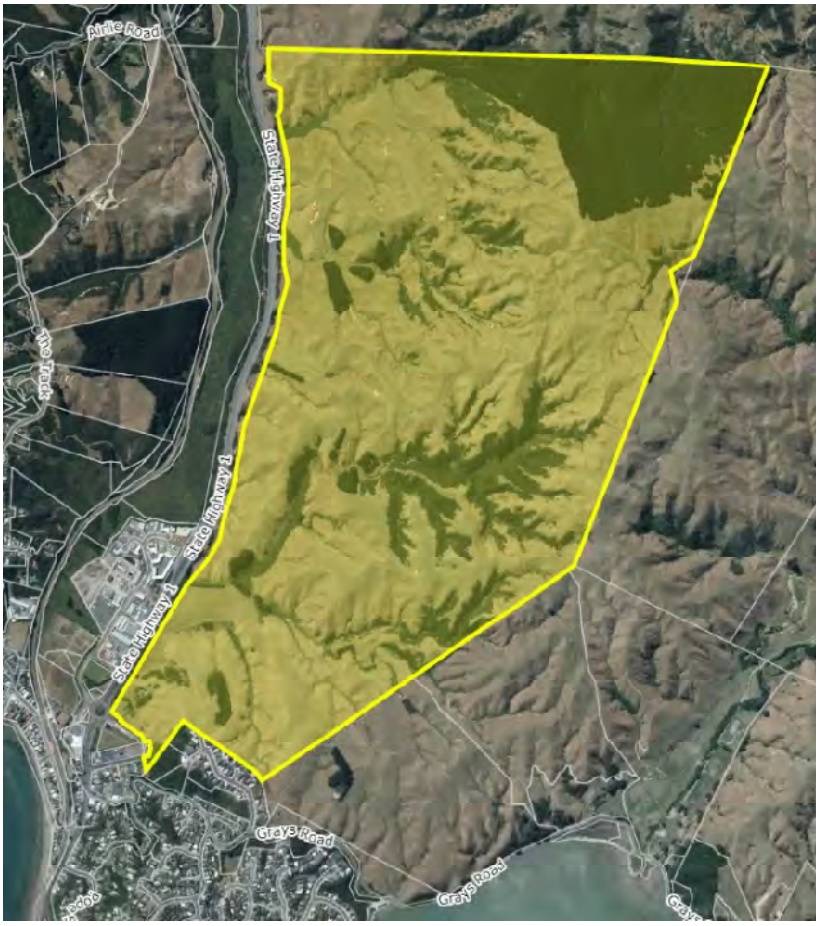


Figure 1: Plimmerton Farms development site boundary

The Stage 1 development concept has been refined over a period of 5 years based on input from the expert project team. In addition, the following activities have been undertaken:

- Detailed services investigations and planning that sought to inform PCC's IAF application;
- Detailed site investigations that informed the plan change;
- Flood modelling undertaken by Awa to confirm that hydraulic neutrality and flood hazard mitigation could be achieved;
- Detailed analysis of wetlands and streams and extensive coordination with the project ecologist to minimise potential effects on indigenous biodiversity;
- Numerous site visits carried out by the project team, other consultants and key stakeholders.
- Meetings, discussions and workshops with PCC and WWL staff about infrastructure servicing.
- Meetings with key stakeholders.

2 Introduction

This memorandum is to inform of the existing and proposed infrastructure for three waters and earthworks for Plimmerton Farms Development as they relate to the proposed Stage 1 development fast track consent referral. It outlines the planned and required three waters infrastructure and associated bulk earthworks required to support the housing development.

All 3 waters infrastructure within this development will be designed to the Greater Wellington Regional standards, Wellington Water standards and specifications and local Porirua City Council requirements.

After plan change PC18 was approved the Plimmerton Farms site was master-planned by the project team to refine development areas, roading layouts, open spaces, and retained and enhanced natural

amenities. Refer to Figure 2 below for this revised masterplan. The current Stage 1 development layout area details can be seen in Figure 3.

