REPORT

Tonkin+Taylor

Hawkins Hill Right of Way

Service Levels and Maintenance Review

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Wellington City Council
Prepared by
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Executive summary

Hawkin's Hill Road is a narrow, sealed, public right of way (RoW) owned by Wellington City Council (WCC) that provides key walking and cycling links from Ashton Fitchett Drive through the Outer Green Belt to the Meridian Wind Turbine, the 700 ha Te Kopahou Reserve, and the south coastal areas. There are a number of well used cycle trails and walking tracks that are accessed from the RoW as well as private residences and businesses.

Access for vehicles is limited with an automatic sliding gate at the start which is closed during the hours of darkness to allow authorised access only. Public vehicles can reach the car park at the Meridian Wind Turbine during the day but should be prevented from driving further south by another gate.

It appears that public access has not been restricted for some time and as a result, inappropriate volumes of traffic have been recorded along the sealed length of the RoW. This, combined with water ingress into the pavement is affecting the service life of the roadway and necessitating intervention to maintain an appropriate level of service.

WCC have received complaints from residents and legitimate users (pedestrians and cyclists) that the volumes and speeds of traffic are creating an unsafe environment.

Through active management of the sliding gates, it will be possible to restrict public vehicle access to the car park during daylight hours, thereby reducing the maintenance burden on the RoW and increasing overall safety of users.

A number of levels of intervention have been assessed for the future level of service and maintenance of the RoW as follows:

Table 1.1: Treatment Options

Option	Indicative Cost	Assessment
Do Minimum Minor maintenance and signage upgrades	$380K Capital $120K Maintenance ($500K 20 year)	Does not meet policy, stakeholder, or public requirements, does not address risks or liabilities in long term
Minor Improvement Safety and efficiency improvements, improved walking & cycling facilities	$1.1M Capital $700K Maintenance ($1.8M 20 year)	Meets stakeholder and public requirements and exceeds policy requirements, offers optimum level of service and long term resilience of asset
Major Improvement Significant improvements to level of service and walking and cycling facilities	$3.5M Capital $1.3M Maintenance ($4.8M 20 year)	Exceeds requirements and significantly over-delivers on level of service, possibly increasing maintenance liability

In terms of value for money and long term appropriateness of the form and function of the RoW, the minor improvement option is considered to be the most appropriate.

Three potential delivery options are suggested:

a Long term upgrade which progressively delivers the whole programme over a 20 year period

b Targeted investment approach which prioritises Sections A and B and progressively improves the remainder through maintenance activities over a 20 year period

c Priority investment which implements improvements to Sections A and B and then provides minimum targeted maintenance over the 20 year period.

A priority investment approach (Scenario C) could offer best value for money for WCC as it upgrades the most used Sections A and B within the first four to six years. Upgrade of the remaining sections could be deferred (on an 'as needs' basis) and only essential maintenance activities undertaken over the remaining 14 years.

Costs are approximately $850k (annually: $200k in years 1 and 2; $130K in years 3 and 4; $80k in years 5 and 6), residual maintenance costs are in the order of $250K or approximately $18k per year.

Total cost is likely to be in the order of $1.1M over the 20 year period.

1 Context

Wellington City Council (WCC) is the owner of a Right of Way (RoW), known as Hawkin's Hill Road. This RoW is over a key entrance that provides for walking and cycling access to the 700ha Te Kopahou Reserve and Te Kopahou Track. Hawkins Hill Road is not a legal road, legal right of way is granted to the Airways' Radar Dome (Radome) that services Wellington International Airport, the Meridian Wind Turbine and 20 private rural residential lots.

The RoW falls within the Outer Green Belt Management Plan[1] that provides the following policy direction (these are the outcomes WCC wish to achieve):

- To maintain full public access for walking and cycling along Hawkin's Hill Road and public vehicle access as far as the wind turbine car park at Brooklyn;
- To clarify all existing access rights to the Hawkins Hill Road, establish a clear policy on the provision of private access and to ensure current vehicle use is consistent with public use of the RoW.

Recently, a subdivision consent was granted to establish 15 new 'life style' lots in the rural area that accesses over the RoW. A number of dwellings have now been constructed or are in the process of construction, which have legal access over the RoW. This has increased the number of vehicles using the RoW. There are also two known commercial activities including Woofingtons (kennels) and Seal Safari (vehicle based tourism operation) that use the RoW. Council has also recently granted landowner approval (resource consent still to be secured) for a zip line in the area accessing via the RoW (draft license agreement conditions specify no more than 24 movements a day are allowed).

We understand that historically there has been limited investment in RoW maintenance and the most used section of the RoW is between the Meridian wind turbine and Aston Fitchett Drive. WCC are now planning maintenance works on the RoW which will address some of the existing pavement defects and safety concerns. Meridian contribute funds to the upkeep of the RoW section between Ashton Fitchett Drive and the wind turbine.

WCC are to take an Officer's report to Councillors with a recommendation on the future of the RoW, including proposed level of service, potential improvements and ongoing maintenance. From this report, WCC will prepare a cost sharing proposal for ongoing maintenance and management of the RoW, split between those that have a legal interest in the RoW.

1.1 Scope of Work

WCC have requested that T+T carry out an assessment of the existing RoW condition, and prepare a summary report which includes recommendations on reactive maintenance and safety improvements, a specification for each section of RoW based on fit for purpose and cost effective ongoing management. We have allowed for the following scope items:

1 Undertake a visual inspection and document the pavement condition assessment for Hawkin's Hill Road for the five separate sections:
   - A. From Ashton Fitchett Drive to the wind turbine;
   - B. The wind turbine to Southernthread Road;
   - C. Southernthread Road to Woofingtons (commercial kennels - a castle shape building on the western side to the RoW);
   - D. Woofingtons to the Radome;
   - E. Radome to Te Kopahou- (private land that Council has RoW over).

[1] Wellington's Outer Green Belt Management Plan, May 2004

Make observations on the general RoW alignment and sight distances on curves;

2 Review background traffic data (from WCC traffic counts May 2018), Resource Consent documents for the residential and commercial activities, and information on potential future demand/activities that access the RoW from WCC;

3 Undertake a Level of Service (LoS) assessment for each section of the RoW, which will identify the existing LoS, and define a desired LoS for the sections based on the expected function and level of use, including for suggested safety improvements and upgrades;

4 Identify options including, but not limited to the following:

- a Scheduled and reactive maintenance requirements such as:
  - i Water table improvements required and management of storm water runoff;
  - ii Management of berms e.g. mowing and widening for pedestrian access;
  - iii Pavement and surfacing.
- b Improvement in safety and level of service such as:
  - i Possible widening of RoW, sight distance improvements to reduce risk to all users, including pedestrians and cyclists;
  - ii Possible speed limits and suggested signage improvements, speed controls, safety barriers etc;
  - iii Possible lighting requirements.
- c Do-minimum which involves reactive maintenance on the existing carriageway surface to bring it up to an acceptable minimum standard.
- d Feasibility of making the RoW a public road.

2 Rough order cost estimates for:

- a The identified options;
- b A legal road standard (WCC Code of Practice) upgrade for comparison with the options identified above;
- c Long term maintenance requirements of all the identified options.

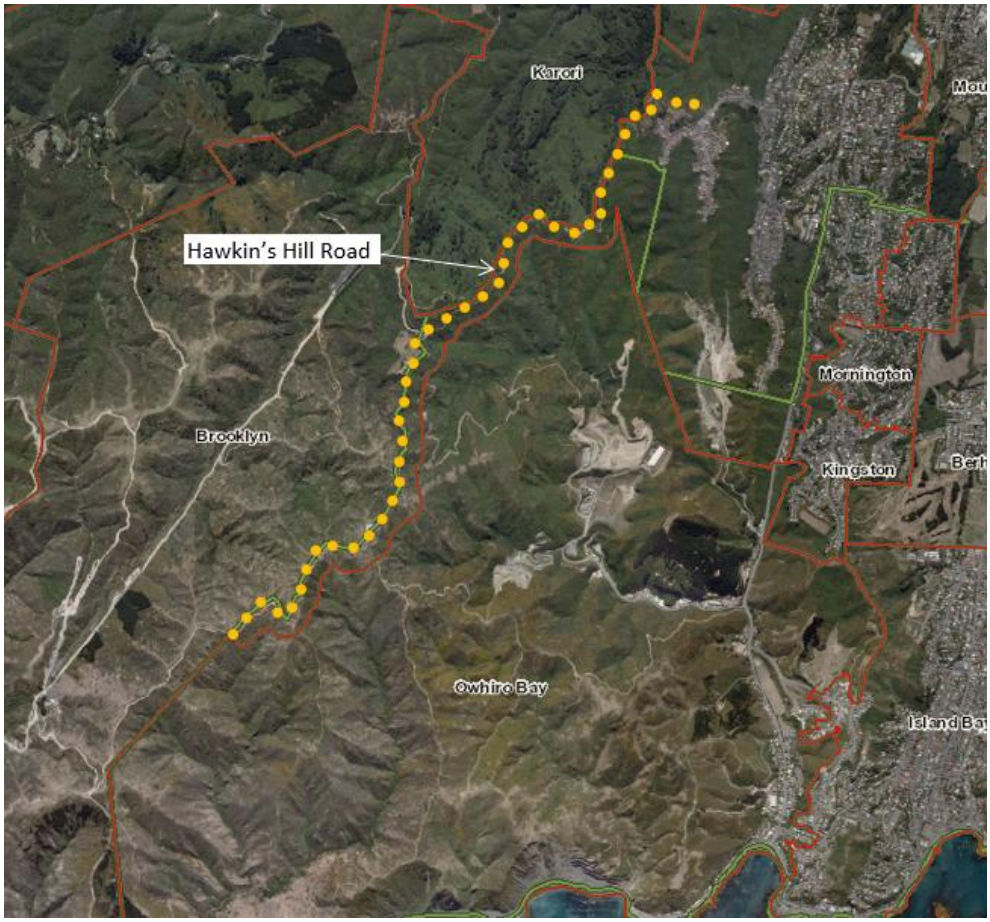
2 Site Description

The Hawkins Hill Right of Way (RoW) extends approximately eight kilometres along a ridgeline from Ashton Fitchett Drive, Brooklyn to Te Kopahou peak on Wellington's south coast. The location and extent is shown in Appendix A.

The RoW provides public access to the wind turbine and walking and cycling tracks within Polhill Reserve at the north end and Te Kopahou Reserve at the south end. Public vehicle access is provided during daylight hours to the wind turbine, with access after-hours via a keypad code for authorised users.

There is a gate (not operational during our site visit) at the wind turbine that used to prevent vehicles from accessing the RoW past the wind turbine carpark.

The RoW provides access for residents and businesses operating within the RoW.



Note: Extent of WCC RoW denoted by orange dotted line

Figure 2.1: Hawkin's Hill Road Locality (source WCC)

3 Condition Assessment

The following section describes in detail the individual elements of the RoW and their current condition and use. The RoW has been split into five sections (A to E) based on the different levels of access and natural break points, such as gated sections. The sections are as follows and are shown in Appendix A on Drawing 1006626-01:

Section A	Ashton Fitchett Drive to the wind turbine
Section B	Wind turbine to Southernthread Road
Section C	Southernthread Road to Woofingtons
Section D	Woofingtons to the Radome
Section E	Radome to Te Kopahou

3.1 Section A - Ashton Fitchett Drive to the wind turbine

This sealed 1.6km section of the RoW provides public access to the Brooklyn Wind Turbine. It follows a reasonably steady gradient on the east side of the natural ridgeline. An automatic gate near the junction with Ashton Fitchett Drive restricts public access to daylight hours only, with access for residents provided after hours via a keypad code. Two properties (46 and 54 Hawkins Hill Road) access this part of the RoW (in the same ownership with one residential dwelling).

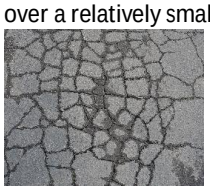
Tables 3.1 and 3.2 below provide an overall description of this section of the RoW. Additional details are also provided on Drawings 1006626-10 to 12 attached in Appendix A.

Table 3.1: Existing RoW Condition (Section A)

Item	Description
Carriageway width	The RoW has a chip sealed surface varying in width from 4.0m on straight sections up to approximately twice that around tight horizontal curves where the widened areas are metalled but traversable. The automatic gate near the junction with Ashton Fitchett Drive opens to a maximum width of 3.5m.
Pavement condition	A visible vehicle path in the centre of the pavement indicates a single lane of traffic during normal operation. Flushing[2] is evident within the wheel tracks. Some crocodile cracking[3] evident near the wind turbine indicates poor pavement condition for an approximately 10m length of pavement (Otherwise pavement appears in generally good condition with little rutting or cracking evident.

[2] Flushing is a term referring to when smooth patches of bitumen appear on the carriageway surface instead of the more usual rough stone chip texture.

[3] Crocodile cracking is a term likening the appearance of the cracked surface to crocodile skin – appears heavily cracked over a relatively small area, almost "scaly".



Item	Description
	No potholes were observed in this section. Especially around corners, edge break is visible along the edge of the seal where vehicles cross to allow passing. In some places the seal is up to 50mm above the adjacent eroded dirt surface.
Markings and signage	There are no pavement markings except within the sealed parking area adjacent to the turbine. Signage includes; · PW-43.1 '*Road Narrows'* and PW-23 '*Winding Road'* (with advisory speed 25 km/h) signs for both directions of traffic. · PW-29 '*Pedestrians Ahead'* signs and green cycle surfacing at tracks crossing (at approx. 1300m up the RoW). · Signage for alternate walking and cycling route (see below). Until recently a 30km/h sign was present at the start of the RoW although we understand this has been removed as the limit is technically unenforceable.
Gradients	The RoW climbs steeply from Ashton Fitchett Drive to the wind turbine on the ridgeline, at gradients typically varying between 4% (1 in 25) and 10% (1 in 10). This section of the RoW has a maximum calculated gradient of 12% (1 in 8).
Sight distance	Five corners do not meet the Stopping Sight Distance (SSD)[4] of 49.2m for an operating speed of 50 km/hr[5] due to: · restriction by a slope on the inside of the corner, and · restriction by overgrown vegetation on the inside of the corner.
Traffic volumes	Traffic counts undertaken in May 2018 recorded a seven day average of 254 vehicle movements per day on this part of the RoW, including an average of seven heavy vehicle movements (2.6% of the total traffic movements). Marked parking spaces for 39 vehicles is provided in a sealed parking area adjacent to the wind turbine. Most vehicles (88%) exceeded the 30 km/h inferred speed limit on this part of the RoW, with the 85th percentile recorded speed being approximately 54 km/hr.
Walking and cycling	There are three options for walking and cycling access to the Wind Turbine: 1. The unsealed Zealandia perimeter track; 2. The "Car Parts" mountain bike track and; 3. The edge of seal and berm of the RoW. Whilst there is no separate provision for walking or cycling along the RoW, multiple pedestrians were observed walking up the edge of the RoW during the site inspection. Signage recommends an alternate walking and cycling route is available via the Zealandia perimeter track. Although a similar distance (1,400m versus 1,350m via the RoW), pedestrians are still observed using the RoW, likely because; · An additional 20m of climbing are required as the perimeter track follows the ridgeline rather than the adjacent contours. · Parts of the perimeter track are steep, assessed as exceeding 1 in 4 (25%). The RoW reaches a maximum gradient of 1 in 8 (12%). · The perimeter track is roughly formed with loose aggregate on the surface, requiring more concentration when walking.

