

# Melling Intersection: SH2 Pedestrian Overbridge

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0	17/05/19	Draft for Comment	9(2)(a)			
1	31/07/19	Final Draft				

## 1 Purpose and Scope

The purpose of this report is to provide a brief feasibility analysis to determine the benefits and costs of installing a new pedestrian connection over State Highway 2 (SH2) in Melling, as part of the wider Melling Interchange and RiverLink improvements. This report builds on a previous report assessing the impacts of moving the Melling station south of its current location (Melling Station Relocation Assessment, Stantec, November 2017).

The following scope was undertaken to assess the potential usage of connection options:

- Review and update of base walking catchment model
- Network coding of the Queen Drive direct option
- Scenario testing of current base network and 3 potential future networks (shown in Table 1-1), based around variants of a new pedestrian connection over SH2.
- Catchment isochrone analysis and GIS mapping

Whilst the Melling station move will impact all road users who travel to and from the station, the focus of this file note is on the pedestrian bridge over SH2, and therefore primarily on pedestrians, scooters and wheelchairs.

Geographic information systems were used alongside SQL and R programming languages to complete the assessment. Approximate locations of additional connection options are displayed in Table 1-1. The current station location (at Melling intersection) and proposed future station (end of Margaret Street footbridge) are also shown. It is noted that the final location of the relocated railway station has not yet been decided and any change in this location may impact the results of the analysis.

**Table 1-1: SH2 Pedestrian Bridge options**

Option	Description	Station location used in analysis
Existing network	Existing Melling base network.	Current location.
Option 1	-Includes new interchange and bridge over Hutt River into Queen's Drive (Green in figure below). -Parts of the network that are not relevant to future scenarios (including current SH2 bridge) have been removed. -Margaret street footbridge connection added (Blue).	Proposed location for new station, approximately 500m south of the existing.
Option 2	As Option 1, with the addition of a new pedestrian bridge over SH2 connecting into Harbour View (Red).	
Option 3	As Option 2, with an additional City View Grove footpath extension added (Yellow).	
Option 3A	Option 3 variant with an alternative connection to City View Grove (Dashed Yellow)	