Figure 2: Master planning layout for Plimmerton Farms development

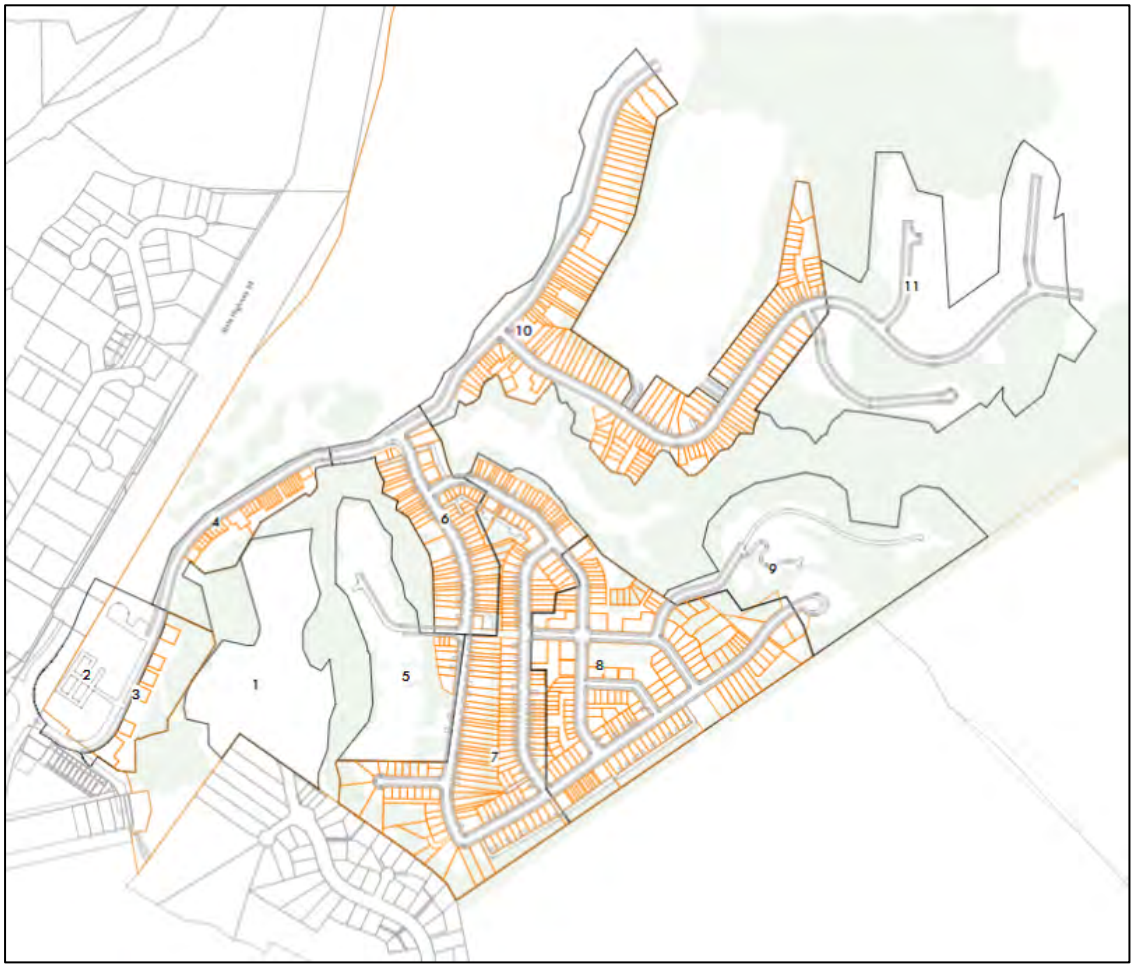


Figure 3: Stage 1 development areas and architectural lot layout

3 Three Waters Infrastructure

Existing three waters infrastructure information was informed using the Wellington Waters regional GIS maps and an infrastructure report completed by Envelope Engineering in 2019 for the Plimmerton Farm Plan Change 18. Figure 4 below shows the existing infrastructure surrounding the site. Based on feedback from WWL and PCC, the current three waters infrastructure around the site is at capacity and unable to support a new development as it stands. As such, this proposed site will include construction of onsite stormwater, wastewater, and potable water storage infrastructure to support the new development.

We note that a small portion of the site – the Mo St extension to be constructed in 2023 – has been designed with these capacity constraints resulting in 'temporary' solutions that will be integrated to the Stage 1 development once constructed.

Figure 4: Three waters infrastructure captured from Wellington Water GIS portal, Jan 2023

4 Wastewater

4.1 Existing infrastructure

There is currently no existing public wastewater infrastructure on site. The closest line is a 375mm that runs parrel along State Highway 59. Wellington Water has informed Aurecon there is no additional capacity in the pipeline and it is in poor condition downstream.

The existing reticulation downstream of the Plimmerton Site is in poor condition and undersized at present. Wastewater discharge is not anticipated to be able to directly connect to the existing network without capacity issues being addressed. Upgrades to the Porirua Wastewater Trunk system would increase capacity to accommodate the development. Additionally, trunk mains downstream of site do not have capacity during peak times. Further discussion would be required to confirm timing for any upgrade works and thus impact on viable design solutions. Due to this, the design of site networks is based on site detention and flow control to manage downstream capacity i.e. no offsite upgrades.

To mitigate these infrastructure issues, peak flow control management will be included in the design solutions. This will include detention of peak wastewater flows on site, and a discharge flow control system.

4.2 Proposed Wastewater infrastructure

A new sewer reticulation network is required for the Stage 1 development aligning with the proposed road network and avoiding sensitive wetland areas. All allotments will include a connection at the boundary as per WWLs Regional Standard.

