TRAFFIC PLANNING CONSULTANTS LTD

PROPOSED EARTH-FILL SITE
TRANSPORT ASSESSMENT

1618 ARARIMU ROAD
PAPAKURA

Project Information:

Client	SB Civil
Job Number	220863
Title	Proposed Earth-Fill Site, 1618 Ararimu Road, Papakura
Prepared By	Peter Kelly
Date	September 2023
Report Status	Final

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1.0 INTRODUCTION

The proposal consists of establishing an earth-fill site at 1618 Ararimu Road, Papakura. The site has been designed to take an approximately 1.56 million m^3 of fill, over an approximate 10-15 year period. **Figure 1** illustrates the subject site location and proposed access point.

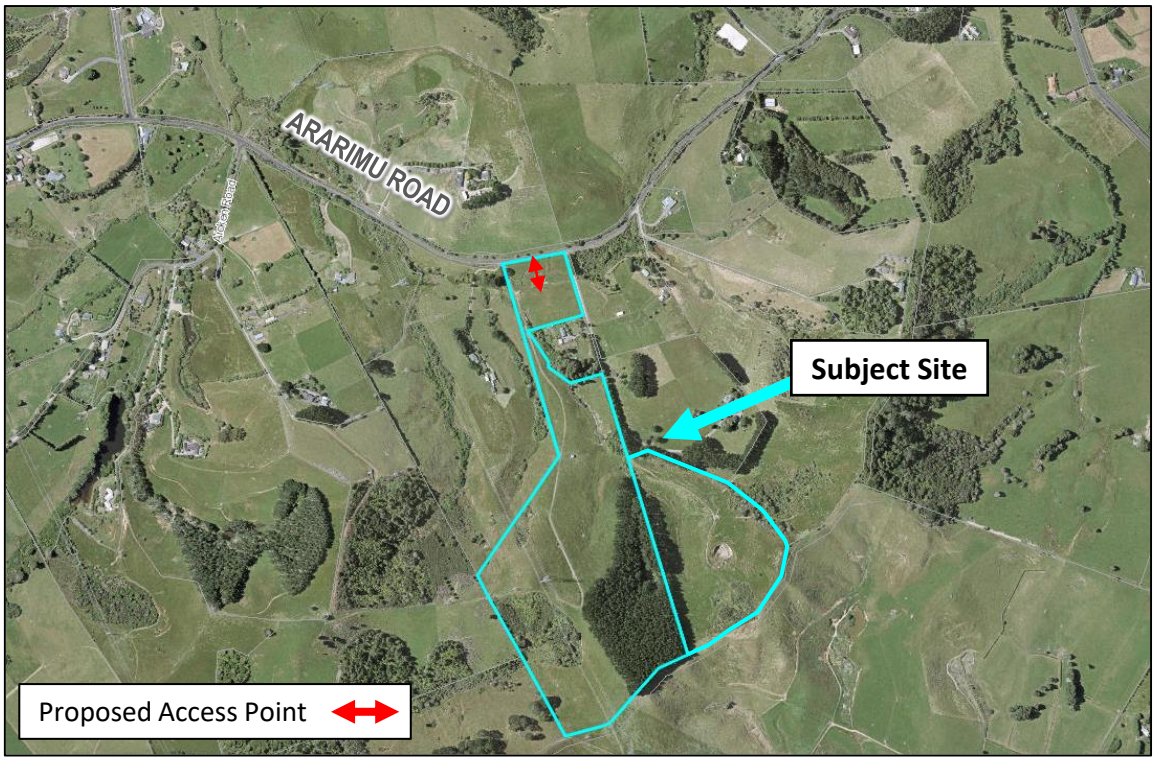


Figure 1: Site Location
Image Source: Auckland Council GeoMaps

2.0 EXISTING TRANSPORT ENVIRONMENT

2.1 Road Network

In the location near the subject site, Ararimu Road is a two-lane local road. Ararimu Road runs from Great South Road in the west to Paparimu Road in the east. It has a carriageway width of approximately 7 metres near the subject site and the road follows relatively gentle vertical and horizontal curves in alignment with the natural topography. Near the site Ararimu Road has a posted speed limit of 80 km/h. East of the subject site, Ararimu Road is provided with advisory curve 45 km/h signage and chevron boards to highlight the curve within the road.

Traffic counts and vehicle operating speeds were collected along Ararimu Road via a one-week tube count. From this data collection it was determined that Ararimu Road has an average daily traffic of 299 vehicles, with a peak hour volume of 37 vehicle movements. On average, 14.7% of the vehicle traffic along Ararimu Road was classified as heavy vehicles.

The tube count was installed approximately 90 metres west of the existing vehicle crossing for 1618 Ararimu Road. In this location the 85th percentile eastbound and westbound speeds were determined to be 78.3 km/h and 84.2 km/h respectively. Both the traffic count and operating speed data can be made available upon request.

2.2 Crash History

A review of crash data for the ten year+ period of January 2012 to present (2023 data subject to reporting delays) along Ararimu Road between Aicken Road and Paparimu Road, shows that a total of five crashes were reported which are summarised as:

- April 2020 – Ararimu Road, 500 metres south of Paparimu Road: Motorcyclist lost control while turning due to a medical illness and went off road into the ditch. A minor injury was reported.
- July 2020 – Intersection of Ararimu Road and Paparimu Road: Driver travelling at excessive speed, lost control while turning through curve and hitting loos material on road. No injuries were reported.
- November 2020 – Intersection of Ararimu Road and Aicken Road: Driver overtaking another vehicle at junction, hit other vehicle which was turning right. No injuries were reported.
- December 2020 – Intersection of Ararimu Road and Paparimu Road: Motorcyclist travelling at excessive speed, lost control at bend and went off road. A minor injury was reported.
- June 2022 – Ararimu Road, 775 metres south of Paparimu Road: Driver lost control presumably due to excessive speed and hit the road bank multiple times. A minor injury was reported.

From the available crash history, there are no significant trends within the data that would suggest any inherent road safety concerns with respect to the road, nor with property access onto Ararimu Road.

