19 August 2024

Fonterra Siding

Feasibility Assessment Summary

Prepared for / **Fonterra Limited – Auckland**

Project No. / **V-1253**

Revision / Rev# 2

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Revision History

Rev	Date	Implemented By	Purpose/Change
1	19/08/2024	Nigel Holman	Issue to Fonterra for review
2	19/08/2024	Nigel Holman	Final Issue

Sign Off

		Signature
Prepared By:	Nigel Holman Project Leader 19-Aug-2024	
Verified By:	Bryce Hourigan Senior Rail Engineer 19-Aug-2024	
Approved By:	Brad Jones Business Leader Auckland 19-Aug-2024	

Transmittal / Distribution

Date of Issue	To	To	To	Reason[1]
19 August 2024	Samantha Lochery			Final Issue

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Design Terminology

The following technical terms are defined for understanding of this report:

Cant	Change in rail track height to assist in turning.
Crossover	A pair of switches that connects two parallel rail tracks, allowing a train on one track to cross over to the other
Locomotives	A rail transport vehicle that provides motive power for a train or is responsible for pulling wagons or carriages.
Mainline	A primary rail transport route, typically connecting major cities. In this report, NIMT is the Mainline.
Run-around	A short length of track that allows locomotives to run around parked wagons and be positioned at either end of the wagons, ready for locomotive first departure.
Siding	A low-speed track section that is distinct from the main line that is used to store rolling stock or enable trains to pass through on the same line.
Wagons (also known as goods carriages, goods trucks, freight carriages or freight trucks)	Are unpowered railway vehicles that are used for the transportation of cargo.

1 Purpose

This report has been prepared on behalf of Fonterra Limited ('Fonterra') to inform and support their Private Plan Change request ('PC17') at Te Rapa, Hamilton. The purpose of PC17 is to rezone approximately 91ha of land (the 'Plan Change Area') surrounding the Te Rapa Dairy Manufacturing Site. PC17 does not seek to amend the zoning of any of the land within the Te Rapa Dairy Manufacturing Site or planning provisions relating to the manufacturing site.

The objectives of the private plan change are to:

1. Rezone all Fonterra-owned land to Te Rapa North Industrial zone.
2. Protect the Te Rapa Dairy Manufacturing Site from reverse sensitivity risk.
3. Future proof rail access on the North Island Main Trunk Line.

The extent of the Plan Change Area is set out within **Figure 1** below.

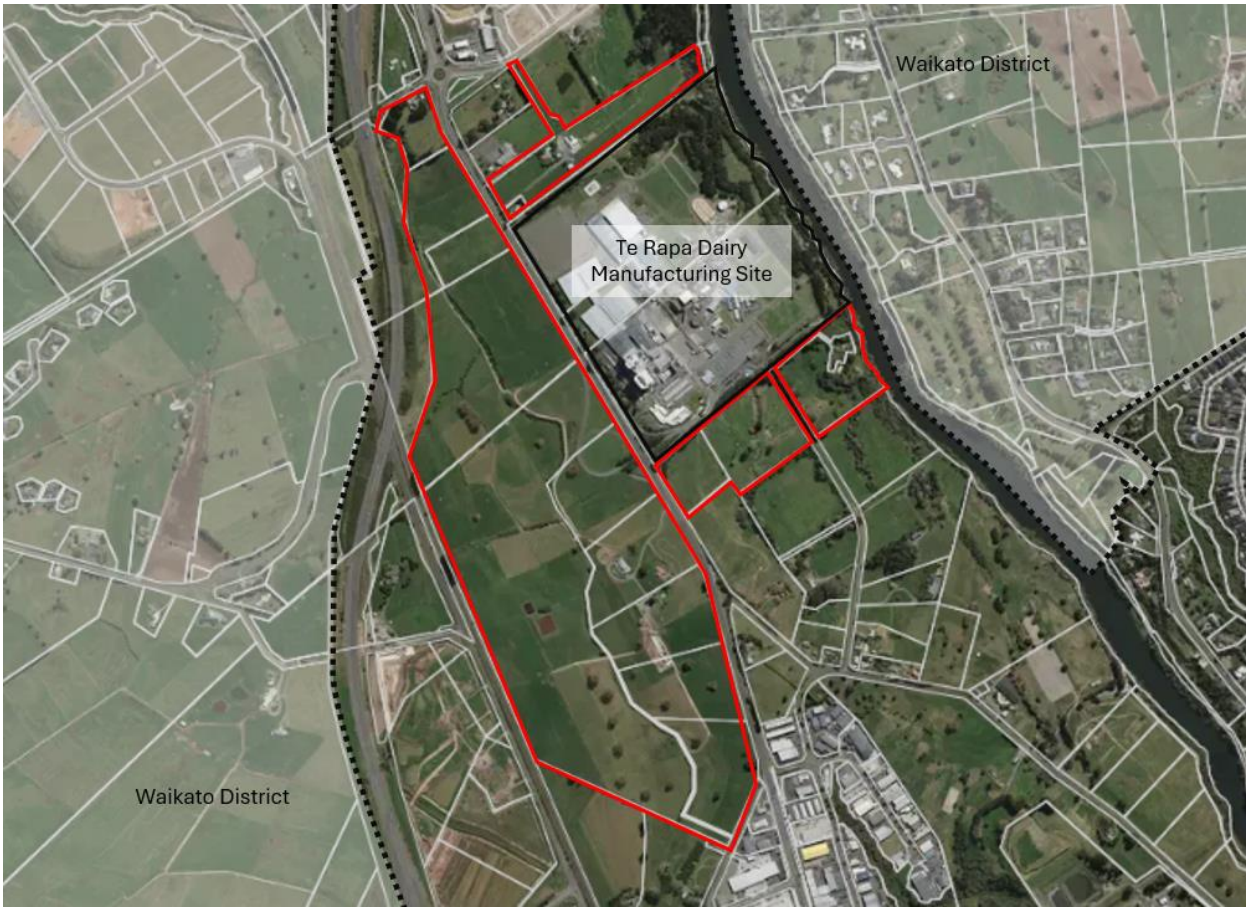

Figure 1 | The extent of the Plan Change Area is shown in red outline.

This report demonstrates the feasibility of a new siding on the North Island Main Trunk (NIMT) within Fonterra-owned land within the Plan Change Area and should be read in conjunction with the attached drawings in Appendix A.

The design used to demonstrate the feasibility of this future use has been developed in accordance with the KiwiRail Limited's ('KiwiRail') Design Standards and can support up to 37 wagons and two locomotives. Further design development and engineering approvals will be required in future consenting processes with KiwiRail to confirm acceptance and finalise the layout of the siding.

This report and attached drawings will be used to facilitate initial deed of grant discussions and engineering approvals with KiwiRail (to occur outside and likely subsequent to the PC17 process).

2 Plan Change Area

The Plan Change Area is located in the northern extent of Te Rapa, approximately 8km north of Central Hamilton. It is within the northernmost part of Hamilton City District near the boundary of the Waikato District.

The Plan Change Area is made up of three distinct areas, all of which are encompassed by the Waikato River to the east, the Waikato Expressway (State Highway 1C) and the NIMT rail line to the west, Hutchinson Road and Bern Road to the north and Ruffell Road, Old Ruffell Road and property boundaries to the south (see Figure 1). All three areas have frontage to Te Rapa Road which runs north to south through the centre of the Plan Change Area. The three areas are described as follows:

- **West Block:** Section 3 SO 456626, Section 1 SO 456626, Lot 1 – 6 DPS 11087, Part Lot 2 DPS 10804, Lot 1 DPS 34481 & Part Lot 1 DPS 1080
- **North Block:** Lot 1 DP 551065 and Lot 1 DPS 8230
- **South-East Block:** Lot 5 DPS 18043, Lot 1 DPS 85687 and Lot 1-3 DPS 61136

The Plan Change Area is currently utilised for rural and residential uses.

3 Existing Situation

The NIMT is the rail line linking Wellington and Auckland. It is over 650 kilometres long and passes through Hamilton along its route.

The section of track that is the focus of the report is between 550km and 551.5km (NIMT metreage) and is shown in **Figure 2.** This part of the NIMT route abuts the Plan Change Area, with the dual track up-and-down mains running North / South with approximately 800m of the Plan Change Area's western boundary. This part of the Plan Change Area is level with the track and is currently used for rural purposes.

Figure 2 | North Island Main Trunk line section that is the focus of the report (yellow line) in relation to the Plan Change Area.

The existing NIMT between 550km and 550.975km is a tangent track, with a 2085 radius right-hand curve between 550.975km and 551.250km. The KiwiRail track logs show gradients between one in 243 and one in 1098 through this area as shown in **Figure 3**.