[4] Austroads Guide to Road Design Part 3: Geometric Design (2016) Stopping Sight Distance is the minimum forward visibility to allow a driver to observe and safely react to a hazard, SSD has been determined for low volume 'mountainous' roads, which is considered appropriate for this location.

[5] The default speed environment is assumed to be 50km/h based on the observed traffic speeds and semi-rural location.

Item	Description
	· The perimeter track is not visible from the RoW for extended periods, which could lead to concerns regarding safety and being unknown. It is unlikely that the mountain bike track would be used in the uphill direction by walkers and recreational cyclists due to the likelihood of high speed downhill users.
Drainage	There is no formal drainage along the RoW, and it is likely that there is significant water flowing down the inside of the carriageway during rainfall events. There is no evidence of scour or extended lengths of failed pavements.
Slope stability	Superficial slumping is evident on the grassed batters east of the RoW, typically less than 0.4m depth and up to five cubic metres in volume.

Table 3.2: Existing RoW Photos (Section A)

Photograph 3-1: Typical RoW section

Photograph 3-2: Horizontal curves below the wind turbine carpark

Photograph 3-3: Zealandia perimeter track

Photograph 3-4: Pavement cracking

3.2 Section B - Wind turbine to Southernthread Road

Beyond the gate at the southern end of the wind turbine car park, the RoW becomes narrower and is signed as unsuitable for pedestrians and *"authorised vehicles only"*, although there is no physical restriction on access currently enforced. This section is approximately 1.3km in length and sealed.

All residents that live beyond the gate at the wind turbine access their properties over this section of the RoW.

The approach to Southernthread Road lies in a hollow and has recently been resurfaced.

Southernthread Road is a partly sealed private RoW that skirts the southern boundary of Zealandia and provides access to a number of dwellings.

Tables 3.3 and 3.4 below provide an overall description of this section of the RoW. Additional details are also provided on Drawings 1006626-10 to 12 attached in Appendix A.

Table 3.3: Existing RoW Condition (Section B)

Item	Description
Carriageway width	The RoW has a chip sealed surface approximately 3.5m in width with some sections widening to approximately 5m to provide informal passing places with a combination of seal widening and metalled surface. The gate at the southern end of the wind turbine car park is approximately 3m wide.
Pavement condition	A visible vehicle path in the centre of the pavement indicates a single lane of traffic during normal operation. Flushing is evident within the wheel tracks. And a large proportion of the RoW has been patched along the edges. Significant crocodile cracking, edge break and pot holes are evident at most corners along this section suggesting significant pavement deterioration due to overrunning and water ingress. A number of patches and pavement repairs were in progress between the gate and the first corner at the time of the inspection.
Markings and signage	There are no pavement markings except within the sealed parking area adjacent to the turbine. There is little signage evident with a solitary *'cyclists ahead'* warning sign northbound from Southernthread Road intersection, and a curve warning and supplementary 20 km/h advisory in advance of the first bend.
Gradients	The RoW follows the ridgeline and climbs steadily from the car park to Southernthread Road (no data on gradient).
Sight distance	Several corners do not meet the Stopping Sight Distance (SSD) of 49.2m for the speed environment of 50 km/hr with a mix of sight distance restricted by a cut slope or vegetation growth on the inside of corners.
Traffic volumes	Traffic counts undertaken in May 2018 recorded a seven day average of 152 vehicle movements per day on this part of the RoW, including an average of 5 heavy vehicle movements (4% of the total traffic movements). The recorded 85th percentile speed is approximately 48 km/hr.
Walking and cycling	There is no separate provision for walking or cycling along this section of the RoW which is signed as *"unsuitable for pedestrians"* at its start point. However, we understand that a number of walkers and cyclists use this section to access the reserve and mountain bike tracks. A small number of pedestrians were observed walking up the edge of the RoW during the site inspection. No alternative sealed path exists for pedestrians or cyclists, however there is a track for mountain bikers *(Car Parts Extension track)* that runs parallel to the section, as well as the Zealandia fence line perimeter track (pedestrians and cyclists) which extends approximately two thirds along the RoW from the wind turbine carpark.
Drainage	There is no formal drainage along the RoW, and it is likely that there is significant water flowing down the inside and across the carriageway during rainfall events. There is

Item	Description
	evidence of scour on some of the berms and roadside banks as well as pavement failures on corners that can be in part attributed to water ingress.
Slope stability	There is no obvious evidence of slope failure or soil creep along this section although a number of batter slopes are in excess of 2m in height with a severe slope angle.

Table 3.4: Existing RoW Photos (Section B)

Photograph 3-5: Gate at start of right of way with large seal repair

Photograph 3-6: Cracking and edge break

Photograph 3-7: Crazing, edge break and overrun of berm

Photograph 3-8: Southernthread Road intersection looking north

3.3 Section C - Southernthread Road to Woofingtons

From the intersection at Southernthread Road the RoW continues uphill through an open farm gate to the south, it reaches a crest in the ridgeline, and then falls towards Woofingtons. This section is approximately 1.5km in length and sealed.

Currently two residential dwellings (320 and 380 Hawkins Hill Road) access this part of the RoW, plus Woofingtons Ltd.

Tables 3.5 and 3.6 below provide an overall description of this section of the RoW. Additional details are also provided on Drawings 1006626-10 to 12 attached in Appendix A.

Table 3.5: Existing RoW Condition (Section C)

Item	Description
Carriageway width	The RoW has a chipsealed surface approximately 3.5m in width. The RoW section at the intersection with Southernthread Road has recently been resurfaced with asphalt 4m in width.
Pavement condition	A visible vehicle path in the centre of the pavement indicates a single lane of traffic during normal operation. Flushing is evident within the wheel tracks. And a large proportion of the RoW has been patched along the edges. Significant crocodile cracking, edge break and pot holes are evident at most corners along this section suggesting significant pavement deterioration due to overrunning and water ingress. A number of patches and pavement repairs have been marked in preparation for maintenance.
Markings and signage	There are no pavement markings and little signage evident
Gradients	The RoW climbs steadily from Southernthread Road to a crest then falls towards Woofingtons.
Sight distance	Several corners do not meet the Stopping Sight Distance (SSD) of 49.2m for a speed environment of 50 km/hr with a mix of sight distance restricted by a cut slope or vegetation growth on the inside of the corner.
Traffic volumes	Traffic counts undertaken in May 2018 recorded a seven day average of 54 vehicle movements per day on this part of the RoW, including an average of 2 heavy vehicle movements (3% of the total traffic movements). The recorded 85th percentile speed is approximately 50 km/hr.
Walking and cycling	There is no separate provision for walking or cycling along this section of the RoW. However, we understand that a number of walkers and cyclists use this section to access the reserve and mountain bike tracks. No alternative sealed path exists for pedestrians or cyclists, however there is a track for pedestrians and mountain bikers *(Barking Emu track)* that runs parallel to the section. However, this is remote from the roadway and may not be as popular with less confident users.
Drainage	There is no formal drainage along the RoW, and it is likely that there is significant water flowing down the inside and across the carriageway during rainfall events. There is evidence of scour on some of the berms and roadside banks as well as pavement failures on corners that can be in part attributed to water ingress.
Slope stability	There is some evidence of minor slope failure in some of the more exposed rocky sections of the RoW, although this is not significant and, apart from minor debris, does not appear to signify any underlying instability.

Table 3.6: Existing RoW Photos (Section C)

Photograph 3-9: View south from Southernthread Road

Photograph 3-10: Typical alignment showing patching to edge break

Photograph 3-11: Sharp corner with limited sight distance showing edge break and overrun

Photograph 3-12: View south towards Woofingtons with limited sight distance and gravel overrun

3.4 Section D - Woofingtons to the Radome

From a closed gate immediately south of Woofingtons' entrance the RoW continues as a sealed track climbing out of the hollow along the ridgeline for a further 500m to the Radome installation.

There are no known residential dwellings past Woofingtons Ltd.

Tables 3.7 and 3.8 below provide an overall description of this section of the RoW. Additional details are also provided on Drawings 1006626-10 to 12 attached in Appendix A.

Table 3.7: Existing RoW Condition (Section D)

Item	Description
Carriageway width	The RoW has a chip sealed surface approximately 3.5m in width with some sections widening to approximately 5m to provide informal passing places
Pavement condition	A visible vehicle path in the centre of the pavement indicates a single lane of traffic during normal operation. Flushing is evident within the wheel tracks. And a large proportion of the RoW has been patched along the edges. Significant crocodile cracking, edge break and pot holes are evident at most corners along this section suggesting significant pavement deterioration due to overrunning and water ingress. A number of patches and pavement repairs are evident.
Markings and signage	There are no pavement markings. There is little signage evident.
Gradients	The RoW climbs steeply from Woofingtons to the Radome
Sight distance	Several corners do not meet the Stopping Sight Distance (SSD) of 49.2m for a design speed of 50 km/hr with a mix of sight distance restricted by a cut slope or vegetation growth on the inside of the corner.
Traffic volumes	Traffic counts undertaken in May 2018 recorded a seven day average of 54 vehicle movements per day on this part of the RoW[6], including an average of 2 heavy vehicle movements (3% of the total traffic movements). The recorded 85th percentile speed is approximately 50 km/hr.
Walking and cycling	There is no separate provision for walking or cycling along this section of the RoW. However, we understand that a number of walkers and cyclists use this section to access the reserve and mountain bike tracks. No alternative sealed path exists for pedestrians or cyclists, however there is a track for pedestrians and mountain bikers *(Barking Emu track)* that runs parallel to the section until Woofingtons where it meets two additional pedestrian and mountain bike tracks *(the 'Tip Track' and Red Rocks track).*
Drainage	There is no formal drainage along the RoW, and it is likely that there is significant water flowing down the inside and across the carriageway during rainfall events. There is evidence of scour on some of the berms and roadside banks as well as pavement failures on corners that can be in part attributed to water ingress
Slope stability	There is some evidence of minor slope failure in some of the more exposed rocky sections of the RoW, although this is not significant and, apart from minor debris, does not appear to signify any underlying instability

[6] Note that the count did not differentiate between Section C and Section D, whilst it is likely that volumes in this section are lower than in the previous, there is no evidence at the time of writing

Table 3.8: Existing RoW Photos (Section D)

Photograph 3-13: Farm gate immediately south of Woofingtons

Photograph 3-14: RoW south towards Radome, metalled widening on corner with repaired edge break

Photograph 3-15: Sight distance restricted by bank with minor slippage

Photograph 3-16: Typical ridgeline section

3.5 Section E - Radome to Te Kopahou

From the Radome, the sealed RoW drops toward the south and ends 600m away, approximately 100m before the RoW continues as an unsealed track to a locked farm gate at the boundary of Long Gully Station. Beyond this only pedestrian access to Te Kopahou is available through a narrow gap to the right of the gate. The RoW continues for a further 1.8km as an unsealed farm track with rocky outcrops.

There are no known residential dwellings past the Radome.

Tables 3.9 and 3.10 below provide an overall description of this section of the RoW. Additional details are also provided on Drawings 1006626-10 to 12 attached in Appendix A.

Table 3.9: Existing RoW Condition (Section E)

Item	Description
Carriageway width	The RoW has a chip sealed surface approximately 3.5m in width.
Pavement condition	The pavement appears to be in reasonable condition, considering its age with little evidence of failure along its length. There is significant edge break at the interface with the unsealed gated section 100m before the end of the RoW.
Markings and signage	There are no pavement markings with little signage evident
Gradients	The RoW falls from the Radome to the end of seal, the unsealed track beyond follows the ridgeline towards Te Kopahou
Sight distance	Several corners do not meet the Stopping Sight Distance (SSD) of 49.2m for a design speed of 50 km/hr with a mix of sight distance restricted by a cut slope or vegetation growth on the inside of the corner
Traffic volumes	Traffic counts undertaken in May 2018 recorded a seven day average of 14 vehicle movements per day on this part of the RoW, including an average of 1 heavy vehicle movements (6% of the total traffic movements). The recorded 85th percentile speed is approximately 42 km/hr.
Walking and cycling	There is no separate provision for walking or cycling along this section of the RoW. However, we understand that a number of walkers and cyclists use this section to access the reserve and mountain bike tracks. A small number of pedestrians were observed walking up the edge of the RoW during the site inspection. There are three tracks for pedestrians and mountain bikers associated with this section. The Radome Track starts near the beginning of this unsealed section; The Te Kopahuo Track follows this section of RoW then links up with Ribs Track that drops down to Te Rimurapa/Sinclair Head.
Drainage	There is no formal drainage along the RoW, and it is likely that there is significant water flowing down the inside and across the carriageway during rainfall events. There is evidence of scour on some of the berms and roadside banks as well as pavement failures on corners that can be in part attributed to water ingress.
Slope stability	There is some evidence of minor slope failure in some of the more exposed rocky sections of the RoW, although this is not significant and, apart from minor debris, does not appear to signify any underlying instability.

Table 3.10: Existing RoW Photos (Section E)

 *Photograph 3-17: Retaining wall under construction at access to radome*	 *Photograph 3-18: Edge break at start of unsealed RoW section*
 *Photograph 3-19: First 100m of unsealed RoW ending at farm gate*	 *Photograph 3-20: Typical view of remaining farm track RoW to access the reserve*

4 Qualitative assessment and potential improvement options

The assessment has been undertaken in accordance with the following reference documents;

- Wellington City Council Code of Practice for Land Development 2012 (WCC COP);
- New Zealand Standards 4404:2010 Land Development and Subdivision Infrastructure (NZS 4404:2010);
- Wellington Water Regional Standard for Water Services 2012 (WW Standard);
- Current legislation and;
- Austroads and NZTA standards and guidance documents.