3.0 PROPOSED DEVELOPMENT

The proposal consists of repurposing the existing rural site to enable the depositing of earth fill from various sites throughout Auckland. The site is estimated to accommodate 1.56 million m^3 of fill over a 15-year period.

3.1 Trip Generation

Based on the site accommodating 1.56 million m^3 of fill over the next 10-15 years, the site is estimated to receive approximately 104,000-156,000 m^3 per annum. Based on an average single body truck fill volume of 6 m^3 approximately 17,350-26,000 trucks can be anticipated each year to the site, or 58-87 trucks per working day (Monday-Saturday, ~300 days per year). Over an approximate 10-hour operation day (Monday-Saturday), this equates to 6-9 trucks each hour, or 12-18 truck movements (split equally between in-out of the site) each hour, on average.

With the existing traffic volumes on Ararimu Road being relatively low (299 daily vehicles, with 37 peak hour vehicles), truck traffic to/from the site are forecast to be able to turn freely with minimal delay/queuing along Ararimu Road or within the site's access. As well, the vehicle traffic associated with the site can be accommodated within the surrounding road environment with less than minor effects.

3.2 Site Access

The existing site is currently served by a single vehicle crossing along the site's western boundary. The existing crossing will be removed and reinstated as grass berm as part of the proposal. A new vehicle crossing will be constructed approximately mid-way along the site's frontage, so to be located in a position with increased visibility along Ararimu Road (discussed in later section). The vehicle crossing will be onto a local road, more than 500 metres from the nearest intersection. As such there are no vehicle access restrictions which apply to the site.

The vehicle crossing for the site will be formed with a bespoke design to facilitate two-way vehicle movement at the access for a truck and trailer. The vehicle crossing has also been design, such that a truck and trailer turning left out of the site will not be required to cross the centreline of Ararimu Road. The vehicle crossing will have a width of 23 metres at the boundary, where under the AUP a maximum width of 9 metres is permitted. Assessment on the effect of this non-compliance is included later within this report.

The facilitation of vehicle turning movements to/from Ararimu Road in both directions was a main consideration in the design of the vehicle crossing. Vehicle tracking diagrams are included in Attachment 1 illustrating the design vehicle turning to/from the site.

Within the site, the access will have a formed width of 6.0 metres, allowing for two-way vehicle movement along straight sections of the access, and ensuring vehicles stay within sealed areas through bends along the access. Overall, the access widths comply with the E27 standards.

The access will be formed with a gradient no steeper than of 1 in 16.1 (6.2%), with a platform gradient of 1 in 16.1 (6.2%). Under the AUP standards, non-residential vehicle accesses are permitted a maximum gradient of 1 in 8 (12.5%) and require a vehicle platform six metres in length on a gradient of 1 in 20 (5%). Therefore, the proposed vehicle access platform gradient does not comply with this standard. Assessment on the effect of this non-compliance is included later within this report.

3.3 Sight Distance

3.3.1 Guidelines for Visibility at Driveways (RTS 6)

In respect of sight distance, the appropriate standard to use is the Land Transport Safety Authority publication "Guidelines for Visibility at Driveways". There are two components to the sight distance measurement, the first being the sight distance requirement and the second being the lines of clear sight. The sight distance/lines of clear sight required is dependent upon the traffic generation of the proposal, the 85th percentile speed of vehicles on the frontage road, and the classification of the frontage road.

For this location, the access is forecast to accommodate less than 200 vehicle trips per day, therefore classifying the driveway as low volume. The 85th percentile speed along Ararimu Road were found to be 84 km/h (rounded up to 90 km/h). As Ararimu Road is a local road, a sight distance of 130 metres is required.

Sight distances at the proposed vehicle crossing location were confirmed to be 140 metres towards the west and more than 170 metres to the west. **Figure 4** displays the indicative sight distance for the vehicle crossing along Ararimu Road.

Overall, the proposed access point provides a suitable level of sight distance.

Figure 4: Vehicle Crossing Indicative Sight Distance along Ararimu Road
Source: Traffic Planning Consultants Ltd

Figure 5: Ararimu Road Indicative Sight Distance toward Vehicle Crossing
Source: Traffic Planning Consultants Ltd

3.3.2 Austroads Intersection Visibility

Further sightlines have been assessed under the Austroads publication "Part 4A: Unsignalised and Signalised Intersections". There are three types of sight distance[1] that should be provided at intersections:

- Approach Sight Distance (ASD) – is the minimum level of sight distance which must be available on the minor road approaches to all intersections to ensure that drivers are aware of the presence of an intersection.
- Safe Intersection Sight Distance (SISD) – is the minimum distance which should be provided on the major road at any intersection. It provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle on a minor road approach moving into a collision situation (e.g. in the worst case, stalling across the traffic lanes) and to decelerate to a stop before reaching the collision point.
- Minimum Gap Sight Distance (MGSD) – is based on the distances corresponding to the critical acceptance gap that drivers are prepared to accept when undertaking a crossing or turning manoeuvre at intersections.

Approach Sight Distance

Within Austroads, an equation is provided to determine the ASD taking into account factors such as decision time, operating speed, and road gradients. The equation provided is:

$$ASD = \frac{R_T \times V}{3.6} + \frac{V^2}{254 \times (d + 0.01 \times a)}$$

Where:

- ASD = approach sight distance (m)
- R_T = reaction time (2 s)
- V = operating (85th percentile) speed (km/h)
- d = coefficient of deceleration (0.36)
- a = longitudinal grade (%)

Based on a 30 km/h operating speed for vehicles exiting the site (anticipating stopping at Ararimu Road and rounding the access' bend), a 2.0s reaction time (alert drivers anticipating stopping at Ararimu Road), and a ~5% uphill gradient, an Approach Sight Distance of 25 metres is required.

From the design of the site's access, drivers will have more than 100 metres of approach sight distance available along the access towards Ararimu Road, the available sight distance meets the ASD requirement. Additionally, drivers exiting the site will be aware of the presence of Ararimu Road as they would have entered from this location previously.

