SPECIALIST ASSESSMENT – CONNECTIVITY CRITERION

PALMERSTON NORTH REGIONAL FREIGHT HUB MULTI CRITERIA ANALYSIS AND DECISION CONFERENCING PROCESS

PREPARED FOR KIWIRAIL

June 2020

Central North Island Freight Hub - Workshop 2

Assessment Template - Connectivity

1. Introduction

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The following is a high-level comparative assessment of the possible connectivity impacts of the long list site options to inform the Multi Criteria Assessment (MCA) workshop for KiwiRail's future Palmerston North Rail and Freight Hub. This note considers only the connectivity criteria

This assessment has relied on the following information:

- Local and Regional Context
  - PNCC Strategic Transport Plan, 2018
  - PNCC 10 Year Plan, 2018
  - Network Operating Framework, 2019
- Transport Network Data
  - One Network Road Classification (ONRC) data (Source: Palmerston North Economic Hub Project GIS portal)
  - Rail Terminal Access traffic count data – September 2019 (Source: Matrix ATC/Stantec)
  - Road Safety (Source: Megamaps risk metrics, Crash Analysis System)
  - Walking and cycling information (Existing W&C routes, Network Operating Framework (NOF), Strava heatmaps)
  - Transport Modelling information – PNATM (Source: Palmerston North Economic Hub Project GIS portal)
  - Freight Demand Study Phase 1, 2019
  - Transport Network Constraints (Source: Palmerston North Economic Hub Project GIS portal) - Level crossings, Bridges, Streams/rivers, Intersections etc
- Workshop 2 Briefing:
  - The long list options included a list of eight possible new sites and an expanded existing site to account for the larger masterplan footprint
  - Description of future activity
  - Master Plan Concept Design (Concept F)

The following information was not available for this assessment

- Information regarding the application of the concept to the sites (i.e. the specific location and arrangement of the concept to the site options and detail around how the masterplan could connect into the existing road and rail transport network has not been determined). For the purposes of this high-level comparative assessment, assumptions relating to the connectivity have been made, these are outlined in Section 3.

- Transport modelling impacts of relocating the existing hub to each of the sites is not available at this stage. Further, it is unknown what land-use will replace the existing site. It is recommended to undertake transport modelling at the short list stage to understand network wide impacts. Refer Section 3 for further detail on how this limitation was addressed for the purposes of long list assessment.
- It is expected that further detailed assessment will be undertaken as the process develops and more information becomes available. The assessment undertaken to date has been high level using currently available information and judgement.

2. Constraints identified in each area

Key constraints relating to connectivity include the availability of appropriate strategic network connections. Other constraints considered include:

- Availability of appropriate strategic network connections
- Number and classification of roads within and potentially impacted
- Existing level crossings
- Existing walking and cycling links
- NIMT Alignment
- Manawatu River
- Streams
- Residential areas
- Schools
- PN Airport
- Taonui Airport

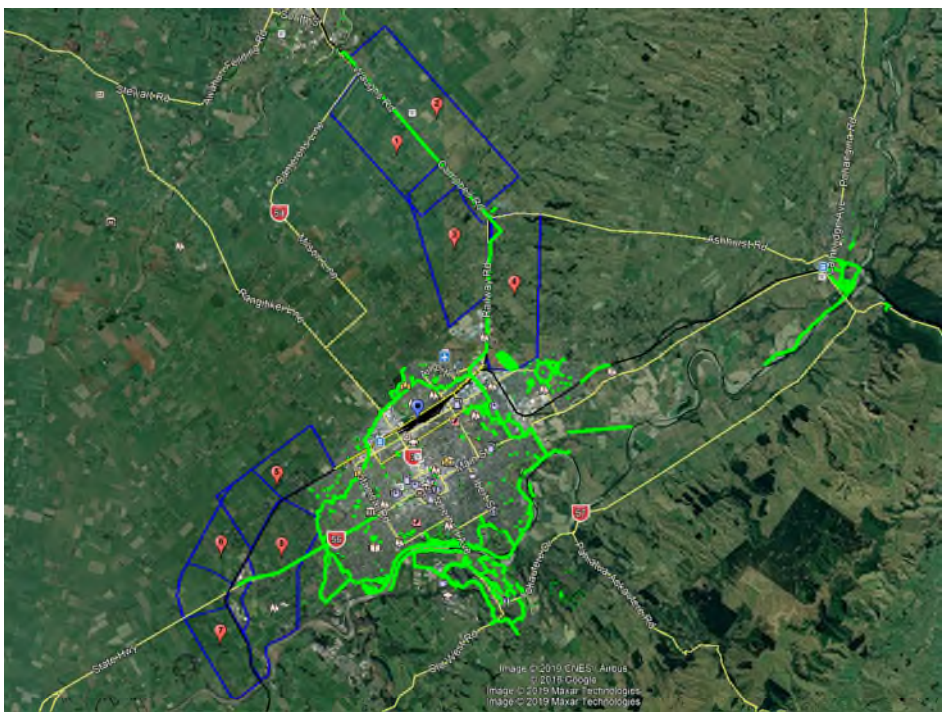

Figure 1: Map of Potential Sites and existing W&C networks (Green)

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Table-1: Constraints

Area for Investigation	Constraints - what they are and where they are in the area
Option 1	• 1 Arterial, 1 Primary collector and 5 Access roads cross the site • 5 lower classification roads impacted (Access, low volume) with residential land use • Taonui School • 2 Pedestrian Level Crossings (Campbell and Waughs) • 1 Road level crossing (Campbell/Waughs Rd) • Te Araroa Trail
Option 2	• 1 Arterial, 2 Secondary Collector, 5 Access and 1 low volume road cross the site • 6 lower classification roads impacted (Access, low volume) with residential land use • Taonui Airport • Te Araroa Trail • 2 Pedestrian Level Crossings (Campbell and Waughs) • 1 road level crossing (Campbell/Waughs Rd)
Option 3	• Site is assumed to be offline to the existing NIMT for connectivity purposes, based on an initial spatial review of the potential application of the Master Plan Concept F (5.5km) to the existing rail line. This considered tie-ins to the existing NIMT and avoiding the Bunnythorpe township. • 2 Arterial, 1 Secondary collector, 8 access roads cross the site • 8 lower classification roads impacted (Access, low volume) with residential land use • Number of streams • Te Araroa Trail
Option 4	• 2 Arterial, 1 primary collector, 1 secondary collector, 3 access and 5 low volume roads cross the site • 8 lower classification roads impacted (Access, low volume) with residential land use • 2 existing level crossings (Roberts Line, Cleverly Line) • Te Araroa Trail • Southern end of site contains the Linklater Reserve
Option 5	• 1 arterial, 1 primary collector and 1 access road cross the site • 1 lower classification road impacted (Access, low volume) with residential land use • 1 x existing level crossing at Cloverlea Road • Residential areas impacted along No1 Line
Option 6	• 1 arterial, 3 primary collectors, 1 secondary collector, 1 access and 2 low volume roads cross the site • 3 lower classification road impacted (Access, low volume) with residential land use • Some residential areas impacted along No1 Line • 1 x existing level crossing at Reserve Road
Option 7	• 1 arterial, 1 access and 2 low volume roads cross the site • Sections have been assumed as likely to be offline to NIMT, based on a spatial review of the potential application of the masterplan Concept F (5.5km). Specifically, spatially the back shunts could be difficult to

Area for Investigation	Constraints - what they are and where they are in the area
	incorporate into NIMT without impacting the Manawatu River • 3 lower classification roads impacted (Access, low volume) with residential land use • May impact on the Longburn to Palmerston North Shared Path on the eastern edge of the site
Option 8	• Site is assumed to be offline to the existing NIMT for connectivity purposes, based on an initial spatial review of the potential application of the masterplan Concept F (5.5km) to the existing rail line. This considered tie-ins to the existing NIMT and avoiding the existing Longburn industrial area. • 2 arterial, 1 primary collector, 4 access and 2 low volume roads cross the site • 6 lower classification roads impacted (Access, low volume) with residential land use • Longburn Adventist College, Walkers Road • Site is predominately residential • Impact on the Longburn to Palmerston North Shared Path
Option 9	• 1 regional, 3 arterial, 1 primary collector, 3 secondary arterials in addition to a number of lower classification routes • Existing residential land use constrains growth opportunities • Existing congestion and access difficulties during peak periods • Coronation Park

3. Criteria being assessed

The connectivity criterion considers the impact of the site on the existing or planned transport network and includes two key aspects:

1. Impacts and ability to integrate with other modes (Road, rail, walking and cycling, air)
2. Ability to connect to the proposed road network hierarchy

To consider the multi-modal impacts, further sub-criteria were developed as follows, based on the criteria considerations developed in Workshop 1:

Table-2: Connectivity Criteria

Criteria	Mode	Sub Criteria	Considerations
Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	**Road/ Rail**	**Connectivity impacts**	- Availability of appropriate connections into the existing strategic road and rail network - Extent of upgrades/new links required to service estimated demand (Based on terminal traffic survey data)

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Criteria	Mode	Sub Criteria	Considerations
			- Impact on other sensitive land use (schools, hospitals, residential communities impacted by potential severance etc) - Impacts on the number of access and low volume routes (residential function)
		Safety Impacts	- Level crossings - impact on existing/number of new level crossings
			- Crash Risk - impacts on existing high risk corridors and intersections (Megamaps)
	Walking and Cycling	**Connectivity Impacts**	- Impact on existing W&C links - Impact on proposed routes (NOF) - Impact on used routes (Strava)
	Air	**Connectivity Impacts**	- Distance from Airport and potential for direct connectivity
Ability to connect to the proposed road network hierarchy	**Connectivity to the proposed future network (As per PNCC Strategic Transport Plan)**		- Connectivity to the proposed road network - Proximity to proposed network and key strategic roads

Criteria Assumptions and Limitations

- Connectivity for the purposes of this assessment has focused on impacts and linkages into the existing/proposed network. It is understood that the Economic criteria is considering the benefits of connectivity (i.e. strategic accessibility)
- Ability to connect to the proposed road network hierarchy may overlap with "Fit with Regional Plans" criteria; however, this sub-criteria for connectivity does not consider other wider regional plans (e.g. a site may align well with the proposed future road hierarchy but also overlap with a proposed future residential zone).
- Rail criteria have been considered in terms of road/rail interface (i.e. level crossings) and connectivity of each site to the existing NIMT (based on an initial spatial review of the potential application of the masterplan Concept F (5.5km) to the existing rail line masterplan[1]).
- As outlined above, transport modelling impacts of relocating the hub to the sites is not available at this stage. It is recommended to undertake transport modelling at the short list stage to better understand network wide impacts (re-routing of general and heavy vehicle traffic, levels of service).
    - For the purposes of this assessment, estimated localised network impacts (as a proxy for assessing the extent of potential upgrades required) were undertaken based on applying the surveyed terminal traffic[2] demand on to the assumed connecting road(s).
        - This enables a high-level assessment of additional traffic as a percentage over

[1] As outlined in Section 1 above, information regarding the application of the concept to the sites (i.e. the specific location and arrangement of the concept to the site options and detail around how the masterplan could connect into the existing road and rail transport network has not been determined).

[2] Traffic tube count surveys were undertaken in Sept 2019. Based on the survey outputs, movements in and out of the Tremaine accesses (Toll, Mainfreight, Logs/General) and Matthews Avenue (Network Services) totalled over 3,500 vpd. The daily flows were adjusted for seasonal rail commodity peak factors, for an average month, estimated at 4,100 vpd with up to 25% heavy vehicles, refer Appendix B. Allowing for a growth factor of 1.5, this equates to potential average future demand of 6,150 vpd.

typical average daily traffic for a given road (i.e. does applying terminal traffic increase demands by 50% compared to normal traffic). To account for future growth, a further escalation factor of 1.5[3] was applied to the existing terminal flows, resulting in a flow of 6,150 vpd used for the purposes of this assessment.

- For context, the surveyed rail terminal heavy vehicle traffic accounts for approximately 5% of the total heavy vehicle demand and less than 1% of total overall demands across the Palmerston North Area Traffic Model network.

Scoring

Each of the sub criteria were evaluated the possible site options and scored according to the criteria outlined in Figure 2 below, with example scoring thresholds for Low and High Impact/Difficulty outlined in Table 3.

	Criteria		
Score	Benefits	Impact	Difficulty
	• Rail • Economic	• Tangata whenua values • Natural environment (terrestrial and freshwater) • Noise and vibration • Heritage • Visual and landscape impacts • Community Cohesion • Fit with (regional) strategies / plans	• Engineering degree of difficulty • Connectivity • Property degree of difficulty • Resilience -Hazards • Cost
1	High Benefits	Low Impact	Low Difficulty
2	Medium High	Medium Low	Medium Low
3	Medium	Medium	Medium
4	Medium Low	Medium High	Medium High
5	Low Benefits	High Impact	High Difficulty

Figure 2: Proposed Scoring System

Table 3 : Connectivity Criteria and Thresholds

Criteria	Mode	Sub Criteria	Considerations	Low Impact/ Low Difficulty	High Impact/ High Difficulty
Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	**Road/ Rail**	**Connectivity impacts**	- Availability of appropriate connections into the existing strategic road and rail network - Extent of upgrades/new links required to service estimated demand (Based on terminal traffic survey data)	- Direct connection to existing SH or Arterial road network - Limited upgrades required to the existing network to cater for expected demand (<50% estimated additional traffic)	-Offline to the existing NIMT - No direct connection to existing SH or arterial network - Estimated terminal traffic likely to require significant road network upgrades (>+100% estimated additional traffic)
			- Impact on other sensitive land use (schools, hospitals, residential communities impacted by potential severance etc)	Minimal impact on other activities within the site	Impacts multiple sensitive activity areas or multiple residential function streets

[3] A growth escalation factor of 1.5 was assumed, in lieu of project specific growth forecasts, based on the National Freight Demand Study (2014) 30 year forecasts of national freight task, which estimated growth of +48% and +58% in tonne-km and tonnes respectively. https://www.transport.govt.nz/assets/Uploads/Research/Documents/19d9dc9df9/National-Freight-Demand-Study-2014-executive-summary.pdf

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Criteria	Mode	Sub Criteria	Considerations	Low Impact/ Low Difficulty	High Impact/ High Difficulty
			- Impacts on the number of access and low volume routes (residential function		
		Safety Impacts	- Level crossings - impact on existing/number of new level crossings	Minimal impact/ no new crossings	Several new major level crossings required
			- Crash Risk - impacts on existing high risk corridors and intersections (Megamaps)	Little to no impact	Impacts on multiple high-risk routes or intersections
	Walking and Cycling	**Connectivity Impacts**	- Impact on existing W&C links - Impact on proposed routes (NOF) - Impact on used routes (Strava)	Site has little to no impact on existing W&C links	Site is likely to impact key W&C corridors and/or impacts multiple well used W&C routes/corridors
	Air	**Connectivity Impacts**	- Distance from Airport and potential for direct connectivity	Close proximity, <3km, potential for direct connection	Distance >10km, no feasible direct connections
Ability to connect to the proposed road network hierarchy	**Connectivity to the proposed future network (As per PNCC Strategic Transport Plan)**		- Connectivity and proximity to the proposed road network	Potential direct connection to likely future Ring Road	No direct connection to likely future RR

Weighting

Different weights and weighting systems were developed to consider the relative significance of each sub-criteria.