Potential improvement options are described for each section to overcome a particular issue such as safety, accessibility and maintenance and are described section by section in the context of current and recommended levels of access for pedestrians, cyclists and vehicular traffic.

4.1 Section A - Ashton Fitchett Drive to the wind turbine

Table 4.1: Qualitative assessment and potential improvement options (Section A)

Item	Description
Level of Service	<u>RoW Width</u> The current RoW width of 3.5m is technically unsuitable for the recorded traffic volumes (254 vpd), and this is evidenced by the edge break along the roadside where vehicles cross the berm to pass opposing traffic. Given the traffic volumes and potential increase in traffic from the consented activities (e.g. Woofingtons and uptake of rural residential sections), this section of the RoW will need to be improved to cater for the increasing demands for two way traffic. Published standards suggest that it should be upgraded to a two lane two way road. (See section 4.8 below) However, it is more appropriate that the RoW is considered a single track road in this section due to the nature of the surrounding reserve. Maintaining the current alignment with limited widening to approximately 4.5m through sealing localised areas of berm overrun would seem appropriate, if combined with widening of appropriate corners, to allow passing places with good inter-visibility. Future widening to 5.5m minimum width two-way road may be appropriate if the RoW was to be upgraded to public road status to cater for any future increase in traffic volumes beyond those currently approved by Council. <u>Intersection with Ashton Fitchett Drive</u> The RoW access to Ashton Fitchett Drive, currently formed as a driveway, is not ideally suited for the traffic volumes and the safe and efficient operation of the RoW. Ideally, it may be more appropriate to realign it as a formal intersection with Ashton Fitchett Drive, removing the section of path across the RoW, installing no-stopping lines, give way markings, signage, and a street name sign adjacent. The RoW should also be realigned slightly to increase the approach angle closer to 90 degrees and improve visibility to the south along Ashton Fitchett Drive for exiting vehicles. As a minimum, widening of the access should be considered to allow opposing vehicles to enter and exit the RoW without blocking the lanes of Ashton Fitchett Drive. <u>Automatic Gate</u> The automatic gate is currently wide enough for a single vehicle only. It is operational during evenings and is accessible only to those residents and businesses who have the access code. Maintaining this feature is important to reinforce the RoW nature of the road and to prevent inappropriate night time access.

Item	Description
	Increasing the width would allow opposing vehicles to pass through the gate at the same time although this is considered unnecessary as the current facility is fit for purpose. Ideally, widening a short length of the road to 5.5m should be considered on either side of the gate to provide a passing bay and minimise conflict between opposing vehicles. Edge marking should also be considered to guide vehicles through the gate, as well as priority signage in a southbound direction. <u>Turbine Car Park Gate</u> The gate at the southern extent of the car park prevents unauthorised vehicle access beyond the area considered applicable for public vehicles during the day (i.e. the RoW up to the wind turbine car park). It appears that this gate may be left open. Closing this gate during the day will reduce the level of unwanted vehicle access to the upper sections of the RoW. It would be beneficial if this gate were automatically controlled in the same manner as the main gate at Ashton Fitchett Drive
Safety	<u>Speed</u> The traffic monitoring results show most vehicles exceeding the 30km/h inferred speed limit, some by a significant amount (typically 50 km/h). Under the current rules[7], the road controlling authority is required to "aim for" compliance within 10%. This gives a de-facto speed limit of 33km/h and given the public attitude to speed limits it would be advisable to apply a design speed of 40km/h for any significant improvements to reflect this. Considering the recorded 85th percentile speed of 54km/h, it is reasonable to assume that drivers consider the speed environment to be between 40 and 50km/h[8]. Regardless of the design speed of any improvements, a posted speed limit should be officially introduced as 30km/h within this publicly accessible section. Drivers are clearly exceeding the posted limit, and the primary consideration should be improving compliance rather than increasing the standard. Any significant upgrade of the RoW to improve or enhance the speed environment would likely result in even higher vehicle speeds and significantly increased risks. 30km/h repeater signs should be used along the length of the RoW to reinforce the limit at a minimum of 500m spacing. This could be reinforced by painting "30" markings on the carriageway. <u>Traffic Calming</u> The width and geometry of the current RoW act as a form of passive traffic calming in that drivers are unable to gain sufficient speed to present a significant danger due to the risk of conflict with an opposing vehicle or losing control on a tight bend. However, it is acknowledged that the average speeds encountered are excessive given the volume of traffic and likelihood of vulnerable users on the RoW. Low profile speed humps could be considered to control vehicle speeds, especially if pedestrians and cyclists continue to share the space with vehicles although these could prove hazardous to cyclists and motorcyclists travelling downhill. Based on the assumption that the majority of walkers and cyclists will use the off road paths, the use of speed humps would be appropriate, particularly in this high trafficked and publicly accessible section. To improve awareness of the humps advance warning PW-39 signage should be used, with reflective posts or bollards at each hump location. Care should be taken to prevent issues with ponding of surface water when positioning humps. The use of localised narrowing can be effective in reducing speeds, although the roadway is already narrow and a further restriction may actually increase conflict

[7] Land Transport Rule 54001/2017 "Setting of Speed Limits 2017"
[8] Speed Limits New Zealand (2003) Table SLNZ3

Item	Description
	between opposing drivers to get through the restriction first. This could be managed using priority signage. Any narrowing would need to be on a straight section with good visibility and carefully designed so that it was not a hazard to cyclists or pedestrians or to drivers at night. <u>Sight Distance</u> Sight distance does not meet Austroads requirements for a one lane road as noted previously in Section 2.1. Whilst the RoW is not an official road, it would likely be regarded as one by casual users gaining access to the car park. There are a number of interventions that could be used to improve safety: · A permanent but high cost solution would be to increase the carriageway width to approximately 5m on tight corners, the sight distance issue would be overcome and localised passing opportunities could be provided. Painted centre lines could be marked around curves where sight distance is limited. · Targeted slope cutting "benching" and vegetation trimming would be appropriate to improve sightlines within this higher trafficked section. Using SSD for a 30km/h speed environment of approximately 25m minimises the extent of cutting work necessary to achieve a safe minimum. · Sight rails may be beneficial on some of the corners to improve driver awareness and give a clear indication of the alignment of the RoW. Whilst they are not designed to prevent vehicles from leaving the carriageway in the way that standard roadside barriers do, they are an inexpensive way of defining a carriageway layout where the risk of crashing is low.  · Roadside barriers are a higher cost preventative measure that are not justified on this site due to low traffic volumes and no history of vehicles leaving the carriageway. It may be beneficial to review the level of risk.  · A third alternative would be to use "safe hit" edge marker posts which are typically used along the length of rural highways. 

Item	Description
	Lighting The RoW is currently unlit, conversion to a public road would likely necessitate lighting to WCC standards if the road were to remain open to the public during the hours of darkness. Providing lighting on the closed RoW may suggest to the public that the road should be open and accessible and may attract unwanted nocturnal activity. Lighting would also create undesirable light pollution on the Wellington skyline and rural belt. Edge lines Providing edge lines may improve corridor safety under poor visibility conditions, they will however provide a 'shy line' pushing vehicles closer to the centre of an already narrow roadway. Given the likelihood of consistent overrunning, markings would not be very durable and would need repainting regularly. Road markings tend to increase driver confidence and it may result in higher speeds. A further risk is that a marked shoulder, however narrow, may be considered to be a cycle or walking lane, giving a false sense of safety for vulnerable users.
Pavements	In general, the RoW pavement appears to be in reasonable condition. A short section below the wind turbine showing cracking, evidence of weak or wet subbase layers. This section is likely to continue to require frequent patching and resealing unless pavement reconstruction is undertaken (full localised dig out, sub base improvement, base course, reseal, and drainage improvement as required). Carriageway widening to seal the areas of overrun (approx. 0.5m), will significantly reduce (or eliminate) the ongoing edge break. As a further control, an unsealed shoulder 0.5m in width could be constructed along the edge of the seal to support any vehicle wheels crossing into the berm. Flushing is not currently a significant issue and future resealing regimes will remove it.
Walking and cycling	Both the WCC COP and NZS 4404:2010 do not require specific provisions for cyclists for roads with a design speed of 40 km/hr or below, although the introduction of speed management should improve pedestrian and cyclist safety overall. Separate pedestrian and cyclist facilities are already available in the form of the Zealandia perimeter track and "Car Parts" mountain bike track, it is acknowledged that pedestrians and cyclists also use the sealed carriageway. Ideally, a 2.5m wide continuous shared footway/cycleway would be provided, separated from the carriageway by a vertical/visual difference, (such as a kerb or a small grassed strip). However, the cost of this is likely to be prohibitive for its likely usage and funding would be better invested in improving the RoW environment. The alternate routes via the Zealandia perimeter track or the Car Parts track are unlikely to attract all pedestrians and cyclists from the RoW without significant improvement to gradients and surface regularity, especially given its separated nature from the RoW. Although improved signage and wayfinding may help.
Drainage	There is no formal drainage along the RoW, except in specific locations where a culvert conveys flows from existing outlets beneath the RoW. The lack of drainage infrastructure does not appear to be resulting in significant issues along this section. However, any widening of the carriageway should incorporate drainage improvements where gradients and cross falls would cause flow of water across the carriageway. This will be particularly important if speed humps are installed. Ideally, berms should be reshaped to allow better run off from the seal to shallow roadside ditches where there is sufficient space.
Slope stability	Ongoing small slumping is likely to occur within the grassed batter slopes. These shallow slumps are unlikely to affect the structural integrity of the slope but may be unsightly until the areas re-vegetate, and may also result in spoil within the berm and edge of the seal.

Item	Description
	The frequency at which slumping occurs could be reduced by either reducing the batter angle or planting with shrubs/trees (noting this will impact sight distance).
Ongoing Maintenance	Inspections should be carried out annually with a focus on vegetation growth, pavement condition and drainage function. Apart from cyclic maintenance (vegetation control, drain cleaning, sign cleaning & removal of minor slip debris) the only interventions would be repairs to edge break or potholes and chip sealing to retain pavement integrity – probably in a 10 year cycle.

4.2 Section B - Wind turbine to Southernthread Road

Table 4.2: Qualitative assessment and potential improvement options (Section B)

Item	Description
Level of Service	<u>RoW Width</u> The current single traffic lane width of 3.5m is generally considered unsuitable for the recorded traffic volumes (154 vpd), when the previously stated standards are referred to. There is evidence of extensive edge break along the carriageway where vehicles are travelling along the berm to pass opposing traffic or sweep wide around corners to gain sight distance. As with the previous section, it would be appropriate to retain the current alignment and widen localised areas on corners and seal areas of overrun to improve sight distance and provide short passing places at strategic locations. Considering that the level of daily traffic is excessively high when compared to the number of dwellings and legitimate businesses on (and beyond this RoW section, traffic management would be the first and most appropriate option towards the longevity and ongoing safety of the route. Removing casual visiting vehicles would reduce demand by something in the region of 80%, based on the comparison between daytime and night time traffic (when the lower gate is shut). By using this as the baseline traffic condition, the alignment becomes appropriate for the level of traffic and the need for upgrade is significantly reduced.
Safety	<u>Speed</u> Whilst there is no official speed restriction, the inferred speed limit is likely to be 50km/h as this is the default for a constrained narrow "urban fringe" or semi-rural road. This is reflected by the observed 85th percentile speed of traffic. With an introduction of a statutory limit in the lower sections it can be inferred that the default speed environment is 30km/h without formally introducing one in this section. Restriction of traffic access to this section will significantly reduce risk through exclusion of all casual visitors and therefore limiting users to those who are familiar with the route and its conditions. Sight rails may be beneficial on some of the tighter corners with drop offs to assist drivers recognising the potential hazard well in advance. <u>Sight Distance</u> Sight distance does not meet Austroads minimum requirements for SSD on three corners. By increasing the carriageway width to approximately 5m on tight corners, the sight distance issue can be overcome and localised passing opportunities can be provided. Painted centre lines could be marked around curves where sight distance is limited. Targeted slope cutting and vegetation trimming on corners and achieve sightlines and could be done in lieu of actual carriageway widening to reduce costs.

Item	Description
Pavements	In general, the pavement appears to be in a reasonable condition. However a considerable length is showing evidence of edge beak and overrun onto the berm. Most corners are showing signs of cracking and pot holes symptomatic of weak or wet subbase layers. Minor widening to repair edge break would also significantly reduce the ongoing edge break observed. An additional unsealed shoulder 0.5m in width could also be provided along the edge of the seal to support any vehicle crossing into the berm, although this is not necessary if vehicle access is restricted during the day. Corners are likely to continue to require frequent patching and resealing unless pavement reconstruction is undertaken (full localised dig out, sub base improvement, base course, reseal, and drainage improvement as required). Flushing is not currently a significant issue and future resealing regimes will remove it. The intersection and approaches to Southernthread Road have recently been sealed in asphalt to a width of between 4.5 and 5m, this exceeds the minimum requirements for the RoW and is unlikely to need any further treatment for several years under current traffic conditions.
Walking and cycling	There is a high demand for pedestrians and cyclists using this section of RoW. Typically, it is anticipated that the majority of cyclists will be recreational mountain-bikers using the RoW as an easy climb to the start of the downhill single track sections. Therefore the need to cater for higher speed downhill cyclists in this section is likely to be low. A separate shared footway/cycleway would be considered appropriate if the traffic volumes were to remain unchecked during the day. However, with a throttling of vehicle access, the traffic volumes, speeds and risk to pedestrians and cyclists will be significantly reduced. However, with the consented developments, daytime traffic would still be relatively high (roughly 100 vpd). In this instance, with the alternative routes being somewhat disconnected from the RoW, an on-road facility would be an appropriate option. Widening the carriageway by between 1 and 2m would allow a shared use cycle/footway “lane” to be installed between the turbine car park and Southernthread Road. If there are residual concerns over safety due to lack of separation then safe hit posts could be used as well as the shared path signage along the route. A suitable access point would be required for pedestrians and cyclists to bypass the gate at the car park when it is closed during the day.
Drainage	There is no formal drainage along the RoW, except in specific locations where a culvert conveys flows from existing outlets beneath the RoW. The lack of drainage infrastructure appears to be contributing to premature failure of the carriageway surface on corners where flows cross over and through the pavement layers, combined with the additional stresses of turning vehicles and overrun into the berm. In these areas water should be prevented from entering the pavement layers by intercepting flows upstream and conveying them past or under the carriageway to a suitable downstream discharge point. As a minimum berms should be reshaped to allow better run off from the seal to shallow roadside ditches where there is sufficient space. If kerbing is installed to support a footpath, more formal drainage (sumps etc.) will be required to control increased surface flows.
Slope stability	Ongoing small slips are likely to occur within the steep batter slopes. These are unlikely to affect the structural integrity of the slope but result in spoil within the berm and edge of the seal. The frequency at which slips occur could be reduced by either reducing the batter angle, planting with shrubs/trees (noting this will impact sight distance), or using some form of retaining structure (high cost).