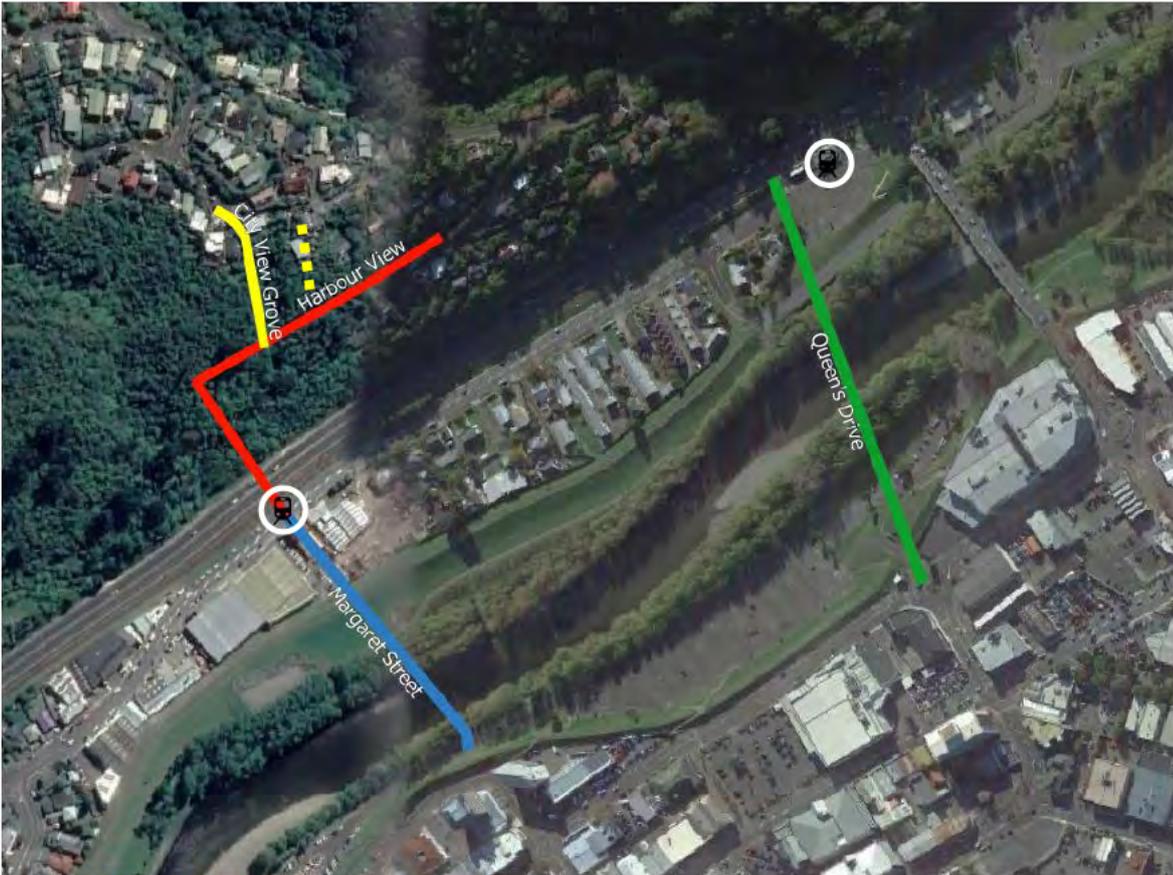


Figure 1-1: Potential additional connection options

## 2 Networks

The preferred location for the new Melling railway station will be approximately 500 metres south of the current station and directly opposite the proposed pedestrian bridge into the Lower Hutt CBD at Margaret Street. This location provides easy access for people traveling to and from the CBD. The exact location of the railway station has not yet been decided and any change in this location may impact the results of the analysis.

For the purpose of this report, routes within 1.6km (or approximately 20 minutes) of the station have been considered as 'walkable' by station users.

### 2.1 Option Assessment

This file note aims to provide a high-level summary of what additional pedestrian links over SH2 would mean for current and future users, along with commentary on several other considerations (e.g. development potential and timings). The file note will also focus on the feasibility of these possible network options relative to the number of people impacted.

#### 2.1.1.1 Walking Catchment

GIS software was used to identify the catchment area as well as the number of people<sup>1</sup> living within 400m, 800m, 1,200m and 1,600m from each station location, the results are summarised in Table 2-1. Walking catchment maps for each option are displayed in Appendix A - D.

Walking catchment maps also include an overlay of the Melling Station access mode by origin survey information<sup>2</sup>, with key insights<sup>3</sup> outlined below:

- Respondents travelled to Melling Station from both sides of the Hutt River;
- Fewer respondents walked to the station from the adjacent hill suburbs than from the valley;
- More people drove to the station from the hill suburbs than from the valley floor;
- Respondents that accessed the station by bus all travelled from Belmont; and
- More than twice as many survey respondents travel from north of the station.

**Table 2-1: Walking Impacts**

Walking Impacts (42% of current train passengers walk to Melling)		Existing:	Option 1:	Option 2:	Option 3/3A:
		Do Nothing/ Retain Existing Station	Queen's Drive overbridge and Margaret Street connection.	Queen's Drive overbridge, Margaret Street and single Harbour View connection.	Queen's Drive overbridge, Margaret Street, Harbour View Connections and City View Grove extension.
Harbour View to Stn	Change in Walking Distance (m)	0	+364	+64	+64
	Change in Walking Time <sup>4</sup> (min)	0	+3.9	0.0	+0.0
Tirohanga to Stn	Change in Walking Distance (m)	0	+609	+609	+609
	Change in Walking Time <sup>4</sup> (min)	0	+4.9	+4.9	+4.9
Walking Catchment Impacts	Difference in Walking Population Catchment within Harbour View <sup>5</sup>	0	-474	+14	+302
	Anticipated CBD Growth (Promenade)	+2,600 new residents (medium growth 20 year horizon) <sup>6</sup>			

<sup>1</sup> 2013 Census, for the employed census usually resident population count aged 15 years and over.

<sup>2</sup> Greater Wellington Regional Council, Analysis of the Rail Survey data, 2011/12.

<sup>3</sup> Reproduced from RiverLink, Provision of New Walking & Cycling Connection Across Hutt River & Relocated Melling Station, 2017

<sup>4</sup> Travel time savings were based on a walking speed of 1.3m/s combined with changes in walking distance and signal phasing.

<sup>5</sup> This figure was calculated using CoreLogic datasets and refers to entire populations, rather than the working population described in census data. CoreLogic data points were more suitable for small-scale catchment change assessments.