Three weighting systems tested included:

1. **Unweighted** – all 7 sub-criteria have an equal weight (14%)
2. **Weighting System A**
    a. Impacts and ability to integrate with other modes (rail, road, walking and cycling, air) – 83%
        i. Road/Rail (70%)
            1. Connectivity (44%)
            2. Safety (26%)
        ii. Walking and Cycling (4%)
        iii. Air (9%)
    b. Ability to connect to the proposed road network hierarchy - 17%
3. **Weighting System B**
    a. Impacts and ability to integrate with other modes (rail, road, walking and cycling, air) – 50%
        i. Road/Rail (50%)
            1. Connectivity (26%)
            2. Safety (16%)
        ii. Walking and Cycling (3%)

iii. Air (5%)

b. Ability to connect to the proposed road network hierarchy (50%)

Weighting systems A and B both have a higher weighting placed on Road/Rail connectivity and Safety. Walking and cycling and connections to air both have lower weightings, reflecting that the likely scale of impacts or connectivity opportunities is more limited when compared to other sub criteria.

Under the weighting system A, the "ability to connect to the proposed road network hierarchy" has a lower weighting than the "impacts and ability to integrate with other modes". This is due to the existing impacts being considered more important, and therefore weighted higher, than the ability to connect to a future proposed network.

Weighting System B adopts a higher, 50/50 split between 'the ability to connect to the proposed road network hierarchy' and 'impacts and ability to integrate with other modes'. This equal weighting was adopted to understand the sensitivity of the scoring to if both key criteria had equal importance.

Weighting System A was adopted for the assessment as:

- The unweighted system does not account for the difference in scale of multimodal impacts and opportunities
- Weighting system B has an equal weight between the two main criteria. It is considered that due to the uncertainty in the form and timing of the proposed network hierarchy (being investigated by NZTA/PNCC) the weighting for the 'impacts and ability to integrate with other modes' should have a higher weight. Weighting system B would be a useful sensitivity test.

4. Comparative assessment

The results of the comparative assessment for the three weighting systems is summarised in Figure 3 and Table 3 below. Refer to Appendix A for the detailed scoring assessment, incorporating the assumptions and constraints outlined in the sections above.

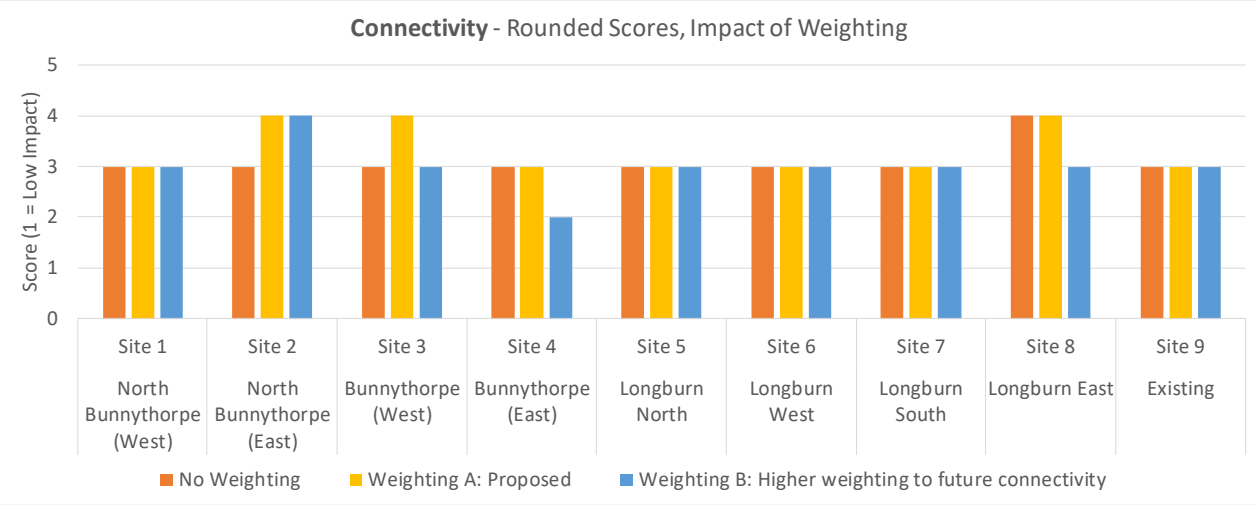

Figure 3: Connectivity - Summary of Scores and Ranking

Table 4 : Connectivity Summary Table

Area for Investigation	Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	Ability to connect to the proposed road network hierarchy	Overall Score (Weighting A)
Option 1	• Parallel to existing NIMT • Potential direct connection to SH54 (Arterial) and Waughs Road (Primary Collector) access. Likely to require some intersection/midblock upgrades assuming even split of estimated demand, <50% increase in traffic expected. • Level crossings - 7 potential roads impacted, including 5 lower classification, residential function • Likely to impact and add further demand on 2 high safety risk corridors • Potential impact on Te Araroa Trail and existing W&C routes • Limited PN Airport Integration opportunities	Potential to access SH54 and KB Road via Roberts Line. However, no direct connection to the PNCC proposed future ring road as the site located further north	3

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Area for Investigation	Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	Ability to connect to the proposed road network hierarchy	Overall Score (Weighting A)
Option 2	• Parallel to existing NIMT, no direct SH access, • Potential direct connection to Campbell Road (Arterial/ Primary Collector). Likely to require some intersection/midblock upgrades (>50% additional traffic) • Taonui Airport potential impact • Level crossings - 9 potential roads impacted, including 6 lower classification roads impacted (Access, low volume) with residential land use. 2 existing Pedestrian Level Crossings (Campbell and Waughs) and 1 road level crossing (Campbell/Waughs Rd) will be impacted. • Potential impact through increased demand on Campbell Road - High Collective Risk • Likely to impact on the Te Araroa Trail. Cyclists use Campbell Rd, recreational cycling on other access roads will be impacted • 5-10km distance from PN Airport using the existing transport network, limited potential for integration opportunities	No direct connection to the PNCC proposed future ring road. Site is located opposite the key proposed corridors of KB Road, SH54, Railway Road. However, the site could still be accessed via Ashhurst Road.	4
Option 3	• Offline to existing NIMT, No direct SH accesses • Access via KB Road (Arterial). KB Road likely to require some intersection/midblock upgrades - KB Road (+200% traffic) • Number of streams impacted may require structures • 11 potential roads impacted including 8 lower classification roads impacted (Access, low volume) with residential land use • Potential safety impact resulting from increased demand on 3 high risk intersections along KB Road (SH3/54 KB, KB/Milson and KB/Roberts Line) in addition to the high risk KB Road Corridor (top 2%) • Potential slight impacts on the Te Araroa Trail, some recreational cycling route impacts • Located in close proximity PN Airport using the existing transport network. Potential for a direct connection	Aligns to the proposed JTS/PNCC future hierarchy, with the potential for direct connections to KB Road, Roberts Line and Stoney Creek Road	4
Option 4	• Parallel to existing NIMT, No direct SH access • Split access to Railway Road/Ashhurst Road/Kelvin Grove (Arterials). Connections to Railway Road (Arterial) will require structures. Ashhurst Road/Railway Road are likely to require some intersection/midblock upgrades (>50% additional traffic) • Level crossings - 12 potential roads impacted including 8 lower classification roads impacted (Access, low volume) with residential land use. 2 existing level crossings (Roberts Line, Cleverly Line) • Potential safety impact resulting from increased demand on two high risk roads Ashhurst Road (top 5%) and Kelvin Grove Road (top 1%). Further potential impacts on the high-risk intersection of Stoney Creek/Kelvin Grove (#9) • Potential to impact on the Te Araroa Trail, recreational cycling routes on other roads likely to be impacted (Stoney Creek, Tutaki Rd, Roberts Line). Southern end of site contains the Linklater	Aligns to the proposed PNCC future road network, with the potential for direct connections to Ashhurst Road, Railway Road and Stoney Creek Road.	3

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Area for Investigation	Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	Ability to connect to the proposed road network hierarchy	Overall Score (Weighting A)
	Reserve • Site located in close proximity, but opposite, the PN Airport		
Option 5	• Parallel to existing NIMT, No direct SH Access • Split access to Rongotea Road (Primary Collector) and No 1 Line (Arterial) • Likely to require intersection /midblock upgrades (>150% additional traffic) • Level crossings - 3 potential roads impacted including 1 lower classification road impacted (Access, low volume) with residential land use. Residential areas impacted along No1 Line. 1 x existing level crossing at Cloverlea Road. • Potential safety impact resulting from increased demand on the No1 Line Longburn high risk corridor (top 5%) and the No1 Line/Rongotea Road high risk intersection (#42). • No direct impact on dedicated W&C routes/facilities. However, Longburn Rongotea Road is a well-used route which will be impacted • 10km distance from PN Airport, limited potential for integration opportunities	Aligns to the proposed PNCC future road network, with the potential for direct connections to Longburn Rongotea Road and alignment with a downstream bridge	3
Option 6	• Parallel to existing NIMT • Direct SH56, No 1 Line (Arterial/Primary Collector) and Rongotea Road access. Likely Intersection upgrades based on split demand (> 50% increase in traffic)" • Level crossings - 8 potential roads impacted including 3 lower classification roads impacted (Access, low volume). Some residential areas impacted along No1 Line. 1 x existing level crossing at Reserve Road. • Potential safety impact resulting from increased demand on the No1 Line Longburn high risk corridor (top 5%), SH56 high risk corridor (top 5%), and the No1 Line/Rongotea Road high risk intersection (#42). • No direct impact on dedicated W&C routes/facilities. No1 line is used as a recreational route and will be impacted • >10km distance from PN Airport, limited potential for integration opportunities	Aligns to the proposed PNCC future road network, with the potential for direct connections to Longburn Rongotea Road and aligns with a downstream bridge	3
Option 7	• Sections likely to be offline to NIMT, indicative masterplan placements show back shunts difficult to incorporate into NIMT without impacting the Manawatu River • Direct SH56 Access (Arterial), SH56 likely to require intersection upgrades + link upgrades (>100% additional traffic)" • 4 potential roads impacted including 3 lower classification road impacted (Access, low volume). • Potential safety impact resulting from increased demand on the No1 Line Longburn high risk corridor (top 5%), SH56 high risk corridor (top 5%), • May impact on the Longburn to Palmerston North Shared Path on the eastern edge of the site. Both SH56 and the shared path have high cyclist usage • >10km distance from PN Airport, limited potential for integration opportunities	Some alignment to the proposed PNCC future road network, with the potential for direct connections to SH56 Pioneer Highway, close proximity to a downstream bridge	3

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Area for Investigation	Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	Ability to connect to the proposed road network hierarchy	Overall Score (Weighting A)
Option 8	• Offline to NIMT • Direct SH56 Access (Arterial) and Longburn Rongotea Road (Primary Collector). SH56 and Longburn Rongotea likely to require intersection upgrades + link upgrades (>50% additional traffic)" • Level crossings - 8 potential roads impacted including 6 lower classification roads impacted (Access, low volume). Site is predominately residential • Potential impacts on Longburn Adventist College, Walkers Road • Potential safety impact resulting from increased demand on the No1 Line Longburn high risk corridor (top 5%), SH56 high risk corridor (top 5%), and the No1 Line/Rongotea Road high risk intersection (#42). • Will impact on the Longburn to Palmerston North Shared Path. Both SH56 and the shared path have high cyclist usage • >10km distance from PN Airport, limited potential for integration opportunities	Aligns to the proposed PNCC future road network, with the potential for direct connections to SH56, Longburn Rongotea Road and a downstream bridge.	4
Option 9	• Existing site has appropriate regional (SH3), arterial (Tremaine Ave, Railway Road and Ruahine St) links. • Existing congestion during peak periods indicates further intersection improvements may be required depending on the extent of Hub expansion. • Existing site causes severance between residential zones, Tremaine avenue mixed use function • Level crossings - Existing G/S structures, expansion will likely increase demand on existing crossings • Potential impacts through increased demand at the existing site could further exacerbate issues at a number of high-risk intersections and high-risk corridors including; Tremaine Avenue/SH3 high risk intersection (#105), SH3 North of Tremaine, Ruahine St and Milson Line. • Existing W&C routes established; expansion may impact PN Urban Cycling Masterplan Routes • Existing site, <3km away from PN Airport using the existing network	No direct connections to the proposed PNCC future road network due to the central location of the existing hub.	3