Wastewater generated by the development will be managed to ensure that the Stage 1 development does not exacerbate capacity issues within the existing wastewater network. To do this a detention tank with approximately 1000m^3 of capacity will be required for Stage 1 to provide 12 hours of average dry weather flow (ADWF) storage, plus an additional 8-hour buffer for resilience and maintenance requirements. The tank will be sited at the south-west of the Stage 1 area comprising a single tank structure or connected cellular structures.

It is proposed to connect the development to the existing wastewater infrastructure at the south-western side of the site adjacent James St. We note Wellington Water prefer to have less assets to manage when they are vested after commissioning thus the detention tank and pump station infrastructure will be consolidated at a single location for Stage 1.

The wastewater detained in tanks will be gradually discharged to the downstream network at controlled volumes outside the times of peak flow in the existing trunk main. Controlled discharge will be completed when levels are lower in the existing network. Controls will be linked to the James St pump station level sensors (PCC_WWPS213). Further engagement with Wellington Water will ensure integration with existing networks, proposed upgrades, discharge limits, and controls during heavy rainfall events.

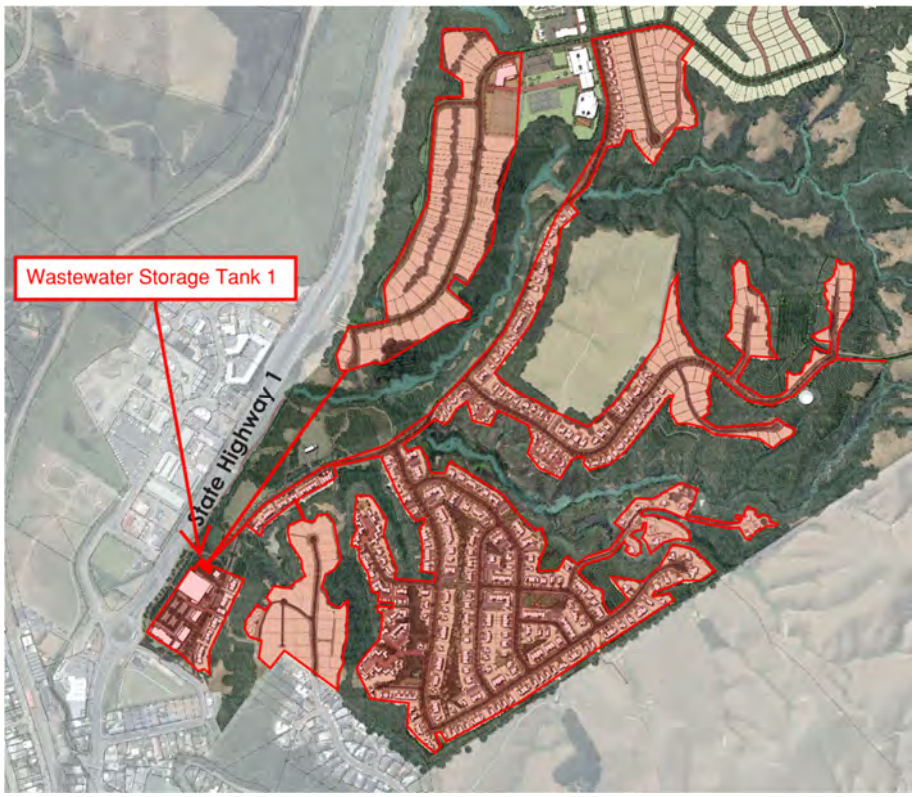


Figure 5: Stage 1 development proposed wastewater storage tank location

Figure 6: **Stage 1 development proposed wastewater mains**

5 Potable Water

5.1 Existing Infrastructure

There is a 250 mm transmission main running down State Highway 59 owned by Greater Wellington Regional Council. The current potable water reservoir infrastructure in the area is not sufficient to supply the development daily needs, and there is also a reduced level of emergency/resilience reservoir storage. New reservoir storage and connections to the trunk network will be required for the Stage 1 development. The existing bulks mains will be used for supply of new reservoir infrastructure.

Within Stage 1 there is an existing farmhouse supplied from a private water connection to an existing public council rider main located within State Highway 59 berm. This will be abandoned as part of the works.

5.2 Proposed Potable Infrastructure

The proposed potable water design requires reticulated water supply be connected and available at all new allotments throughout the Stage 1 development.

A new reservoir will be constructed to service the Stage 1 development with a total storage of 3.35Ml / 3,350m^3. The reservoir will be located at an RL of approximately 115m. The proposed reservoir site will also facilitate future development of subsequent site stages with space to construct a second reservoir, or a larger single reservoir at Stage 1 (up to 6.2Ml capacity).

The figures below show indicatively the scale of single or twin reservoirs options. Note that these are schematic only and would be subject to benching and earthworks to minimise visual effects.