Item	Description
Ongoing Maintenance	Inspections should be carried out annually with a focus on vegetation growth, pavement condition and drainage function. Apart from cyclic maintenance (vegetation control, drain cleaning, sign cleaning & removal of minor slip debris) the only interventions would be repairs to edge break or potholes and chip sealing to retain pavement integrity – probably in a 10 year cycle.

4.3 Section C - Southernthread Road to Woofingtons

Table 4.3: Qualitative assessment and potential improvement options (Section C)

Item	Description
Level of Service	<u>RoW Width</u> Traffic volumes drop significantly beyond the rural subdivisions on Southernthread Road. The current single traffic lane width of 3.5m is generally considered appropriate for the recorded traffic volumes (54 vpd), when the previously stated standards are referred to. However, there is evidence of extensive edge break along the carriageway where vehicles are travelling along the berm to pass opposing traffic or sweep wide around corners to gain sight distance. As with the previous section, it would be appropriate to retain the current alignment and widen localised areas on corners and seal areas of overrun, unless access is restricted during the day.
Safety	<u>Speed</u> In the absence of a posted speed limit, the default is assumed to be 50km/h based on the observed driver behaviour. The introduction of a formal 30km/h speed limit on Section A could be interpreted as a de-facto or inferred limit for this section given the constrained nature. However, it is unlikely that many drivers would adhere to that limit. Daytime closure of the gate at the Turbine car park would remove casual visitors and therefore reduce the risk of unfamiliar drivers being on this section of the RoW. Sight rails may be beneficial on some of the tighter corners with drop offs to assist drivers recognising the potential hazard well in advance. <u>Sight Distance</u> Sight distance does not meet Austroads requirements for SSD. By increasing the carriageway width to approximately 5m on tight corners, the sight distance issue can be overcome and localised passing opportunities can be provided. Painted centre lines could be marked around curves where sight distance is limited. Targeted slope cutting and vegetation trimming will be necessary to widen corners and achieve sightlines.
Pavements	In general, the pavement appears to be in a reasonable condition. However a considerable length is showing evidence of edge beak and overrun onto the berm. Most corners are showing signs of cracking and pot holes symptomatic of weak or wet subbase layers. Minor widening to repair edge break and seal areas of overrun (as proposed above) will also significantly reduce the ongoing edge break observed. An additional unsealed shoulder 0.5m in width could also be provided along the edge of the seal to support any vehicle crossing into the berm, although this is not necessary immediately. Corners are likely to continue to require frequent patching and resealing unless pavement reconstruction is undertaken (full localised dig out, sub base improvement, base course, reseal, and drainage improvement as required). Flushing is not currently a significant issue and future resealing regimes will remove it.

Item	Description
Walking and cycling	With the significant drop off in vehicle activity, this section does not have such a high level of risk to pedestrians and cyclists, and with an active daytime traffic management, the risk to vulnerable RoW users would be significantly reduced. A continuous shared footway/cycleway would be ideal although cost constraints for construction in difficult terrain are likely to be prohibitive. Similarly, an informal unsealed shoulder could be developed along the length that would provide a relatively sheltered area for people to walk and cycle. However, given the gradients involved, cyclists are likely to continue to use the RoW although a shoulder would provide additional space for vehicles to pass safely. The most cost effective solution relies on the introduction of active traffic management and is essentially retaining the status quo. Pedestrians and cyclists share the RoW space with vehicles with appropriate signage to warn drivers along the route. An appropriate pedestrian access adjacent to the field gate south of Southernthread Road (at the start of this section) should be provided to provide unrestricted access to walkers and cyclists during the times the RoW is closed to vehicles.
Drainage	There is no formal drainage along the RoW, except in specific locations where a culvert conveys flows from existing outlets beneath the RoW. The lack of drainage infrastructure appears to be contributing to premature failure of the carriageway surface on corners where flows cross over and through the pavement layers, combined with the additional stresses of turning vehicles and overrun into the berm. In these areas water should be prevented from entering the pavement layers by intercepting flows upstream and conveying them past or under the carriageway to a suitable downstream discharge point. As a minimum berms should be reshaped to allow better run off from the seal to shallow roadside ditches where there is sufficient space. If kerbing is installed to support a footpath, more formal drainage (sumps etc.) will be required to control increased surface flows.
Slope stability	Ongoing small slips are likely to occur within the steep batter slopes. These are unlikely to affect the structural integrity of the slope but result in spoil within the berm and edge of the seal. The frequency at which slips occur could be reduced by either reducing the batter angle, planting with shrubs/trees (noting this will impact sight distance), or using some form of retaining structure (high cost).
Ongoing Maintenance	Inspections should be carried out annually with a focus on vegetation growth, pavement condition and drainage function. Apart from cyclic maintenance (vegetation control, drain cleaning, sign cleaning & removal of minor slip debris) the only interventions would be repairs to edge break or potholes and chip sealing to retain pavement integrity – probably in a 10 year cycle.

4.4 Section D - Woofingtons to the Radome

Table 4.4: Qualitative assessment and suggested improvement options (Section D)

Item	Description
Level of Service	<u>RoW Width</u> Beyond Woofingtons access is limited to sporadic use by visitors to the station and maintenance activities at the Airways installations. The current single traffic lane width of 3.5m (widening to 4.0m at the Radome) is generally considered appropriate for the recorded traffic volumes (14 vpd), when the previously stated standards are referred to. However, there is evidence of edge break along the carriageway where vehicles are cross the berm or sweep wide around corners to gain sight distance.

Item	Description
	As with the previous section, it would be appropriate to retain the current alignment and widen localised areas on corners. Areas of overrun should be reconstructed as unsealed shoulder and minor edge break repaired.
Safety	Speed In the absence of a posted speed limit, the default is assumed to be 50km/h based on the observed driver behaviour. The introduction of a formal 30km/h speed limit on Section A could be interpreted as a de-facto or inferred limit for this section given the constrained nature. However, it is unlikely that many drivers would adhere to that limit. Daytime closure of the gate at the Turbine car park would remove casual visitors and therefore reduce the risk of unfamiliar drivers being on this section of RoW. Sight rails may be beneficial on some of the tighter corners with drop offs to assist drivers recognising the potential hazard well in advance. Sight Distance Sight distance does not meet Austroads requirements. By increasing the carriageway width to approximately 5m on tight corners, the sight distance issue can be overcome and localised passing opportunities can be provided. Painted centre lines could be marked around curves where sight distance is limited. Targeted slope cutting and vegetation trimming will be necessary to widen corners and achieve sightlines.
Pavements	In general, the pavement appears to be in a good condition. Some of the RoW length is showing evidence of edge beak and overrun onto the berm. There is little sign of cracking and no major potholes. Little work is needed other than minor patching to repair edge break. Widening on corners would be beneficial to improve sightlines and provide pavement area for passing although this could be in the form of unsealed shoulder.
Walking and cycling	This section does not have a high level of risk to pedestrians and cyclists, no work other than warning signage and berm maintenance is considered necessary. An appropriate pedestrian access adjacent to the field gate south of Woofingtons should be provided to provide unrestricted access to walkers and cyclists during the times the RoW is closed to vehicles.
Drainage	There is no formal drainage along the RoW, except in specific locations where a culvert conveys flows from existing outlets beneath to RoW. The lack of drainage infrastructure appears to be contributing to premature failure of the carriageway surface on corners where flows cross over and through the pavement layers, combined with the additional stresses of turning vehicles and overrun into the berm. In these areas water should be prevented from entering the pavement layers by intercepting flows upstream and conveying them past or under the RoW to a suitable downstream discharge point. As a minimum berms should be reshaped to allow better run off from the seal to shallow roadside ditches where there is sufficient space. If kerbing is installed to support a footpath, more formal drainage (sumps etc.) will be required to control increased surface flows.
Slope stability	Ongoing small slips are likely to occur within the steep batter slopes. These are unlikely to affect the structural integrity of the slope but result in spoil within the berm and edge of the seal. The frequency at which slips occur could be reduced by either reducing the batter angle, planting with shrubs/trees (noting this will impact sight distance), or using some form of retaining structure (high cost).
Ongoing Maintenance	Inspections should be carried out annually with a focus on vegetation growth, pavement condition and drainage function.

Item	Description
	Apart from cyclic maintenance (vegetation control, drain cleaning, sign cleaning & removal of minor slip debris) the only interventions would be repairs to edge break or potholes and chip sealing to retain pavement integrity – probably in a 10 year cycle.

4.5 Section E - Radome to Te Kopahou

Table 4.5: Qualitative assessment and suggested improvement options (Section E)

Item	Description
Level of Service	RoW Width The current single traffic lane width of 3.5m is generally considered appropriate for the recorded traffic volumes (14 vpd), when the previously stated standards are referred to. As with the previous section, it would be appropriate to retain the current alignment and widen localised areas on corners. Areas of overrun should be reconstructed as unsealed shoulder and minor edge break repaired.
Safety	Speed In the absence of a posted speed limit, the default is assumed to be 50km/h based on the observed driver behaviour. The introduction of a formal 30km/h speed limit on Section A could be interpreted as a de-facto or inferred limit for this section given the constrained nature. However, it is unlikely that many drivers would adhere to that limit. Daytime closure of the gate at the Turbine car park would remove casual visitors and therefore reduce the risk of unfamiliar drivers being on this section of RoW. Sight rails may be beneficial on some of the tighter corners with drop offs to assist drivers recognising the potential hazard well in advance. Sight Distance Sight distance does not meet Austroads requirements. By increasing the carriageway width to approximately 5m on tight corners, the sight distance issue can be overcome and localised passing opportunities can be provided. Painted centre lines could be marked around curves where sight distance is limited. Targeted slope cutting and vegetation trimming may be necessary to widen corners and achieve sightlines.
Pavements	In general, the pavement appears to be in a good condition. Some of the RoW length shows evidence of repair to historic edge break. There is little sign of cracking and no potholes. Little work is needed other than sealing the transition from sealed RoW and the start of the unsealed farm track. Ideally this should be sealed for approximately 3m to provide a safe and durable transition. Widening on corners would be beneficial to improve sightlines and provide pavement area for passing although there does not appear to be any need to address this with the current traffic levels. Beyond the farm gate the track is unsealed and within private land, no vehicle access is possible other than residents and official farm visitors. The track is considered fit for purpose and no work is necessary to maintain public walking and cycling access.
Walking and cycling	This section does not have a high level of risk to pedestrians and cyclists, no work other than warning signage and berm maintenance is considered necessary on the sealed section. Improved pedestrian gateway should be provided at the farm gate plus improved wayfinding and access signage (currently the sign on the gate implies that public access is prohibited).
Drainage	There is no formal drainage along the RoW, except in specific locations where a culvert conveys flows from existing outlets beneath to road.

Item	Description
	The lack of drainage infrastructure appears to be contributing to premature failure of the carriageway surface on corners where flows cross over and through the pavement layers, combined with the additional stresses of turning vehicles and overrun into the berm. In these areas water should be prevented from entering the pavement layers by intercepting flows upstream and conveying them past or under the carriageway to a suitable downstream discharge point. Where appropriate, berms should be reshaped to allow better run off from the seal to shallow roadside ditches where there is sufficient space. Beyond the end of seal no work is necessary.
Slope stability	Ongoing small slips are likely to occur within the steep batter slopes. These are unlikely to affect the structural integrity of the slope but result in spoil within the berm and edge of the seal. The frequency at which slips occur could be reduced by either reducing the batter angle, planting with shrubs/trees (noting this will impact sight distance), or using some form of retaining structure (high cost).
Ongoing Maintenance	Inspections should be carried out annually with a focus on vegetation growth, pavement condition and drainage function. Apart from cyclic maintenance (vegetation control, drain cleaning, sign cleaning & removal of minor slip debris) the only interventions would be repairs to edge break or potholes and chip sealing to retain pavement integrity – probably in a 10 year cycle. Beyond the end of seal only safety inspections and review of wayfinding signage would be necessary on an annual basis.

4.6 Traffic Management

The automatic gate at the start of Hawkins Hill Road at Ashton Fitchett Drive is understood to be closed, with authorised access only, between the hours of 5pm and 7am during the winter months (April to September) and between 8pm and 7am during the summer (October to March).

This restricts access during the hours of darkness to authorised maintenance activities and residents. This also means that traffic will be low and generally RoW users will be experienced in the location and hazards, the same way that they would be within a long private roadway.

The sliding gate at the start of Section B at the turbine car park is not operational. As a result unauthorised vehicle access further along the RoW is not prevented. This is reflected in the traffic counts obtained.

Maintaining the two gate system where the main gate opens during the day, and the car park one remains closed is a highly effective way of managing traffic and therefore safety of authorised users (pedestrians, cyclists and residents etc.).

It may be necessary to automate the second gate to increase daytime compliance with access limitations.

The typical winter counts, in Table 4.6 below show that daytime activity is spread along the length of the sealed RoW which indicates that access control beyond the turbine car park is not normally in place.

Table 4.6: Two –Way traffic measured during May 2018

Section	A	B	C[1]	D	E
Night	38[2]	31	7		3
Day	217	123	47		11
24 hour	254	154	54		14

Note:

1. Sections C and D counted as single length
2. This is likely to include a number of vehicles leaving at 5pm just as the gate closes

4.7 Speed Limit

We understand that a 30km/h speed restriction was originally sign posted at the start of section A. According to WCC this was not an official restriction and the signs were removed. There are two significant risks with this course of action: firstly, drivers on the right of way will have no guidance as to the constrained and challenging nature of the road environment; and secondly the RoW will adopt a default speed limit, in this area it could be considered rural, meaning that legally people can drive at 100km/h.

Whilst the status of the current restriction is uncertain, removal because of legal technicality is likely to result in higher speeds than are already observed and increase the risk of a speed related incident.

The default speed environment can be described as what drivers feel comfortable with. Based on recorded traffic, the 85th percentile speed is in the region of 50km/h. According to Speed Limits New Zealand (2003), this suggests that the recorded speed is generally within 10km/h of the speed limit. Therefore in this instance the speed "limit" can be inferred as between 40 and 50km/h. When the RoW environment is assessed against the SLNZ "Roadway Rating", the speed environment defaults to 50km/h with a proviso that a lower speed limit can be introduced within a traffic calmed area.

Being a RoW and not a public road poses a challenge for enforcement unless it is declared a public road or the speed limit is approved by NZTA and its location notified in the Gazette.