				1	5												
				Low Difficulty	High Difficulty	**Weighting Systems** Note: Percentages may not total 100 due to rounding									North Bunnythorpe (West)		
				Low Impact	High Impact	None			A			B			Site 1		
Criteria	**Mode**	**Sub Criteria**	**Considerations**	**Threshold**		**%**	**Notes**	**Combined %**	**%**	**Notes**	**Combined %**	**%**	**Notes**	**Combined %**	**Assessment**	Score
Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	**Road/ Rail**	**Connectivity impacts**	- Availability of appropriate connections into the existing strategic road and rail network - Extent of upgrades/new links required to service estimated demand (Based on terminal traffic survey data)	- Direct connection to existing SH or Arterial road network - Limited upgrades required to the existing network to cater for expected demand (<50% estimated additional traffic)	-Offline to the existing NIMT - No direct connection to existing SH or arterial network - Estimated terminal traffic likely to require significant road network upgrades (>+100% estimated additional traffic)	14%	Equal split between sub-criteria	29%	35%	Availability of appropriate connections and extent of likely upgrades is a key sub-criteria and has the highest weighting while impacts on sensitive land use has a similar but slightly lower weight than the unweighted system. Overall the road/rail connectivity impacts have the highest overall weighting, reflecting the scale of impacts and likely mitigation, relative to other sub criteria.	43%	21%	Reduced weighting for all 'Impact and ability to integrate with other modes' sub-criteria to achieve a 50/50 split between the two main criteria. The sub criteria within this criteria have the same relative importance as Weighting System A (i.e. % are lower, but have the same relative proportions as Weighting system A)	26%	Parallel to existing NIMT Potential direct connection to SH54 (Arterial) and Waughs Road (Primary Collector) access. Likely to require some intersection/midblock upgrades assuming even split of estimated demand, <50% increase in traffic expected.	2
			- Impact on other sensitive land use (schools, hospitals, residential communities impacted by potential severance etc) - Impacts on the number of access and low volume routes (residential function	Little to no impact on other activities the within site	Impacts multiple sensitive activity areas or multiple residential function streets	14%			9%			5%			Potential impact on a small number properties and Taonui School accessed from Waughs Road - no alternative road access 5 lower classification roads impacted (Access, low volume) with residential land use	4
		Safety Impacts	- Level crossings - impact on existing/number of new level crossings	Minimal impact/ no new crossings	Several new major level crossings required	14%		29%	17%	Similar weighting to unweighted, reflecting that safety considerations are important. Higher weighting given to level crossings as potential mitigations are directly applicable to the sites.	26%	11%		16%	7 potential roads impacted 2 Pedestrian Level Crossings (Campbell and Waughs) 1 Road level crossing (Campbell/Waughs Rd)	4
			- Crash Risk - impacts on existing high risk corridors and intersections (Megamaps)	Little to no impact	Impacts on multiple high risk routes or intersections	14%			9%			5%			Likely to impact and add further demand on 2 high risk corridors (SH54 top 1%, Campbell Road top 5%)	3
	Walking and Cycling	**Connectivity Impacts**	- Impact on existing W&C links - Impact on proposed routes (NOF) - Impact on used routes (Strava)	Site has little to no impact existing W&C links	Site is likely to impact key W&C corridors and/or impacts multiple well used W&C routes/corridors	14%		14%	4%	Reduced weighting compared to unweighted, reflecting that this sub-criteria, whilst important, is likely to be easier to mitigate when compared to other sub-criteria	4%	3%		3%	Likely to impact on the Te Araroa Trail Cyclists use Campbell Rd, Waugh Road sth of Newbury Rd. Cyclists on access roads may be impacted	2
	Air	**Connectivity Impacts**	- Distance from Airport and potential for direct connectivity	Close proximity, <3km, potential for direct connection	Distance >10km, no feasible direct connections	14%		14%	9%	Reduced weighting compared to unweighted, reflecting that this sub-criteria is an opportunity rather than impact	9%	5%		5%	5-10km distance from PN Airport using the existing transport network, limited potential for integration opportunities	3
Ability to connect to the proposed road network hierarchy	**Connectivity to the proposed future network (As per PNCC Strategic Transport Plan)**		- Connectivity to the proposed road network - Proximity to proposed network and key strategic roads	Potential direct connection to likely future RR	No direct connection to likely future RR	14%		14%	17%	Slightly increased weighting compared to the unweighted system, but the 'impact and ability to integrate with other modes' is considered the key criteria as it focuses on impacts on the existing system. While the 'ability to connect to the proposed network hierarchy' is important, due to the uncertainty in form and timing, a lower relative weighting was adopted.	17%	50%	Increased weighting to achieve a 50/50 split between the 2 main criteria	50%	Potential to access SH54 and KB Road via Roberts Line. However, no direct connection to the PNCC proposed future ring road as the site located further north	3

				1	5	North Bunnythorpe (East)		Bunnythorpe (West)		Bunnythorpe (East)		Longburn North	
				Low Difficulty	High Difficulty								
				Low Impact	High Impact	Site 2		Site 3		Site 4		Site 5	
Criteria	**Mode**	**Sub Criteria**	**Considerations**	**Threshold**		**Assessment**	Score	**Assessment**	Score	**Assessment**	Score	**Assessment**	Score
Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	**Road/ Rail**	**Connectivity impacts**	- Availability of appropriate connections into the existing strategic road and rail network - Extent of upgrades/new links required to service estimated demand (Based on terminal traffic survey data)	- Direct connection to existing SH or Arterial road network - Limited upgrades required to the existing network to cater for expected demand (<50% estimated additional traffic)	-Offline to the existing NIMT - No direct connection to existing SH or arterial network - Estimated terminal traffic likely to require significant road network upgrades (>+100% estimated additional traffic)	Parallel to existing NIMT No direct SH access Potential direct connection to Campbell Road (Arterial/ Primary Collector) Likely to require some intersection/midblock upgrades (>50% additional traffic) Taonui Airport avoidance works	3	Offline to existing NIMT No direct SH access Access via KB Road (Arterial) KB Road likely to require some intersection/midblock upgrades - KB Road (+200% traffic) Number of streams impacted may require structures	5	Parallel to existing NIMT No direct SH access Split access to Railway Road/Ashhurst Road/Kelvin Grove (Arterials). Connections to Railway Road (Arterial) will require structures Ashhurst Road/Railway Road are likely to require some intersection/midblock upgrades (>50% additional traffic)	3	Parallel to existing NIMT No direct SH Access Split access to Rongotea Road (Primary Collector) and No 1 Line (Arterial) Likely to require intersection/midblock upgrades (>150% additional traffic)	4
			- Impact on other sensitive land use (schools, hospitals, residential communities impacted by potential severance etc) - Impacts on the number of access and low volume routes (residential function	Little to no impact on other activities the within site	Impacts multiple sensitive activity areas or multiple residential function streets	Impact on Taonui Road (Secondary Collector) - access to residential properties. Alternate routes available Taonui Airport potential impact 6 lower classification roads impacted (Access, low volume) with residential land use	4	8 lower classification roads impacted (Access, low volume) with residential land use	4	8 lower classification roads impacted (Access, low volume) with residential land use	4	1 lower classification roads impacted (Access, low volume) with residential land use Residential areas impacted along No1 Line	3
		Safety Impacts	- Level crossings - impact on existing/number of new level crossings	Minimal impact/ no new crossings	Several new major level crossings required	9 potential roads impacted 2 Pedestrian Level Crossings (Campbell and Waughs) 1 road level crossing (Campbell/Waughs Rd)	5	11 potential roads impacted	5	12 potential roads impacted 2 existing level crossings (Roberts Line, Cleverly Line)	5	3 potential roads impacted 1 x existing LX at Cloverlea Road	2
			- Crash Risk - impacts on existing high risk corridors and intersections (Megamaps)	Little to no impact	Impacts on multiple high risk routes or intersections	Potential impact through increased demand on Campbell Road - High Collective Risk (top 5%)	3	Potential impact on through increased demand on 3 high risk intersections along KB Road (SH3/54 KB, KB/Milson and KB/Roberts Line) in addition to the high risk KB Road Corridor (top 2%)	4	Potential impact through increased demand on two high risk roads Ashhurst Road (top 5%) and Kelvin Grove Road (top 1%). Further potential impacts on the high risk intersection of Stoney Creek/Kelvin Grove (#9)	4	Potential impacts through increased demand on the No1 Line Longburn high risk corridor (top 5%) and the No1 Line/Rongotea Road high risk intersection (#42).	4
	Walking and Cycling	**Connectivity Impacts**	- Impact on existing W&C links - Impact on proposed routes (NOF) - Impact on used routes (Strava)	Site has little to no impact existing W&C links	Site is likely to impact key W&C corridors and/or impacts multiple well used W&C routes/corridors	Likely to impact on the Te Araroa Trail Cyclists use Campbell Rd, recreational cycling on other access roads will be impacted	2	Potential to impact on the Te Araroa Trail, connections only, some recreational cycling on other roads (Bunnythorpe Road, Roberts Line North)	2	Potential to impact on the Te Araroa Trail, recreational cycling routes on other roads likely to be impacted (Stoney Creek, Tutaki Rd, Roberts Line) Southern end of site contains the Linklater Reserve, including W&C routes.	4	No direct impact on dedicated routes/facilities However, Longburn Rongotea Road is a well-used route which will be impacted	1
	Air	**Connectivity Impacts**	- Distance from Airport and potential for direct connectivity	Close proximity, <3km, potential for direct connection	Distance >10km, no feasible direct connections	5-10km distance from PN Airport using the existing transport network, limited potential for integration opportunities	3	Located in close proximity PN Airport using the existing transport network. Potential for a direct connection	1	Site located in close proximity, but opposite, the PN Airport	2	10km distance from PN Airport, limited potential for integration opportunities	4
Ability to connect to the proposed road network hierarchy	**Connectivity to the proposed future network (As per PNCC Strategic Transport Plan)**		- Connectivity to the proposed road network - Proximity to proposed network and key strategic roads	Potential direct connection to likely future RR	No direct connection to likely future RR	No direct connection to the PNCC proposed future ring road. Site is located opposite the key proposed corridors of KB Road, SH54, Railway Road. However, the site could still be accessed via Ashhurst Road.	4	Aligns to the proposed JTS/PNCC future hierarchy, with the potential for direct connections to KB Road, Roberts Line and Stoney Creek Road	1	Aligns to the proposed PNCC future road network, with the potential for direct connections to Ashhurst Road, Railway Road and Stoney Creek Road.	1	Aligns to the proposed PNCC future road network, with the potential for direct connections to Longburn Rongotea Road and alignment with a downstream bridge	2

				1	5	Longburn West		Longburn South		Longburn East		Existing	
				Low Difficulty	High Difficulty								
				Low Impact	High Impact	Site 6		Site 7		Site 8		Site 9	
Criteria	**Mode**	**Sub Criteria**	**Considerations**	**Threshold**		**Assessment**	Score	**Assessment**	Score	**Assessment**	Score	**Assessment**	Score
Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	**Road/ Rail**	**Connectivity impacts**	- Availability of appropriate connections into the existing strategic road and rail network - Extent of upgrades/new links required to service estimated demand (Based on terminal traffic survey data)	- Direct connection to existing SH or Arterial road network - Limited upgrades required to the existing network to cater for expected demand (<50% estimated additional traffic)	-Offline to the existing NIMT - No direct connection to existing SH or arterial network - Estimated terminal traffic likely to require significant road network upgrades (>+100% estimated additional traffic)	Parallel to existing NIMT Direct SH56, No 1 Line (Arterial/Primary Collector) and Rongotea Road access. Likely Intersection upgrades based on split demand (> 50% increase in traffic)	3	Sections likely to be offline to NIMT, indicative masterplan placements show backshunts difficult to incorporate into NIMT without impacting the Manawatu River Direct SH56 Access (Arterial) . SH56 likely to require intersection upgrades + link upgrades (>100% additional traffic)	4	Offline to NIMT Direct SH56 Access (Arterial) and Longburn Rongotea Road (Primary Collector) SH56 and Longburn Rongotea likely to require intersection upgrades + link upgrades (>50% additional traffic)	5	Existing site has appropriate regional (SH3) and arterial (Tremaine) links. Existing congestion during peak periods indicates further intersection improvements may be required depending on the extent of Hub expansion.	2
			- Impact on other sensitive land use (schools, hospitals, residential communities impacted by potential severance etc) - Impacts on the number of access and low volume routes (residential function	Little to no impact on other activities the within site	Impacts multiple sensitive activity areas or multiple residential function streets	3 lower classification roads impacted (Access, low volume) Some residential areas impacted along No1 Line	3	3 lower classification roads impacted (Access, low volume).	2	Longburn Adventist College, Walkers Road Site is predominately residential 6 lower classification roads impacted (Access, low volume) with residential land use	5	Existing site causes severance between residential zones, Tremaine avenue mixed use function	5
		Safety Impacts	- Level crossings - impact on existing/number of new level crossings	Minimal impact/ no new crossings	Several new major level crossings required	8 potential roads impacted 1 x existing LX at Reserve Road	4	4 potential roads impacted	2	8 potential roads impacted	4	Existing G/S structures, expansion will likely increase demand on existing crossings.	1
			- Crash Risk - impacts on existing high risk corridors and intersections (Megamaps)	Little to no impact	Impacts on multiple high risk routes or intersections	Potential impacts through increased demand on the No1 Line Longburn high risk corridor (top 5%), SH56 high risk corridor (top 5%), and the No1 Line/Rongotea Road high risk intersection (#42).	4	Potential impacts through increased demand on the No1 Line Longburn high risk corridor (top 5%), SH56 high risk corridor (top 5%),	3	Potential impacts through increased demand on the No1 Line Longburn high risk corridor (top 5%), SH56 high risk corridor (top 5%), and the No1 Line/Rongotea Road high risk intersection (#42).	4	Potential impacts through increased demand at the existing site could further exacerbate issues at a number of high risk intersections and high risk corridors including; Tremaine Ave/SH3 high risk intersection (#105), SH3 North of Tremaine, Ruahine St and Milson Line.	5
	Walking and Cycling	**Connectivity Impacts**	- Impact on existing W&C links - Impact on proposed routes (NOF) - Impact on used routes (Strava)	Site has little to no impact existing W&C links	Site is likely to impact key W&C corridors and/or impacts multiple well used W&C routes/corridors	No direct impact on dedicated routes/facilities No1 line and Longburn Rongotea Road are used as recreational routes and will be impacted	1	May impact on the Longburn to Palmerston North Shared Path on the eastern edge of the site Both SH56 and the shared path have high cyclist usage	2	Will impact on the Longburn to Palmerston North Shared Path Both SH56 and the shared path have high cyclist usage	3	Existing routes established, expansion may impact PN Urban Cycling Masterplan Routes	1
	Air	**Connectivity Impacts**	- Distance from Airport and potential for direct connectivity	Close proximity, <3km, potential for direct connection	Distance >10km, no feasible direct connections	>10km distance from PN Airport, limited potential for integration opportunities	5	>10km distance from PN Airport, limited potential for integration opportunities	5	>10km distance from PN Airport, limited potential for integration opportunities	5	Existing site, <3km away from PN Airport using the existing network	2
Ability to connect to the proposed road network hierarchy	**Connectivity to the proposed future network (As per PNCC Strategic Transport Plan)**		- Connectivity to the proposed road network - Proximity to proposed network and key strategic roads	Potential direct connection to likely future RR	No direct connection to likely future RR	Aligns to the proposed PNCC future road network, with the potential for direct connections to Longburn Rongotea Road and aligns with a downstream bridge	2	Some alignment to the proposed PNCC future road network, with the potential for direct connections to SH56 Pioneer Highway, close proximity to a downstream bridge	3	Aligns to the proposed PNCC future road network, with the potential for direct connections to SH56, Longburn Rongotea Road and a downstream bridge.	2	No direct connections to the proposed PNCC future road network due to the central location of the hub.	4

Central North Island Freight Hub - Workshop 2

Addendum to the Workshop 2 Connectivity Assessment

Reasons for the addendum

The reason for this addendum is to provide a:

- record updates to my assessment following Workshop 2 on 25 September 2019; and
- further assessment of the area options with the masterplan layout applied

This addendum should only be read in conjunction with the original Connectivity Workshop 2 assessment.