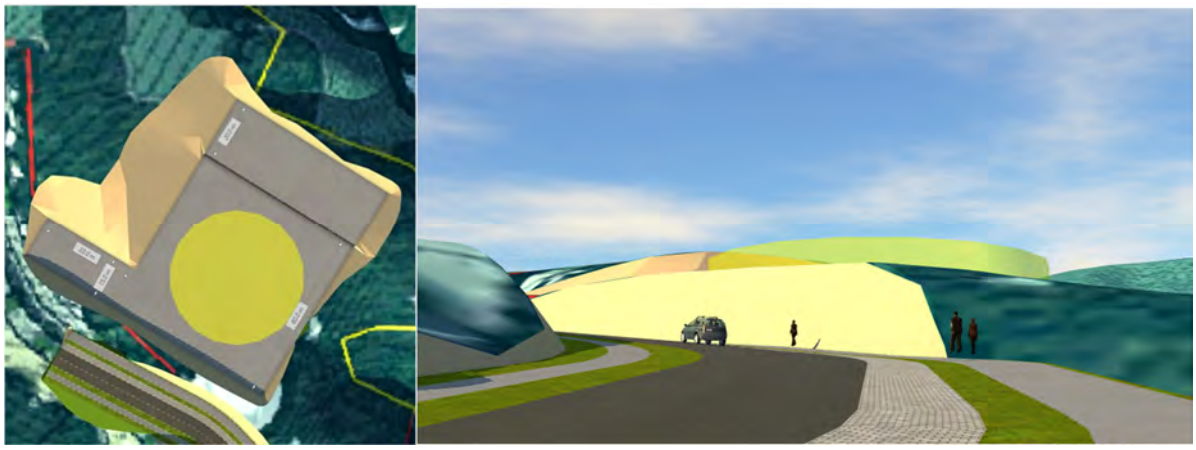


Figure 7: Potential layout for single reservoir

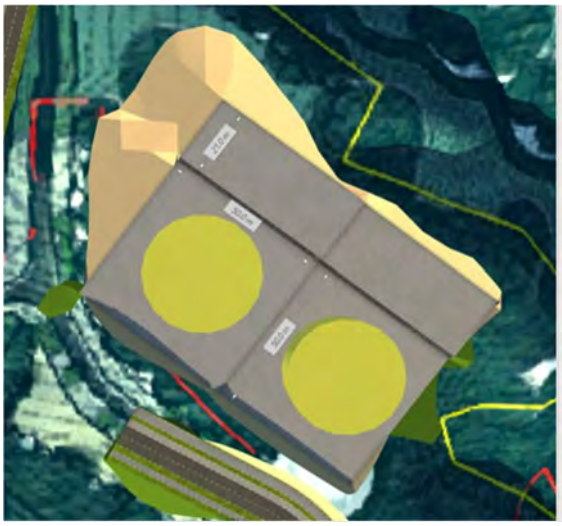


Figure 8: Potential layout for twin reservoirs (for future staging)

The bulk transmission main supplying the reservoir will connect to the GWRC transmission mains on State Highway 59, with new pumps installed to supply the reservoirs.

Trunk potable water mains within the development will connect from the reservoirs to supply the Stage 1 development. Connections will be made to neighbouring networks (e.g. Mo Street to Camborne Reservoir) to allow for integrated management of the water networks by Wellington Water. The transmission main will feed into principal mains and rider mains laid on every new proposed road. The proposed bulk mains for Stage 1 are illustrated in the figure below.

Figure 9: Proposed Stage 1 bulk water supply mains

6 Stormwater

6.1 Existing Infrastructure

There are three existing main stormwater catchment areas on Plimmerton Farms area.

1. Taupō Swamp – to the north-west of the site where surface runoff is directed towards the lower part of the site on the western boundary by State Highway 59. From these low-lying areas, stormwater is collected and directed under State Highway 59 through concrete culverts and discharged into Taupō Stream at the south or into the Taupō Swamp itself towards the north. This catchment is adjacent the western and northern extents of the Stage 1 development not impacted by housing but for the balance earthworks fill zones for Stage 1.
2. Taupō Stream – to the south of the site. The Taupō Swamp and Stream follow the same surface runoff direction. This is the principal catchment for the Stage 1 development.
3. Kakaho – to the north-east of the site and falls from the ridgeline to the east in the northern area of the site. This is not affected by the Stage 1 development.

'The Taupo Swamp complex is a Schedule A - Outstanding Waterbodies in the GWRC Natural Resources Plan and when approving the streamlined plan change process Minister Parker gave the following directive:

> *c) ensures that future development will be undertaken in a manner that recognises the sensitive receiving and downstream environments, such as the Taupō Swamp, including minimising changes to the hydrological regime."*

In response to this the Plimmerton Farm Zone chapter includes provisions seeking to protect Taupo Swamp.

The lower south-west of the site and downstream areas experience periodic flooding, which have been accounted for in the proposed design, modelling and consultation with PCC and WWL, and is proposed to be addressed as described below.