Current legislation allows WCC to set speed limits within their network through a bylaw, provided that it meets the criteria in the 2016 NZ Speed Management Guide. In this instance the guide is unclear as the RoW is not a shared use public road in an urban area which would attract a limit of 30km/h, neither is it a low usage, low access, rural road which would default to 60km/h. The closest parallel in Table 2.1 is park and car park with recommended speeds of 20km/h and 10km/h respectively.

However, when the factors relating to road function and classification are considered, it is apparent that the RoW shares many of the aspects common to all low speed classifications:

- Narrow width, steep grades and tight corners;
- Shared use with a single track being used by motor vehicles, pedestrians and cyclists;
- Primarily recreational in function;
- Low traffic volumes;
- Restricted access.

Given the nature of the RoW, its location, geometry and usage, a 30km/h speed limit would be the most appropriate.

To make this a legal speed limit that is enforceable, WCC will need to:

- Gazette the length of RoW to be restricted;

- Consult with key stakeholders and user groups;
- Carry out public consultation;
- Create a bylaw;
- Erect and maintain appropriate signage and traffic control devices.

4.8 Upgrade RoW to Public Road

A permanent solution to access and use restrictions would be to upgrade the RoW to meet current WCC standards for a public road. Given the usage, the most appropriate length would be Section A from Ashton Fitchett Drive to the wind turbine car park, beyond this there would be limited benefit in upgrading for the benefit of a relatively low number of dwellings and restricted access businesses.

Primarily, the RoW would need to be designed as a two lane, two way urban facilities with a speed environment of 40km/h. However, the posted speed limit should be a maximum of 30km/h.

Current road minimum standards recommend the following:

- The WCC COP indicates the RoW should be considered as a Residential Local Long Cul-de-sac, with a design speed of 40 km/hr, two 2.5m wide traffic lanes and two 1.5m footpaths.
- NZS 4404:2010 indicates the RoW should be considered Suburban Primary Access to Housing (Figure E12) with a design speed of 40 km/hr, 5.5-5.7m wide carriageway and a 1.5m wide footpath on one side.
- In order to achieve a layout suitable for a Residential Collector (Figure E13), two 3.5m wide traffic lanes, two 1.5m wide cycle lanes and two 1.5m wide footpaths would be required to meet guidance requirements.

Given its usage, the most appropriate cross section would likely be:

- two 2.5m wide traffic lanes
- kerbed both sides with a single 1.5m footway on one side

To achieve this, the following steps would be necessary:

i The current RoW would need to be widened by approximately 2.5m with SSD of approximately 50m (to allow for 10% speed variance). It will be necessary to cut into the hillside extensively and retaining structures will be required both to support the road and retain the cut slopes in certain areas.

ii Guardrail would be necessary to restrain vehicles at drop offs on corners.

iii Drainage improvements would be required due to increased catchment and reduced berm area for run off. The introduction of formal pedestrian paths would likely necessitate the use of kerb and channel, therefore increasing the need for some form of drainage reticulation and control of the velocity of water running down the road.

iv The automatic gate would be removed, and the access onto Ashton Fitchett Drive fully reconstructed to form an intersection. Lighting is recommended as the new public road would have 24 hour access.

v Physical restraints to control vehicle speeds, such as narrowing and road humps, would be necessary to increase compliance with the posted speed limit.

The cost of implementation, for Section A only, would be in the region of $1.5M.

To declare this section as a public road, WCC would need to carry out extensive stakeholder consultation and the road section would need to undergo the same procedures as a private development road in order to be accepted. Access would still need to be restricted south of the wind turbine car park as there is no public benefit in providing unrestricted vehicle access beyond.

Creating a new road will increase maintenance liabilities for WCC as the level of access will be unrestricted; it will allow unrestricted night time access to a relatively remote car park which could

result in inappropriate and dangerous activities; a wider road will result in a higher speed environment and an increased risk of loss of control crashes; lighting will impact on the night time skyline of the reserve and green belt.

Overall there is no overriding need to upgrade Section A to public road. There are however significant dis-benefits and liabilities associated with it and, as such, this option has not been included in the overall options assessment.

5 Options Assessment

This section sets out and assesses different levels of treatment that might be applied to each section of the RoW.

5.1 Treatment Options

Based on the observations and qualitative assessments set out in the previous sections; three possible levels of treatment have been identified for each section of the RoW:

Do Minimum which involves bare minimum repairs to areas of seal with immediate risk of failure and low level safety improvements.

Minor Improvement which includes the lowest level of appropriate upgrade to safety and effectiveness of the RoW including minor widening to form passing places, seal repairs and drainage upgrade. This would be applied progressively on an 'as needs' basis to coincide with maintenance activities and within budget constraints.

Major Improvement which upgrades the RoW progressively, depending on level of traffic, to achieve appropriate standards for level of service progressively with a two way public access road at the start of the RoW reducing in scale along its length as activity declines (note, this is not public road standard).

These treatment level options, as they relate to each section of the RoW are set out in Table 5.1.

Walking and cycling (accessibility and safety) is addressed separately in Table 5.2

Cyclic maintenance activities are included in the overall assessment based on the scale of the option being assessed (i.e. do minimum ongoing maintenance is lower than the improvement options, etc.).

Rough order cost estimates for each level of treatment along each RoW section are provided in Tables 5.1 and 5.2. Costs are based on the rates provided in the WCC Physical Works Supplier Panel, adjusted to reflect the scale of works for each level of treatment. These estimates are provided for the purpose of comparison of the options developed in this report only. They are indicative only and are subject to variables including cost escalation, construction timeframes and contractor availability. At this level they are not suitable for budgeting or other purposes.

Table 5.1: Treatment options by section

Activity	Section A	Section B	Section C	Section D	Section E
Do Minimum	Repair potholes and edge break; reconstruct overrun areas as unsealed shoulder.			Complete retaining wall to Radome access.	Repair edge break at interface between seal and unsealed section.
Minor Improvement	Reconstruct pavement failures on corners; widen seal into areas of berm overrun; widen seal on bends to 5m width; widen entry to Ashton Fitchett Drive and create a passing bay at the gate; provide sight rails on sharp corners with drop off; consistent warning and advisory signage; 30km/h speed limit with repeater signage and pavement markings; Road humps at regular intervals; Provide passing bays on straight sections; upgrade turbine car park gate to automatic gate.	Reconstruct pavement failures on corners; improve drainage on corners; provide unsealed shoulder in areas of berm overrun; widen seal or shoulder on bends to 5m width; provide passing bays at regular intervals; provide sight rails on sharp corners with drop off; consistent warning and advisory signage.		Complete retaining wall to Radome access; provide sight rails on sharp corners with drop off.	Extend seal transition by 3m into unsealed RoW section; provide sight rails on sharp corners with drop off.
Major Improvement	Widen RoW to form access road with 5.5m wide seal for its full length; provide 2m sealed path; provide upgraded drainage system; realign access at Ashton Fitchett Drive into formal	Widen RoW seal to 4m for its full length with 0.5m unsealed shoulders; extend widening to 5.5m on bends to provide sight distance and passing places; improve drainage on bends.	Widen RoW with 0.5m unsealed shoulders; reconstruct pavement failures on corners; improve drainage on corners; widen seal on bends to 5m seal width to improve sightlines and	Complete retaining wall to Radome access; widen RoW with 0.5m unsealed shoulders; reconstruct pavement failures on corners; improve drainage on corners; widen seal on bends to	Improve drainage on corners; widen seal on bends to 5m seal width to improve sightlines and provide passing opportunities; provide sight rails on sharp corners with drop off;

Activity	Section A	Section B	Section C	Section D	Section E
	intersection; upgrade turbine car park gate to automatic gate. Consider lighting if road is to be publicly accessible 24 hours.		provide passing opportunities; provide sight rails on sharp corners with drop off.	5m width to improve sightlines and provide passing opportunities; provide sight rails on sharp corners with drop off.	seal start of farm track 5m.
Walking & Cycling - Do Minimum	Improve wayfinding for existing walking track adjacent to Zealandia fence line; Enhanced warning signage and wayfinding.	Improve wayfinding for existing walking track adjacent to Zealandia fence line; Enhanced warning signage and wayfinding.	Walking on berm and cycling on carriageway. Enhanced warning signage and wayfinding.		
Walking & Cycling - Minor Option	Improve wayfinding for existing walking track adjacent to Zealandia fence line; Enhanced warning signage and wayfinding.	Widen seal to provide 1.5m sealed shoulder as shared path up to Southernthread Road; Enhanced warning signage and wayfinding.	Walking on berm and cycling on carriageway. Enhanced warning signage and wayfinding.	Walking and cycling on carriageway under most conditions. Enhanced warning signage and wayfinding. Walking and cycling on carriageway under most conditions. Enhanced warning signage and wayfinding.	
Walking & Cycling - Major Option	Improve wayfinding for existing walking track adjacent to Zealandia fence line; construct 2.5m unsealed shared path up to wind turbine car park; Enhanced warning signage and wayfinding.	Construct 2.5m unsealed shared path up to Southern Thread Road; Enhanced warning signage and wayfinding.	Walking on berm and cycling on carriageway. Enhanced warning signage and wayfinding. Widen seal to provide 2.0m shoulder as walking and cycling facility if traffic volumes increase.	Walking and cycling on carriageway under most conditions. Enhanced warning signage and wayfinding. Provide 1.0m metalled shoulder for walkers if traffic volumes increase.	Walking and cycling on carriageway under most conditions. Enhanced warning signage and wayfinding. Provide 1.0m metalled shoulder for walkers if traffic volumes increase (up to end of seal).
Maintenance - Initial	Reduce berm height to provide run off in strategic locations; grass cutting; trim back vegetation on corners and at driveways; inspect and clear out drainage channels and pipes; clear slip material and batter back unstable slopes				
Maintenance - Six Monthly	Grass cutting berms; clean signs				

Activity	Section A	Section B	Section C	Section D	Section E
Maintenance - Annual	Safety inspection, condition inspection, check drainage systems; re-paint markings where necessary; repair edge break and potholes if evident; clear slip material from berm and visually assess slope stability.				
Maintenance +5 years	Reseal				
Maintenance +10 years	Replace road humps if necessary	Reseal			
Maintenance +15 years	Reseal		Reseal		
Maintenance +20 years	Replace road humps if necessary	Reseal		Reseal	Reseal

Table 5.2: Option costing by section

Activity	Section A	Section B	Section C	Section D	Section E
RoW Upgrade:					
Do Minimum	$128,000	$85,000	$64,000	$52,000	$31,000
Minor Improvement	$388,000	$196,000	$194,000	$155,000	$86,000
Major Improvement	$1,024,000	$659,000	$448,000	$393,000	$222,000
Walking & Cycling:					
Do Minimum	$9,000	$7,000	$2,000	$1,000	$1,000
Minor Option	$13,000	$62,000	$4,000	$1,000	$1,000
Major Option	$333,000	$232,000	$175,000	$1,000	$1,000
Maintenance:					
Annual	$2,200 ($44k for 20 years)	$1,300 ($26k for 20 years)	$1,500 ($30k for 20 Years)	$500 ($10k for 20 years)	$500 ($10k for 20 years)
+5 years	$154,000				
+10 years	$15,000	$91,000			
+15 years	$154,000		$105,000		
+20 years	$15,000			$35,000	$35,000
20 Year costs	$384,200	$118,300	$136,500	$45,500	$45,500

5.2 Assessment of Options

A Multi-criteria Assessment (MCA)[9] process has been used to score each treatment option for comparative assessment. This process, and the results obtained, are described in the following sections.

5.2.1 Objectives

The assessment has been made by considering the alignment of the different options with the objectives of the project. The following objectives are considered to be important to the appropriateness and success of any improvement work that is to be undetaken:

- Meeting Stakeholder expectations;
- Minimisation of maintenance liabilities;
- Safety and serviceability;
- Minimisation of environmental impacts and concerns/fit of the RoW in the environment;
- Alignment with walking and cycling needs and priorities;
- Compatibility with constraints within the reserve (visual amenity, access, etc.);
- Practicality/buildability
- WCC strategies/ investment objectives;
- Cost/Affordability (whole of life);
- Management of future development potential;
- Consistent with appropriate access and use/discourages inappropriate use.

5.2.1.1 WCC Strategies and objectives

There are 4 objectives in the 2004 Outer Green Belt Management Plan that specifically relate to Hawkins Hill Road:

- Maintaining full public access for walking and cycling and vehicle access as far as the wind turbine
- Clarify existing access rights and establish a clear policy on private access
- Complete link to Sinclair Head
- Improve links to Careys Gully, Polhill and Waimapihi Reserves

Three of the four "Wellington Towards 2040" overarching goals provide a clear direction for option alignment and assessment:

- Eco City, by increasing the offering for walking and cycling facilities
- Connected City, though improving walking and cycling links to important reserve locations and recreational areas.
- People-Centred City, through contributing to active, healthy and safe communities

Under the Operative District Plan, Hawkins Hill Road runs along a ridgetop between rural land to the west and Open Space B to the east. Open space B is considered to be the natural environment and the DP discourages any activity that changes this appearance such as artificial constructs. The

[9] *A MCA is the method by which different options can be assessed against a list of criteria. Those options which have the best overall score (ratio of positive to negative criteria) and have no fatal flaws are continued through each stage of the MCA. The final outcome identifies a small number of options to be continued as a short list.*

primary objective is to retain the open and natural aspect and to protect any ecological qualities. Rural land has very similar rules which protect the character and visual appearance.

We understand that there is no specific access and use policy for the RoW at the time of writing and this should be considered during the future stages of the improvement and asset management process.

5.2.1.2 Stakeholder expectations

Stakeholders for the RoW include, but are not limited to:

- Local residents; lifestyle blocks and farm
- Official businesses that either operate from or make use of the RoW; Woofingtons, Seal Safari, Zip Line
- Partner organisations with an interest in maintaining access; Meridian Energy, Airways

We understand that the key expectations for stakeholders are:

- Safety of RoW users through improving level of service and safety improvements
- Managing access through reducing unrestricted public vehicle
- Improving the level of service through maintenance and improvement activities

These objectives have been distilled into a number of criteria for scoring in the MCA process. These criteria are set out in Tables 5.5 and 5.6 below for the treatment options for the RoW and walking and cycling access respectively.

5.2.2 Scoring

The MCA scores each option against each objective on a five-point scale as set out in Table 5.3. Options with the strongest alignment with the selected criteria/objectives receive the highest scores. The scores for individual criteria are then summed to identify the options with the best overall alignment with project objectives. Results in the tables are colour coded to assist in the ease of assessment across the options and criteria.