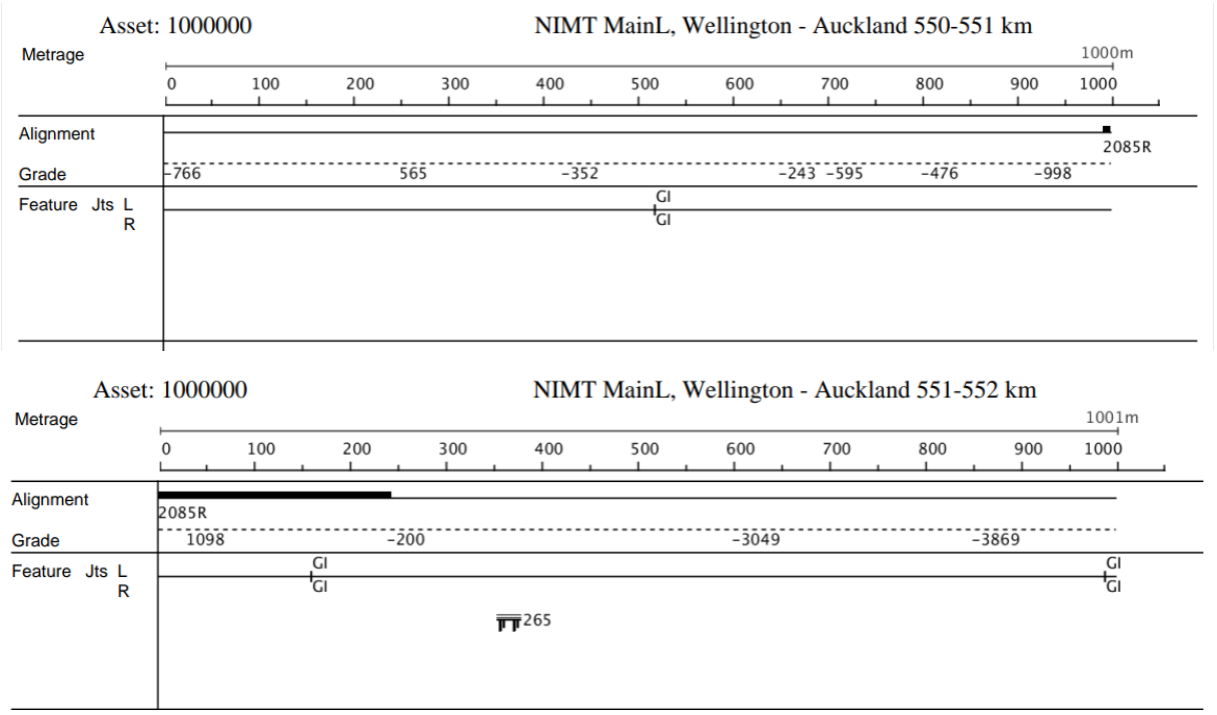

Figure 3 | KiwiRail Track Logs 550km – 552km. Adjacent to the Plan Change Area.

North of the Plan Change Area, State Highway 1C passes over the NIMT (also Onion Road) with a road over the rail bridge supported by concrete piles on either side of the rail corridor (shown with blue shading in Figure 2). South of the Plan Change Area the line has two major stations - Burbush, which services the Mainfreight Limited's site on Ruffell Road and Te Rapa, which is a major passenger rail interchange.

4 Track Design

4.1 DESIGN INPUTS

A concept design has been developed to demonstrate that it is feasible to deliver a rail siding from the NIMT into the Fonterra-owned land in Te Rapa that is subject to PC17. The Fonterra-owned parcels (Part Lot 2 DPS 10804 & Lot 6 DPS 11087) that form the potential location are identified in blue dashed outline in Figure 4 below.

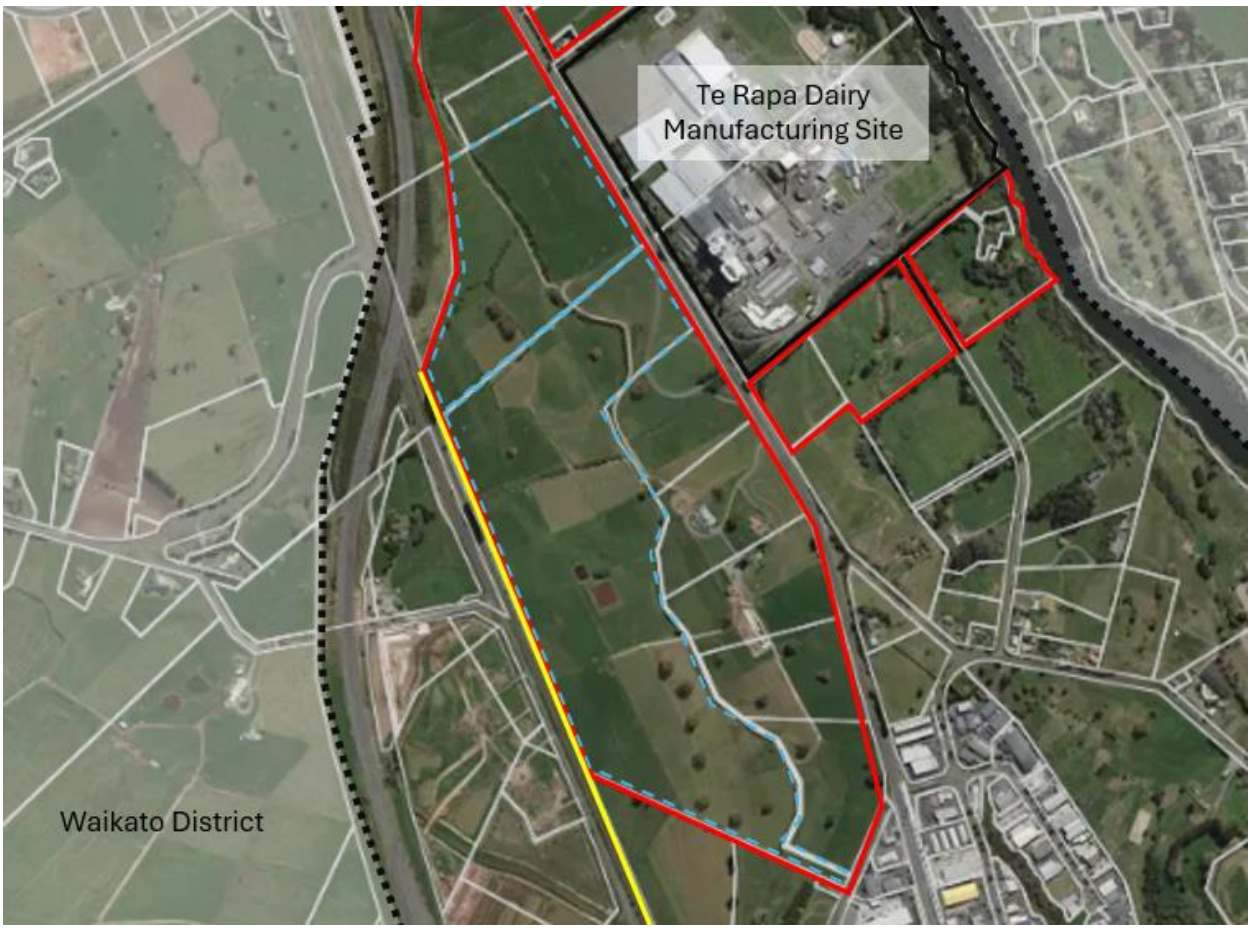

Figure 4 | Fonterra-owned land identified for future rail siding (blue dashed outline).

The design was developed with the following external inputs.

- Harrison Grierson Consultants Limited's Topographical Survey dated April 2023 (Appendix B).
- The PC17 Illustrative Te Rapa North Masterplan ('Masterplan') (Appendix C)
- Land Information New Zealand's Data Aerial Images

Note: Although appropriate to determine if a siding is feasible as needed to inform PC17, this data does not meet the standard required for detailed track design. Detailed design would be undertaken in the development and consenting stage.

4.2 DESIGN ASSUMPTIONS

The following key design assumptions have been adopted in the feasibility design.

- All works remain within Fonterra-owned land as shown in the Masterplan.
- The train movements are required to be north and southbound.

5 Design Criteria

The design includes track alignment and level in accordance with KiwiRail's standard T-ST-DE-5200 with the key assumptions and design parameters adopted as set out in Table 5-1 below.

Table5- 1: KiwiRail T-ST-DE-5200 Design Criteria

Design Criteria	Option - Siding
Track Design Speed	25km/h
Min Horizontal Radius	150m
Max Vertical Grade	1 in 200 [Assumed to match existing track line]
Turnout	1 in 9 used for mainline connections as per KiwiRail requirements 1 in 7.5 used in the sidings
Track Storage Length	675m (single track) 37 IA Wagons + 2 Locomotives
Electrification Allowance	Yes

6 Concept Design

The following section describes the proposed design. It is shown below in Figure 4 and can be viewed in full as Appendix A

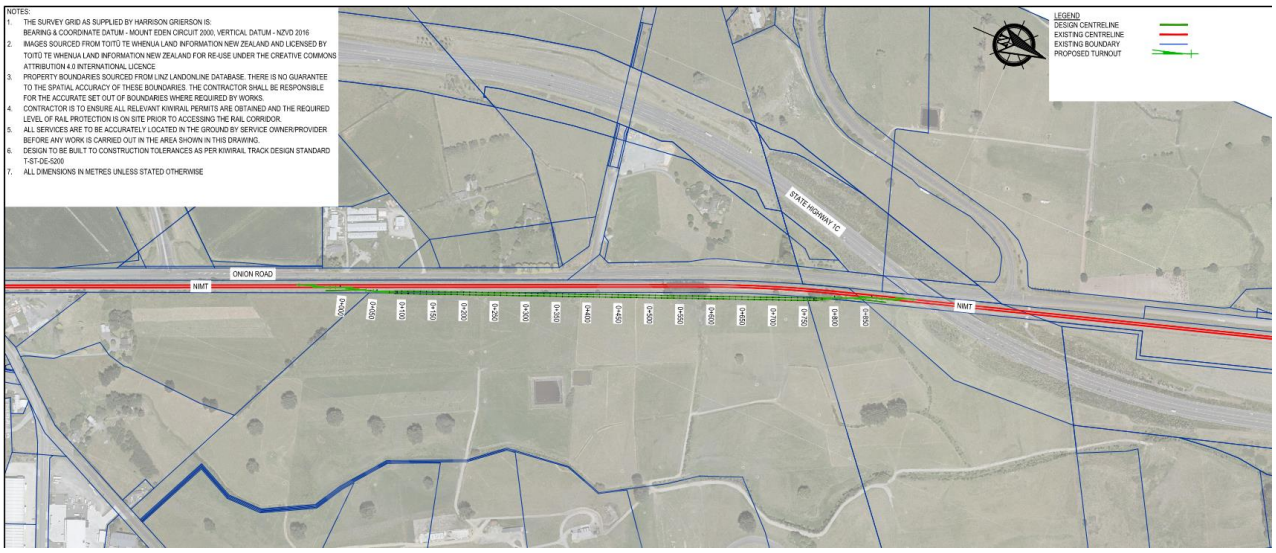

Figure 4 | Concept Design for future Railing Siding for NIMT

The concept design that is proposed along the western boundary of the Plan Change Area applies the inputs and criteria above. The design would achieve functionality and capacity increases such that it is considered a viable future scenario.