The figure below captures the extend of flooding in the Plimmerton area for a 100-year rainfall event considering climate change impacts.

Figure 10: Flooding impact for a 100-year rainfall event including climate change

6.2 Proposed Stormwater Infrastructure

There are several engineering objectives that are key for this development:

6.2.1 Hydraulic Neutrality

Hydraulic neutrality for this site is the reduction of peak flows for events up to the 100-year ARI event. It also includes maintaining the frequency of existing channel forming flows (low return period events, 2-year ARI, PC18 Freshwater Principles SWMP30). Hydraulic neutrality will be designed based on the stormwater management and freshwater principals in PC18, for example;

- Control of low flow 'channel forming events' up to the 2-year ARI at source with rainwater harvesting tanks or similar. The impacts of these devices would be modelled during master planning and design and implemented as dwellings are constructed. This has the added benefit of conserving the resource of water and managing the site water balance.
- Control of peak flows from larger flood events, up to 100-year ARI + climate change in low lying areas and gullies using stormwater detention devices. Space has been provided at the base of the catchment to attenuate flood flows. Modelling will be provided to confirm impacts on downstream properties and that hydraulic neutrality has been achieved. This primarily involves for Stage 1 the construction of a stormwater detention wetland area at the south-west of the site.

Based on a preliminary catchment assessment of Stage 1 development runoff and including the existing flood hazard, it is feasible to provide stormwater attenuation during extreme rainfall events to manage the combined flood hazard at the site without increasing flood risk external to the site. Per PC18, the proposed stormwater concepts and measures have been designed on the basis that the development will achieve hydraulic neutrality.

In short, the assessments and modelling undertaken to date confirm that appropriate measures can be employed (as have been allowed for in the masterplan design) to ensure potential adverse effects associated with stormwater discharge or with undertaking earthworks and development within the existing flood areas can be adequately mitigated.

6.2.2 Compensatory Flood Storage

A portion of the Stage 1 development currently experiences inundation during large flood events. To prevent impact on downstream properties, removal of flood storage within low lying zones due to roading or development will require compensatory storage in addition to increased runoff from the Stage 1 development.

As above, detailed flood modelling of the impact of proposed flood storage devices will be completed to demonstrate that attenuation devices are effective to mitigate downstream impacts. The proposed Stage 1 enhanced 6.8Ha flood detention zone is shown in the below figure which will form a significant part of the stormwater strategy to ensure hydraulic neutrality for the Stage 1 development. This area will also form part of the proposed wetland restoration zone.

Figure 11: Stage 1 development proposed enhanced stormwater detention zone

6.2.3 Quality Control.

Quality objectives for this catchment have a focus on E.coli, dissolved zinc, copper toxicity, ammonia and nitrate toxicity, and sediment load limits. The GWRC Natural Resources Plan has the following objectives for this area including, quality of water is maintained or improved, waterbodies are appropriate for recreational and Māori customary use, aquatic health is safeguarded, sediment laden water is minimised, and adverse effects of stormwater discharges are managed to mitigate effects of volumes and peak flows.

Quality measures are proposed to be implemented on a superlot basis near to source. Quality devices will be designed based on the following principals from the PC18 reporting & requirements. Quality modelling will be completed during design to confirm expected outcomes, such as:

- Treatment of all road surfaces for sediment and sediment bound contaminants as per PC18.
- Treatment of any materials that may contribute zinc and copper to the environment. It is intended that these building materials are avoided or managed as per PC18.

6.2.4 Other measures will be undertaken in design to enhance quality outcomes:

- Protect headwaters from development by planting, setting back development where possible and keeping these areas pervious. This has the benefit of controlling temperature and baseflow in the stream.
- Avoid mixing water from different catchment sources. Focus on having a natural distribution of stormwater outlets to mimic the diversity of stormwater contributions in the current environment.
- Run water over land and rock prior to discharge in harmony with Te Mana o Te Wai principles.
- Protect overland flow paths.

7 Earthworks

Earthworks are required to develop the Stage 1 development suitable for construction of housing in alignment with PC18. Earthworks will be required to construct roads into the site, graded platforms for housing, managing excess cut into engineered fill sites for future development, construction of bulk potable water storage reservoirs, and construction of stormwater management devices. Parts of the site are proposed as a retirement village, commercial zone and school site, which have specific requirements for development.

There is an excess of excavated earthwork material to support the Stage 1 development that is proposed to be moved to future Stage fill zones as part of the Stage 1 works. These fill-only areas are identified on the Earthworks plan in the Appendices. Temporary haul roads will be installed through the fill only zones to support these advance works without impacting the Stage 1 finished roading.