[1] Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections, Chapter 3 – Sight Distance, Austroads, 2010

Safe Intersection Sight Distance

Within Austroads, an equation is provided to determine the SISD taking into account factors such as decision time, operating speed, and road gradients. The equation provided is:

$$SISD = \frac{D_T \times V}{3.6} + \frac{V^2}{254 \times (d + 0.01 \times a)}$$

Where:

- SISD = safe intersection sight distance (m)
- D_T = decision time (s): observation time (1.5 s) + reaction time (2 s)
- V = operating (85th percentile) speed (km/h)
- d = coefficient of deceleration (0.36)
- a = longitudinal grade (%)

Utilising the collected 85th percentile speed data along Ararimu Road for eastbound traffic (78.3 km/h) and westbound traffic (84.2 km/h), a 1.5 second observation time (T-intersection with two-lane main road carrying less than 4,000 vehicles per day), a SISD of 143.2 metres is required for eastbound traffic and 159.4 metres for southbound traffic. During a site visit the available eastbound SISD was confirmed to be approximately 140 metres and the available westbound SISD was confirmed to be 170 metres, as shown in **Figure 3** and **Figure 4**.

While the available sightlines for the eastbound approach are deficient by approximately 3 metres, considering the available sightlines, the surrounding environment and the volume of vehicle movements along Ararimu Road and along the site's access, the access point has suitable Safe Intersection Sight Distance from both the east and west in order to operate safely. It is recommended that approximately 200 metres east and west of the site regulatory warning signs "Vehicles Crossing Trucks", denoted as a PW-50 be installed to increase awareness for drivers along Ararimu Road.

Minimum Gap Sight Distance

For the site access, vehicles turning onto Ararimu Road require a sight distance corresponding to the amount of time required to complete a turning movement and reach the 85th percentile speed along the main road (78 and 84 km/h, rounded to 80 and 90 km/h). In this case, vehicles turning from the access will require a minimum gap sight distance to account for 5 seconds to turn and then time to accelerate to reach an operating speed that will not largely impact vehicles already along the main road. Based on this, an eastbound and westbound MGSDs of 111 metres and 125 metres are required for an 85th percentile operating speed of 80/90 km/h.

From the site access at its intersection with Ararimu Road, a gap sight distance of approximately 140 metres to the west is available and 170 metres to the east. **Figure 3** and **Figure 4** display the available sight distance along Ararimu Road from the site access towards the east and west respectively. Both directions exceed the MGSD requirement.

3.4 Ararimu Road and Site Access Auxiliary Turn Lane Treatment

The intersection of Ararimu Road and the site access is anticipated to accommodate approximately 90 vpd, with 20 vph turning through the intersection to access the wider road network. Additionally, Ararimu Road is likely to carry up to up to 50 peak hour vehicle movements. Applying these volumes; the turn lane nomograph within Austroads for a 70-100 km/h speed environment indicates that no auxiliary turn lane treatments are warranted, as shown in **Figure 5**.

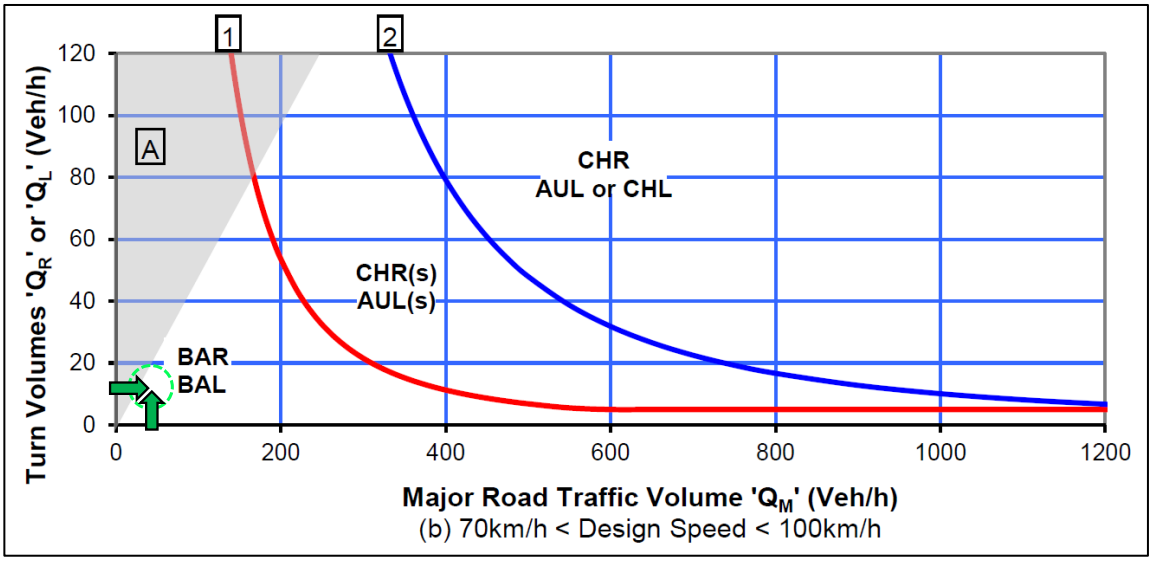


Figure 5: Auxiliary Turn Lane Warrant Nomograph
Image Source: Austroads

3.5 Parking Design

As part of this Resource Consent application, there are no formal plans to establish on-site parking. Given the scale of the site and then general arrangements, it is anticipated that parking on site will be informal in nature but will have sufficient space provided to allow for safe and efficient parking and manoeuvring.

It is anticipated that parking spaces will be formed on gradients not exceeding 1 in 20 (5.0%) with manoeuvring area gradients no steeper than 1 in 8 (12.5%). Within the AUP parking spaces are permitted to have a maximum gradient of 1 in 20 (5.0%) and manoeuvring areas are permitted a maximum gradient of 1 in 8 (12.5%). Therefore, the parking gradients are anticipated to comply with the AUP standards.

4.0 AUCKLAND UNITARY PLAN STANDARDS

Section E27 of the Auckland Unitary Plan (Operative in Part) sets out the development standards relating to transport. Table 2 lists the relevant standards that apply to this development and comments on compliance. Where there is non-compliance, further assessment has been undertaken against the criteria set out in the AUP.