The concept design is as follows:

- A siding 675m in length that has a minimum of 5.2m offset from centreline of the mainline;
- Four 1 in 7.5 gradient runarounds;
- A run-around with a minimum 5.2m offset from the centreline of the mainline, with the siding 4m adjacent to the run-around;
- Two crossovers with 1 in 9 gradients placed both north and south of the siding to allow access and departure by north and southbound trains; and
- Capacity for space for 37 wagons and 2 locomotives.

6.1.1 Horizontal geometry

Table 6-1 below has been produced to prove compliance with KiwiRail's Track Design Standard T-ST-DE-5200.

Table 6-1: Horizontal Geometry

CURVE NUMBER		SPEED	RADIUS	CANT EQUILIBRIUM (Eq) (mm)	CANT DEFICIENCY (ED) (mm)	CANT (Ea) (mm)	TRANS 1 LENGTH (m)	RATE OF CHANGE OF CANT (mm/s)	RATE OF CHANGE OF DEFICENCY (mm/s)	TRANS 2 LENGTH (m)	RATE OF CHANGE OF CANT (mm/s)	RATE OF CHANGE OF DEFICENCY (mm/s)
1	V Max=	25	525	10.6	10.6	0	12.2	0.0	6.0	12.2	0.0	6.0
	V=	25		10.6	10.6			0.0	6.0		0.0	6.0
	V TSR=	25		10.6	10.6			0.0	6.0		0.0	6.0
2	V Max=	25	825	6.7	6.7	0	12.2	0.0	3.8	12.2	0.0	3.8
	V=	25		6.7	6.7			0.0	3.8		0.0	3.8
	V TSR=	25		6.7	6.7			0.0	3.8		0.0	3.8
3	V Max=	25	225	24.7	24.7	0	12.2	0.0	14.1	12.2	0.0	14.1
	V=	25		24.7	24.7			0.0	14.1		0.0	14.1
	V TSR=	25		24.7	24.7			0.0	14.1		0.0	14.1
4	V Max=	25	150	37.0	37.0	0	12.2	0.0	21.1	12.2	0.0	21.1
	V=	25		37.0	37.0			0.0	21.1		0.0	21.1
	V TSR=	25		37.0	37.0			0.0	21.1		0.0	21.1

6.1.2 Cant

The track geometry does not require any cant to be applied in the siding.

6.1.3 Line Speed

The track geometry has been designed to a horizontal line speed of 25km/hr for yards and sidings.

6.2 VERTICAL GEOMETRY

The vertical design is assumed to match the NIMT which is no steeper than 1:200, which meets the requirement in T-ST-TE-5200, track design.

7 Summary

This report demonstrates a new rail siding for the NIMT is feasible within the western edge of the Plan Change Area between the NIMT meterage points 550km and 551.5km.

The topography and space available within the potential location appears supportive of a concept design with capacity for 37 wagons and two locomotives, with cross-overs and run-arounds to provide for north and southbound movements.

The identified area is entirely within Fonterra-owned land and the Plan Change Area, and the concept track alignment is designed to be within desirable tolerances as set out in KiwiRail's T-ST-DE-5200 and T-ST-DE-5212 Clearances.

Although subject to further design development, engineering approvals and input from KiwiRail, the identified location on the western edge of the Plan Change Area is considered a feasible future location for a rail siding for the NIMT.

Appendix

A

Drawings

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A.1 Drawing List

DRAWING NUMBER	TITLE	REV
V-1253-01-2101	SIDING SITE OVERVIEW SHEET 1/4	P01
V-1253-01-2102	PROPSOED SIDING AND RUN AROUND SHEET 2/4	P01
V-1253-01-2103	PROPSOED SIDING AND RUNAROUND SHEET 3/4	P01
V-1253-01-2104	PROPOSED SIDING AND RUNAROUND SHEET 4/4	P01

NOTES:
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2. IMAGES SOURCED FROM TOITŪ TE WHENUA LAND INFORMATION NEW ZEALAND AND LICENSED BY TOITŪ TE WHENUA LAND INFORMATION NEW ZEALAND FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 INTERNATIONAL LICENCE
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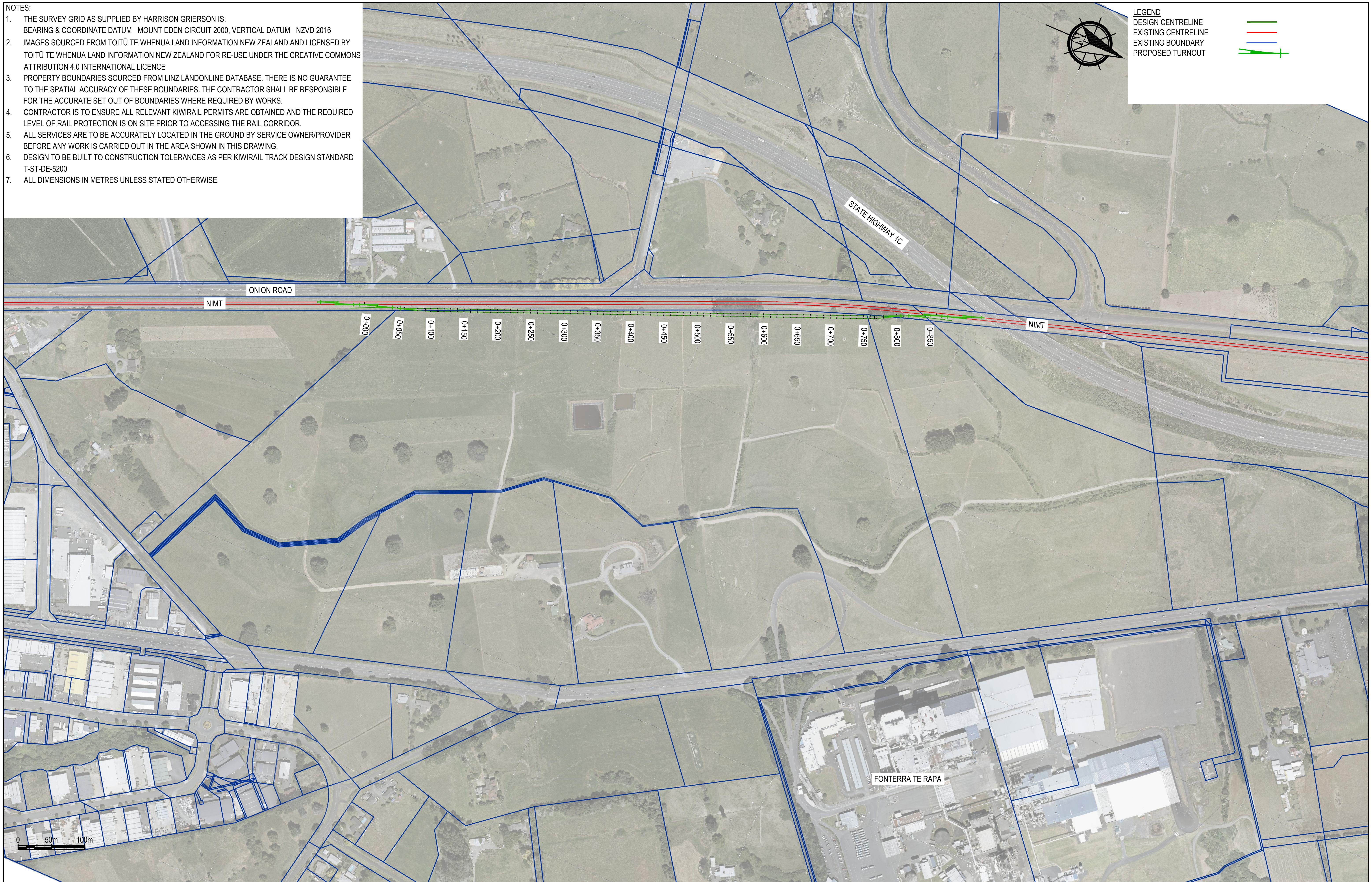
4. CONTRACTOR IS TO ENSURE ALL RELEVANT KIWIRAIL PERMITS ARE OBTAINED AND THE REQUIRED LEVEL OF RAIL PROTECTION IS ON SITE PRIOR TO ACCESSING THE RAIL CORRIDOR.
5. ALL SERVICES ARE TO BE ACCURATELY LOCATED IN THE GROUND BY SERVICE OWNER/PROVIDER BEFORE ANY WORK IS CARRIED OUT IN THE AREA SHOWN IN THIS DRAWING.
6. DESIGN TO BE BUILT TO CONSTRUCTION TOLERANCES AS PER KIWIRAIL TRACK DESIGN STANDARD T-ST-DE-5200
7. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE

LEGEND
DESIGN CENTRELINE
EXISTING CENTRELINE
EXISTING BOUNDARY
PROPOSED TURNOUT



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VERIFIED BH	SIGNED BH	DATE 30/05/23					
APPROVED BJ	SIGNED BJ	DATE 30/05/23					

CLIENT
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PROJECT
FONTERRA SIDING
FEASIBILITY ASSESSMENT

DRAWING TITLE
PROPOSED SIDING
SITE OVERVIEW
SHEET 1 OF 4

STATUS
FOR INFORMATION
NOT FOR CONSTRUCTION

SCALE	SHEET SIZE
1:5000	A3

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TRACK GEOMETRY DETAILS

CURVE NUMBER		SPEED	RADIUS	CANT EQUILIBRIUM (Eq) (mm)	CANT DEFICIENCY (ED) (mm)	CANT (Ea) (mm)	CANT % OF Eq	TRANSITION 1 LENGTH (m)	RATE OF CHANGE OF CANT (mm/s)	RATE OF CHANGE OF DEFICIENCY (mm/s)	TRANSITION 2 LENGTH (m)	RATE OF CHANGE OF CANT (mm/s)	RATE OF CHANGE OF DEFICIENCY (mm/s)
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2	V Max=	25	825	6.7	6.7	0	0.0	12.2	0.0	3.8	12.2	0.0	3.8
	V=	25		6.7	6.7		0.0		0.0	3.8		0.0	3.8
	V TSR=	25		6.7	6.7		0.0		0.0	3.8		0.0	3.8
3	V Max=	25	225	24.7	24.7	0	0.0	12.2	0.0	14.1	12.2	0.0	14.1
	V=	25		24.7	24.7		0.0		0.0	14.1		0.0	14.1
	V TSR=	25		24.7	24.7		0.0		0.0	14.1		0.0	14.1
4	V Max=	25	150	37.0	37.0	0	0.0	12.2	0.0	21.1	12.2	0.0	21.1
	V=	25		37.0	37.0		0.0		0.0	21.1		0.0	21.1
	V TSR=	25		37.0	37.0		0.0		0.0	21.1		0.0	21.1