Indicative bulk earthworks volumes are as follows – note these are in-situ volumes:

- Stage 1 Cut Volume: 1,900,000m^3
- Stage 1 Fill Volume: 1,300,000m^3
- Surplus Stage 1 Cut: 600,000m^3

The identified fill zones on the scheme plan allow for up to 1,000,000m^3 of fill – with provision for bulking and contingency within the current earthwork figures.

The total earthworks area including fill only areas for excess cut are:

- Area: 83.5Ha

8 Conclusion

This memo has been prepared to provide an overview of the existing infrastructure surrounding Plimmerton Farm, and provision of new or upgraded services to support the proposed Stage 1 development.

Three waters infrastructure will be designed to GWRC, PCC and WWL standards. The final design will be developed in consultation with these parties to achieve an acceptable outcome with regard to the regional and district plans and relevant codes and guidelines.

The resource consent application will include an Infrastructure Report that provides full details of the proposed servicing of the Project. In addition, a Stormwater Management Plan will outline how stormwater will be appropriately managed.

In summary, it is our view that the site can be developed and adequately serviced subject to further engineering design, and that this can be addressed through future consents. Further, no bulk off-site infrastructure upgrades appear to be necessary to support the development at this stage.

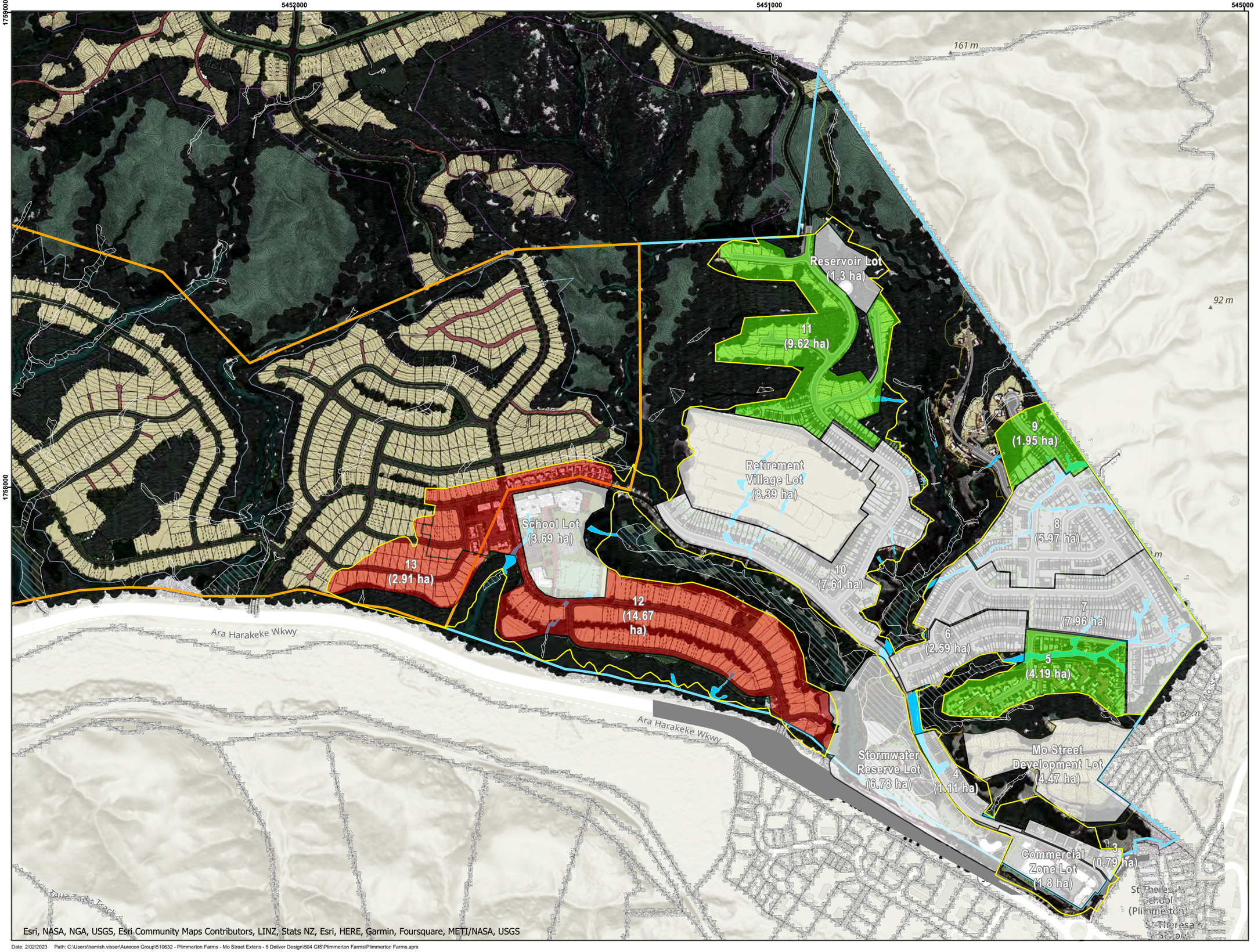
9 Appendices

Please refer to the following appendices which include the following:

- Fast Track Scheme Plan.
- Three Water Infrastructure plan.
- Draft Roading Plan.
- Draft Earthworks Comparison plan.