Table 5.3: Objective assessment scale

2	Strong Alignment
1	Minor Alignment
0	Neutral
-1	Minor Detraction
-2	Strong Detraction

The MCA also scores each option against cost on a three-point scale as set out in Table 5.4. This was determined by rough order scale of costs and affordability. Results are colour coded to assist in the ease of assessment across the options and criteria.

Table 5.4: Cost assessment scale

$0,000	High (>$500k)
$0,000	Medium ($100k - $500k)
$0,000	Low (<$100k)

Table 5.5 below shows the MCA assessment for the different levels of treatment for the RoW for each section. The "Walking & Cycling" options are scored separately in Table 5.6 and can be added to any of the three RoW intervention strategies or introduced as a standalone investment.

5.2.3 Results

In all sections the do minimum for both the RoW and walking and cycling improvements fundamentally fails the test for meeting stakeholder expectations, level of service and safety for users. The minor improvement options provide an appropriate level of benefits on an "as needs basis" and should retain the character of the RoW without compromising safety or accessibility. The major improvements provide some additional benefits but also introduce some drawbacks in the areas of strategic alignment and buildability, would provide a higher level of service than is required and are likely to be cost prohibitive. The best value for money outcomes are assessed to be achieved from the minor improvement options on all sections for both Row and walking and cycling improvements.

Table 5.5: MCA RoW Road Option Assessment

		Section A			Section B			Section C			Section D			Section E			Notes
Theme	Criteria	Do minimum	Minor Improvement	Major Improvement	Do minimum	Minor Improvement	Major Improvement	Do minimum	Minor Improvement	Major Improvement	Do minimum	Minor Improvement	Major Improvement	Do minimum	Minor Improvement	Major Improvement	
Strategic Alignment	Overarching 2040 Goals for WCC	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	improvements will align partly with 2040 goals
	Plan alignment (District, Reserves, Other)	-1	2	0	-1	2	1	-1	2	1	-1	2	1	-1	2	1	larger infrastructure will detract from visual and environmental goals although will enhance public access
Objectives	Fit for Purpose (access and use)	-2	2	1	-1	2	1	-1	2	1	0	2	1	0	2	1	major option significantly exceeds requirements (current and consented) and will encourage additional traffic
	Stakeholder expectation	-2	1	2	-2	1	2	-1	1	2	-1	1	1	0	1	1	at this stage it is assumed that stakeholders want a fully formed road
	Level of Service	0	1	2	0	1	2	0	1	2	0	0	0	0	0	0	
	Safety	-1	1	2	-1	2	1	-1	2	1	0	1	1	0	1	1	wider roads will encourage higher speeds
	Supports Walking & Cycling	-1	0	2	-1	2	2	-1	1	2	0	1	1	0	1	1	larger option will include wider lanes, minor and major options both restrict access beyond the Meridian car park
Liability	Buildability	2	1	-2	2	1	-2	2	1	-2	2	1	0	2	1	0	major infrastructure in difficult terrain
	Whole Life Cost	-1	0	-1	-1	0	0	0	-1	-1	0	-1	-1	0	-1	-1	larger infrastructure will require more maintenance, similarly no improvement will incur higher ad hoc repairs
MCA Score		-6	9	7	-5	12	8	-3	10	7	0	8	5	1	8	5	
Cost	Construction cost ($000)	$128	$388	$1,024	$85	$196	$659	$64	$155	$448	$52	$155	$393	$31	$86	$222	
	Maintenance costs (20 year) ($0,000)	$46	$384	$738	$27	$118	$135	$31	$136	$273	$10	$45	$56	$10	$45	$56	
	Whole Life Cost ($0,000)	$174	$772	$1,732	$112	$314	$895	$95	$331	$721	$62	$200	$449	$41	$131	$278	
Rank		3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	

Table 5.6: MCA RoW Walking & Cycling Option Assessment

Theme	Criteria	Section A			Section B			Section C			Section D			Section E			Notes
		Do minimum	Minor Improvement	Major Improvement	Do minimum	Minor Improvement	Major Improvement	Do minimum	Minor Improvement	Major Improvement	Do minimum	Minor Improvement	Major Improvement	Do minimum	Minor Improvement	Major Improvement	
Strategic Alignment	Overarching 2040 Goals for WCC	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	improvements will align partly with 2040 goals
	Plan alignment (District, Reserves, Other)	1	2	0	-1	2	1	-1	2	1	-1	2	1	-1	2	1	larger infrastructure will detract from visual and environmental goals although will enhance public access
Objectives	Fit for Purpose (access and use)	-1	2	2	-1	2	2	-1	2	2	0	2	2	0	2	2	major option significantly exceeds requirement and may increase higher cycling speeds on road
	Stakeholder expectation	-1	1	2	-1	1	2	-1	1	2	0	1	1	0	1	1	at this stage it is assumed that stakeholders want a fully separate cycleway
	Level of Service	0	1	2	0	1	2	0	1	2	0	1	1	0	1	1	larger option has separate facility
	Safety	-2	1	2	-2	2	2	-1	2	2	0	2	2	0	2	2	closure of gate will significantly enhance safety beyond the Meridian car park, it is assumed this will happen in all scenarios other than Do Minimum, hence low safety score
	Supports Recreational Access	1	1	2	-1	2	2	-1	1	1	0	1	1	0	1	1	current alignment has high risk beyond the Meridian car park due to unrestricted vehicle access
Liability	Buildability	2	2	-2	2	1	-2	2	1	-2	2	1	0	2	1	0	major infrastructure in difficult terrain
	Whole Life Cost	0	0	-1	-1	0	0	0	-1	-1	0	-1	-1	0	-1	-1	larger infrastructure will require more maintenance, similarly no improvement will incur higher ad hoc repairs
MCA Score		0	11	8	-5	12	10	-3	10	8	1	10	8	1	10	8	do minimum scores assume that no RoW works will be carried out and therefore have lower safety and amenity scores
Cost	Construction cost (0,000)	$9	$13	$333	$7	$62	$232	$2	$4	$175	$1	$1	$1	$1	$1	$1	
	Maintenance costs (included above)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Rank		3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	

6 Recommended Options

The assessment in Section 5 indicates that the recommended option should consist of a suite of interventions for the incremental upgrade of the RoW to address; accessibility, safety, walking and cycling, and maintenance activities. Each RoW section has different demands and therefore each section has a different treatment and maintenance regime.

The outcome of the MCA demonstrates that "do minimum" does not address the needs of users and stakeholders for the majority of the length of the RoW, whereas the "major improvement option" exceeds these needs but is, in turn, prohibitively expensive.

Generally, the greatest level of benefit can be achieved through the "minor improvement option", or a combination of minor improvement and do minimum, which is described in detail in the subsequent section 6.1 to 6.5, conceptual layout plans of this option are included in Appendix B

6.1 Section A - Ashton Fitchett Drive to the wind turbine

Table 6.1: Recommended options (Section A)

Item	Description
Improvements	Realign entry to Ashton Fitchett Drive to provide space for 2-way traffic, widen south of automatic gate to create passing bay, erect priority signage. Cut inner slope face on corners to provide additional road width and sight distance. Construct passing places for opposing traffic flows
Safety	Introduce 30km/h speed restriction and erect repeater signage for 30 km/h speed limit with painted "30" in road at regular intervals. Install speed humps and warning signs. Provide sight rails on tight corners with drop offs. Trim slope/vegetation on corners to improve sight distance.
Access Control	Modify gate at southern end of turbine car park to be automated with keypad entry.
Walking and cycling	Provide warning signage. Provide improved wayfinding for existing perimeter track footpath link.
Drainage	Trim berm level to allow surface water to drain freely.
Slope stability	Geotechnical walkover to determine any risks.
Cyclic Maintenance	Monthly – cut grass berms and roadside vegetation to maintain sight distance. Annual – visual condition inspection of road and drainage; clear sumps and pipes. 10 years – reseal pavement (chip seal) full length – can be split over successive years.
Reactive Maintenance	Edge break and pot holes where they appear – this may be symptomatic of increased traffic. Clear any slip material.

6.2 Section B - Wind turbine to Southernthread Road

Table 6.2: Recommended options (Section B)

Item	Description
Improvements	Cut inner slope face on corners to provide additional sight distance; Construct passing places for opposing traffic flows; Repair potholes and edge break where necessary;

Item	Description
	Widen seal into areas of regular berm overrun.
Safety	Provide sight rails on tight corners with drop offs; Trim slope/ vegetation on corners to improve sight distance.
Walking and cycling	Widen seal to provide 1.5m wide unsealed footway/cycleway "shoulder" for full length (1.3km); Provide shared use signage and markings.
Drainage	Trim berm level to allow surface water to drain freely.
Slope stability	Geotechnical walkover to determine any risks.
Cyclic Maintenance	Monthly – cut grass berms and roadside vegetation to maintain sight distance; Annual – visual condition inspection of road and drainage; clear sumps and pipes; 10 - 15 years – reseal pavement (chip seal) full length – can be split over successive years.
Reactive Maintenance	Edge break and pot holes where they appear – this may be symptomatic of increased traffic. Clear slip material.

6.3 Section C - Southernthread Road to Woofingtons

Table 6.3: Recommended options (Section C)

Item	Description
Improvements	Cut inner slope face on corners to provide additional sight distance; Repair potholes and edge break where necessary; Widen into areas of regular berm overrun as unsealed shoulder.
Safety	Provide sight rails on tight corners with drop offs; Trim slope/ vegetation on corners to improve sight distance.
Walking and cycling	Provide pedestrian and cyclist warning signage as well as wayfinding signs.
Drainage	Trim berm level to allow surface water to drain freely.
Slope stability	Geotechnical walkover to determine any risks.
Cyclic Maintenance	Monthly – cut grass berms and roadside vegetation to maintain sight distance and provide safe refuge for pedestrians and cyclists to avoid vehicles. Annual – visual condition inspection of road and drainage; clear sumps and pipes. 10 -15 years – reseal pavement (chip seal) full length – can be split over successive years.
Reactive Maintenance	Edge break and pot holes where they appear – this may be symptomatic of increased traffic. Clear slip material.

6.4 Section D - Woofingtons to the Radome

Table 6.4: Recommended options (Section D)

Item	Description
Improvements	Cut inner slope face on corners to provide additional sight distance; Repair potholes and edge break where necessary;

Item	Description
	Widen into areas of regular berm overrun as unsealed shoulder;
Safety	Provide sight rails on tight corners with drop offs; Trim slope/ vegetation on corners to improve sight distance.
Walking and cycling	Provide pedestrian and cyclist warning signage as well as wayfinding signs.
Drainage	Trim berm level to allow surface water to drain freely.
Slope stability	Geotechnical walkover to determine any risks.
Cyclic Maintenance	Monthly – cut grass berms and roadside vegetation to maintain sight distance and provide safe refuge for pedestrians and cyclists to avoid vehicles. Annual – visual condition inspection of road and drainage; clear sumps and pipes. 10-15 years – reseal pavement (chip seal) full length – can be split over successive years.
Reactive Maintenance	Edge break and pot holes where they appear – this may be symptomatic of increased traffic. Clear slip material.

6.5 Section E - Radome to Te Kopahou

Table 6.5: Recommended options (Section E)

Item	Description
Improvements	Extend seal for 3m into the farm track at the end of the sealed section to control edge break and increase pavement life. Sight benching on corners to provide additional sight distance for opposing traffic flows and walkers and cyclists in the road; Repair potholes and edge break where necessary; Widen into areas of regular berm overrun as unsealed shoulder.
Safety	Provide sight rails on tight corners with drop offs; Trim slope/ vegetation on corners to improve sight distance.
Walking and cycling	Provide pedestrian and cyclist warning signage as well as wayfinding signs.
Drainage	Trim berm level to allow surface water to drain freely.
Slope stability	Geotechnical walkover to determine any risks.
Cyclic Maintenance	Monthly – cut grass berms and roadside vegetation to maintain sight distance and provide safe refuge for pedestrians and cyclists to avoid vehicles. Annual – visual condition inspection of road and drainage; clear sumps and pipes. 10 - 15 years – reseal pavement (chip seal) full length – can be split over successive years.
Reactive Maintenance	Edge break and pot holes where they appear – this may be symptomatic of increased traffic. Clear slip material.

7 Cost Estimates

At this stage the options are conceptual and derived from brief visual site examination and reference to WCC documents. Therefore cost estimates are not based on any design or measurement and are indicative only.

A high level of contingency has been applied to reflect this uncertainty.

The elemental breakdown of the Minor Improvement option for upgrade of the RoW and Walking & Cycling Facilities is summarised in the table below:

Table 7.1: RoW Construction Costs – Minor Improvement Option

	Section A	Section B	Section C	Section D	Section E
Preliminary and General	$35,000	$20,000	$15,000	$10,000	$5,000
Earthworks	$84,300	$75,595	$53,400	$75,650	$27,030
Pavement	$99,150	$49,725	$57,375	$19,125	$19,125
Drainage	$5,000	$5,000	$5,000	$5,000	$5,000
Line Marking and Signage	$6,600	$5,760	$1,800	$600	$600
Landscaping	$11,650	$10,975	$6,125	$5,375	$5,375
Accommodation Works	$66,600	$30,875	$13,000	$4,550	$5,200
Sub total	$308,300	$197,930	$151,700	$120,300	$67,330
Contingency	$92,490	$59,379	$45,510	$36,090	$20,199
Total	$400,790	$257,309	$197,210	$156,390	$87,529
Reseal	$154,000	$91,000	$105,000	$35,000	$35,000
Annual Cyclic maintenance	$2,200	$1,300	$1,500	$500	$500

Whole RoW improvement cost $1,099,228

Whole RoW cost (20 years)[10] $1,824,000

Comparative costs:

	Improvement	20 Year
Do Minimum	$380,000	$500,000
Major Improvement	$3,488,000	$4,836,000

Further development of the proposed scope of works and refinement of these costs is required for derivation of costs for budgeting purposes.

[10] 20 year costs include capital expenditure for upgrade plus reseals and cyclic maintenance (20 x annual cost)

7.1 Staged Approach

It is not necessary to commit to an “all or nothing” approach to achieve the full benefits of investment in the recommended minor improvement option. A staged approach over a period of years can be implemented which will reduce the up-front financial burden and allow works to progress on an ‘as needs’ basis to suit budgets and maintenance activities.