LEGEND

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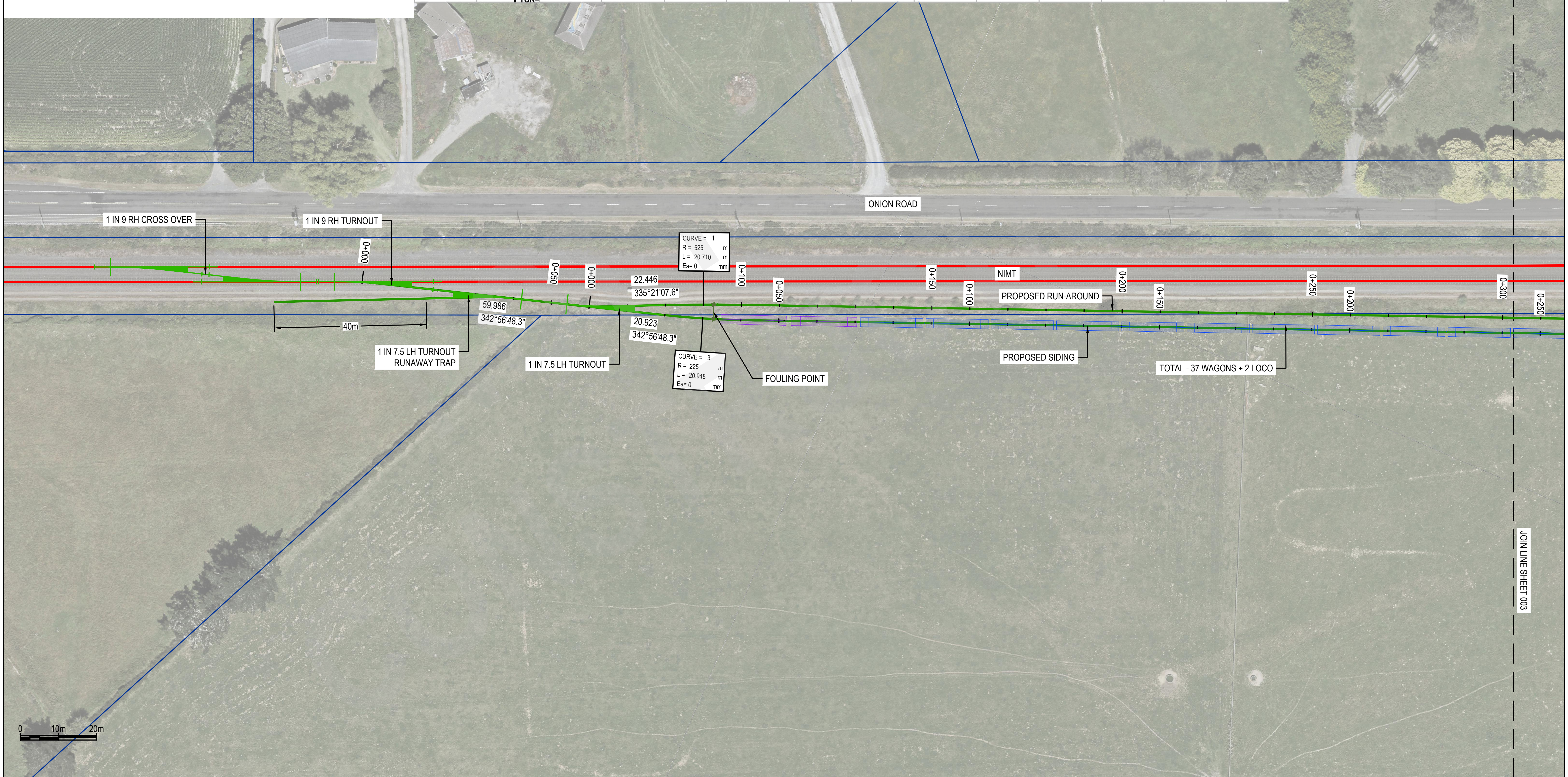
- EXISTING CENTRELINE
- EXISTING BOUNDARY
- PROPOSED TURNOUT
- IA WAGON & DL LOCO



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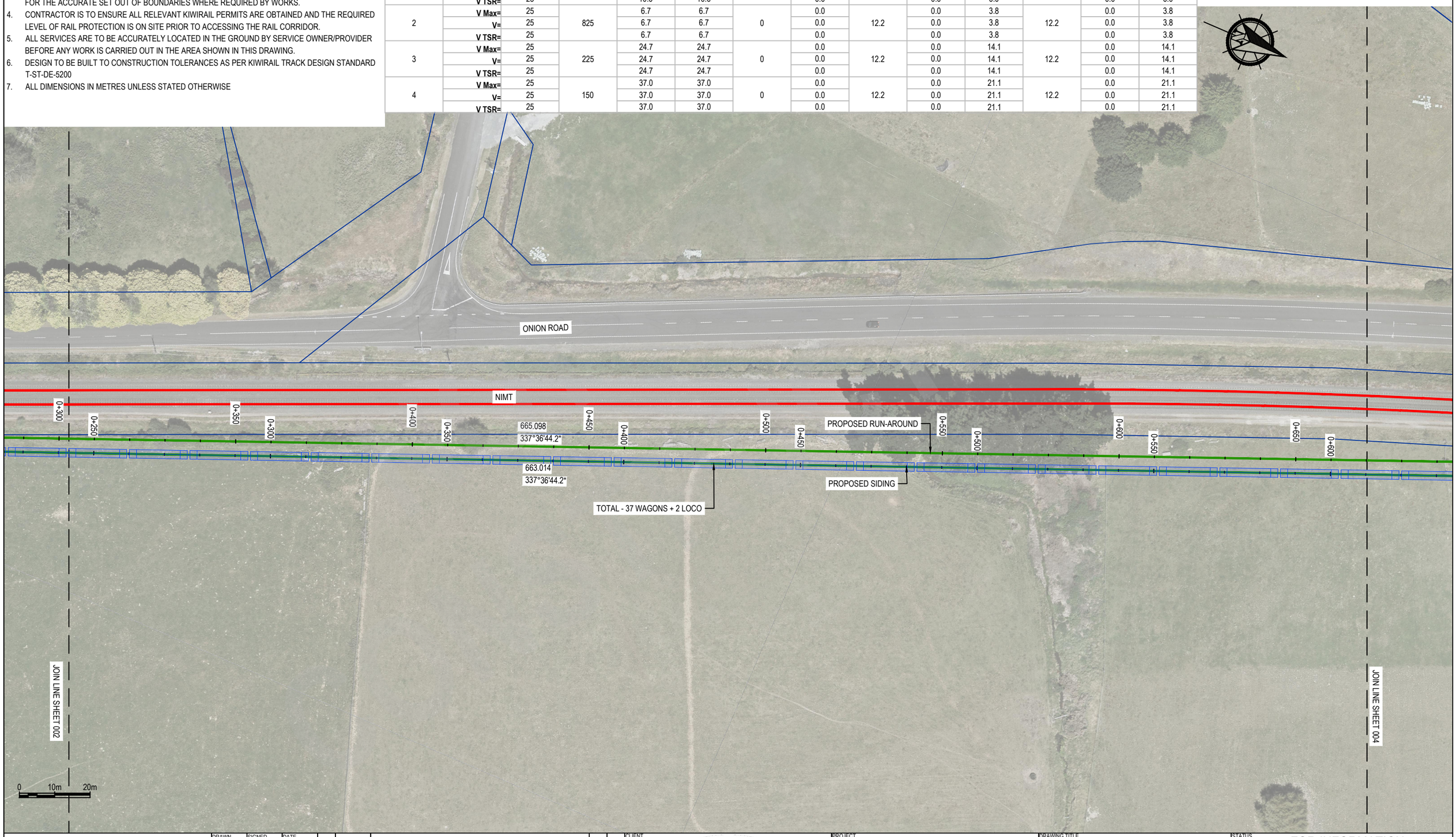