Appendix A

FIGURE KK-0031: Fast Track Scheme Plan



Legend

- Revised Earthworks Outline
- Proposed Super Lots
- Future Stage Fill Zones
- Development Areas

Affected Wetland Area

- Zone 1
- Wetland Area

Zones

- Zone 1
- Zone 2

Ecological Extents

- Zone 1
- Zone 2
- Zone 3

Notes

1. Data Sourced:

Wetland Areas via RMA Ecology

aurecon

Date: 2/02/2023 Path: C:\Users\hamish.visser\Aurecon Group\510632 - Plimmerton Farms - Mo Street Extens - 5 Deliver Design\504 GIS\Plimmerton Farms\Plimmerton Farms.aprx

Scale 1:7,500 @ A3

0 100 200 300 400 500 m

Project Number: 510632

Projection: NZTM

PILMMERTON FARMS STAGE 1

FIGURE KK-0031: Fast Track Scheme Plan

Appendix B

FIGURE KK-0032: Three water Infrastructure

5452000 5451000 5450000

1759000 1758000

Wastewater connection from Precinct B in future

Trunk water main connection to Precinct B in future

Lower Reservoir to service Precinct A & B at elevation of 115m. Total volume of 6,150m3 required for Precincts A & B. 3,350m3 required for Precinct A alone.

Bunding around stormwater reserve to provide additional flood storage

Wastewater buffer storage & pump station.

Pump station located here for connection from GWRC network to reservoir

Connection to other water zones as required by Wellington Water

161 m

92 m

Reservoir Lot (1.3 ha)

11 (9.62 ha)

9 (1.95 ha)

Retirement Village Lot (8.39 ha)

School Lot (3.69 ha)

13 (2.91 ha)

12 (14.67 ha)

10 (7.61 ha)

8 (5.97 ha)

7 (7.96 ha)

6 (2.59 ha)

5 (4.19 ha)

Stormwater Reserve Lot (6.78 ha)

4 (1.11 ha)

Mo Street Development Lot (4.47 ha)

Commercial Zone Lot (1.8 ha)

3 (0.79 ha)

Ara Harakeke Wkwy

Ara Harakeke Wkwy

Esri Community Maps Contributors, LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

Legend

- Reservior Location
- Trunk Water Pipelines (Principal and Rider Mains not shown)
- Reservoir Supply Pipeline from GWRC
- Key Wastewater Pipelines
- Wastewater Rising Main Discharge

Development Areas
- Proposed Super Lots
- Future Stage Fill Zones
- Development Areas
- Revised Earthworks Outline

Affected Wetland Area
- Zone 1
- Wetland Area

Zones
- Zone 1
- Zone 2

Ecological Extents
- Zone 1
- Zone 2
- Zone 3

Notes

1. Data Sourced:

Wetland Areas via RMA Ecology

aurecon

Date: 2/02/2023 Path: C:\Users\hamish.visser\Aurecon Group\510632 - Plimmerton Farms - Mo Street Extens - 5 Deliver Design\504 GIS\Plimmerton Farms\Plimmerton Farms.aprx

Scale 1:7,500 @ A3

0 100 200 300 400 500 m

Project Number: 510632

Projection: NZTM

PILMMERTON FARMS STAGE 1

FIGURE KK-0032: Fast Track Scheme Plan: Three Waters Infrastructure

Appendix C

FIGURE KK-0033: Draft Roading Plan

5452000 5451000 5450000

1759000

1758000

161 m

92 m

Ara Harakeke Wkwy

Ara Harakeke Wkwy

Esri Community Maps Contributors, LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

Date: 2/02/2023 Path: C:\Users\hamish.visser\Aurecon Group\510632 - Plimmerton Farms - Mo Street Extens - 5 Deliver Design\504 GIS\Plimmerton Farms\Plimmerton Farms.aprx

Legend

- Haul Route
- Stage 2 Future Roading
- Stage 1 Roading
- Revised Earthworks Outline

Zones

- Zone 1
- Zone 2
- Zone 3

Notes

1. Road alignments and widths are based on the Design TIN. Where no information was available, the road was estimated using the Plimmerton Farm Urban Acumen and Precinct Plan.