Table 2: Transport Development Controls

Standard	Requirement/Details	Comment
E27.6.1 Traffic Generation	Sets the threshold for when resource consent as a restricted discretionary activity is required.	This development is forecast to generate approximately 90 vehicle movements per day and 10 vehicle movements during peak hours – **does not apply**
E27.6.2 (1) Number of Parking Spaces	Defines the maximum number of parking spaces for new developments.	Parking will be provided informally on site, where there is no minimum or maximum requirement – **complies**
E27.6.2 (6) Bicycle Parking	Defines the number of bicycle parks required for new residential and commercial developments.	The activity proposed does not require bicycle parking **– does not apply**
E27.6.2 (7) End Trip Facilities	End trip facilities to be provided for any office, education of hospital facilities.	The activity proposed does not require end-trip facilities – **does not apply**
E27.6.2 (8) Number of Loading Spaces	Outlines the minimum loading space requirements for new developments.	The site will have bespoke truck circulation areas for unloading of earth fill, but will not be a dedicated area due to the nature of the operation **– does not apply**
E27.6.3.1 (1) Size and Location of Parking Spaces	Defines the size, use and location of parking spaces.	Parking will be provided informally on-site for employees/visitors and are anticipated to be compliant with dimension standards.
E27.6.3.2 Size and Location of Loading Spaces	Defines the size, use and location of loading spaces	No formal loading spaces will be provided – **does not apply**
E27.6.3.3 Access and Manoeuvring for Parking	Defines the requirements for design vehicles, driveways, manoeuvring area and stacked parking allowances.	All parking spaces will accommodate B85 vehicle tracking – **complies**
E27.6.3.4 Reverse Manoeuvring	Defines the conditions in which reversing manoeuvring is prohibited to and from a site.	Vehicles will be able to enter and exit the site in a forward direction – **complies**
E27.6.3.5 Vertical Clearance	Defines the minimum overhead clearance for vehicles to pass safely under overhead structures.	There will be no overhead structures within the site – **does not apply**
E27.6.3.6 Formations and Gradients	Defines the formation and gradients for all parking spaces and manoeuvring areas.	Parking areas will not have all-weather surfaces – **complies** Parking spaces for the site will have gradients no steeper than 1 in 20 (5.0%) – **complies**

Standard	Requirement/Details	Comment
		Manoeuvring areas will have gradients no steeper than 1 in 8 (12.5%) – **complies**
E27.6.3.7 Lighting	Defines where lighting within access and parking areas is required.	Fewer than 10 parking spaces are anticipated to be provided within the site **– does not apply**
E27.6.4.1 Vehicle Access Restrictions	Defines the acceptable locations of access points in relation to strategic roads and intersections.	Ararimu Road is a local road – **does not apply** The vehicle crossing is located more than 100 metres from any intersection – **does not apply**
E27.6.4.2 Width and Number of Vehicle Crossings	Defines the maximum number of vehicle crossings, proximity to others and permitted widths.	One vehicle crossing is proposed for the site – **complies** The vehicle crossing will have a width of 23 metres, measured at the road boundary – **does not comply** The vehicle crossing will be separated from adjacent vehicle crossings by more than 50 metres – **complies**
E27.6.4.3 Width of Vehicle Access and Queuing	Defines the standards for vehicle access widths for on-site parking and pedestrian movements.	The vehicle access will have a minimum width of 6.0 metres – **complies**
E27.6.4.4 Gradient of Vehicle Access	Defines the gradients of circulating aisles for vehicle movements.	All gradients within vehicle circulating areas will be no steeper than 1 in 8 (12.5%) – **complies** The access is designed with a gradient of 1 in 16.1 (6.2%) for 6 metres, where adjoining the road boundary – **does not comply**
E27.6.5 Design/Location of Pedestrian and Cycle Facilities	Defines the requirements for off-road and pedestrian and cycle facilities.	The site has not been designed to accommodate pedestrian and cyclist access, based on the site activity – **does not apply**

5.0 AUCKLAND UNITARY PLAN ASSESSMENT CRITERIA

Section E27.8.2 of the AUP sets out the assessment criteria when there is non-compliance against a development standard. For this proposal, the following standards require resource consent:

- E27.6.4.2 – Width and Number of Vehicle Crossings (Criteria 8)
- E27.6.4.4 – Gradient of Vehicle Access (Criteria 8)

8. Any activity or development which infringes the standards for design of parking and loading areas or access under Standard E27.6.3, E27.6.4.2, E27.6.4.3, and E27.6.4.4:

(a) effects on the safe and efficient operation of the adjacent transport network having regard to:

(i) the effect of the modification on visibility and safe sight distances;

(ii) existing and future traffic conditions including speed, volume, type, current accident rate and the need for safe manoeuvring;

(iii) existing pedestrian numbers, and estimated future pedestrian numbers having regard to the level of development provided for in this Plan; or

(iv) existing community or public infrastructure located in the adjoining road, such as bus stops, bus lanes, footpaths and cycleways.

(b) effects on pedestrian amenity or the amenity of the streetscape, having regard to:

(i) the effect of additional crossings or crossings which exceed the maximum width; or

(ii) effects on pedestrian amenity and the continuity of activities and pedestrian movement at street level in the Business – City Centre Zone, Business – Metropolitan Centre Zone, Business – Town Centre Zone and Business – Local Centre Zone.

(c) the practicality and adequacy of parking, loading and access arrangements having regard to:

(i) site limitations, the configuration of buildings and activities, user requirements and operational requirements;

(ii) the ability of the access to accommodate the nature and volume of traffic and vehicle types expected to use the access. This may include considering whether a wider vehicle crossing is required to:

- *comply with the tracking curve applicable to the largest vehicle anticipated to use the site regularly;*
- *accommodate the traffic volumes anticipated to use the crossing, especially where it is desirable to separate left and right turn exit lanes;*
  - *the desirability of separating truck movements accessing a site from customer vehicle movements;*
  - *the extent to which reduced manoeuvring and parking space dimensions can be accommodated because the parking will be used by regular users familiar with the layout, rather than by casual users;*

(iv) any use of mechanical parking installation such as car stackers or turntables does not result in queuing beyond the site boundary; or

(v) any stacked parking is allocated and managed in such a way that it does not compromise the operation and use of the parking area.