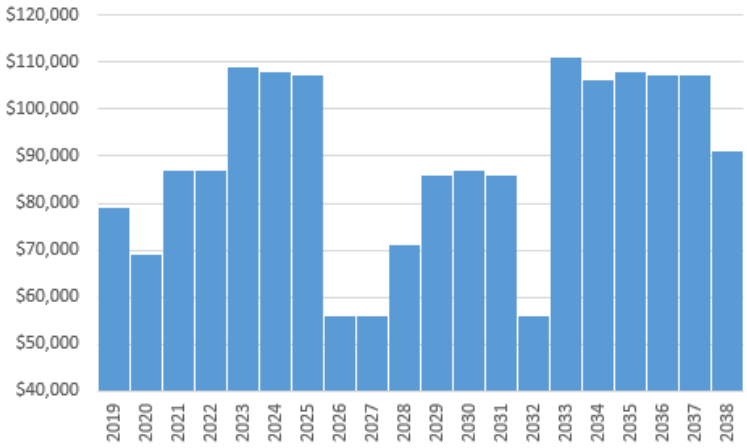
A programme of works over 20 years can therefore be established that will incrementally upgrade and maintain the whole RoW. Three suggested scenarios are outlined below.

It is important to note that these scenarios are for illustrative purposes and any number of combinations can be developed to meet the needs and budget constraints.

Scenario A: Long Term Upgrade

By using the approximate 20 year cost of $1.8m (see Section 7), this could be budgeted at between $50 and $110k per year to suit specific activities and funding sources. An indicative 20 year budget is shown in Figure 7.1 below:

Figure 7.1: Indicative cost by year: Scenario A



This will mean that the works to upgrade section A and B would take approximately 12 years with upgrades and maintenance over the remaining 8 years on a progressive basis. An indicative programme is shown on Table7.2 below. (Note: some maintenance drops to year 21 so not shown on the programme)

Table 7.2: Indicative Programme: Scenario A

		Year																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Section A	Improvement																				
	Walking & Cycling																				
	Maintenance																				
Section B	Improvement																				
	Walking & Cycling																				
	Maintenance																				
Section C	Improvement																				
	Walking & Cycling																				
	Maintenance																				
Section D	Improvement																				
	Walking & Cycling																				
	Maintenance																				
Section E	Improvement																				
	Walking & Cycling																				
	Maintenance																				

Scenario B: Targeted Upgrade

A targeted investment approach to upgrade Sections A to B within the first six years (including a full reseal of section A and all walking and cycling initiatives within the first four years) could be adopted at a cost of approximately $850k (annually: $200k in years 1 and 2; $130K in years 3 and 4; $80k in years 5 and 6), with progressive maintenance and upgrades on all other sections in years 7 to 20. Overall cost remains $1.8M over the initial 20 years. Table 7.3 shows an indicative programme for this approach with expenditure shown in Figure 7.2.

Figure 7.2: Indicative cost by year: Scenario B

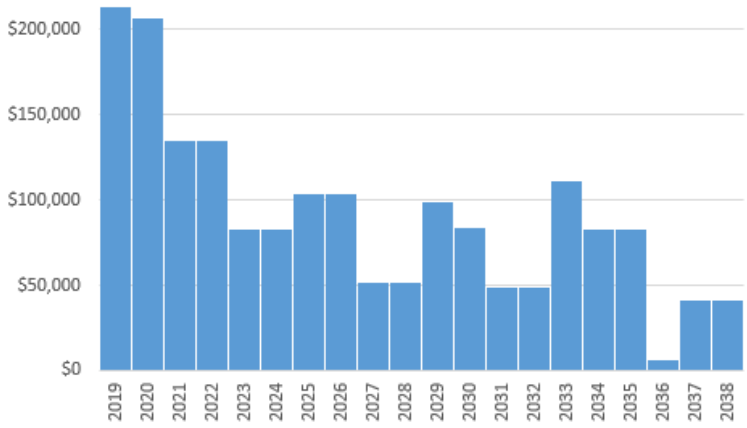


Table 7.3: Indicative Programme: Scenario B

		Year																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Section A	Improvement																				
	Walking & Cycling																				
	Maintenance																				
Section B	Improvement																				
	Walking & Cycling																				
	Maintenance																				
Section C	Improvement																				
	Walking & Cycling																				
	Maintenance																				
Section D	Improvement																				
	Walking & Cycling																				
	Maintenance																				
Section E	Improvement																				
	Walking & Cycling																				
	Maintenance																				

Scenario C: Priority Investment Only

This would follow the same investment profile as Scenario B, with sections A and B completed within 6 years. Upgrade of the remaining sections will be deferred and only essential maintenance activities undertaken over the remaining 14 years.
Initial investment is approximately $850K spread over years 1 to 6, with residual maintenance costs in the order of $250K over the next 14 years or approximately $18k per year. The indicative expenditure is shown in figure 7.3, with the associated programme in Table 7.4 below.
Total cost is likely to be in the order of $1.1M over the 20 year period.

Figure 7.3: Indicative cost by year: Scenario C

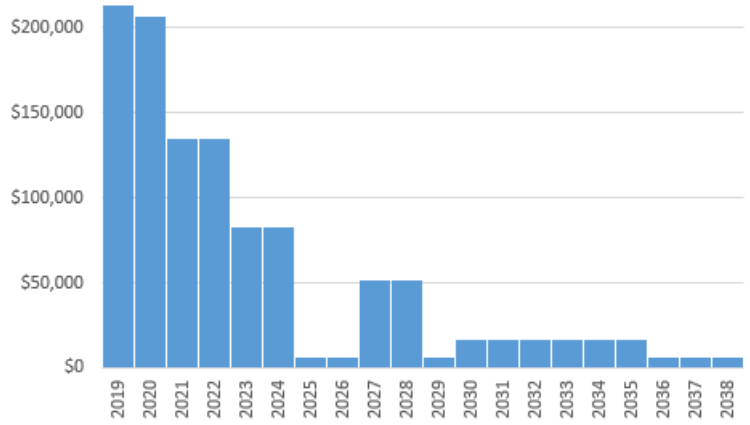


Table 7.4: Indicative Programme: Scenario C

		Year																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Section A	Improvement																				
	Walking & Cycling																				
	Maintenance																				
Section B	Improvement																				
	Walking & Cycling																				
	Maintenance																				
Section C	Improvement																				
	Walking & Cycling																				
	Maintenance																				
Section D	Improvement																				
	Walking & Cycling																				
	Maintenance																				
Section E	Improvement																				
	Walking & Cycling																				
	Maintenance																				

8 Next Steps

In order to provide a fully informed Asset Management Plan and Case for future investment, the following steps are considered necessary to refine costings and reduce the risk of cost escalation, constructability and accessibility issues:

8.1 Asset Condition Assessment

- Formal assessment of pavement condition;
- Review of pavement structural integrity;
- Survey of drainage;
- Assessment of slope stability.

8.2 Safety Assessment

- Confirm sight distances;
- Road user safety assessment/safety audit of existing.

8.3 Access and Use Review

- Confirm consent conditions with respect to access and use;
- Review of regulatory changes (if any);
- Warrant for speed limit (if required);
- Confirm changes to access conditions (if any);
- Consultation with residents and stakeholders;
- Draft access and use policy for RoW.

8.4 Option Confirmation and Development

- Confirm preferred option, legal requirements, and funding requirements;
- Further develop scope and timing of options and refine costs and programme.

9 Applicability

This report has been prepared for the exclusive use of our client Wellington City Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Report prepared by:

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Alan Gregory

Principal Transport Planner

Authorised for Tonkin & Taylor Ltd by:

.....

Hugh Cherrill

Project Director

Reviewed by:

.....

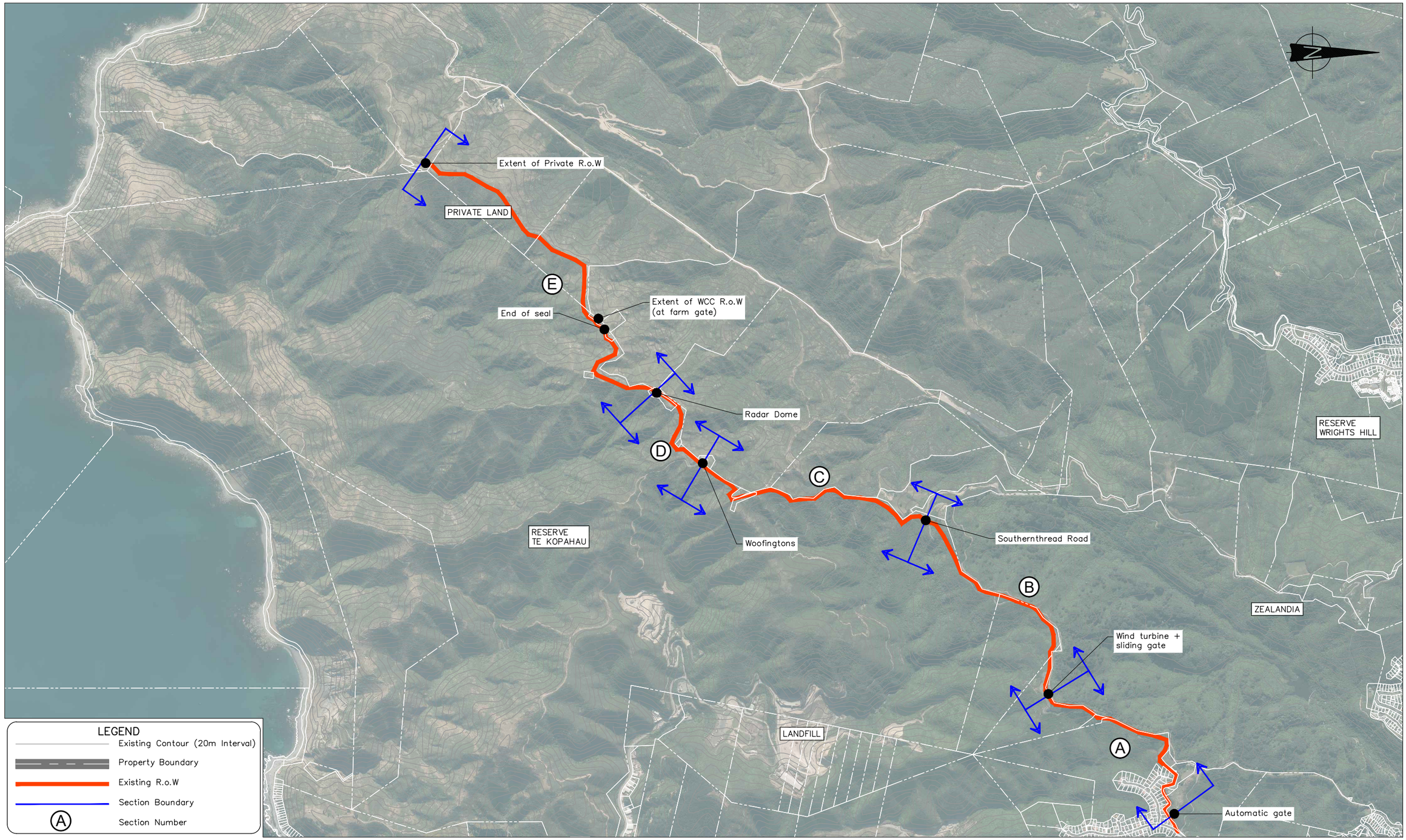
Ryan Dunn

Senior Transportation Engineer

BLR
\\ttgroup.local\corporate\wellington\tt projects\1006626\1006626.1000\workingmaterial\hawkins hill row - service levels and maintenance review (revision 3-1) final draft 270818.docx

Appendix A: Existing Layout Plans

- Drawing 1006626-01 - Overall Plan Layout
- Drawing 1006626-10 - Existing Plan Layout - Sheet 1
- Drawing 1006626-11 - Existing Plan Layout - Sheet 2
- Drawing 1006626-12 - Existing Plan Layout - Sheet 3



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REVISION	DESCRIPTION	BY	DATE
1	Preliminary Draft		

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CADFILE : \\ 1006626-0 1.dwg

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TITLE
MAINTENANCE ASSET MANAGEMENT REVIEW
Overall Plan Layout

SCALES (AT A3 SIZE)	DWG. No.	REV.
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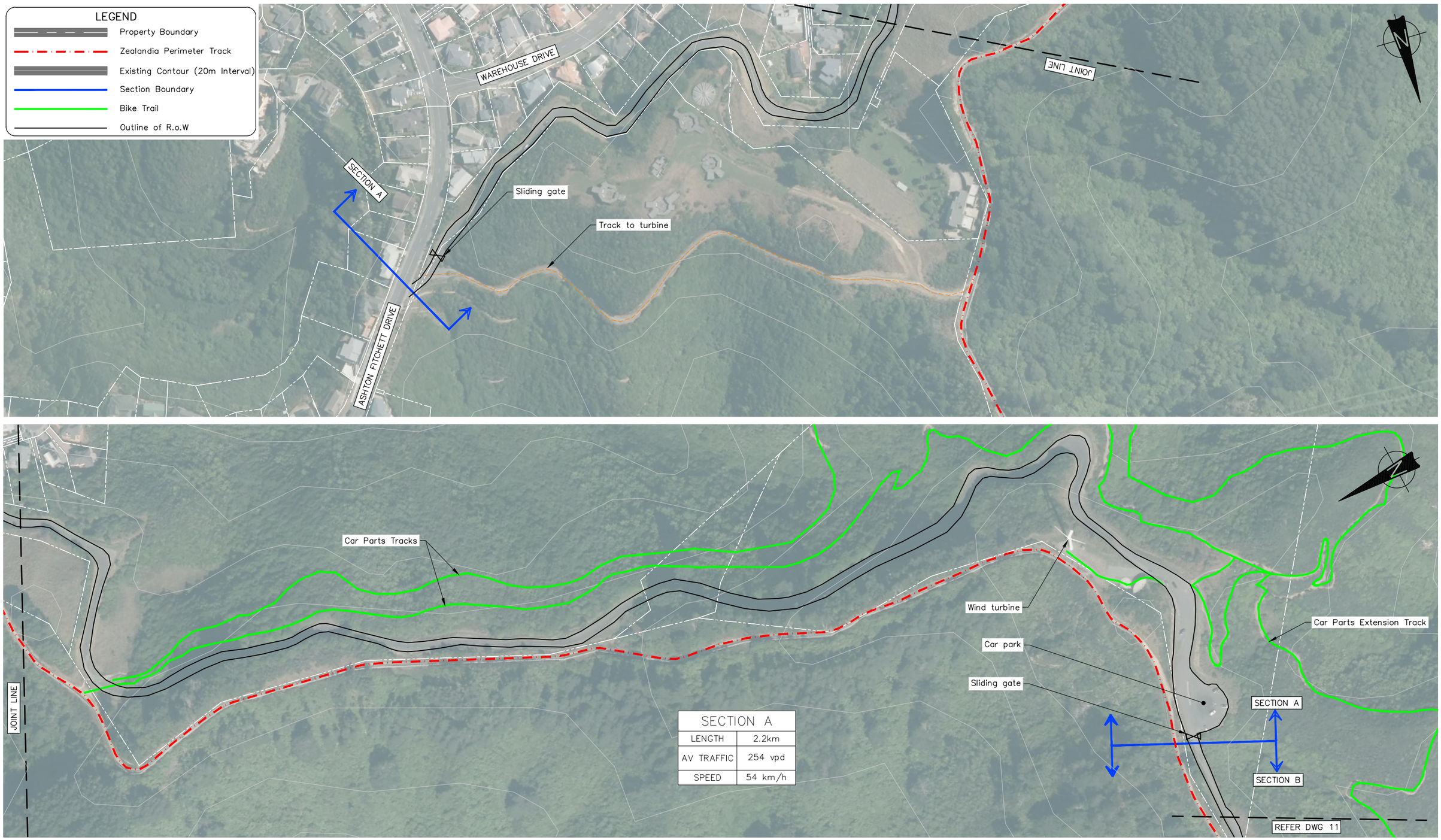