aurecon

Scale 1:7,500 @ A3

0 100 200 300 400 500 m

Project Number: 510632

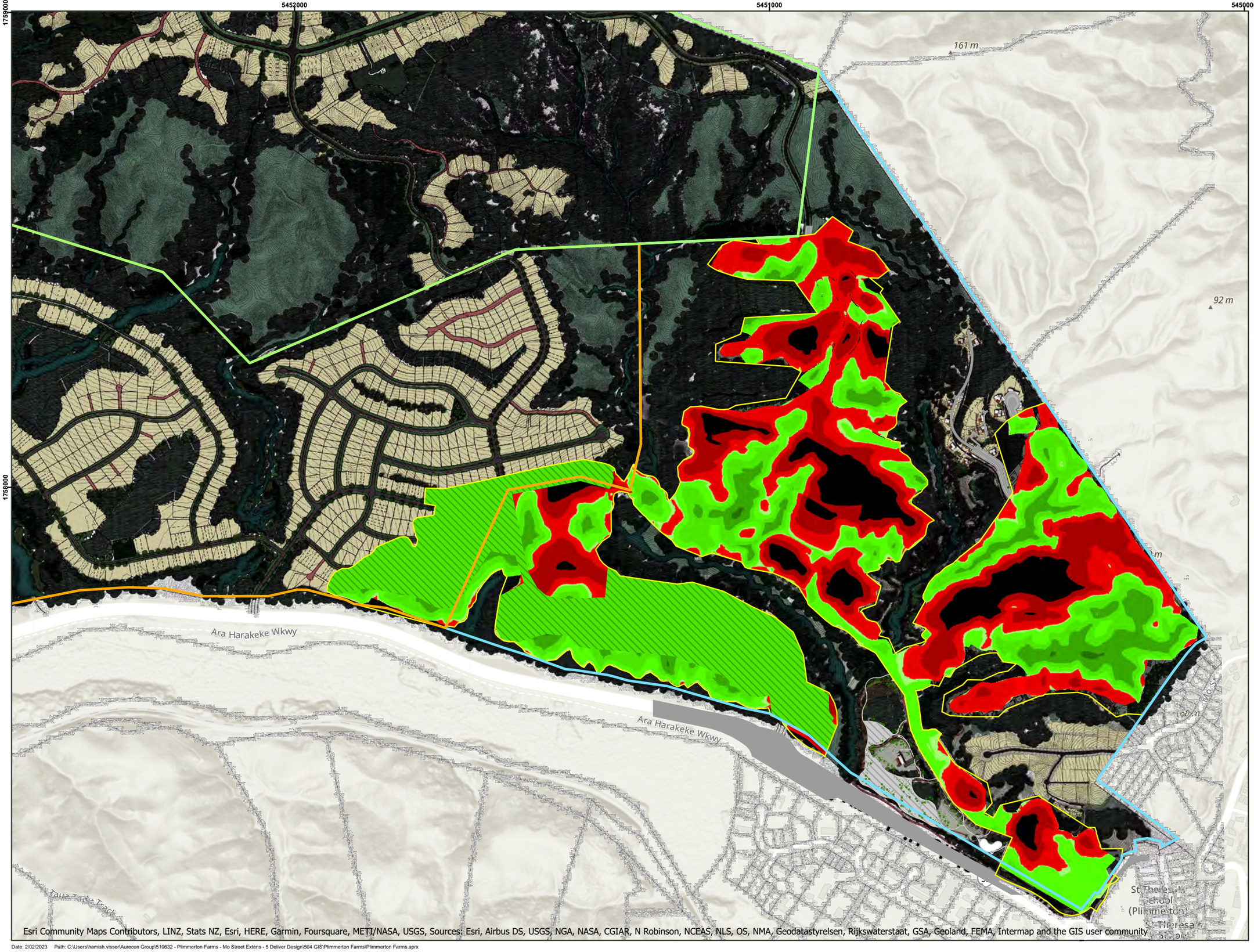
Projection: NZTM

PILMMERTON FARMS STAGE 1

FIGURE KK-0033: Draft Roading Plan

Appendix D

FIGURE KK-0034: Draft Earthworks Comparison



Legend

Design Surface vs Existing Ground

Fill vs Cut

- -24.459 - -20
- -19.999 - -10
- -9.999 - -5
- -4.999 - -1
- -0.999 - -0.01
- -0.009 - 0.01
- 0.011 - 1
- 1.001 - 5
- 5.001 - 10
- 10.001 - 25
- Future Stage Fill Zone
- Revised Earthworks Outline

Zones

- Zone 1
- Zone 2
- Zone 3

INDICATIVE EARTHWORKS VOLUME BETWEEN EXISTING AND DESIGN SURFACE:

EW ZONE
CUT: 1,900,000m3
FILL: 1,300,000m3

FILL ZONE
FILL: 1,000,000m3

Notes

aurecon

Date: 2/02/2023 Path: C:\Users\hamish.visser\Aurecon Group\510632 - Plimmerton Farms - Mo Street Extens - 5 Deliver Design\504 GIS\Plimmerton Farms\Plimmerton Farms.aprx

Scale 1:7,500 @ A3

0 100 200 300 400 500 m

Project Number: 510632

Projection: NZTM

PILMMERTON FARMS STAGE 1

FIGURE KK-0034: Draft Earthworks Comparison