5.1 Assessment of E27.6.4.2 – Width of Vehicle Crossing

The reason for consent under this standard relates to the provided vehicle crossing width for the site. The vehicle crossing will be formed with a width of some 23 metres, where a maximum width of 9 metres is permitted for vehicle crossings within the rural zone serving large vehicles. The increased vehicle crossing width has been provided in order to facilitate the turning of a dump truck and trailer, which is approximately 17 metres long. As a result, a larger vehicle crossing width and corner radius has been provided to allow for two-way truck movement at the access where connecting to Ararimu Road, and to allow vehicles to turn left from the site without crossing the centreline of Ararimu Road.

Additionally, the edge of the road seal to the road boundary along the south side of the road is some 1.2 metres. This formation also contributes to the wider vehicle crossing (as it is measured at the boundary). If the formed carriageway was constructed centrally to the road reserve, the carriageway would be located approximately 6 metres further north, which would result in a vehicle crossing width at the boundary of approximately 12.5 metres. While this is still non-compliant, it demonstrates that the proposed design is closer in alignment with the standards than the reported dimensions indicate on first inspection.

As the site is located within a rural area, very low volumes of pedestrians and cyclists are anticipated to travel past the site, such that the wider vehicle crossing is not considered to have any tangible effects to these users. Notwithstanding, the access location and design has allowed for good visibility, enabling any vehicle exiting the site to be able to easily identify any oncoming cyclists/pedestrians.

Based on the likely vehicles servicing the site, vehicle operating speeds of trucks turning to and from the site will be generally low, such that the increased vehicle crossing is not likely to result in vehicles entering/exiting the site at inappropriate speeds, such that a safety concern would result.

Considering this, the proposed vehicle crossing width will have less than minor effects onto the surrounding environment and is acceptable.

5.2 Assessment of E27.6.4.4 – Gradient of Vehicle Access

The reason for consent under this standard relates to the provided vehicle access gradient within the first 6.0 metres of the site; the vehicle platform. Under the AUP, non-residential vehicle accesses are to provide a platform 6.0 metres in length on a gradient not exceeding 1 in 20 (5%). The proposal will see the access formed with a gradient of 1 in 16.1 (6.2%) within this platform area. The following points are made in support of the non-compliance:

- The vehicle access has looked to minimise the gradient within the platform area, while also balancing out the fill required within the site to facilitate the vehicle access, as the current site topography falls away rather steeply from the carriageway.
- Over a distance of 6 metres, the proposed gradient will result in a height difference of 72 millimetres compared to a compliant design. This height difference is not anticipated to result in any reduced sightlines to any road users along Ararimu Road in both directions.
- The access will predominantly service dump trucks, where the driver would be in an elevated position compared to passenger vehicles, thereby allowing for increased visibility from the platform to the east and west.
- As Ararimu Road is a low volume rural road, very low volumes of pedestrians and cyclists are anticipated to travel past the site on a weekly basis.
- Vehicles are not anticipated to have any difficulties coming to a controlled and complete stop on a gradient of 1 in 16.1 (6.2%), noting that public roads are permitted gradients of up to 1 in 8 (12.5%) routinely, and demonstrate vehicles are able to start/stop safely on these higher gradients.

Considering these points, the proposed vehicle access gradient will have less than minor effects onto the surrounding environment and is acceptable.

6.0 CONCLUSION

Based on the assessment described in this report, the following conclusions can be made in respect of the proposal to establish an earth-fill facility at 1618 Ararimu Road in Papakura:

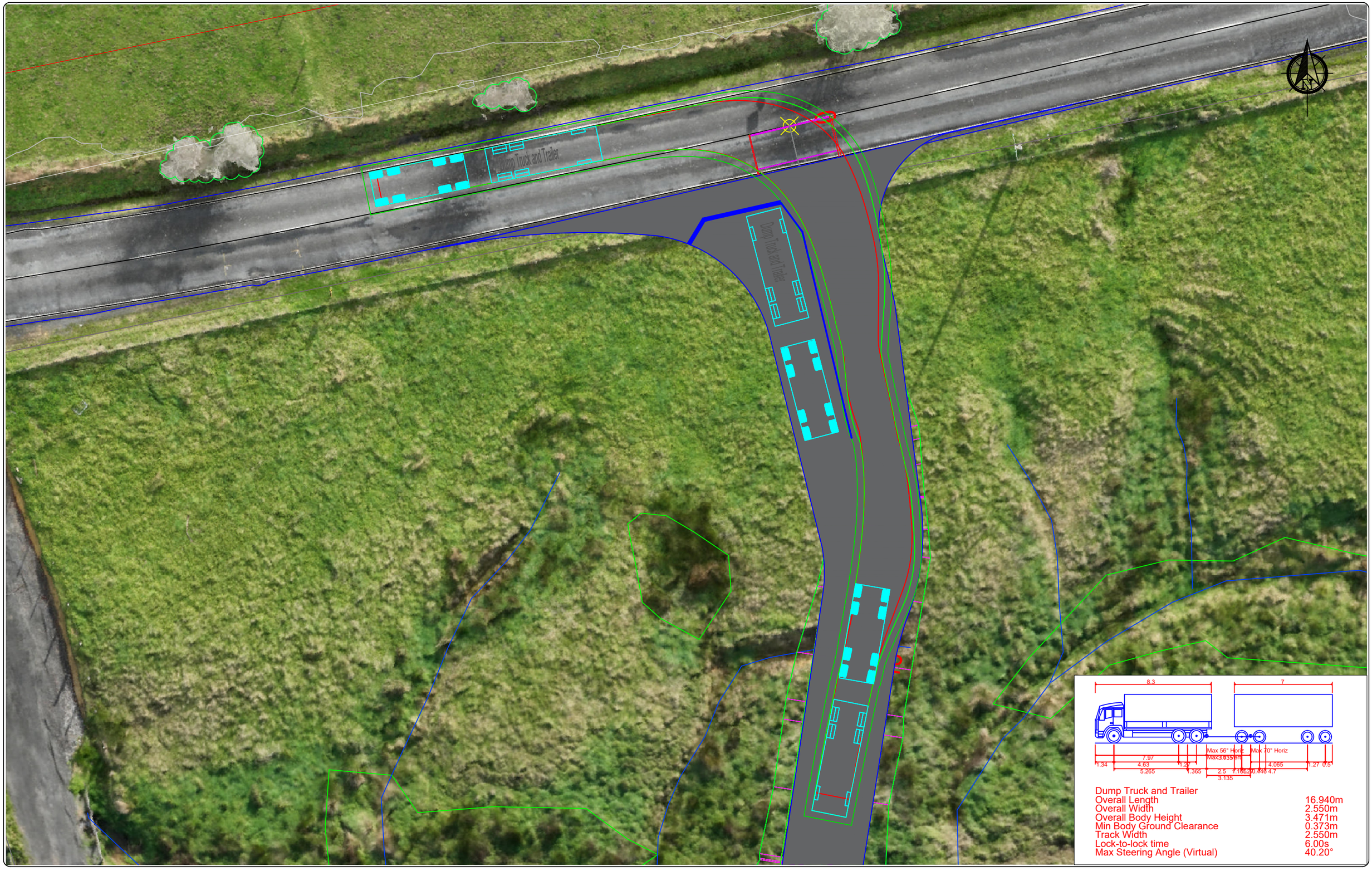
- A review of the transport standards has identified two items which require consent under Section E27 of the Auckland Unitary Plan, they are:
  - E27.6.4.2 – Width of Vehicle Crossing
  - E27.6.4.4 – Gradient of Vehicle Access
- Vehicle access to the site is designed to a suitable standard such that the proposal will have less than minor effects on the surrounding road network and to the safety of site users.
- Warning signage (PW-50) should be installed along Ararimu Road approximately 200 metres east and west of the site's access in order to highlight to oncoming traffic the potential to encounter a turning truck.