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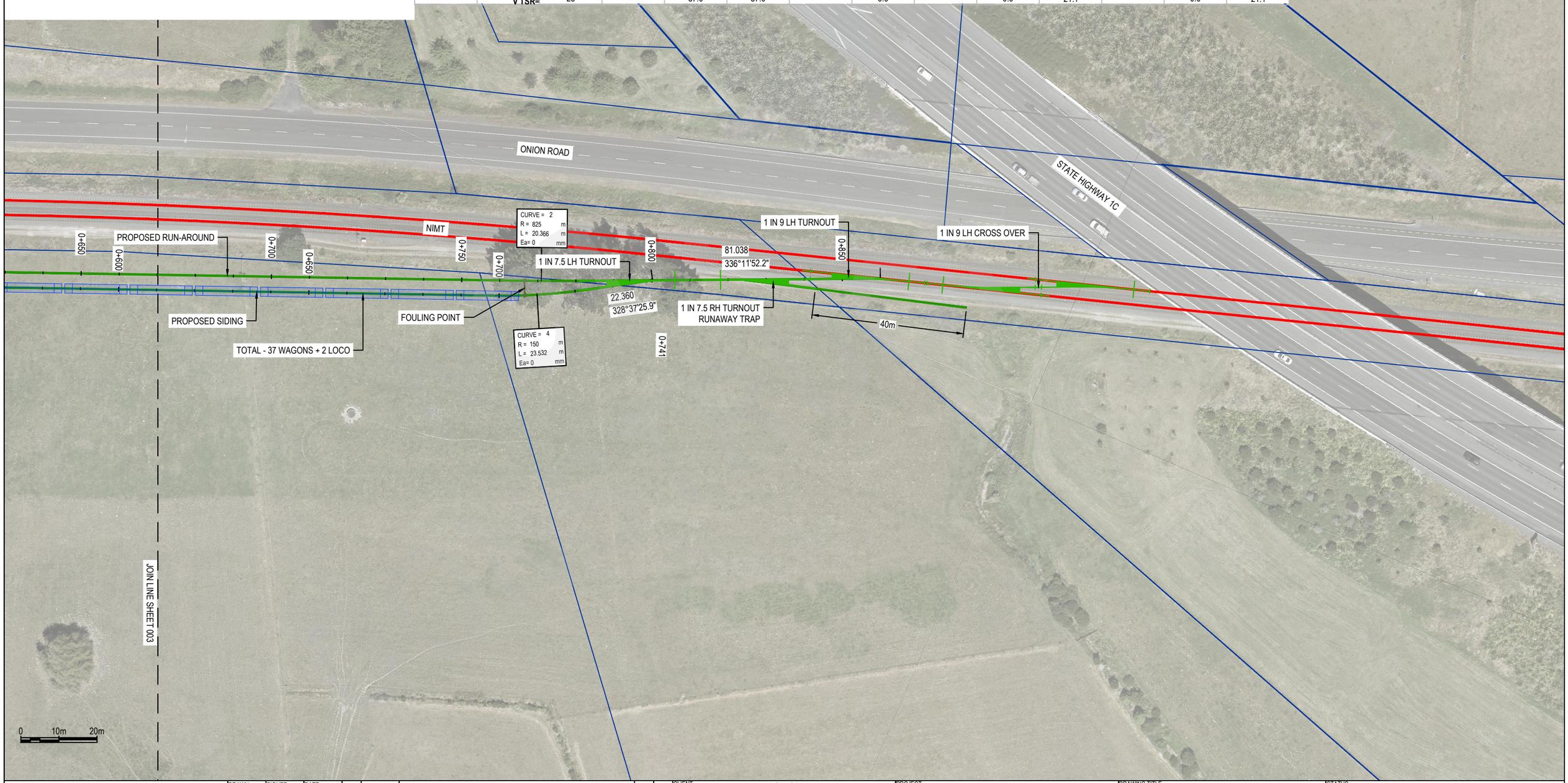
   BEARING & COORDINATE DATUM - MOUNT EDEN CIRCUIT 2000, VERTICAL DATUM - NZVD 2016
2. IMAGES SOURCED FROM TOITŪ TE WHENUA LAND INFORMATION NEW ZEALAND AND LICENSED BY TOITŪ TE WHENUA LAND INFORMATION NEW ZEALAND FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 INTERNATIONAL LICENCE
3. PROPERTY BOUNDARIES SOURCED FROM LINZ LANDONLINE DATABASE. THERE IS NO GUARANTEE TO THE SPATIAL ACCURACY OF THESE BOUNDARIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCURATE SET OUT OF BOUNDARIES WHERE REQUIRED BY WORKS.
4. CONTRACTOR IS TO ENSURE ALL RELEVANT KIWIRAIL PERMITS ARE OBTAINED AND THE REQUIRED LEVEL OF RAIL PROTECTION IS ON SITE PRIOR TO ACCESSING THE RAIL CORRIDOR.
5. ALL SERVICES ARE TO BE ACCURATELY LOCATED IN THE GROUND BY SERVICE OWNER/PROVIDER BEFORE ANY WORK IS CARRIED OUT IN THE AREA SHOWN IN THIS DRAWING.
6. DESIGN TO BE BUILT TO CONSTRUCTION TOLERANCES AS PER KIWIRAIL TRACK DESIGN STANDARD T-ST-DE-5200
7. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE

TRACK GEOMETRY DETAILS

CURVE NUMBER		SPEED	RADIUS	CANT EQUILIBRIUM (Eq) (mm)	CANT DEFICIENCY (ED) (mm)	CANT (Ea) (mm)	CANT % OF Eq	TRANSITION 1 LENGTH (m)	RATE OF CHANGE OF CANT (mm/s)	RATE OF CHANGE OF DEFICIENCY (mm/s)	TRANSITION 2 LENGTH (m)	RATE OF CHANGE OF CANT (mm/s)	RATE OF CHANGE OF DEFICIENCY (mm/s)
1	V Max=	25	525	10.6	10.6	0	0.0	12.2	0.0	6.0	12.2	0.0	6.0
	V=	25		10.6	10.6		0.0		0.0	6.0		0.0	6.0
	V TSR=	25		10.6	10.6		0.0		0.0	6.0		0.0	6.0
2	V Max=	25	825	6.7	6.7	0	0.0	12.2	0.0	3.8	12.2	0.0	3.8
	V=	25		6.7	6.7		0.0		0.0	3.8		0.0	3.8
	V TSR=	25		6.7	6.7		0.0		0.0	3.8		0.0	3.8
3	V Max=	25	225	24.7	24.7	0	0.0	12.2	0.0	14.1	12.2	0.0	14.1
	V=	25		24.7	24.7		0.0		0.0	14.1		0.0	14.1
	V TSR=	25		24.7	24.7		0.0		0.0	14.1		0.0	14.1
4	V Max=	25	150	37.0	37.0	0	0.0	12.2	0.0	21.1	12.2	0.0	21.1
	V=	25		37.0	37.0		0.0		0.0	21.1		0.0	21.1
	V TSR=	25		37.0	37.0		0.0		0.0	21.1		0.0	21.1

LEGEND
- DESIGN CENTRELINE
- EXISTING CENTRELINE
- EXISTING BOUNDARY
- PROPOSED TURNOUT
- IA WAGON & DL LOCO



Vitruvius

	DRAWN	SIGNED	DATE
	RS	RS	30/05/23
	DESIGNED	SIGNED	DATE
	RS	RS	30/05/23
	VERIFIED	SIGNED	DATE
	BH	BH	30/05/23
	APPROVED	SIGNED	DATE
	BJ	BJ	30/05/23

REV.	DATE	REVISION DETAILS	BY	APP.
P01	30/05/23	FOR INFORMATION	RS	BJ

CLIENT: Fonterra

PROJECT: FONTERRA SIDING FEASIBILITY ASSESSMENT

DRAWING TITLE: PROPOSED SIDING AND RUNAROUND SHEET 4 OF 4

STATUS: FOR INFORMATION
NOT FOR CONSTRUCTION

SCALE: 1:1000

SHEET SIZE: A3

PROJECT NO.	ORIGIN.	TASK	TYPE	DISC.	SHEET NO.	REV.
V-1253	VIT	01	DW	TR	2104	P01

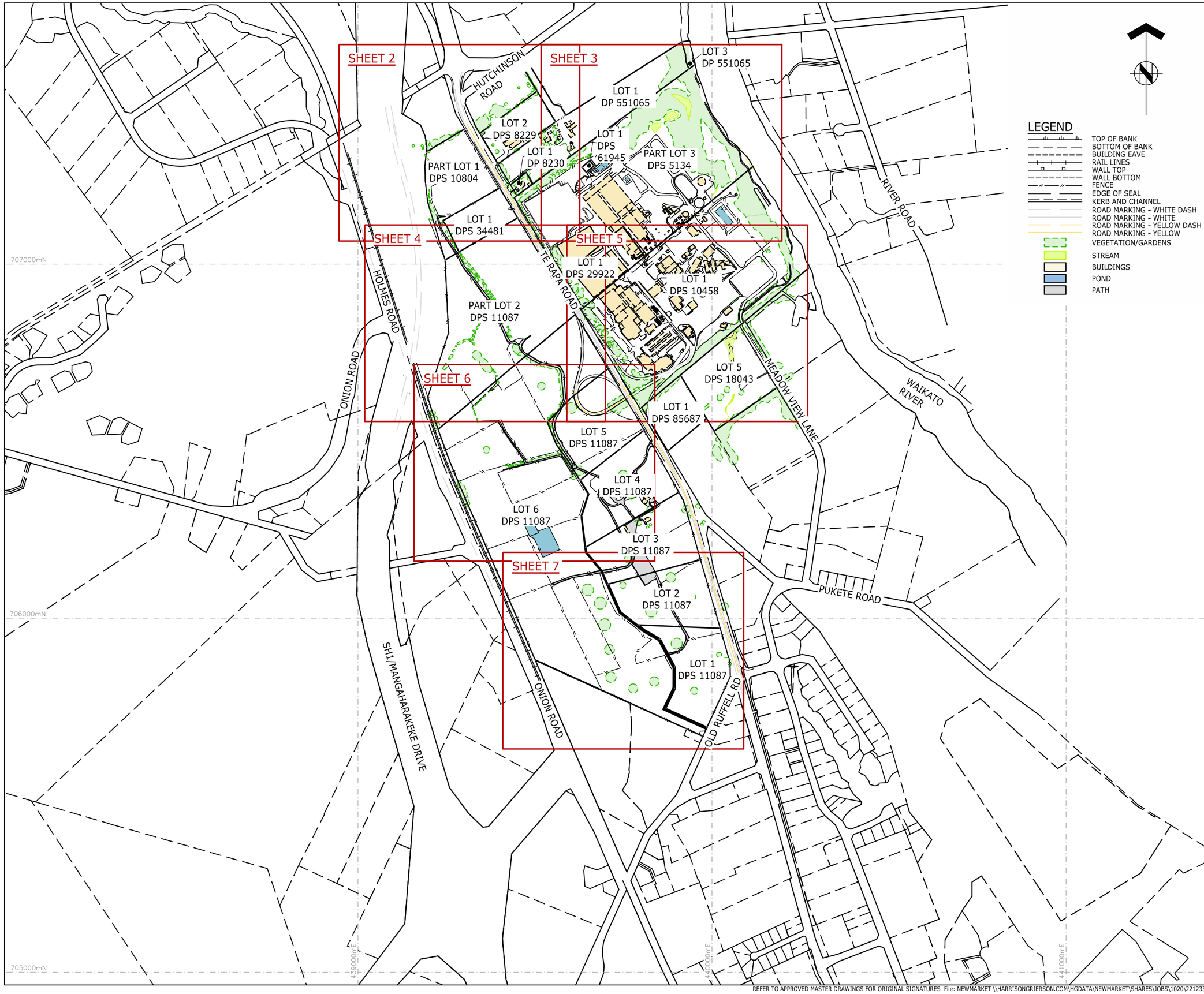
FILE: E:\12ds\data\SYNERGY\V-1253-Fonterra Siding – Feasibility Assessment, New Zealand_16501 DRAWINGS\V-1253-VIT-01-DR-RW-2100.dwg PLOTTED: 31/05/2023 9:16:54 am