Updates to assessment post workshop 2

Following workshop 2, I updated my original assessment. The following changes were made:

- **Weighting**: During Workshop 2, there was discussion as to which weighting system was the most appropriate.
  - Weighting System A, which had a higher weighting towards impacts and ability to integrate with other modes (rail, road, walking and cycling, air (83%) over future connectivity (ability to connect to the proposed road network hierarchy) (17%) or Weighting System B, which had an equal weighting between existing impacts and future connectivity. Weighting System A was preferred prior to Workshop 2, as documented in the original assessment.
  - Weighting system B was adopted as the preferred weighting system as a result of the workshop discussion, on the basis that the proposed hub is part of a long-term vision and therefore future connectivity should have an equal weighting with existing impacts.

- **Criteria:** Changes to the "Ability to connect to the proposed network hierarchy" criteria based on workshop discussion included:
  - The score for Site 2 (North Bunnythorpe East) was adjusted for this criteria to account for while there was no direct connection to the proposed future network, the site was still in close proximity to key strategic links and existing hubbing areas (sub criteria score adjusted from 4 to 3).
  - Similarly, the scores for Sites 6 and 8 were adjusted for this criteria to account for location of these sites being further away from other key hubs, apart from Longburn (sub criteria score adjusted from 2 to 3).

The impact of the sub-criteria and weighting changes outlined above on the overall scoring assessment are outlined below, with options with a change in score as a result of sub-criteria changes highlighted:

	Weighting System A		**Weighting System B (Adopted in WS2)**	
Area Option	Pre WS2 Score (Weighting A)	Post WS2 Score (Weighting A)	Pre WS2 Score (Weighting B)	Post WS2 Score (Weighting B)
Option 1	3	3	3	3
Option 2	4	3	4	3
Option 3	4	4	3	3
Option 4	3	3	2	2
Option 5	3	3	3	3
Option 6	3	3	3	3
Option 7	3	3	3	3
Option 8	4	4	3	4
Option 9	3	3	3	3

Sub-criteria changes

The above table shows that, as a result of the "Ability to connect to the proposed network hierarchy" criteria changes:

- The overall score for Option 2 changed from a 4 to a 3 under both weighting systems.

- The overall score for Option 8, changed from 3 to 4 under Weighting System B (where this criteria has an overall 50% weight) but there is no overall change under Weighting System A (where the criteria has a lower weighting of 17%).

Weighting changes

Options that changed scoring as a result of the preferred weighting system changing from A to B (i.e. greater importance to future connectivity) included Option 3 (improving from 4 to 3) and Option 4 (improving from 3 to 2).

Further assessment

During Workshop 2, participants acknowledged that having a specific site to assess within the areas identified could potentially result in changes to the scores presented at Workshop 2.

As a result, after Workshop 2, the masterplan was applied to the area options assessed in Workshop 2, and sites within those areas identified. The rail connection was included on the refined options, and the implications for connecting to the North Island Main Trunk line were identified.

There are two layout options for areas 1 and 2 (Options 1a, 1b, 2a, 2b). Three layouts were originally developed for area 3, however only one layout was taken forward for assessment because the others did not meet the project objectives. Area 4 could only accommodate one layout option. There were significant constraints at the ends of areas 5 and 6, therefore the parts of these two areas without the constraints were combined to create site 5.

Sites in areas 7, 8 and 9 were not identified as these areas were fatally flawed at Workshop 2.

Assessments

The following table sets out the Connectivity assessment and scoring for each of the site options, along with the comparison to the previous Area Option scores, with changes highlighted.

Area Option	Area Score (Post WS2, Weighting B)	Site Option	Updated Score	Assessment
Option 1	3	Option 1a	3	This site is located approximately within the envelope previously assumed for the assessment of Area Option 1[1]. Impacts on Taonui school, but potentially 1 less local road is impacted compared to 1B. No change to original area score overall.
		Option 1b	3	This site is located approximately within the envelope previously assumed for the assessment of Area Option 1. No impacts on Taonui school, but impacts an additional local road compared to 1A. No change to original score overall, but 1B preferred over 1A due to school impacts.
Option 2	3	Option 2a	4	The site is located in closer proximity to Taonui Road/Airport than previously assumed for Area Option 2. This results in more significant impacts on Taonui Road and Taonui Airport, increasing the previous score overall (3 to 4)
		Option 2b	3	This site is located approximately in the position previously assumed for the assessment of Area Option 2. Significant impacts on Taonui Road, Taonui Airport. No change to original score overall.
Option 3	3	Option 3C	2	Site 3C has significantly lower connectivity impacts than previously assumed for Area Option 3 due to the location being parallel to the existing NIMT rather than offline (reduction in both the number and extent of potential network impacts). Reduction in the original score overall (3 to 2).

[1] As outlined in the original Workshop 2 assessment, assumptions regarding the potential spatial application of the supplied masterplan concept F to each of the site areas was undertaken for the purposes of assessment.

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Area Option	Area Score (Post WS2, Weighting B)	Site Option	Updated Score	Assessment
Option 4	2	Option 4	2	This site is located approximately in the position previously assumed for the assessment of Option 4. No change to original score overall.
Option 5	3	Option 5	3	This site is located approximately in the position previously assumed for the assessment of Option 6. No change to original score overall.

Conclusion

The updated site option assessment shows that Site Options 3C and 4 had the best score from a connectivity perspective, with both options scoring a 2.

KiwiRail: Palmerston North - Connectivity Assessment Workshop 3

1. Introduction

Date: 18/11/19

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Credentials — Transport Engineer, BE (Civil)

The following is a high-level comparative assessment of the connectivity impacts of the short list site options to inform the Multi Criteria Assessment (MCA) workshop for KiwiRail's future Palmerston North Rail and Freight Hub. This note considers only the connectivity criteria.

This assessment has relied on the following information:

- Local and Regional Context
  - PNCC Strategic Transport Plan, 2018
  - PNCC 10 Year Plan, 2018
  - Network Operating Framework, 2019
- Transport Network Data
  - One Network Road Classification (ONRC) data (Source: Palmerston North Economic Hub Project GIS portal)
  - Rail Terminal Access traffic count data – September 2019 (Source: Matrix ATC/Stantec)
  - Road Safety (Source: Megamaps risk metrics, Crash Analysis System)
  - Walking and cycling information (Existing W&C routes, Network Operating Framework (NOF), Strava heatmaps)
  - Transport Modelling information of the short-listed options – PNATM (Source: Palmerston North Economic Hub Project GIS portal)
  - Freight Demand Study Phase 1, 2019
  - Transport Network Constraints (Source: Palmerston North Economic Hub Project GIS portal) - Level crossings, Bridges, Streams/rivers, Intersections etc
- Workshop 3 Briefing information; including the short listed concepts and initial roading layouts.

The following information was not available for this assessment

- High level transport modelling impacts of relocating the existing hub to each of the sites, including the indicative roading layouts, has been provided for each of the short-listed options. However, the roading layouts require further testing and the modelling is of a strategic nature and does not include the impacts of the wider transport infrastructure and land use changes being considered by NZTA and PNCC (e.g. potential new links or additional river crossings). Further, it is unknown what land-use will replace the existing site.
- It is expected that further detailed assessment will be undertaken as the review of the technically

preferred site advances and more information particularly of wider transport infrastructure and land use changes being considered by NZTA and PNCC becomes available. Due to condensed timeframes, the assessment undertaken to date has been high level using currently available information and engineering judgement.

2. Constraints identified in each site

Key constraints relating to connectivity include the availability of appropriate strategic network connections. Other constraints considered include:

- Availability of appropriate strategic network connections (e.g. State highway or arterial connections)
- Number and classification of roads within and potentially impacted
- Existing level crossings
- Existing walking and cycling links
- NIMT Alignment
- Streams
- Residential areas
- Schools
- PN Airport
- Taonui Airport (Fielding Aerodrome)

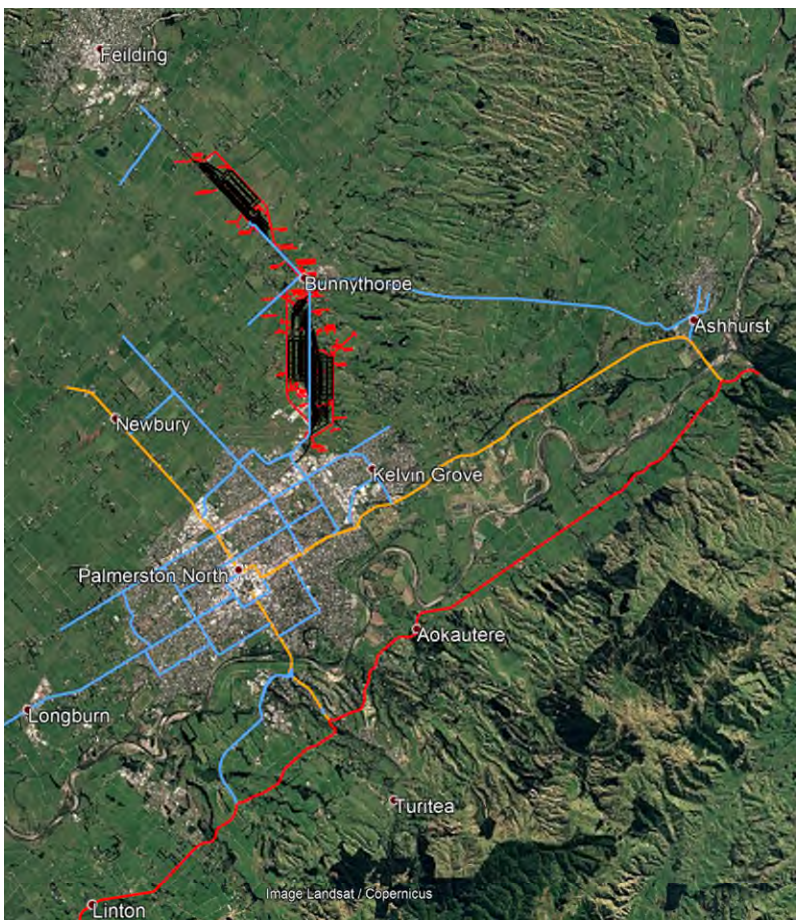

Figure 1: Map of Short Listed Sites and Connectivity to National (Red), Regional (Orange) or Arterial Roads (Blue) (Source:ONRC)

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Site	Constraints - what they are, where they are in the site and the significance of the constraint
Option 2A	• Proximity to Bunnythorpe Township to the south • Te Araroa Trail runs along Campbells/Waughs Road • Limited connectivity and proximity to National or Regional roads (SH3, SH57, SH56, SH54)
Option 3C	• Proximity to Bunnythorpe Township to the north • Proximity and impacts on the North East Industrial Zone • Limited connectivity and proximity to National or Regional roads (SH3, SH57, SH56, SH54) • Te Araroa Trail runs along Railway Road (From PN to Roberts Line), then along Sangters Road, Clevely Line and Stoney Creek Road into Bunnythorpe (Refer Figure 2)
Option 4	• Proximity to Bunnythorpe Township to the north • Limited connectivity and proximity to National or Regional roads (SH3, SH57, SH56, SH54) • Te Araroa Trail runs along Railway Road (From PN to Roberts Line), then along Sangters Road, Clevely Line and Stoney Creek Road into Bunnythorpe (Refer Figure 2)

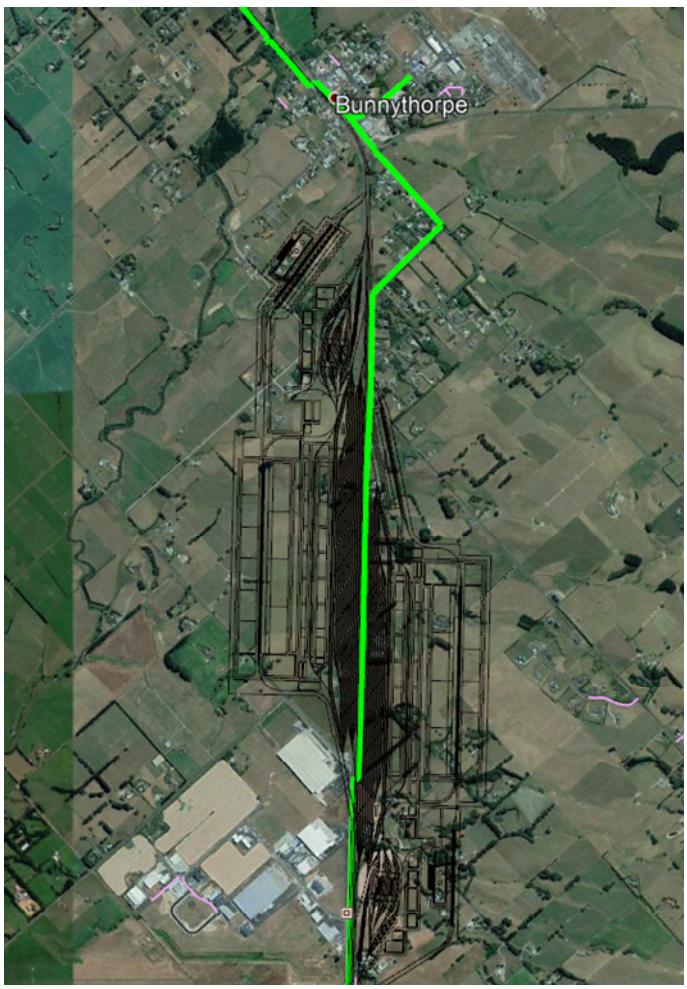

Figure 2: Te Araroa Trail show in Green, overlaid with hub Options 3C and 4

3. Criteria being assessed

The connectivity criterion considers the impact of the site on the existing or planned transport network and includes two key aspects:

1. Impacts and ability to integrate with other modes (Road, rail, walking and cycling, air)
2. Ability to connect, and give effect to, the proposed road network hierarchy

To consider the multi-modal impacts, further sub-criteria were developed as follows, based on the criteria considerations developed in Workshop 1 and 2:

Table-1: Connectivity Criteria

Criteria	Mode	Sub Criteria	Considerations
Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	**Road/ Rail**	**Connectivity impacts**	- Availability of appropriate connections into the existing strategic road - Extent of upgrades/new links required to service estimated demand (Based on terminal traffic survey data and initial modelling)
			- Impact on other sensitive land use through road closures and/or additional traffic (townships, schools, hospitals, residential communities)
		Safety Impacts	- Level crossings - impact on existing/number of new level crossings
			- Crash Risk - impacts on existing high risk corridors and intersections (Megamaps)
	Walking and Cycling	**Connectivity Impacts**	- Impact on existing W&C links - Impact on proposed routes (NOF) - Impact on used routes (Strava)
	Air	**Connectivity Impacts**	- Distance from PN Airport and potential for direct connectivity
Ability to connect, and give effect to, to the proposed road network hierarchy	**Connectivity to the proposed future network (based per PNCC Strategic Transport Plan)**		- Connectivity, and ability to give effect to, the proposed road network - Proximity to proposed network and key strategic roads

Criteria Assumptions and Limitations

- Connectivity for the purposes of this assessment has focused on impacts and linkages into the existing/proposed network. It is understood that the Economic criteria is considering the benefits of connectivity (i.e. strategic accessibility)
- this sub-criteria for connectivity does not consider other wider regional plans (e.g. a site may align well with the proposed future road hierarchy but also overlap with a proposed future residential zone).