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0 50 100 150 (m)

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MAINTENANCE ASSET MANAGEMENT REVIEW
Existing Plan Layout – Sheet 1

SCALES (AT A3 SIZE)	DWG. No.	REV.
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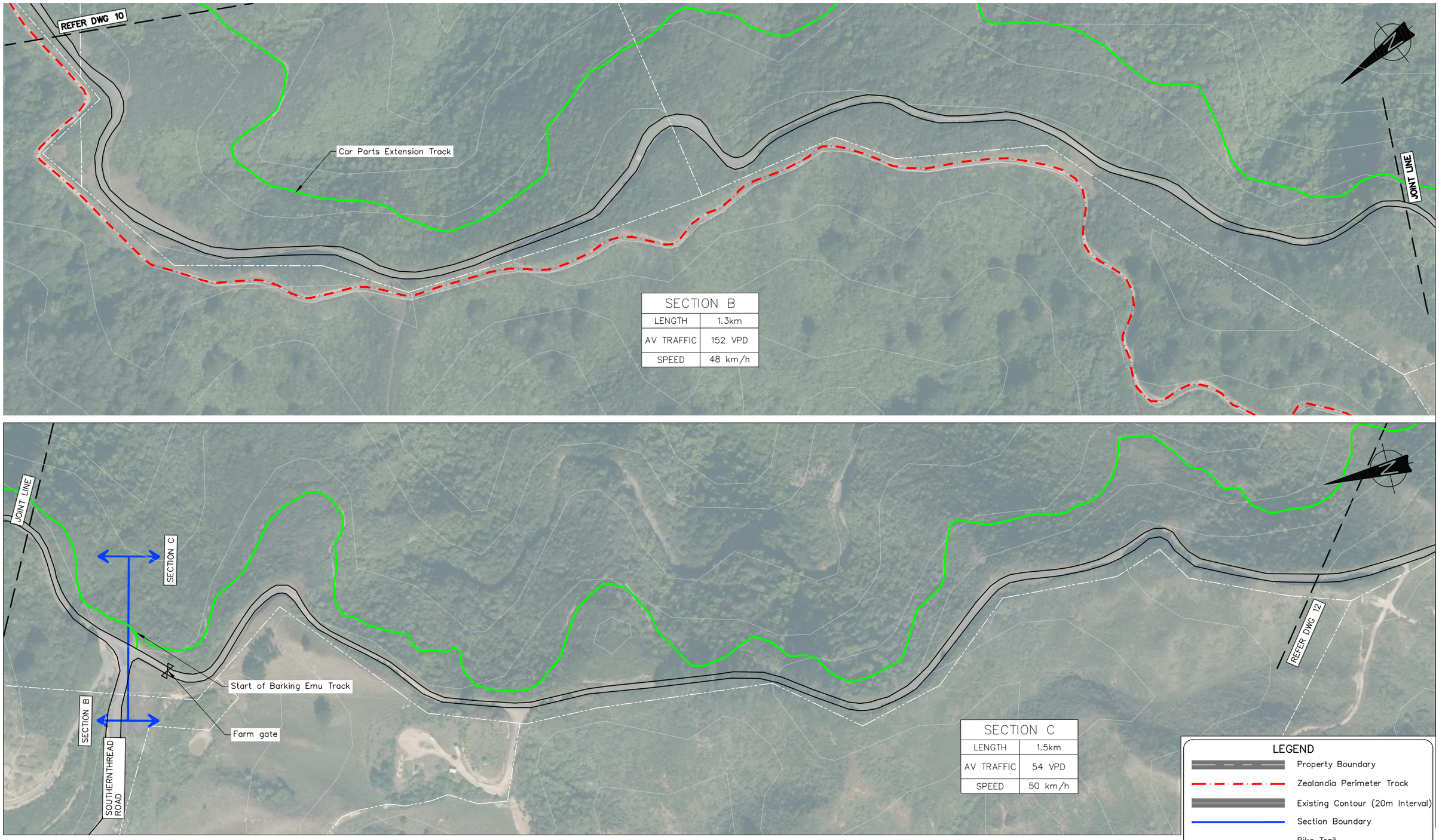

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MAINTENANCE ASSET MANAGEMENT REVIEW
Existing Plan Layout – Sheet 2

SCALES (AT A3 SIZE)	DWG. No.	REV.
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Site of consented zipline

Barking Emu Track

Red Rocks Track

Farm gate

WOOFINGTONS

SECTION C

SECTION D

SECTION E

JOINT LINE

RADAR DOME

REFER DWG 11

SECTION D	
LENGTH	0.5km
AV TRAFFIC	54 VPD
SPEED	50 km/h

LEGEND

- Property Boundary
- Zealandia Perimeter Track
- Existing Contour (20m Interval)
- Section Boundary
- Bike Trail
- Outline of R.o.W

Radar Dome Track

JOINT LINE

Farm gate

Extent of seal

SECTION E	
LENGTH	0.5km (sealed) 1.8km (unsealed
AV TRAFFIC	54 VPD
SPEED	50 km/h

PRIVATE LAND

REFER DRAWING 01 FOR R.O.W EXTENTS

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MAINTENANCE ASSET MANAGEMENT REVIEW
Existing Plan Layout – Sheet 3

SCALES (AT A3 SIZE)	DWG. No.	REV.
1:2500	1006626-12	1

Appendix B: Proposed Layout Plans

- Drawing 1006626-20 - Proposed Plan Layout - Sheet 1
- Drawing 1006626-21 - Proposed Plan Layout - Sheet 2
- Drawing 1006626-22 - Proposed Plan Layout - Sheet 3

LEGEND

- Property Boundary
- Zealandia Perimeter Track
- Existing Contour (20m Interval)
- Section Boundary
- Side Protection (Barrier/Site Rail)
- Bike Trail
- Outline of R.o.W
- Section 'B' Shared Path
- Sight Distance Cutting Required
- Clearing for Passing Bay Construction

WAREHOUSE DRIVE

JOINT LINE

Sliding gate

New 30 RG–1 sign erected at automatic gate and painted on road on way in with a 50 on opposite direction

Speed hump

SECTION A

ASHTON FITCHETT DRIVE

PW–43 'ROAD NARROWS' sign at automatic gate

Track to turbine

PW39 "HUMP" signs & PN25 advisory speed

25 km

3.5

TYPICAL ROAD HUMP – PLAN VIEW

30 RG–1 signs and white "30" markings painted on road

30

3.5

TYPICAL SPEED SIGN REPEATER – PLAN VIEW

Speed hump

New 30 RG–1 signs erected on each side in opposite directions

PW35 "CYCLE" signs

Speed hump

New 30 RG–1 signs erected on each side in opposite directions

Speed hump

JOINT LINE

Speed hump

RG–9 "NO ENTRY" with supplementary "EXCEPT AUTHORISED VEHICLES' R3–5.3

New automatic sliding gate

Install pedestrian gate

SECTION A

SECTION B

REFER DWG 20

6

2

"PASSING BAY" sign

"PASSING BAY" sign

3.5

TYPICAL PASSING BAY – PLAN VIEW

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0 50 100 150 (m)

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Proposed Plan Layout – Sheet 1

SCALES (AT A3 SIZE)	DWG. No.	REV.
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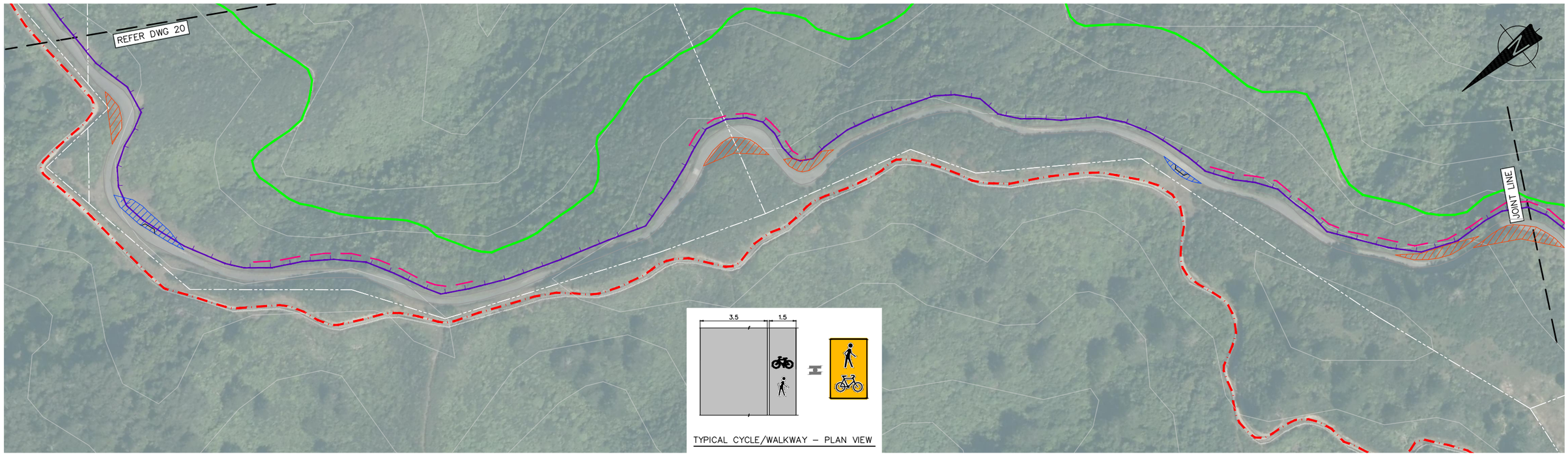

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Proposed Plan Layout – Sheet 2

SCALES (AT A3 SIZE)	DWG. No.	REV.
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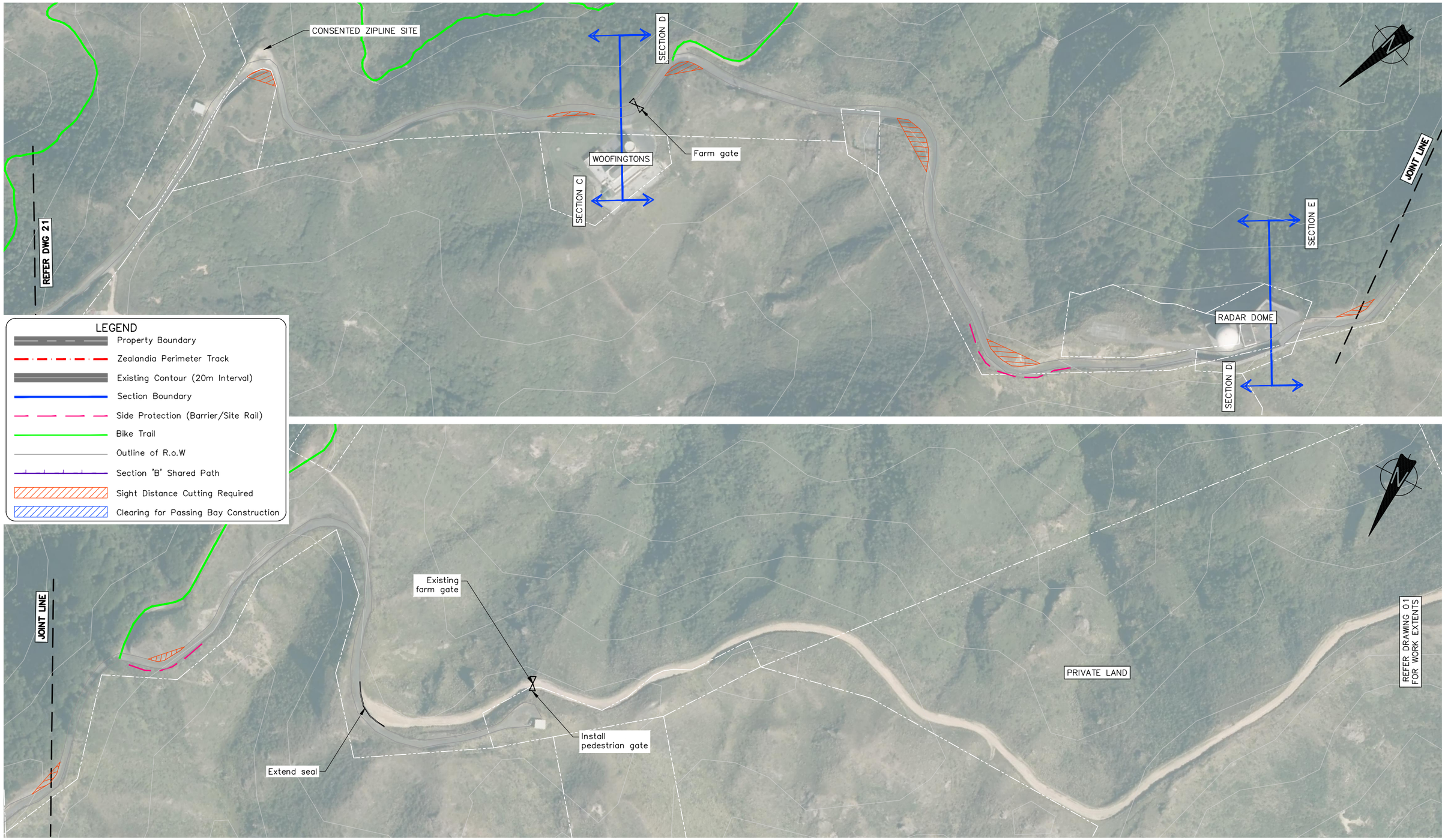

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