Appendix

B

Topographic Survey

Vitruvius / give it strength
make it useful
deliver it beautifully



LEGEND

- TOP OF BANK
- BOTTOM OF BANK
- BUILDING EAVE
- RAIL LINES
- WALL TOP
- WALL BOTTOM
- FENCE
- EDGE OF SEAL
- KERB AND CHANNEL
- ROAD MARKING - WHITE DASH
- ROAD MARKING - WHITE
- ROAD MARKING - YELLOW DASH
- ROAD MARKING - YELLOW
- VEGETATION/GARDENS
- STREAM
- BUILDINGS
- POND
- PATH

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

NOTES

1. LEVELS ARE IN TERMS OF OF MOTURIKI VERTICAL DATUM 2016
   ORIGIN OF LEVELS
   BAQT
   RL 34.834
2. COORDINATES ARE IN TERMS OF NZ GEODETIC DATUM 2000
   MT EDEN CIRCUIT
   ORIGIN OF COORDINATES
   BAQT
   706245.406 mN
   439946.227 mE
3. CONTOURS ARE AT 0.5 m INTERVALS. CONTOURS SHOWN ON THIS PLAN HAVE BEEN ELECTRONICALLY COMPUTED FROM SPOT HEIGHT DETERMINATIONS AND MAY NOT REPRESENT THE TRUE GROUND LEVELS. ANY CRITICAL HEIGHTS SHOULD BE CHECKED ON SITE PRIOR TO DESIGN AND CONSTRUCTION COMMENCING.
4. THIS PLAN HAS BEEN CARRIED OUT TO TOPOGRAPHICAL STANDARDS. ALL LEVELS SHOWN ARE CORRECT AT TIME OF SURVEY. CRITICAL DIMENSIONS AND LEVELS SHOULD BE VERIFIED.
5. BOUNDARIES SHOWN ON THIS PLAN ARE FROM LAND INFORMATION NZ DCDB AND HAVE NOT BEEN SURVEYED. A BOUNDARY DEFINITION SURVEY SHOULD BE CARRIED OUT TO ESTABLISH EXACT BOUNDARY POSITIONS ON SITE.
6. ALL EASEMENTS, COVENANTS AND OTHER LEGAL INSTRUMENTS ASSOCIATED WITH THIS SITE MAY NOT BE SHOWN ON THIS PLAN. AN INVESTIGATION OF THE MOST CURRENT LEGAL RECORDS SHOULD BE UNDERTAKEN PRIOR TO DESIGN AND CONSTRUCTION COMMENCING.
7. SERVICES POSITIONS AND ALIGNMENT MAY HAVE BEEN OBTAINED FROM THIRD PARTY RECORDS AND SHOULD BE VERIFIED ON SITE PRIOR TO CONSTRUCTION COMMENCING. HARRISON GRIERSON DOES NOT IN ANY WAY GUARANTEE THE ACCURACY OF ANY UNDERGROUND SERVICE SHOWN ON THIS PLAN.
8. THIS PLAN MAY NOT PROVIDE ENOUGH INFORMATION FOR HEIGHT TO BOUNDARY CALCULATIONS. WHERE ANY PROPOSED BUILDING OR PART THEREOF IS REQUIRED TO MEET COUNCIL'S HEIGHT IN RELATION TO BOUNDARY CONTROLS, HARRISON GRIERSON SHOULD BE CONSULTED.
9. THESE NOTES ARE AN INTEGRAL PART OF THIS PLAN.
10. THIS PLAN IS ISSUED FOR A SPECIFIC PROJECT AND MAY NOT BE ALTERED OR USED FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF HARRISON GRIERSON.
11. LEGAL DESCRIPTION
    PART LOT 1 DPS 10804 3.8019ha, LOT 1 DPS 34481 1.8575 ha, PART LOT 2 DPS 10804 12.8119 ha, LOT 6 DPS 11087 31.1658 ha, LOT 5 DPS 11087 4.6842ha, LOT 4 DPS 11087 4.9295 ha, LOT 3 DPS 11087 4.6994 ha, LOT 2 DPS 11087 4.2011 ha, LOT 1 DPS 11087 4.1100 ha, LOT 2 DPS 8229 2.0234 ha, LOT 1 DP 551065 6.0076 ha, LOT 1 DPS 8230 0.2036 ha, PART LOT 3 DPS 5134 18.9784 ha, LOT 1 DPS 61945 0.0551 ha, LOT 1 DPS 29922 2.4174 ha, LOT 1 DPS 10458 20.3228 ha, LOT 1 DPS 85687 2.0235 ha, LOT 5 DPS 18043 4.1834 ha.

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PARNELL AUCKLAND 1051
T +64 9 917 5000
W www.harrisongrierson.com

REF	REVISIONS	BY	DATE
A	CLIENT ISSUE	DXH	01.05.23

PROJECT:

FONTERRA (NEW ZEALAND) LIMITED
TE RAPA MASTERPLAN
HAMILTON

TITLE:

SITE SURVEY
SHEET 1 OF 7
(INDEX SHEET)

ORIGINATOR: ISC	DATE: 03.2023	SIGNED:	PLOT BY: DXH
DRAWN: DXH	DATE: 29.03.23	SIGNED:	PLOT DATE: 01.05.23
CHECKED: DGM	DATE: 01.05.23	SIGNED:	SURVEY BY: ISC
APPROVED: DGM	DATE: 01.05.23	SIGNED:	SURVEY DATE: 03.2023

ISSUE STATUS: CLIENT ISSUE

PROJECT No:	SCALES:	
A2212331.00	1:5000 - A1 1:10000 - A3	A1

DRAWING No: 2212331-HG-XX-DR-XX-G-SS01 REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: NEWMARKET \\HARRISONGRIERSON.COM\HGDATA\NEWMARKET\SHARES\JOBS\1020\2212331_A TE RAPA MASTERPLAN\CAD\A2212331.00-HG-XX-DR-XX-G-SS00-SS06.DWG

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

LEGEND

- TOP OF BANK
- BOTTOM OF BANK
- BUILDING EAVE
- RAIL LINES
- WALL TOP
- WALL BOTTOM
- FENCE
- EDGE OF SEAL
- KERB AND CHANNEL
- ROAD MARKING - WHITE DASH
- ROAD MARKING - WHITE
- ROAD MARKING - YELLOW DASH
- ROAD MARKING - YELLOW
- VEGETATION/GARDENS
- STREAM
- BUILDINGS
- POND
- PATH

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REF	REVISIONS	BY	DATE
A	CLIENT ISSUE	DXH	01.05.23

PROJECT:

FONTERRA (NEW ZEALAND) LIMITED
TE RAPA MASTERPLAN
HAMILTON

TITLE:

SITE SURVEY
SHEET 2 OF 7

ORIGINATOR: ISC	DATE: 03.2023	SIGNED:	PLOT BY: DXH
DRAWN: DXH	DATE: 29.03.23	SIGNED:	PLOT DATE: 01.05.23
CHECKED: DGM	DATE: 01.05.23	SIGNED:	SURVEY BY: ISC
APPROVED: DGM	DATE: 01.05.23	SIGNED:	SURVEY DATE: 03.2023

ISSUE STATUS: CLIENT ISSUE

PROJECT No: A2212331.00

SCALES: 1:1000 - A1
1:2000 - A3

A1

DRAWING No: 2212331-HG-XX-DR-XX-G-SS02

REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: NEWMARKET \\HARRISONGRIERSON.COM\HGDATA\NEWMARKET\SHARES\JOBS\1020\2212331_A TE RAPA MASTERPLAN\CAD\A2212331.00-HG-XX-DR-XX-G-SS00-SS06.DWG

LOT 3
DP 551065
1039060
1543 m²

LOT 1
DP 551065
951342
6.0076 ha

LOT 1
DPS 61945
SA50C/513
551 m²

PART LOT 3
DPS 5134
SA50C/514
18.9784 ha

WAIKATO RIVER

2
DPS 68934

4
DPS 68934

2
DPS 61591

1
DPS 61591

7
DPS 61591

6
DPS 335494

CONTOURS INDICATIVE DUE TO VEGETATION

FENCE ON BOUNDARY
FENCE
EXISTING BUILDINGS
SEALED ROAD
GRAVEL ROAD
GRASS AREA
STREAM
POND
CONCRETE PAD
GRASS
TOP OF BANK
SEALED AREA
GRAVEL AREA
EXISTING BUILDINGS
STORAGE
TANK
TANKS
SHED
CONCRETE PATH
SEALED PATH
EDGE OF SEAL
EXISTING BUILDING

LEGEND

- TOP OF BANK
- BOTTOM OF BANK
- BUILDING EAVE
- RAIL LINES
- WALL TOP
- WALL BOTTOM
- FENCE
- EDGE OF SEAL
- KERB AND CHANNEL
- ROAD MARKING - WHITE DASH
- ROAD MARKING - WHITE
- ROAD MARKING - YELLOW DASH
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- VEGETATION/GARDENS
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- POND
- PATH

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REF	REVISIONS	BY	DATE
A	CLIENT ISSUE	DXH	01.05.23

PROJECT:

FONTERRA (NEW ZEALAND) LIMITED
TE RAPA MASTERPLAN
HAMILTON

TITLE:

SITE SURVEY
SHEET 3 OF 7

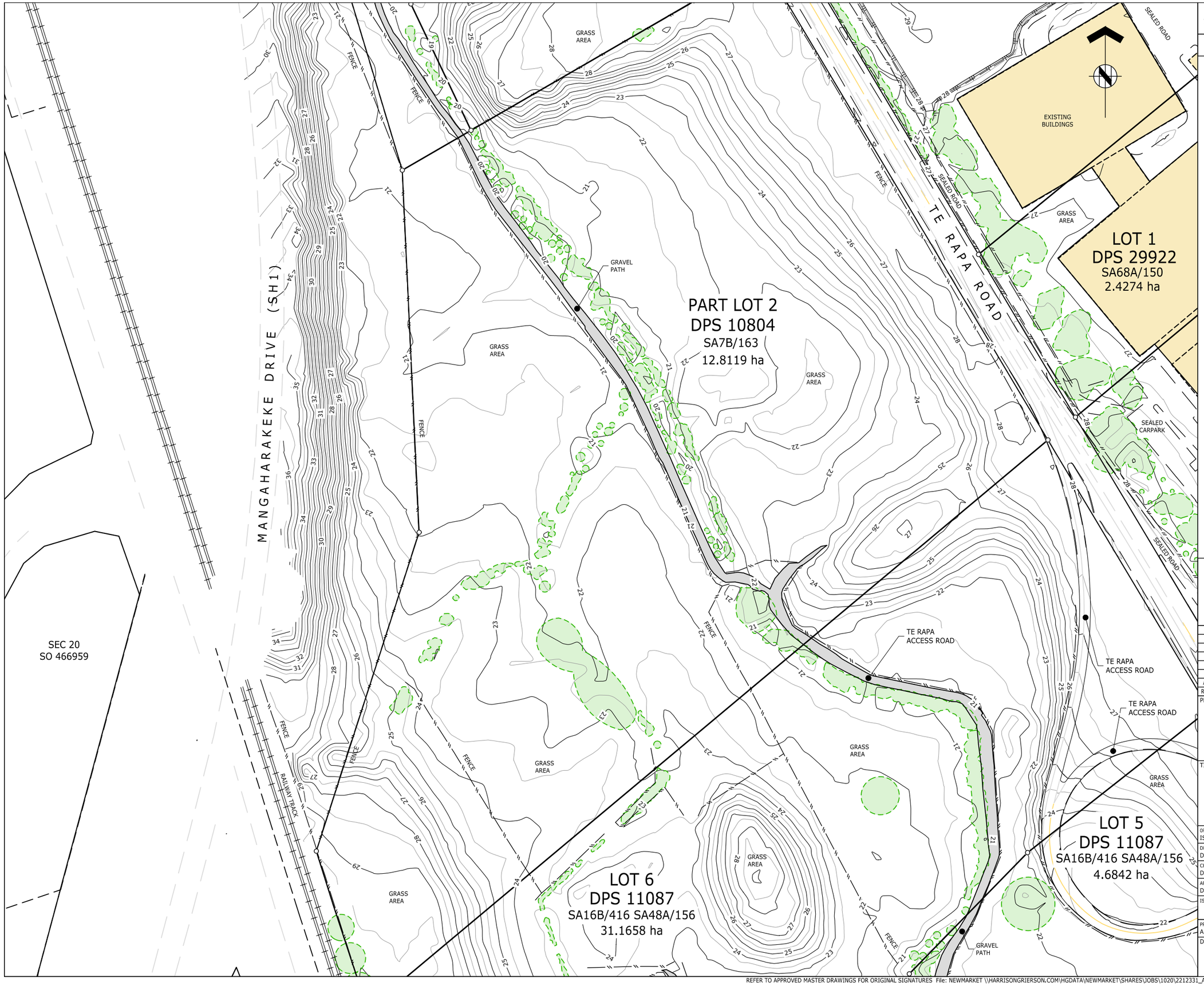
ORIGINATOR: ISC	DATE: 03.2023	SIGNED:	PLOT BY: DXH
DRAWN: DXH	DATE: 29.03.23	SIGNED:	PLOT DATE: 01.05.23
CHECKED: DGM	DATE: 01.05.23	SIGNED:	SURVEY BY: ISC
APPROVED: DGM	DATE: 01.05.23	SIGNED:	SURVEY DATE: 03.2023

ISSUE STATUS: CLIENT ISSUE

PROJECT No: A2212331.00
SCALES: 1:1000 - A1, 1:2000 - A3
A1

DRAWING No: 2212331-HG-XX-DR-XX-G-SS03
REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: NEWMARKET \\HARRISONGRIERSON.COM\HGDATA\NEWMARKET\SHARES\JOBS\1020\2212331_A TE RAPA MASTERPLAN\CAD\A2212331.00-HG-XX-DR-XX-G-SS00-SS06.DWG



ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

LEGEND

- TOP OF BANK
- BOTTOM OF BANK
- BUILDING EAVE
- RAIL LINES
- WALL TOP
- WALL BOTTOM
- FENCE
- EDGE OF SEAL
- KERB AND CHANNEL
- ROAD MARKING - WHITE DASH
- ROAD MARKING - WHITE
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- STREAM
- BUILDINGS
- POND
- PATH

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REF	REVISIONS	BY	DATE
A	CLIENT ISSUE	DXH	01.05.23

PROJECT:

FONTERRA (NEW ZEALAND) LIMITED
TE RAPA MASTERPLAN
HAMILTON

TITLE:

SITE SURVEY
SHEET 4 OF 7

ORIGINATOR: ISC	DATE: 03.2023	SIGNED:	PLOT BY: DXH
DRAWN: DXH	DATE: 29.03.23	SIGNED:	PLOT DATE: 01.05.23
CHECKED: DGM	DATE: 01.05.23	SIGNED:	SURVEY BY: ISC
APPROVED: DGM	DATE: 01.05.23	SIGNED:	SURVEY DATE: 03.2023

ISSUE STATUS: CLIENT ISSUE

PROJECT No: A2212331.00	SCALES: 1:1000 - A1 1:2000 - A3	A1
DRAWING No: 2212331-HG-XX-DR-XX-G-SS04		REV A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: NEWMARKET \\HARRISONGRIERSON.COM\HGDATA\NEWMARKET\SHARES\JOBS\1020\2212331_A TE RAPA MASTERPLAN\CAD\A2212331.00-HG-XX-DR-XX-G-SS00-SS06.DWG

LOT 1
DPS 29922
SA68A/150
2.4274 ha

LOT 1
DPS 10458
SA68A/150
20.3228 ha

LOT 5
DPS 11087
SA16B/416 SA48A/156
4.6842 ha

LOT 5
DPS 18043
SA16D/1480
4.1834 ha

LOT 1
DPS 85687
SA68A/150
2.0235 ha

1
DPS 61136

3
DPS 61136

EXISTING BUILDINGS
EXISTING BUILDING
TANKS
TANK
SEALED ROAD
SEALED CARPARK
SEALED AREA
CONCRETE AREA
CONCRETE PATH
GRASS AREA
FENCE
STREAM
CARPARK CANOPY
EXISTING BUILDING
GRAVEL PATH
TE RAPA ACCESS ROAD
TE RAPA ROAD
MEADOW VIEW LANE

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

LEGEND

- TOP OF BANK
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- VEGETATION/GARDENS
- STREAM
- BUILDINGS
- POND
- PATH

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REF	REVISIONS	BY	DATE
A	CLIENT ISSUE	DXH	01.05.23

PROJECT:
FONTERRA (NEW ZEALAND) LIMITED
TE RAPA MASTERPLAN
HAMILTON

TITTLE:
SITE SURVEY
SHEET 5 OF 7

ORIGINATOR: ISC	DATE: 03.2023	SIGNED:	PLOT BY: DXH
DRAWN: DXH	DATE: 29.03.23	SIGNED:	PLOT DATE: 01.05.23
CHECKED: DGM	DATE: 01.05.23	SIGNED:	SURVEY BY: ISC
APPROVED: DGM	DATE: 01.05.23	SIGNED:	SURVEY DATE: 03.2023

ISSUE STATUS: CLIENT ISSUE

PROJECT No: A2212331.00
SCALES: 1:1000 - A1, 1:2000 - A3
A1

DRAWING No: 2212331-HG-XX-DR-XX-G-SS05
REV A

ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

LEGEND

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A	CLIENT ISSUE	DXH	01.05.23
REF	REVISIONS	BY	DATE

PROJECT:

FONTERRA (NEW ZEALAND) LIMITED
TE RAPA MASTERPLAN
HAMILTON

TITLE:

SITE SURVEY
SHEET 6 OF 7

ORIGINATOR: ISC	DATE: 03.2023	SIGNED:	PLOT BY: DXH
DRAWN: DXH	DATE: 29.03.23	SIGNED:	PLOT DATE: 01.05.23
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APPROVED: DGM	DATE: 01.05.23	SIGNED:	SURVEY DATE: 03.2023