- Rail criteria have been considered in terms of road/rail interface (i.e. level crossings)
- High level transport modelling impacts of relocating the traffic movements forecasted for the new Hub from the existing Tremaine Avenue site to each of the short listed options, including the impacts of the indicative roading layouts, has been undertaken.
    - However, the modelling is of a strategic nature and does not currently include the impacts of the wider transport infrastructure and land use changes being considered by NZTA and PNCC (e.g. potential new links or additional river crossings).
    - Further, it is unknown what land-use will replace the existing site. Therefore, while the movements generated by the future use are not known, they are expected to be the same for each option.
    - For the purposes of this assessment, two approaches were adopted:
        - Estimated localised network impacts (as a proxy for assessing the extent of potential upgrades required) were undertaken based on applying the surveyed terminal traffic[1] demand on to the assumed connecting road(s). Refer Appendix B.
            - This enables a high-level assessment of additional traffic as a percentage over typical average daily traffic for a given road (i.e. does applying terminal traffic increase demands by 50% compared to normal traffic). To account for future growth, a further escalation factor of 1.5[2] was applied to the existing terminal flows, resulting in a flow of 6,150 vpd used for the purposes of this assessment.
    - Network wide impacts considering re-routing of general and heavy vehicle traffic and levels of service were based on high level strategic modelling outputs. The model outputs were based on the differences between a new 2031[3] base (with increased rail demand to match the uplifted 6,150vpd, 25% heavy) and 2031 scenarios created with the forecasted demand shifted to each of the proposed sites. Refer Appendix C for flow difference plots of general traffic for each of the 3 sites (compared to the base). The results from the flow differences plots were used to inform the 'extent of likely roading upgrades' and the 'Ability to connect to the proposed road network hierarchy' criteria assessments.

- For context, the surveyed rail terminal heavy vehicle traffic accounts for approximately 5% of the total heavy vehicle demand and less than 1% of total overall demands across the Palmerston North Area Traffic Model network.

Scoring

Each of the sub criteria were evaluated the possible site options and scored according to the criteria outlined in Figure 3 below, with example scoring thresholds for Low and High Impact/Difficulty outlined in Table 2.

[1] Traffic tube count surveys were undertaken in Sept 2019. Based on the survey outputs, movements in and out of the Tremaine accesses (Toll, Mainfreight, Logs/General) and Matthews Avenue (Network Services) totalled over 3,500 vpd. The daily flows were adjusted for seasonal rail commodity peak factors, for an average month, estimated at 4,100 vpd with up to 25% heavy vehicles, refer Appendix B. Allowing for a growth factor of 1.5, this equates to potential average future demand of 6,150 vpd.

[2] A growth escalation factor of 1.5 was assumed, in lieu of project specific growth forecasts, based on the National Freight Demand Study (2014) 30 year forecasts of national freight task, which estimated growth of +48% and +58% in tonne-km and tonnes respectively. https://www.transport.govt.nz/assets/Uploads/Research/Documents/19d9dc9df9/National-Freight-Demand-Study-2014-executive-summary.pdf

[3] The Palmerston North Area Traffic Model (PNATM) has future years developed for 2021, 2031 and 2041. For the purposes of the short list assessment, 2031 was adopted as the base to account for the likely opening year based on planning, design and construction phase durations.

Score	Criteria		
	Benefits	Impact	Difficulty
	• Rail • Economic	• Tangata whenua values • Natural environment (terrestrial and freshwater) • Noise and vibration • Heritage • Visual and landscape impacts • Community Cohesion • Fit with (regional) strategies / plans	• Engineering degree of difficulty • Connectivity • Property degree of difficulty • Resilience -Hazards • Cost
1	High Benefits	Low Impact	Low Difficulty
2	Medium High	Medium Low	Medium Low
3	Medium	Medium	Medium
4	Medium Low	Medium High	Medium High
5	Low Benefits	High Impact	High Difficulty

Figure 3: Proposed Scoring System

Table 2 : Connectivity Criteria and Thresholds

Criteria	Mode	Sub Criteria	Considerations	Low Impact/ Low Difficulty	High Impact/ High Difficulty
Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	**Road/ Rail**	**Connectivity impacts**	- Availability of appropriate connections into the existing strategic road and rail network - Extent of upgrades/new links required to service estimated demand (Based on terminal traffic survey data and initial modelling, Appendix B and C respectively)	- Direct connection to existing SH or Arterial road network - Limited upgrades required to the existing network to cater for expected demand (<50% estimated additional traffic)	- No direct connection to existing SH or arterial network [4] - Estimated terminal traffic likely to require significant road network upgrades (>+100% estimated additional traffic)
			- Impact on other sensitive land use through road closures and/or additional traffic (townships, schools, hospitals, residential communities)[5]	Minimal impact on other activities within the site	Impacts multiple sensitive activity areas or multiple residential function streets through road closures or additional traffic
		Safety Impacts	- Level crossings - impact on existing/number of new level crossings	Minimal impact/ no new crossings	Several new major level crossings required

[4] Note that the previous WS2 criteria notes included "Offline to the NIMT". This consideration has been removed for the short list consideration as all of the options are parallel to the NIMT.

[5] Note that the previous WS2 criteria notes also included "Impacts on the number of access and low volume routes" this has been condensed into "Impact on other sensitive land use through road closures and/or additional traffic (townships, schools, hospitals, residential communities" for the short list options.

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Criteria	Mode	Sub Criteria	Considerations	Low Impact/ Low Difficulty	High Impact/ High Difficulty
			- Crash Risk - impacts on existing high risk corridors and intersections (Megamaps)	Little to no impact	Impacts on multiple high-risk routes or intersections
	Walking and Cycling	**Connectivity Impacts**	- Impact on existing W&C links - Impact on proposed routes (NOF) - Impact on used routes (Strava)	Site has little to no impact on existing W&C links	Site is likely to impact key W&C corridors and/or impacts multiple well used W&C routes/corridors
	Air	**Connectivity Impacts**	- Distance from Airport (using the existing transport network) and potential for direct connectivity	Close proximity, <3km, potential for direct connection	Distance >10km, no feasible direct connections
Ability to connect to the proposed road network hierarchy	**Connectivity to the proposed future network (As per PNCC Strategic Transport Plan)**		- Connectivity, and ability to give effect to, the proposed road network (informed by initial modelling flow difference, refer Appendix C) - Proximity to proposed network and key strategic roads	Potential direct connection to likely future RR with traffic modelling showing re-routing to upgraded corridors is likely	No direct connection to likely future RR or limited effectiveness of connections (i.e. modelling shows minimal transfer of traffic to strategic routes)

Weighting

Different weights and weighting systems were developed to consider the relative significance of each sub-criteria.
Three weighting systems tested included:

1. **Unweighted** – all 7 sub-criteria have an equal weight (14%)
2. **Weighting System A**
    a. Impacts and ability to integrate with other modes (rail, road, walking and cycling, air) – 83%
        i. Road/Rail (70%)
            1. Connectivity (44%)
            2. Safety (26%)
        ii. Walking and Cycling (4%)
        iii. Air (9%)
    b. Ability to connect to the proposed road network hierarchy - 17%

3. **Weighting System B**:
    a. Impacts and ability to integrate with other modes (rail, road, walking and cycling, air) – 50%
        i. Road/Rail (50%)
            1. Connectivity (26%)
            2. Safety (16%)

ii. Walking and Cycling (3%)
iii. Air (5%)

b. Ability to connect to the proposed road network hierarchy (50%)

Under Weighting System A, the "ability to connect to the proposed road network hierarchy" has a lower weighting than the "impacts and ability to integrate with other modes". This is due to the existing impacts being considered more important, and therefore weighted higher, than the ability to connect to a future proposed network.

Weighting System B adopts a higher, 50/50 split between 'the ability to connect to the proposed road network hierarchy' and 'impacts and ability to integrate with other modes'. This equal weighting was adopted to understand the sensitivity of the scoring to if both key criteria had equal importance.

Weighting System A was initially adopted for the WS2 assessment as:

- The unweighted system does not account for the difference in scale of multimodal impacts and opportunities
- Weighting system B has an equal weight between the two main criteria. It is considered that due to the uncertainty in the form and timing of the proposed network hierarchy (being investigated by NZTA/PNCC) the weighting for the 'impacts and ability to integrate with other modes' should have a higher weight. Weighting system B would be a useful sensitivity test.

However, during Workshop 2, there was discussion as to which weighting system was the most appropriate. Weighting system B was adopted as the preferred weighting system as a result of the workshop discussion, on the basis that the proposed hub is part of a long-term vision and therefore future connectivity should have an equal weighting with impacts.

4. Fatal Flaws

No connectivity fatal flaws have been identified at this stage.

5. Comparative assessment

The results of the comparative assessment for the three short listed options is summarised in Figure 4 and Table 3 below. Refer to Appendix A for the detailed scoring assessment, incorporating the assumptions and constraints outlined in the sections above. As outlined above, following WS2, Weighting B was adopted.

Central North Island Freight Hub - Workshop 3

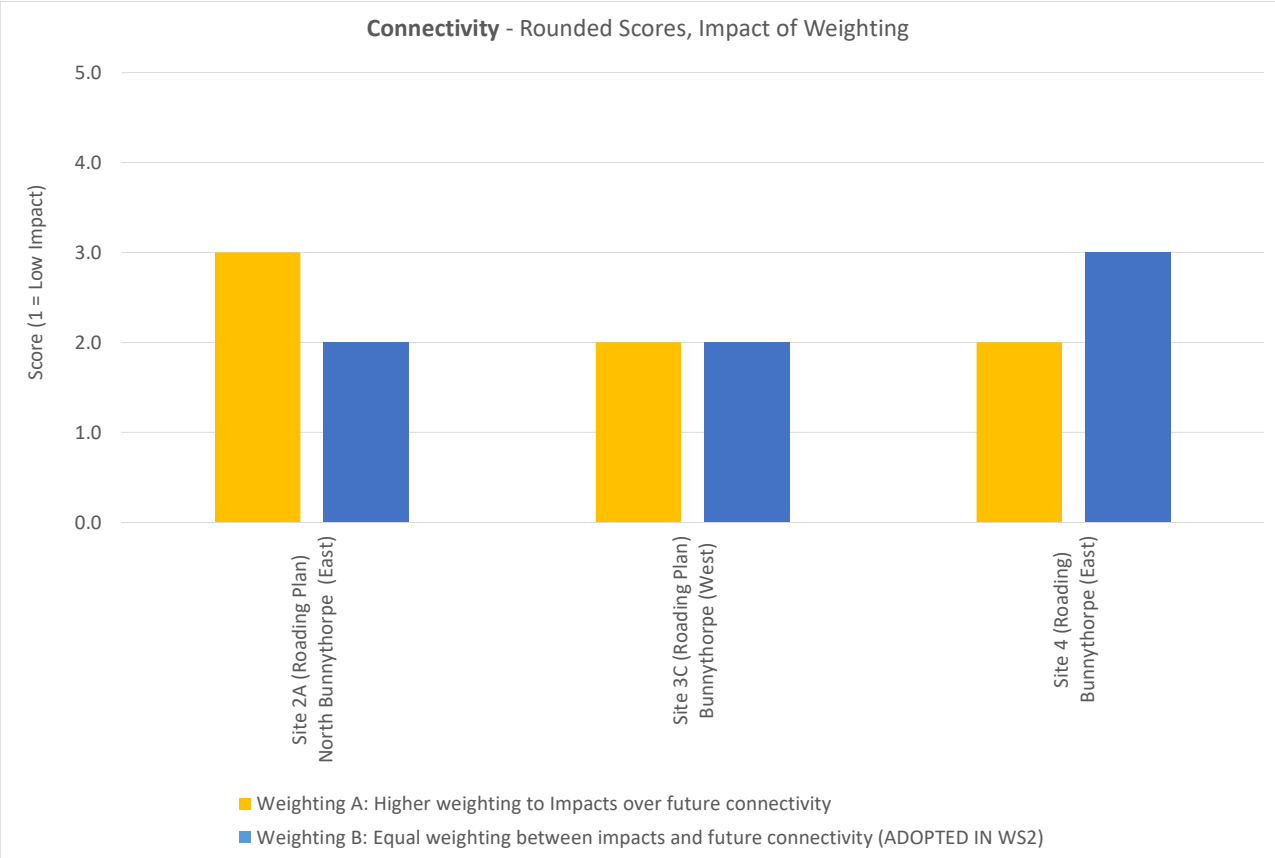


Figure 4: Connectivity - Summary of Scores and Ranking

Table 3 : Connectivity Summary Table

Area for Investigation	Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	Ability to connect, and give effect to, the proposed road network hierarchy	Overall Score (Weighting B)
Option 2A	**Impacts: 3** **Road/Rail** • Minimum 6.5km length of new links, (e.g. Waughs Road extension, yard access links), including intersection treatments • 1x grade separation of Ashhurst Road to Railway Road (underpass) near Bunnythorpe • May require wider network upgrades to cater for demand - intersection and midblock upgrades along - KB Road, Campbell/Waughs • Minor impacts on Taonui Road with new yard access link • The closure of the level crossing at KB Road/Dixons in Bunnythorpe will further increase severance for residents without mitigation (e.g. pedestrian crossing facilities) and increase likelihood that short trips will be by car • The proposed Bunnythorpe bypasses	**Future Network: 2** Site 2A is located to the north of the proposed future strategic network of KB Road, Ashhurst Road/Stoney Creek and Railway Road. However, based the initial roading network, the modelling shows good flow transfer to the strategic routes, due to the linkages around Bunnythorpe to Ashhurst, Railway Road and KB Road. However, additional modelled traffic on SH3 and KB road, coupled with a reduction along Awahuri Road indicates less traffic is choosing to travel to/from the hub via Feilding - this could be due to the lack of a Campbell/Waughs direct link road.	**Overall: 2**