Overall, it is considered that the traffic engineering effects of the proposal can be accommodated on the road network without compromising its function, capacity, or safety.

Prepared by,

Peter Kelly
Senior Transportation Engineer

ATTACHMENT 1:
VEHICLE TRACKING DIAGRAMS



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Sheet Title
Vehicle Tracking - 17m Dump Truck and Trailer

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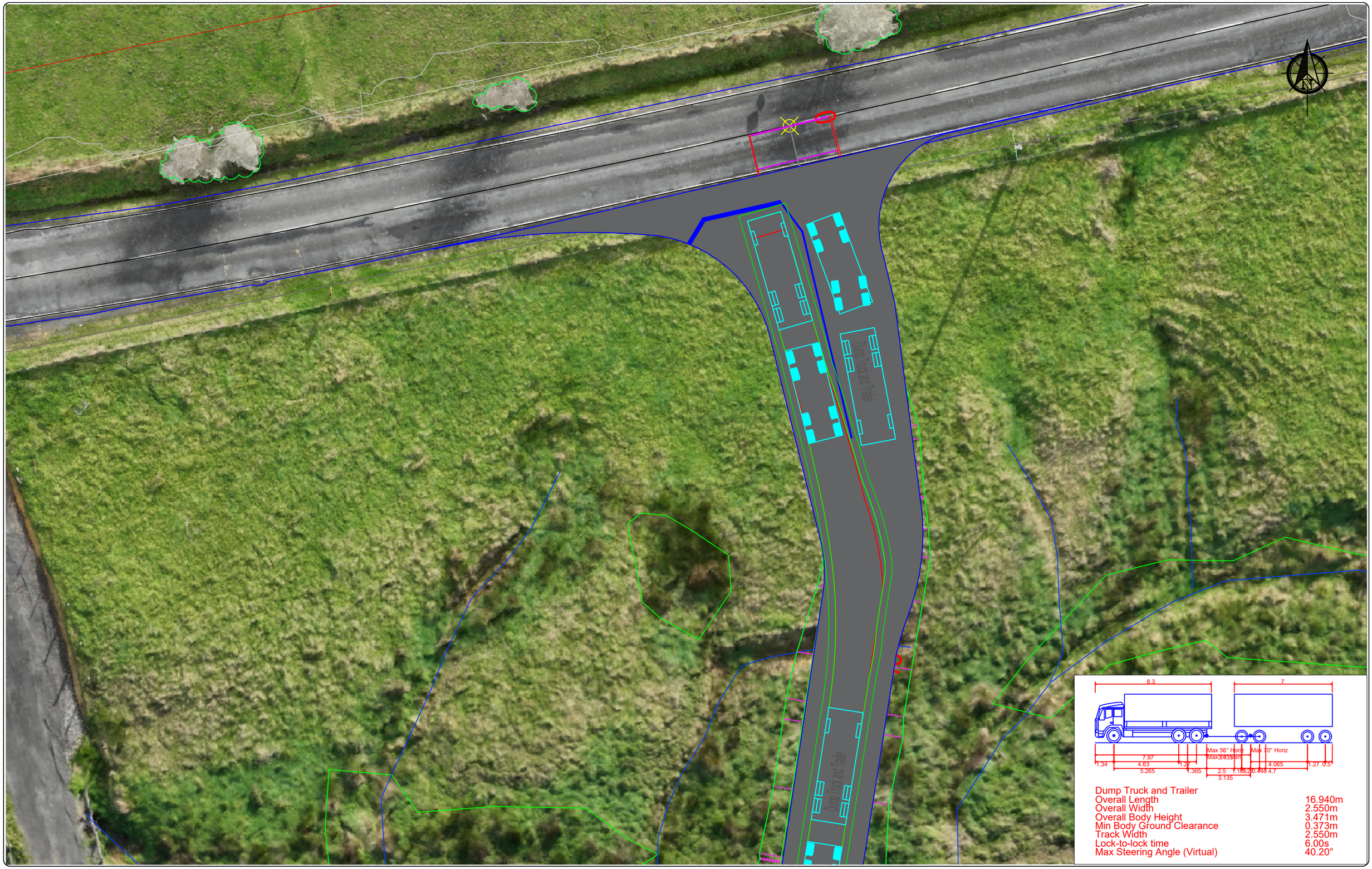