ISSUE STATUS: CLIENT ISSUE

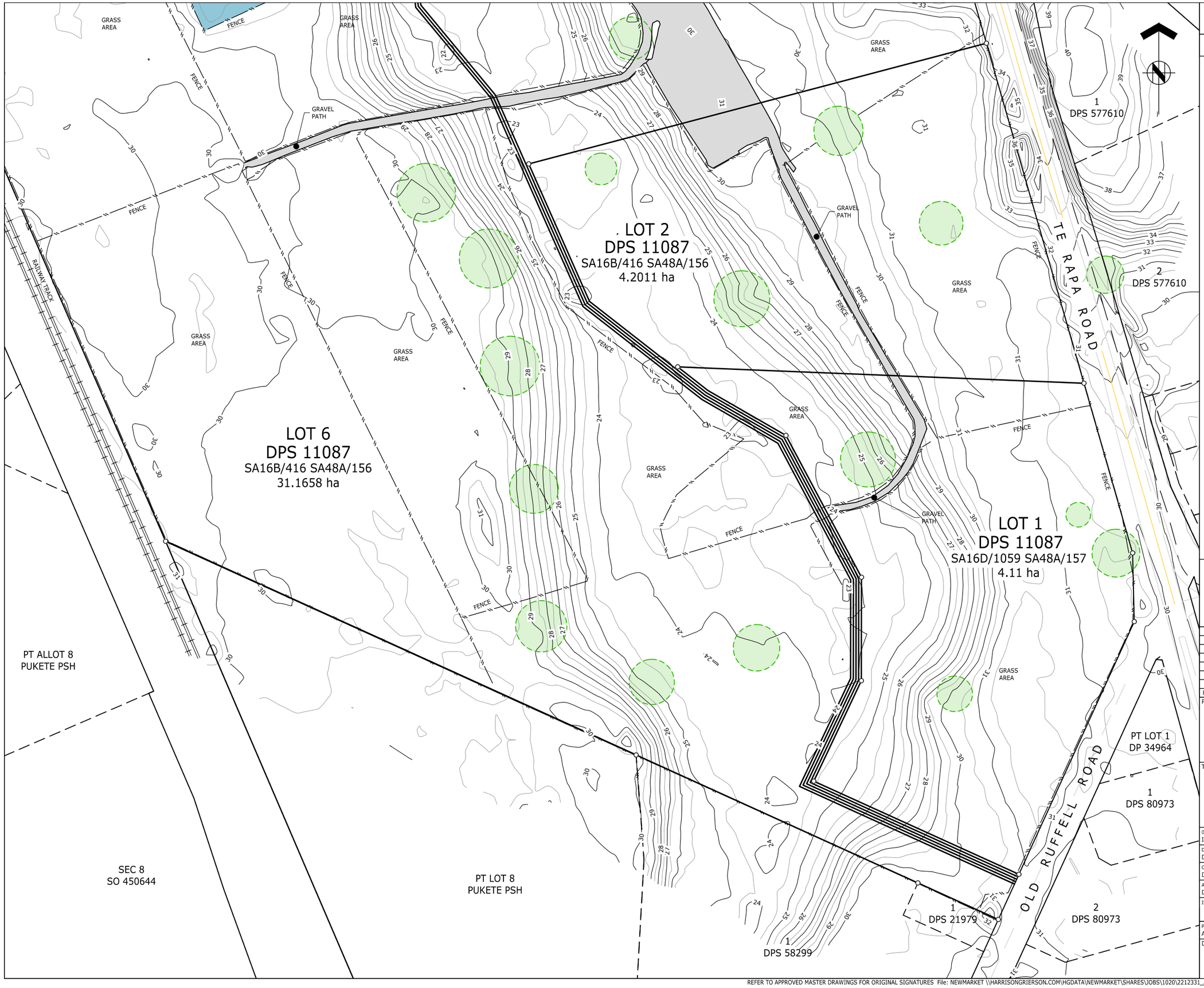
PROJECT No: A2212331.00

SCALES: 1:1000 - A1, 1:2000 - A3

A1

DRAWING No: 2212331-HG-XX-DR-XX-G-SS06

REV A



ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND

ISO 9001 QUALITY ASSURED

LEGEND

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REF	REVISIONS	BY	DATE
A	CLIENT ISSUE	DXH	01.05.23

PROJECT:

FONTERRA (NEW ZEALAND) LIMITED
TE RAPA MASTERPLAN
HAMILTON

TITTLE:

SITE SURVEY
SHEET 7 OF 7

ORIGINATOR: ISC	DATE: 03.2023	SIGNED:	PLOT BY: DXH
DRAWN: DXH	DATE: 29.03.23	SIGNED:	PLOT DATE: 01.05.23
CHECKED: DGM	DATE: 01.05.23	SIGNED:	SURVEY BY: ISC
APPROVED: DGM	DATE: 01.05.23	SIGNED:	SURVEY DATE: 03.2023

ISSUE STATUS: CLIENT ISSUE

PROJECT No: A2212331.00	SCALES: 1:1000 - A1 1:2000 - A3	A1
DRAWING No: 2212331-HG-XX-DR-XX-G-SS07		REV A

Appendix

C

Masterplan

Vitruvius / give it strength
make it useful
deliver it beautifully

Te Rapa North
ILLUSTRATIVE MASTER PLAN

Te Rapa North Industrial Land
Owned by Fonterra

Te Rapa North Industrial Land
Owned by Others

All features shown are indicative.

SCALE:	1:10,000 at A3
CLIENT	Fonterra (New Zealand)Ltd
PROJECT:	Te Rapa Masterplan
DATE:	<DatePublished
STATUS:	For Illustration Purposes

N

HARRISON GRIERSON

A2212331.00- DRAFT

UD900

Appendix

D

Safety in Design Register

Vitruvius / give it strength
make it useful
deliver it beautifully

Safety in Design Risk Register

Vitruvius

PROJECT							
Reference:	V-1253	Author Sign:		Author:	Richard Stone	Date:	1 June 2023
Name:	FONTERRA SIDING FEASIBILITY						
Stage:	FEASIBILITY OPTIONS	Reviewer Sign:		Reviewer:	N Holman	Date:	1 June 2023
Location:	NIMT 550KM - 552KM						

RISKS ASSOCIATED WITH DESIGN ELEMENT									STAGE			DESIGN MITIGATION MEASURES AND RESIDUAL RISK						
						Who is at Risk?												
Number	Activity	Risk or Circumstance	Consequence	Likelihood	Consequence	Risk	Principal / Contractor	Public	Construction	Operation & Maintenance	Demolition	Design Mitigation Measures	Likelihood	Consequence	Risk	Risk Owner	Expected Date to Complete Action	Comments
1	Track Geometry set out and construction	Track not built to design	Train derailment	3	4	High	Y	Y	Y	Y	N	• Design to provide accurate set out data • Design set out close to time of construction to avoid disturbance of set out marks • Recommend Speed restriction be set in place until track is confirmed to be built to design • As-built survey to confirm track geometry is built within construction tolerances set in KiwiRail Track Design Standard T-ST-DE-5200, prior to opening the track to	1	4	Low	Principal / Contractor	Unsure	Nil
			Train collision with fixed structure	3	4	High	Y	Y	Y	Y	N	• Design to provide accurate set out data • Design set out close to time of construction to avoid disturbance of set out marks • As-built survey to confirm track geometry is built within construction tolerances set in KiwiRail Track Design Standard T-ST-DE-5200, prior to opening the track to line speed.						
		Error in Survey	Train derailment	3	4	High	Y	Y	Y	Y	N	Have survey team check controls prior to set out.	1	4	Low	Principal / Contractor	Unsure	Nil
		Excess Ballast needed	Unable to open line to trains	3	1	Low	Y	Y	Y	Y	N	Follow KiwiRail Task Instruction and ensure enough material is on site.	1	1	Low	Principal / Contractor	Unsure	Nil
		Drainage doesn't work	Flooding	2	1	Low	Y	Y	Y	Y	N	• Apply KiwiRail standard drainage profiles, and inspect them prior to leaving the site • Ensure no culverts are blocked before leaving the site • Ensure flow paths to existing or designed outlets are clear and free draining • Check all low points to ensure the water has somewhere to go.	1	1	Low	Principal / Contractor	Unsure	Nil
			Train collision with fixed structure	3	4	High	Y	Y	Y	Y	N	All track components inspected before opening line to trains	1	4	Low	Principal / Contractor	Unsure	Nil
		Damage to services	Unable to open line to trains	3	1	Low	Y	Y	Y	Y	N	• Contractors to Carry out Before U Dig checks and service locate in areas of work. Before commencing work • KiwiRail services shall also be identified and located	1	1	Low	Principal / Contractor	Unsure	Nil

Safety in Design Risk Register

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Number	Activity	Risk or Circumstance	Consequence	Likelihood	Consequence	Risk	Who is at Risk? Principal / Contractor	Who is at Risk? Public	Construction	Operation & Maintenance	Demolition	Design Mitigation Measures	Likelihood	Consequence	Risk	Risk Owner	Expected Date to Complete Action	Comments
			Electrocution	1	5	High	Y	Y	Y	Y	N	• Contractors to Carry out Before U Dig checks and service locate in areas of work. Before commencing work • KiwiRail services shall also be identified and located	1	5	High	Principal / Contractor	Unsure	Nil
2	Earth Works																	
		Large earth work cuts/fill	Ground collapse	1	4	Low	Y	N	Y	N	N	Shoring of all trenches	1	4	Low	Principle / Contractor	Unsure	Nil
			Service Strike	3	1	Low	Y	N	Y	N	N	• Contractors to Carry out Before U Dig checks and service locate in areas of work. Before commencing work • KiwiRail services shall also be identified and located	1	4	Low	Principle / Contractor	Unsure	Nil
			Electrocution	1	5	High	Y	Y	Y	Y	N	• Contractors to Carry out Before U Dig checks and service locate in areas of work. Before commencing work • KiwiRail services shall also be identified and located	1	5	High	Principal / Contractor	Unsure	Nil

LIKLIHOOD			CONSEQUENCES				
			Negligible Injury requiring short-term first aid care and no absence from workplace. 1	Minor Injury requiring short-term medical treatment and workplace absence less than 1 day. 2	Moderate Injury requiring medical treatment or lost time of 1 day to 3 weeks. 3	Severe Serious injury (injuries) requiring specialist medical treatment of lost time greater than 3 weeks. 4	Extreme Loss of life, permanent disability, or multiple serious injuries. 5
Almost Certain	Expected to occur in most circumstances	5	LOW	HIGH	HIGH	CRITICAL	CRITICAL
Likely 55%-85%	Will probably occur in most circumstances	4	LOW	MEDIUM	HIGH	CRITICAL	CRITICAL
Possible 30%-55%	Likely to occur at some time	3	LOW	MEDIUM	MEDIUM	HIGH	CRITICAL
Unlikely 5%-30%	More likely not to occur under normal conditions	2	LOW	LOW	MEDIUM	MEDIUM	HIGH
Rare <5%	Will only occur in exceptional circumstances	1	LOW	LOW	LOW	LOW	HIGH