	(Ashhurst to Railway Rd, Waughs Rd extension) significantly reduce general and freight traffic through the township • The rail hub relocation results in a reduction in freight along Tremaine Ave and other city centre streets, and potentially improving amenity – depending on the replacement land use along Tremaine. **Safety** • Improved safety and reduced risk from the closure of the 2 road and 1 pedestrian level crossings (Campbell/Waughs Rd x2, KB Rd/Dixons), with the new rail crossing being grade separated at Bunnythorpe. • Potential safety impact through increased demand on existing high risk corridors of Campbell Road, KB Road and Ashhurst Road. However, impacts are likely to be offset by a reduction in flows through the city centre and other strategic links (e.g. SH3 Napier Road). **Walking and Cycling** • Likely to impact on the Te Araroa Trail (e.g. KB Road level crossing closure) • Cyclists use Campbell Rd, recreational cycling on other access roads will be impacted **Air** • Taonui Airport / Feilding Aerodrome removed, a significant impact. • 5-10km distance from PN Airport using the existing transport network, limited potential for integration opportunities		
Option 3C	Impacts :**2** **Road/Rail** • Minimum 3.5km length of new links, including intersection treatments • 1x Major grade separation of Campbell/KB near Bunnythorpe Township • Likely to require wider network upgrades to cater for demand - intersection and midblock upgrades along - KB Road, North East Industrial Zone (NEIZ) access road, Railway Road (South), Campbell Road • The closure of the level crossing at KB Road/Dixons in Bunnythorpe will further increase severance without mitigation (e.g. pedestrian crossing facilities) and increase likelihood that short trips will be by car • The closure of Railway Road has been modelled to significantly reduce both general and freight traffic through the Bunnythorpe Township, as traffic will divert via the yard access and the KB/Campbell's connection. However, Ashhurst/Napier traffic will continue to go through Bunnythorpe. • The rail hub relocation results in a reduction in freight along Tremaine Ave and	**Future Network: 2** The site location aligns well to the proposed PNCC future hierarchy, with close proximity to the existing North East Industrial Zone and key links of KB Road. However, based on the current roading layout, there are relatively poor connections to the North East (Ashhurst Rd) compared to options with better connectivity (2A via the Bunnythorpe bypass connections). The strategic modelling shows that there is limited traffic increase along key links (KB Road not utilised as a parallel route, rather more direct routes including Richardson's line and Flygers Line are utilised), highlighting that further consideration of upgrading or detuning other links will be required to avoid rat-running and give effect to the proposed roading network.	**Overall: 2**

	other city centre streets, and potentially improving amenity – depending on the replacement land use along Tremaine. **Safety:** • Improved safety and reduced risk from the closure of four road level crossings (Roberts Line/Railway Rd, KB Rd/Dixons, Clevely Line, Railway Road - private LX. New crossings are grade separated - Campbell Rd to KB Road Connection (Over bridge) • Potential safety impact through increased demand on high risk corridors/intersections along KB Road, Stoney Creek Road and Kelvin Grove. • Some impacts are likely to be offset by a reduction in flows through the city centre and other strategic links, but not to the extent of 2A as currently modelled. **Walking and Cycling** • Potential to impact on the Te Araroa Trail, (e.g. KB Road level crossing closure), some recreational cycling on other roads (Bunnythorpe Road, Roberts Line North). Railway Road partial closure may impact on the existing off-road path between Railway Road and the NIMT (PN to Roberts Line) **Air** • Located in close proximity PN Airport using the existing transport network. Potential for a direct connection.		
Option 4	**Impacts: 2** **Road/Rail** • Minimum 6.5km length of new links, (e.g. Waughs Road extension, yard access links), including intersection treatments • 2x grade separation of Ashhurst Road to Railway Road (underpass) near Bunnythorpe and Yard Access Link to Railway Road (Southern connection) • Likely to require wider network upgrades to cater for demand, intersection and midblock upgrades along - Stoney Creek Road, Railway Road • The closure of the level crossing at KB Road/Dixons in Bunnythorpe will further increase severance without mitigation (e.g. pedestrian crossing facilities) and increase likelihood that short trips will be by car • The modelling shows a reduction of general and freight flows through Bunnythorpe with the rail hub relocation also resulting in a reduction in freight along Tremaine Ave and other city centre streets, potentially improving amenity – depending on the replacement land use along Tremaine. **Safety** • Improved safety and reduced risk from the closure of the 3 road level crossings (Campbell/Waughs Rd, KB Rd/Dixons,	**Future Network: 3** The site location aligns to the proposed PNCC future road network, opposite the North East Industrial Zone, with direct connections to Railway Road, Stoney Creek Road and a Waugh's Road extension. This option also directly connects into the existing North East Industrial Zone with the new hub and the industrial area at Kelvin Grove. However, similar to 3C, based on the current roading layout, there are no direct connections to the Ashhurst Rd from the hub. The strategic modelling shows that there is both a limited decrease in trips along Tremaine avenue (north) and a limited traffic increase along key links (KB Road not utilised as a parallel route, rather other routes including Newbury line, Richardson's line and Flygers Line are utilised). Increased traffic along Railway Road, Kelvin Grove Road, Stoney Creek and Roberts Line may result in rat running through the CBD and along residential streets (Kelvin Grove, Vogel St). This highlights that	**Overall: 3**

	Clevely Line), with the 2 new rail crossings being grade separated. • Potential safety impact through increased demand on two high risk roads Ashhurst Road (top 5%) and Kelvin Grove Road (top 1%). Further potential impacts on the high risk intersection of Stoney Creek/Kelvin Grove (#9). Some impacts are likely to be offset by a reduction in flows through the city centre and other strategic links, but not to the extent of 2A or 3C as currently modelled. **Walking and Cycling** • Potential to impact on the Te Araroa Trail (e.g. KB Road level crossing closure/Sangsters line closure), recreational cycling routes on other roads likely to be impacted (Stoney Creek, Tutaki Rd, Roberts Line). Potential impact on the Railway Road off road path. **Air** • Site located in close proximity, but opposite, the PN Airport. However, a grade separated connection is provided under Railway Road which could enable close integration opportunities.	further consideration of upgrading or detuning other links or providing new links will be required to avoid rat-running and give effect to the proposed roading network.

Further transport network modelling, including consideration of wider network and landuse changes will likely be required to select a preferred option from a connectivity perspective. However, based on existing information and potential for mitigation, Option 3C performs the best.

6. Potential Mitigation

Potential mitigation measures are outlined in Table 4 below, based on factors considered during the comparative assessment. Note that some of these measures have been identified in the assessment detailed in Appendix A; however, any measures noted have not influenced the scoring.

Table 4 : Mitigation

Site	Mitigation
Option 2A	• Bunnythorpe level crossing – consider providing appropriate pedestrian connectivity (e.g. underpass, automatic gates) to reduce severance impacts and reliance on motor vehicles for local residents • Taonui Airport avoidance works to minimize connectivity impacts • Increased traffic along Railway Road and Richardson Line may result in rat running through the CBD (i.e. from Railway Road to Vogel Street). Potential mitigation could be provided in the form of wider transport and land use changes being investigated by the NZTA/PNCC (e.g. wider network improvements, upgrading of other links, additional river crossings)
Option 3C	• Bunnythorpe level crossing – consider providing appropriate pedestrian connectivity (e.g. underpass, automatic gates) to reduce severance impacts and reliance on motor vehicles for local residents • Consider providing an alternate main access, rather than through North East Industrial Zone, to reduce impacts on existing businesses. • Consider providing Bunnythorpe bypass connections, similar to Option 2A and 4, to improve connectivity and reduce impacts on the township from additional general and heavy vehicle through traffic. • Railway Road partial closure may impact on the existing off-road path, options could be investigated as part of next phase to reduce impact. • Increased traffic along Railway Road and Richardson Line may result in rat running through the CBD (i.e. from Railway Road to Vogel Street). Potential mitigation could be provided in the form of wider transport and land use changes being investigated by the NZTA/PNCC (e.g. wider network improvements, upgrading of other links, additional river crossings)
Option 4	• Bunnythorpe level crossing – consider providing appropriate pedestrian connectivity (e.g. underpass, automatic gates) to reduce severance impacts and reliance on motor vehicles for local residents • Rail hub may impact the existing Railway Road/Sangsters Rd off-road path, options could be investigated as part of next phase to reduce impact. • Increased traffic along Railway Road, Stoney Creek, Roberts Line and sections of Tremaine Avenue/Kelvin Grove Road may result in rat running through the CBD and along residential streets (Kelvin Grove, Vogel St). Potential mitigation could be provided in the form of wider transport and land use changes being investigated by the NZTA/PNCC (e.g. wider network improvements, additional river crossings)