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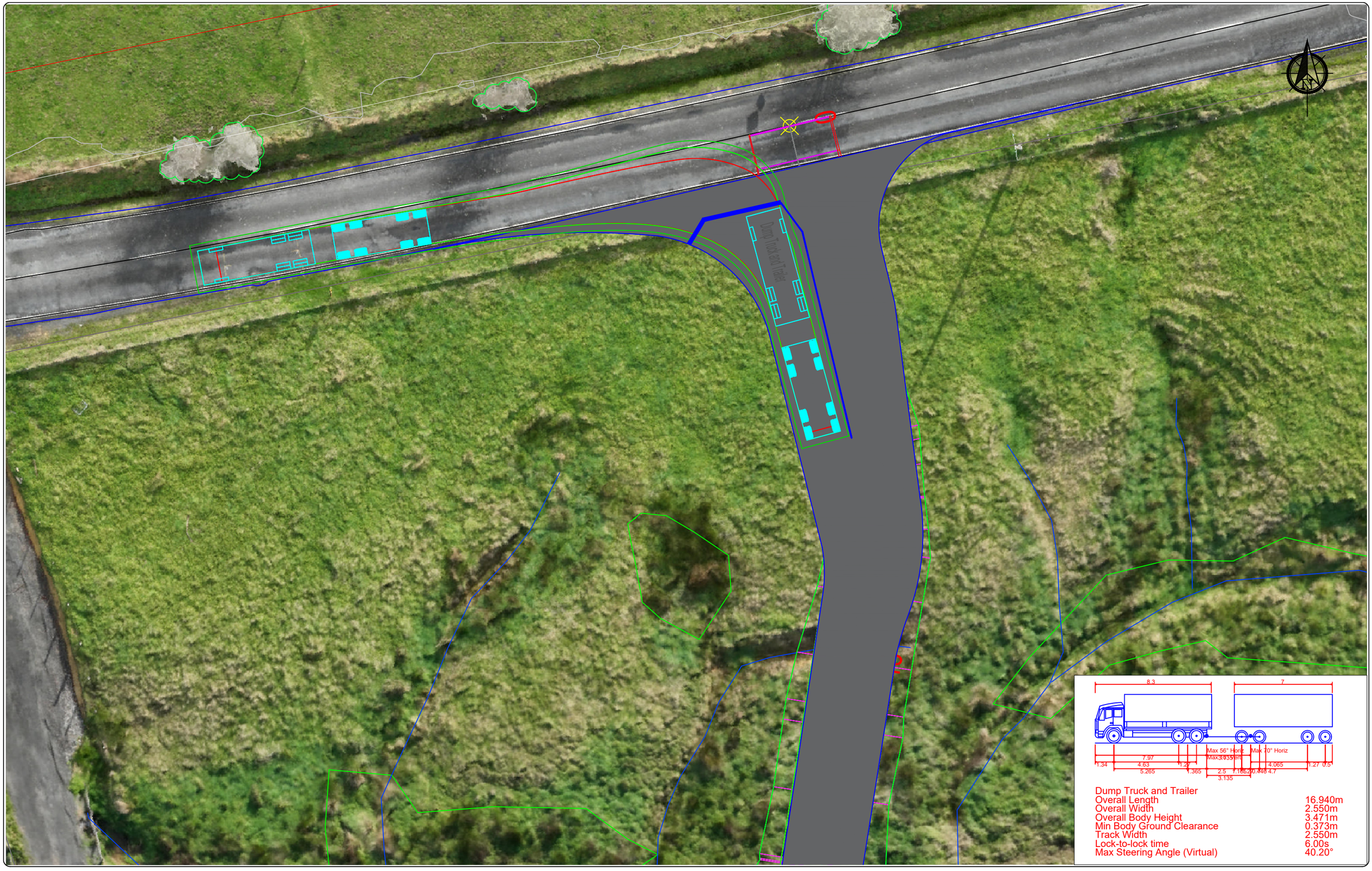

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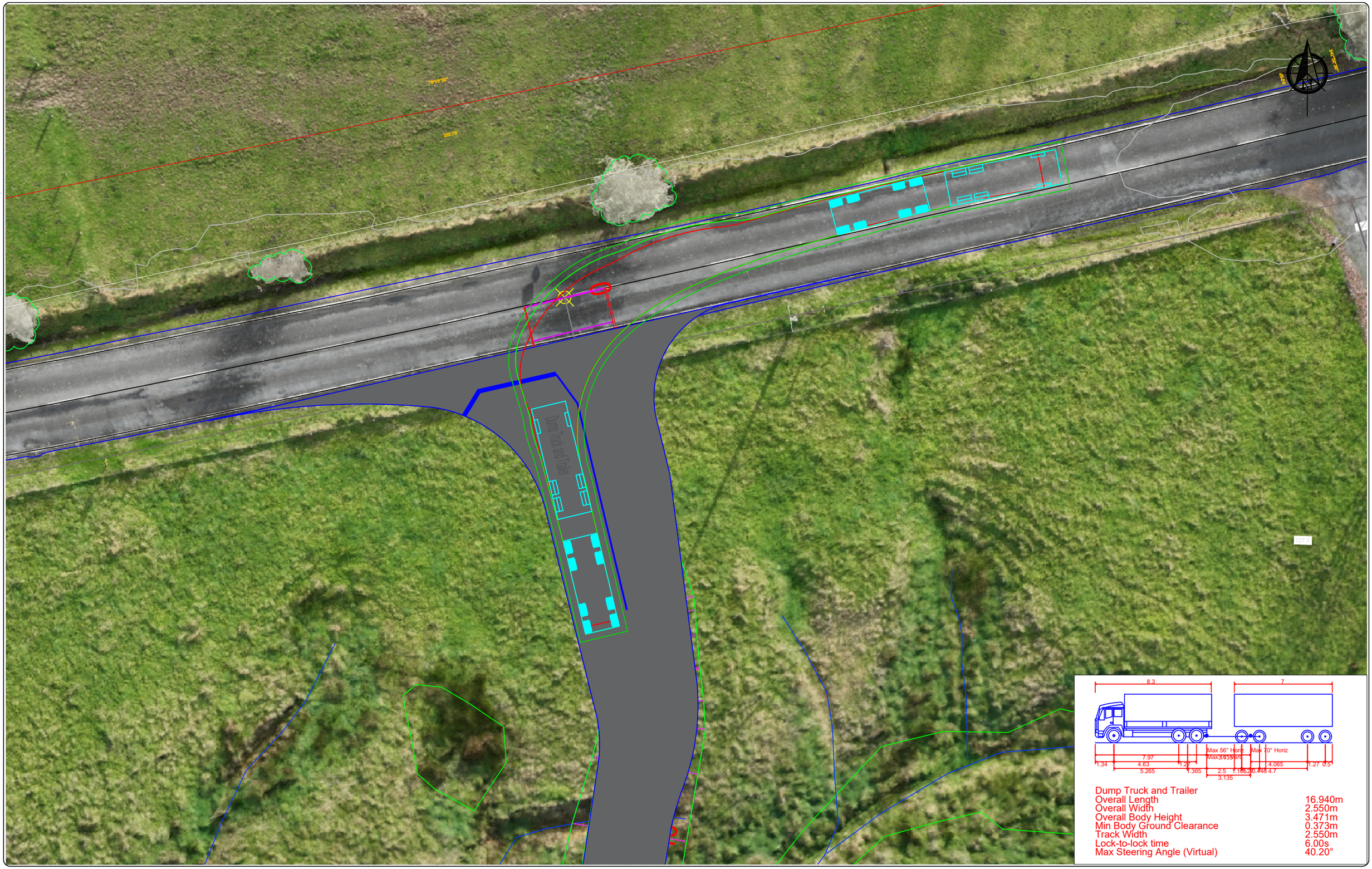