				1	5															
				Low Difficulty	High Difficulty	Weighting Note: Percentages may not total 100 due to rounding									North Bunnythorpe (East)		Bunnythorpe (West)		Bunnythorpe (East)	
				Low Impact	High Impact	None			A			B			Site 2A (Roading Plan)		Site 3C (Roading Plan)		Site 4A (Roading Plan)	
Criteria	Mode	Sub Criteria	Considerations	Threshold		%	Notes	Combined %	%	Notes	Combined %	%	Notes	Combined %	Assessment	Score	Assessment	Score	Assessment	Score
Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	Road/ Rail	Connectivity impacts	- Availability of appropriate connections into the existing strategic road and rail network - Extent of upgrades/new links required to service estimated demand (Based on terminal traffic survey data and initial modelling)	- Direct connection to existing SH or Arterial road network - Limited upgrades required to the existing network to cater for expected demand (<50% estimated additional traffic)	-Difficult connection to NIMT - No direct connection to existing SH or arterial network - Estimated terminal traffic likely to require significant road network upgrades (>+100% estimated additional traffic)	14%	Equal split between sub-criteria	29%	35%	Availability of appropriate connections and extent of likely upgrades is a key sub-criteria and has the highest weighting while impacts on sensitive land use has a similar but slightly lower weight than the unweighted system. Overall the road/rail connectivity impacts have the highest overall weighting, reflecting the scale of impacts and likely mitigation, relative to other sub criteria.	43%	21%	Reduced weighting for all 'Impact and ability to intergrate with other modes' sub-criteria to achieve a 50/50 split between the two main criteria. The sub criteria within this criteria have the same relative importance as Weighting System A (i.e. % are lower, but have the same relative proportions as Weighting system A)	26%	Parallel to existing NIMT No direct SH access with limited connectivity and proximity to National or Regional roads (SH3, SH57, SH56, SH54) Minimum 6.5km length of new links, (e.g. Waughs Road extension, yard access links), including intersection treatments 1x grade separation of Ashhurst Road to Railway Road (underpass) near Bunnythorpe May require wider network upgrades to cater for demand - intersection and midblock upgrades along - KB Road, Campbell/Waughs	3	Parallel to existing NIMT (but rail is opposite side, requiring the closure of Railway Road and associated access roads) No direct SH access with limited connectivity and proximity to National or Regional roads (SH3, SH57, SH56, SH54) Minimum 4km length of new links (e.g. new Railway Road, Sangsters Extension, including intersection treatments) 1x Major grade separation of Campbell/KB near Bunnythorpe Township Likely to require wider network upgrade to cater for demand - intersection and midblock upgrades along - KB Road, NEIZ access road, Railway Road, Campbell Road	3	Parallel to existing NIMT No direct SH access with limited connectivity and proximity to National or Regional roads (SH3, SH57, SH56, SH54) Minimum 6.5km length of new links, (e.g. Waughs Road extension, yard access links), including intersection treatments 2x grade separation of Ashhurst Road to Railway Road (underpass) near Bunnythorpe and Yard Access Link to Railway Road (Southern connection) Likely to require wider network upgrades to cater for demand, intersection and midblock upgrades along - Stoney Creek Road, Railway Road	3
			- Impact on other sensitive land use through road closures and/or additional traffic (townships, schools, hospitals, residential communities)	Minimal impact on other activities within the site	Impacts multiple sensitive activity areas or multiple residential function streets through road closures or additional traffic	14%			9%			5%			Minor impacts on Taonui Road with new yard access link The closure of the level crossing at KB Road/Dixons in Bunnythorpe will further increase severance without mitigation (e.g. pedestrian crossing facilities) The proposed Bunnythorpe bypasses (Ashhurst to Railway Rd, Waughs Rd extension) significantly reduce general and freight traffic through the township The rail hub relocation results in a reduction in freight along Tremaine Ave and other city centre streets, improving amenity.	3	The closure of the level crossing at KB Road/Dixons in Bunnythorpe will further increase severance without mitigation (e.g. pedestrian crossing facilities) The closure of Railway Road has been modelled to significantly reduce both general and freight traffic through the Bunnythorpe Township, as traffic will divert via the yard access and the KB/Campbell's connection. However, Ashhurst/Napier traffic will continue to go through Bunnythorpe. The rail hub relocation results in a reduction in freight along Tremaine Ave and other city centre streets, improving amenity. Clevely Line level crossing closed but proposed property access road provides mitigation with alternate routes available.	2	The closure of the level crossing at KB Road/Dixons in Bunnythorpe will further increase severance without mitigation (e.g. pedestrian crossing facilities) The modelling shows a reduction of general and freight flows through Bunnythorpe; however not to the extent of 2A and 3C due to trips to/from Ashhurst Road and Stoney Creek Rd (including direct yard access) likely to use Campbell Road. The rail hub relocation results in a reduction in freight along Tremaine Ave and other city centre streets, improving amenity. Clevely Line level crossing closed but property access remains	3
		Safety Impacts	- Level crossings - impact on existing/number of new level crossings	Minimal impact/ no new crossings	Several new major level crossings required	14%		29%	17%	Similar weighting to unweighted, reflecting that safety considerations are important. Higher weighting given to level crossings as potential mitigations are directly applicable to the sites.	26%	11%		16%	Improved safety and reduced risk from the closure of the following level crossings: 1 Pedestrian Level Crossings closed (Campbell and Waughs) 2 Road level crossing closed (Campbell/Waughs Rd, KB Rd/Dixons) New crossings are grade separated - Bunnythorpe connection road under rail (Ashhurst Rd to Railway Road)	1	Improved safety and reduced risk from the closure of the following level crossings: 4 Road level crossing closed (Roberts Line/Railway Rd, KB Rd/Dixons, Clevely Line, Railway Road - private LX) New crossings are grade separated - Campbell Rd to KB Road Connection (Overbridge)	1	Improved safety and reduced risk from the closure of the following level crossings: 3 Road level crossing closed (Roberts Line/Railway Rd, KB Rd/Dixons, Clevely Line) 2x New crossings are grade separated - Bunnythorpe connection (road under rail - Ashhurst Rd to Railway Road) and Railway Road southern yard access (Road under rail)	1
			- Crash Risk - impacts on existing high risk corridors and intersections (Megamaps)	Little to no impact	Impacts on multiple high risk routes or intersections	14%			9%			5%			Potential safety impact through increased demand on the existing high risk corridors Campbell Road, KB Road and Ashhurst Road, However, impacts are likely to be offset by a reduction in flows through the city centre and other strategic links (e.g. SH3 Napier Road).	3	Potential safety impact on through increased demand on high risk corridors/intersections along KB Road (SH3/54 KB, KB/Milson and KB/Roberts Line), Stoney Creek Road and Kelvin Grove. Some impacts are likely to be offset by a reduction in flows through the city centre and other strategic links, but not to the extent of 2A as currently modelled.	3	Potential safety impact through increased demand on two high risk roads Ashhurst Road (top 5%) and Kelvin Grove Road (top 1%). Further potential impacts on the high risk intersection of Stoney Creek/Kelvin Grove (#9) Some impacts are likely to be offset by a reduction in flows through the city centre and other strategic links, but not to the extent of 2A as currently modelled.	3
	Walking and Cycling	Connectivity Impacts	- Impact on existing W&C links - Impact on proposed routes (NOF) - Impact on used routes (Strava)	Site has little to no impact existing W&C links	Site is likely to impact key W&C corridors and/or impacts multiple well used W&C routes/corridors	14%		14%	4%	Reduced weighting compared to unweighted, reflecting that this sub-criteria, whilst important, is likely to be easier to mitigate when compared to other sub-criteria	4%	3%		3%	Likely to impact on the Te Araroa Trail (e.g. KB Road level crossing closure) Cyclists use Campbell Rd, recreational cycling on other access roads will be impacted	2	Potential to impact on the Te Araroa Trail, connections only (e.g. KB Road level crossing closure), some recreational cycling on other roads (Bunnythorpe Road, Roberts Line North). Railway Road partial closure may impact on the existing off road path.	3	Potential to impact on the Te Araroa Trail (e.g. KB Road level crossing closure), recreational cycling routes on other roads likely to be impacted (Stoney Creek, Tutaki Rd, Roberts Line) Southern end of site contains the Linklater Reserve, including W&C routes, likely no impact based on current plans.	3
	Air	Connectivity Impacts	- Distance from Airport and potential for direct connectivity	Close proximity, <3km, potential for direct connection	Distance >10km, no feasible direct connections	14%		14%	9%	Reduced weighting compared to unweighted, reflecting that this sub-criteria is an opportunity rather than impact	9%	5%		5%	Taonui Airport / Feilding Aerodrome removed, a significant impact. 5-10km distance from PN Airport using the existing transport network, limited potential for integration opportunities	4	Located in close proximity PN Airport using the existing transport network. Potential for a direct connection	1	Site located in close proximity, but opposite, the PN Airport. However, a grade separated connection is provided across Railway Road which could enable close integration opportunities	1
Ability to connect, and give effect to, the proposed road network hierarchy	Overall (Average of connectivity sector scores)		- Connectivity, and ability to give effect to, the proposed road network - Proximity to proposed network and key strategic roads	Potential direct connection to likely future RR with traffic modelling showing re-routing to upgraded corridors is likely	No direct connection to likely future RR or limited effectiveness of connections (i.e. modelling shows minimal transfer of traffic to strategic routes)	14%		14%	17%	Slightly increased weighting compared to the unweighted system, but the 'impact and ability to integrate with other modes' is considered the key criteria as it focuses on impacts on the existing system. While the 'ability to connect to the proposed network hierarchy' is important, due to the uncertainty in form and timing, a lower relative weighting was adopted.	17%	50%		50%	Site 2A is located to the north of the proposed future strategic network of KB Road, Ashhurst Road/Stoney Creek and Railway Road. However, based the initial roading network, the modelling shows good flow transfer to the strategic routes, due to the linkages around Bunnythorpe to Ashhurst, Railway Road and KB Road. However, additional traffic on SH3 and KB road, coupled with a reduction along Awahuri Road indicates less traffic is choosing to travel to/from the hub via Feilding - this could be due to the lack of a Campbell/Waughs direct link road.	2	Aligns to the proposed PNCC future hierarchy, with close proximity to the existing NEIZ and key links of KB Road. However, based on the current roading layout, there are relatively poor connections to the North East (Ashhurst Rd) compared to options with better connectivity (2A via the Bunnythorpe bypass connections). The strategic modelling shows that there is limited traffic increase along key links (KB Road not utilised as a parallel route, rather more direct routes including Richardson's line and Flygers Line are utilised), highlighting that further consideration of upgrading or detuning other links will be required to avoid rat-running and give effect to the proposed roading network.	2	Aligns to the proposed PNCC future road network, opposite the NEIZ, with direct connections to Railway Road, Stoney Creek Road and a Waugh's Road extension. This option also directly connections the existing NEIZ with the new hub and the industrial area at Kelvin Grove. However, similar to 3C, based on the current roading layout, there are no direct connections to the Ashhurst Rd from the hub. The strategic modelling shows that there is both a limited decrease in trips along Tremaine avenue (north) and a limited traffic increase along key links (KB Road not utilised as a parallel route, rather other routes including Newbury line, Richardson's line and Flygers Line are utilised). Increased traffic along Railway Road, Kelvin Grove Road, Stoney Creek and Roberts Line may result in rat running through the CBD and along residential streets (Kelvin Grove, Vogel St). This highlights that further consideration of upgrading or detuning other links will be required to avoid rat-running and give effect to the proposed roading network.	3
	Connectivity to the proposed future network (As per PNCC Strategic Transport Plan)		Sector – North East (Ashhurst/Napier)			3%	Even split	3%	3%	Even split	3%	10%	Even split	10%	Bunnythorpe bypasses enable good connectivity to/from Ashhurst Road, KB Road and Railway Road. Modelling shows an increase in use of Ashhurst Road.	1	Traffic from Ashhurst Road will need to travel through the Bunnythorpe Township to access the Rail hub, via the overbridge to KB Road. Modelling shows an increase in flows on Stoney Creek Road, aligning with an upstream bridge.	3	Direct connection to Stoney Creek Road, however there is only an indirect connection to/from the hub to Ashhurst Road (Via Stoney Creek Rd or Railway Road). Modelling shows an increase in flow along Stoney Creek Road, aligning with a potential upstream bridge.	2
			Sector – North West (Feilding)			3%		3%	3%		3%	10%		10%	Campbell Road, realigned, becomes the main link between PN and Feilding, with a modelled reduction of flow along SH54 and Milson Line. The extension of Waughs Road enables non-hub related commuter traffic to use the link. However, there is no link between Campbell and Waughs - with the model results showing an increase in total distance travelled compared to Options 3C and 4.	2	Realigned Railway Road has good connectivity to Feilding via Campbell Road and the KB Road overbridge, bypassing Bunnythorpe.	1	Railway Road has good connectivity to Feilding via the Waughs Road extension, bypassing Bunnythorpe. Campbell Road is also an alternative for traffic from Ashhurst Road/Stoney Creek.	1
			Sector - West (SH3)/SH1 North			3%		3%	3%		3%	10%		10%	Modelling indicates increases along SH3 and KB Road, for both general traffic and freight, indicating that the planned strategic corridors are functioning as intended. However, additional traffic on SH3 and KB road, coupled with a reduction along Awahuri Road indicates less traffic is choosing to travel to/from the hub via Feilding - this could be due to the lack of a Campbell/Waughs link road.	2	The strategic modelling shows that there is limited traffic increase along key links (KB Road not utilised as a parallel route, rather the shorter Richardson's line and Flygers Line), highlighting that further consideration of upgrading or detuning other links will be required to avoid rat-running.	2	The strategic modelling shows that there is limited traffic increase along key links (KB Road not utilised as a parallel route, rather the shorter Richardson's line and Flygers Line), highlighting that further consideration of upgrading or detuning other links will be required to avoid rat-running.	3
			Sector – South West (SH56 Longburn)			3%		3%	3%		3%	10%		10%	Modelling indicates increases along SH3 and KB Road, for both general traffic and freight, indicating that the planned strategic corridors are functioning as intended	2	The strategic modelling shows that there is limited traffic increase along key links (KB Road not utilised as a parallel route, rather the more shorter Richardson's line and Flygers Line), highlighting that further consideration of upgrading or detuning other links will be required to avoid rat-running. However, the modelling does show more traffic using KB road south of the SH54/Milson Intersection towards Longburn	3	The strategic modelling shows that there is limited traffic increase along key links (KB Road not utilised as a parallel route, rather the more shorter Richardson's line and Flygers Line), highlighting that further consideration of upgrading or detuning other links will be required to avoid rat-running.	3
			Sector – South (PN SQ to SH57)			3%		3%	3%		3%	10%		10%	Increased traffic along Railway Road and Richardson Line may result in rat running through the CBD (i.e. from Railway Road to Vogel Street). Potential mitigation could be provided in the form of an additional river crossing	3	Increased traffic along Railway Road and Richardson Line may result in rat running through the CBD (i.e. from Railway Road to Vogel Street). Potential mitigation could be provided in the form of an additional river crossing	3	Increased traffic along Railway Road, Stoney Creek, Roberts Line and sections of Tremaine Avenue/Kelvin Grove Road may result in rat running through the CBD and along residential streets (Kelvin Grove, Vogel St). Potential mitigation could be provided in the form of an additional river crossing	4

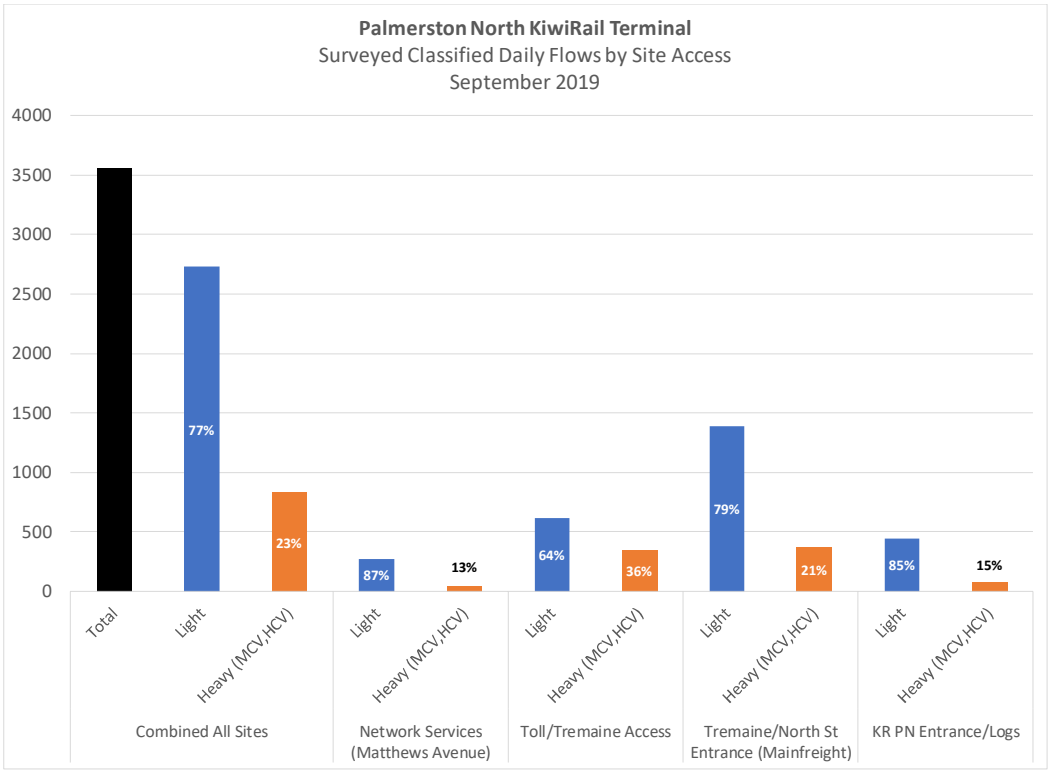
Central North Island Freight Hub

Connectivity: Appendix B – Background Information

Palmerston North KiwiRail Terminal – Initial Summary of Survey Results

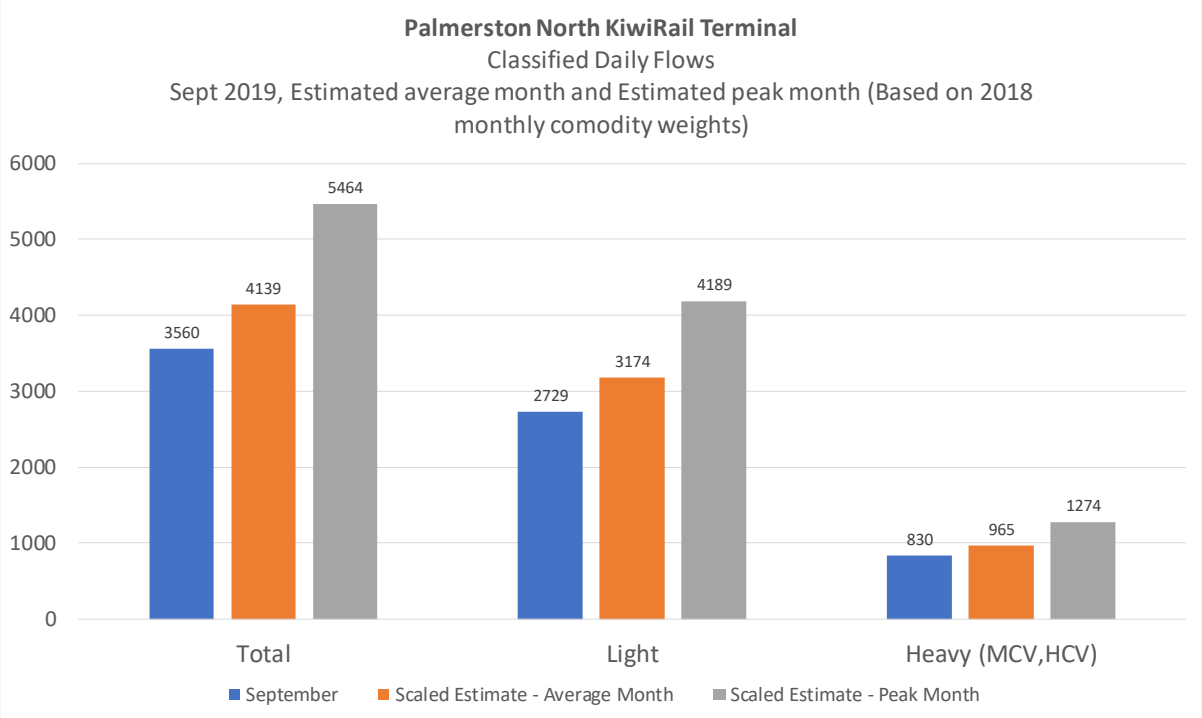
Total traffic demand for the existing KiwiRail terminal has been surveyed, across four accesses (Network Services, Toll, Mainfreight and Logs/General Access), using automatic tube counts (ATC) for the first week of September 2019. Video footage was also collected. The surveyed sites are highlighted in the figure below.

Based on the survey outputs, weekday movements in and out of the Tremaine accesses (Toll, Mainfreight, Logs/General) and Matthews Avenue (Network Services) totalled over 3,500 vehicles per day (vpd), with 23% heavy vehicles. Overall flows by accessway and vehicle type are presented in the figure below. Indirect terminal traffic has not been considered (i.e. demand generated by nearby activities not directly accessing the rail terminal).



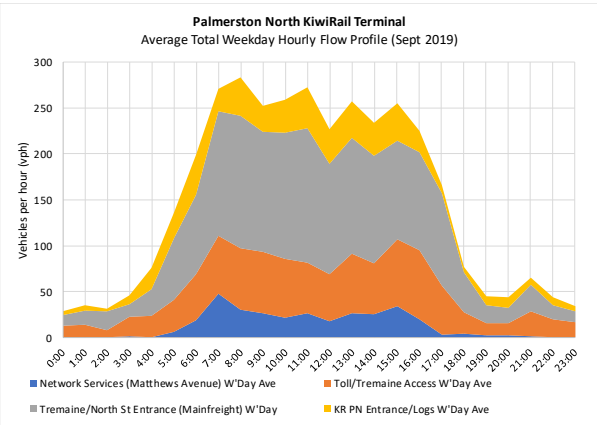
Central North Island Freight Hub

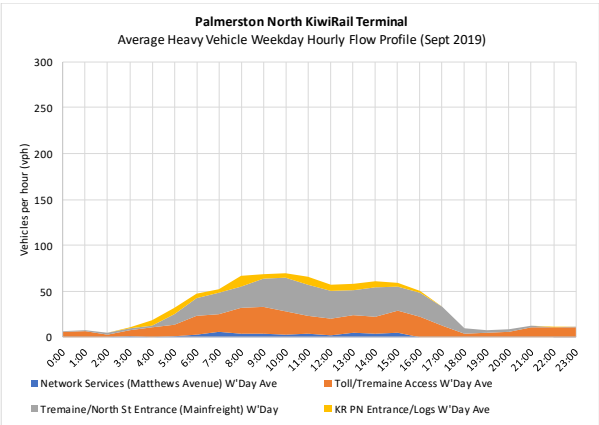
Seasonal peak factors based on 2018 commodities were applied to the count data collected in September. Based on this commodity data, September was found to be 86% of average monthly demand, with November being the peak month at 132% higher than average. The figure below shows the surveyed terminal flows, adjusted for seasonal factors.



Overall, flows throughout the terminal accessways peak at 7-8am and are relatively consistent throughout the day, tapering off after 6pm. There is no defined PM peak. The morning peak across the terminal approaches 300vph, with sustained volumes of 250vph throughout the day. Compared to the peak month of November, sustained peak flows are estimated to be as high as 450vph.

The Tremaine Avenue/North St (Mainfreight) access is the busiest when considering all traffic, peaking at 140 movements/hour, followed by Toll peaking at approximately 80movements/hour. Heavy vehicle traffic movements between the Mainfreight and Toll are similar. The KR depot and logs entrance has lower movements of approximately 20-40 movements per hour.





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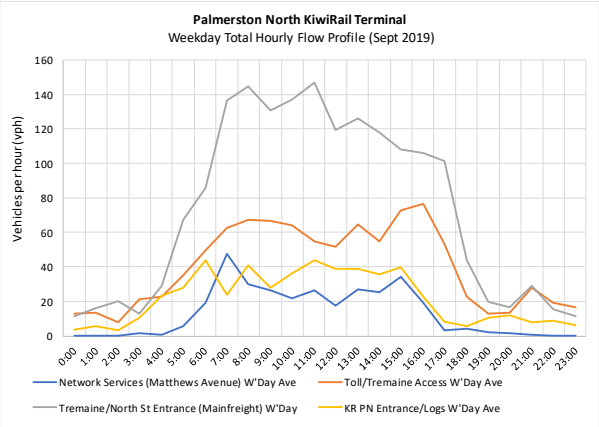

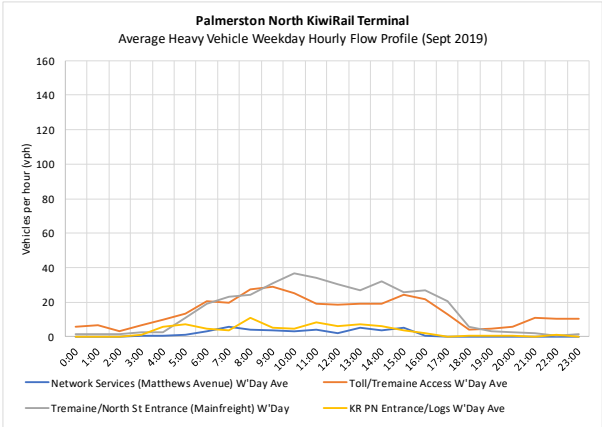

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Connectivity- Addendum

This addendum reflects updates to the scores following the discussion at the KiwiRail MCA workshop 3 in Palmerston North on 20 November 2019. This addendum should only be read in conjunction with the original Connectivity Workshop 3 assessment.

Key discussion points and corresponding changes are outlined in the Table 1 below.

Table 1: Workshop 3 Summary of Discussion and Actions

Discussion	Action
Proposed Future Ring Road and relationship with KiwiRail indicative road layouts - Proposals are under development by NZTA, with 3 short listed options developed - KiwiRail hub proposed roading layouts are indicative for the three sites - Two key objectives of the proposed ring road are to reduce heavy vehicle trips through the city/residential areas and improve access into and out of key hubs (e.g North East Industrial Zone).	- NZTA to consider KR hub integration as part of the MCA short list criteria for the NZTA's Palmerston North Integrated Transport Initiative (PNITI) (Complete) - Modify the 'Connectivity to the proposed future network (As per PNCC Strategic Transport Plan)' into two sub criteria and modify weighting given as follows: o New sub criterion: Alignment to the PNCC Strategic Plan/ 3 Short Listed PNITI options – 40% o New sub criterion: Ability to give effect to the objectives of the proposed Strategic Roading network (traffic flow on appropriate routes) – 20% o Modify weighting to give a total weighting of 60% for the 'Connectivity to the proposed future network', an increase of 10% for that sub criteria in Weighting System B. - To allow for the increase in weighting of 'Connectivity to the proposed future network', the weightings of the other sub criteria were reviewed. The weighting of the Connectivity Impacts sub criterion was reduced by 10% to account for aspects of the 'Extent of upgrades/ new links required to service estimated demand' consideration being considered by the Engineering Degree of Difficulty criteria through a cost lens.

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Discussion	Action
Site Specific 2A - During workshop 3, a few participants, including the NZTA, raised the potential for increased rat-running in the wider transport network due to the location of 2A (e.g. the rat run from SH1 to the Manawatu Gorge) which had not been considered in the original assessment.	- Update the scoring under the 'Ability to give effect to the objectives of the proposed Strategic Roading network (traffic flow on appropriate routes)' and 'Alignment to the PNCC Strategic Plan/ 3 Short Listed PNITI options' based on the 2A hub location being further away from key destinations and generators compared to 3C/4 and to better reflect the increased potential for rat running.
Site Specific 3C - Discussion on key differentiators of 3C; proximity to NEIZ, potential to integrate rail into the NEIZ, severance of Railway Road (offset to a degree by the Railway Road re-alignment and reduced traffic through Bunnythorpe township), potential for further mitigation (i.e. alternate access to El Prado Drive) and better alignment to the proposed ring road.	- Update scoring under the two sub criteria o Alignment to the PNCC Strategic Plan/ 3 Short Listed PNITI options o Ability to give effect to the objectives of the proposed Strategic Roading network (traffic flow on appropriate routes - Further consideration of the negative impacts of the relocated Railway Road having a shared access with the local traffic from the NEIZ via El Prado Drive (without mitigation).
Site Specific 4C - Workshop discussion on how this option could 'funnel' further heavy vehicle traffic into residential areas like Kelvin Grove. - Potential mitigation could be provided via an upstream bridge and other corresponding roading network upgrades.	- Update scoring under the two sub criteria o Alignment to the PNCC Strategic Plan/ 3 Short Listed PNITI options o Ability to give effect to the objectives of the proposed Strategic Roading network (traffic flow on appropriate routes

The overall scores, reflecting the impact of the changes above, is provided in Table 2 below.

Table 2: Updated Overall Score

Option	**Overall Score**
Option 2A	3
Option 3C	2
Option 4	3

A detailed breakdown of the updating scoring is provided in Table 3, with yellow cells indicating areas of change from the Workshop 3 assessment.

Table 3: Detailed Scoring Breakdown

Criteria	Updated Weighting		Mode, Sub Criteria and Considerations	**2A**	**3C**	**4**	Commentary
Impacts and ability to integrate with other modes (rail, road, walking and cycling, air)	40% *(Prev 50%)*	11% (Prev 21%)	**Road/ Rail – Connectivity Impacts:** - Availability of appropriate connections into the existing strategic road - Extent of upgrades/new links	3	3	3	Reduced weighting for Road/Rail connectivity due to EDOD also considering aspects of the 'Extent of upgrades/ new links required to service estimated demand' consideration.

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Criteria	Updated Weighting		Mode, Sub Criteria and Considerations	2A	3C	4	Commentary
			required to service estimated demand				No change to sub-criteria scoring.
		5%	**Road/Rail – Connectivity Impacts:** - Impact on other sensitive land use through road closures and/or additional traffic (townships, schools, hospitals, residential communities)	3	4 (up from 2)	3	Increased score for 3C to better account for the negative traffic and severance impacts of the proposed shared access between the relocated Railway Road and El Prado Drive. The score does not account for any potential mitigations (i.e. alternate access arrangements).
		11%	**Road/Rail - Safety Impacts:** - Level crossings - impact on existing/number of new level crossings	1	1	1	No change to sub-criteria scoring.
		5%	**Road/Rail - Safety Impacts:** - Crash Risk - impacts on existing high risk corridors and intersections	3	3	3	No change to sub-criteria scoring.
		5%	**Air – Connectivity Impacts**: - Distance from PN Airport and potential for direct connectivity	4	1	1	No change to sub-criteria scoring.
		3%	**Walking and Cycling – Connectivity Impacts**: - Impact on existing Walking &Cycling links Impact on proposed routes Impact on used routes	2	3	3	No change to sub-criteria scoring.
Ability to connect, and give effect to, the proposed road network hierarchy	60% *(Prev 50%)*	50%	Previous Connectivity to the proposed future network (As per PNCC Strategic Transport Plan)	2	2	3	Now superseded by the splitting of this criteria into two as outlined below.
		40%	**Alignment to the PNCC Strategic Plan/ 3 Short Listed PNITI options** Split of previous combined 'Connectivity to the proposed future network (As per PNCC Strategic Transport Plan)'.	4	1	3	Site 2A scores the lowest due to it being located north of the proposed strategic network and having limited alignment to the PNITI short listed options compared to 3C and 4. The location of Site 3C aligns the best with the proposed PNCC strategic

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Criteria	Updated Weighting		Mode, Sub Criteria and Considerations	2A	3C	4	Commentary
			This criterion considers the strategic alignment of the KiwiRail site to both the Strategic Transport Plan and short listed PNITI options.				plan and PNITI shortlisted options (proximity to NEIZ, KB Road). Site 4 is aligned to the proposed PNCC strategic plan but only aligns well to a single PNITI option.
		20%	**Ability to give effect to the objectives of the proposed Strategic Roading network** (traffic flow on appropriate routes) Split of previous combined 'Connectivity to the proposed future network (As per PNCC Strategic Transport Plan)'.	3	2	3	This criterion is similar to the previous assessment, with the score for site 2A score increased from 2 to 3 to better reflect the increase in the importance of the longer distance from key origins/ destinations compared to 3C and 4 and potential for increased rat running.
	Overall (Updated)			3 (up from 2)	2	3	Overall, the updated scores do not change for Options 3C and 4. The score for option 2A overall increases from 2 to 3, primarily reflecting the increase in the importance of the longer distance from key origins/ destinations compared to 3C and 4.

Overall, the updated rounded scores are similar for Site 2A and 4 at 3 and a score of 2 for Site 3C. The scores reflect that the differences between the options at this preliminary stage are not very significant when looking across a range of criteria.

The assessment also reflects that there is a significant opportunity for KiwiRail to work with the NZTA, PNCC and MDC to influence the future roading network and mitigate impacts, regardless of the site, as although several wider initiatives are underway, they are in the investigation phase (e.g. PNITI).