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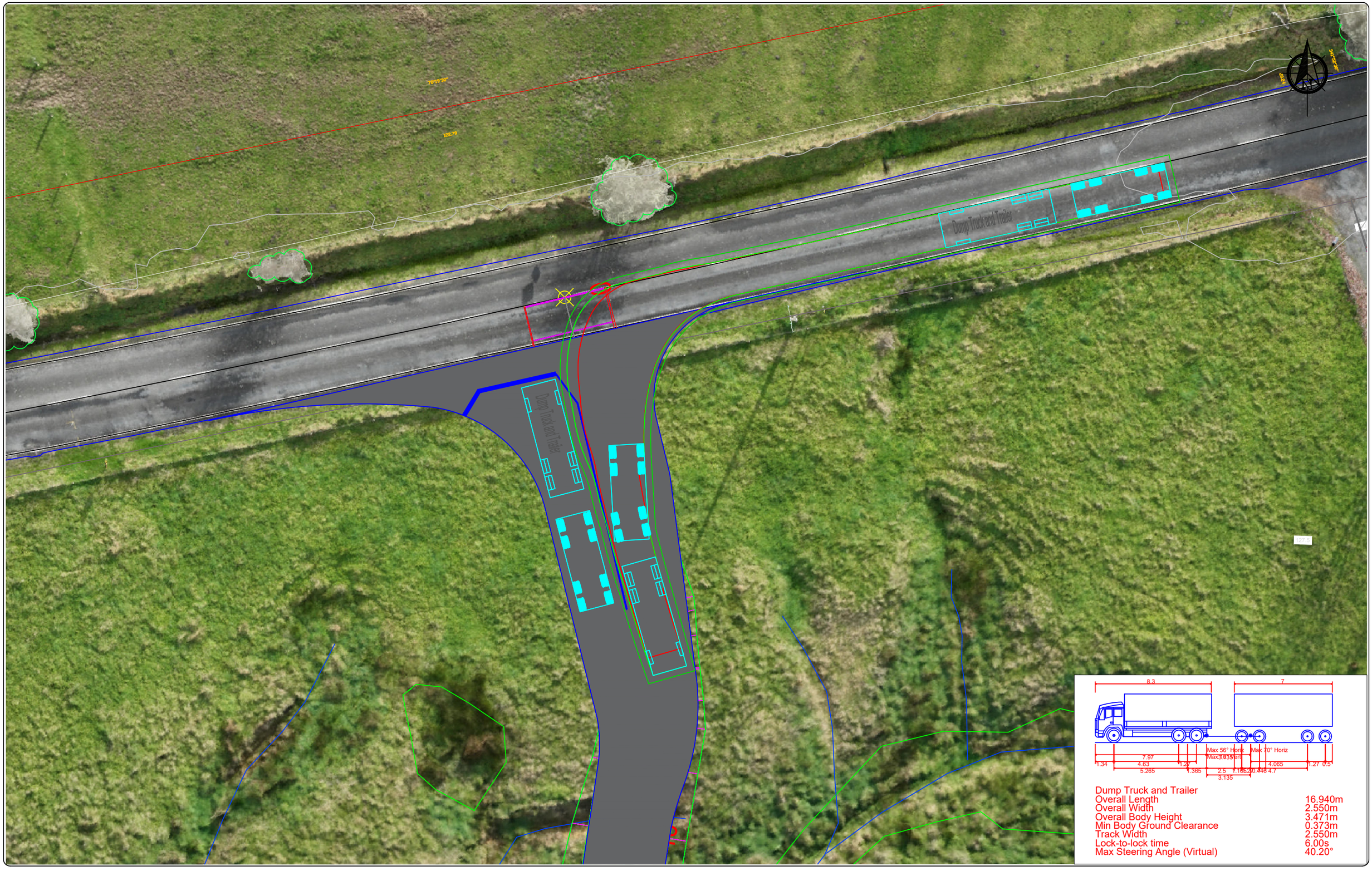

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TPC TRAFFIC PLANNING CONSULTANTS LTD
Level 1, 400 Titirangi Rd, Titirangi, P.O Box 60-255, Auckland 0604
Phone: 09 817-2500 www.trafficplanning.co.nz

Project Title
Earth-Fill Development
1618 Ararimu Road, Papakura

Sheet Title
Vehicle Tracking - 17m Dump Truck and Trailer

Designed	PK	Drawn	PK	Project No - (Sheet No)	Scale 1:250 (A3)
Checked	PK	Approved	PK	220863-VTA - (6)	Date 08.09.23

Rev	Revisions	By	Date

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Checked	PK	Approved	PK	220863-VTA - (7)	Date 08.09.23