<sup>6</sup> The Riverside Promenade – Building the Future Business Case, Hutt City Council, 2017

Walking catchment analysis results include:

- Harbour View impact:  
The additional distance for Harbour View residents is largely offset by reduced waiting times to cross SH2 with the Melling interchange in place.
  - Option 1: This option does not include any additional connections to the Harbour View. Whilst the proposed Melling Interchange is closer to the Harbour View than the current crossing, there is an increase of approximately 4 minutes by foot due to the relocated station. Option 1 reduces the total population in Harbour View within walking distance by approximately 470 people.
  - Option 2: The proposed Harbour View connection results in a large reduction in walking time and distance compared to Option 1 whilst also more than offsetting the reduction in the walking catchment resulting from the station relocation. Compared to the existing situation, Option 2 shows only a small increase in walking distance (64m), but critically, no increase in walking time when the reduced waiting times to cross SH2 with the Melling Interchange in place are taken into account.
  - Option 3/3A: Walking times and distances are the same as Option 2, but the population within walking catchment increases between the two, as a result of the City View Grove link.
    - Based on the population catchment impacts, census train journey to work data, potential school other off-peak shopping train trips, connection usage is likely to be in the range of 55-110 daily trips to and from the railway station<sup>7</sup>.
- Tirohanga impact:
  - All three future options showed a negative impact of the station move to residents of Tirohanga, with increased walking distances to the station. The increase in walking distance is a direct result of the station move, with potential additional network connection options over SH2 having no impact to this area. Additional walking time is expected to be approximately 4 minutes for Tirohanga.
  - The proposed Melling station remains the closest station for Tirohanga.
- Increased access to the Lower Hutt CBD and Bus Services
  - Points of interest within the CBD with improved accessibility (i.e. now within a 10-12 minute walk or less) of the station include; Hutt City Council, Dowse Art Museum and High Street.
  - These points of interest become more easily accessible to western hills residents with the additional connections proposed in Options 2 and 3/3A.
  - Forecast non-rail demand from Harbour View to the CBD, based on increased connectivity is difficult to quantify due to the hilly nature of the suburb, distance to the CBD and schools, limited accessibility of the route due to grade (limiting cyclists, scooters and mobility impaired users) and the fact that a current, albeit longer, route exists.
  - However, it is considered that any demand is likely to be similar to the trips generated to and from the Railway Station, giving an additional connection usage of 55-110 daily trips. This would account for both trips to CBD points of interest as well as school trips.
- Future Catchment Impacts:
  - **Multi-storey development along waterfront "The Promenade" is planned as part of Hutt City's Making Places strategy. The Promenade would include restaurants, cafes and medium density apartments, all of which would be located within 5-10 minutes' walk of both the Margaret St Bridge, the relocated Melling Station and the Hutt CBD.**
  - Hutt City Council estimates an additional 2,600<sup>8</sup> new residents based on a medium growth scenario over the next 20 years as a result of the Promenade development.
  - As a result, all options considered will significantly increase the population within walking distance of the new station. The additional connections outlined in Options 2 and 3 in particular would also **allow for easier access to the Promenade's highly desirable amenities** for Western Hills residents.

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<sup>7</sup> Forecasted trips have been estimated based on; converting total population catchment estimates from GIS analysis to employed population based on Normandale census data (60%) and then adjusting for census journey to work by train mode share for Normandale (10% - existing/low) with the upper end based on Waterloo (20% by train). A further scaling factor of 3 was applied to factor up peak hour to daily trips to rail (i.e. AM, PM with some IP shopping/study usage) and account for some school age rail trips. The estimates are therefore daily overbridge trips and not rail patronage.

<sup>8</sup> The Riverside Promenade – Building the Future Business Case, Hutt City Council, 2017

### 2.1.1.2 Option Feasibility

LIDAR (Light Detection and Ranging) information was used to determine the long-section gradients for each Option alignment. As shown in Figure 2-1, sections were measured within Option 2 (Harbour View connection) and Option 3/3A. Analysis of LIDAR information showed that the average gradient for the Harbour View Connection, Option 2, was over 10%. The average gradient for Option 3/3A, which includes the City View Grove Connection, was found to be significantly higher at over 20%. Given the average gradient of the options is higher than 8%, sections of stairs will be required according to the Pedestrian Planning Guide<sup>9</sup>, refer Table 2-2 below for further information.



Figure 2-1: Sections for gradient analysis

<sup>9</sup> NZTA, Pedestrian and Planning Guide (PPG), Chapter 14

Table 2-2: Option Gradient<sup>10</sup>

Option	Length (m)	Average Gradient (%)	Stairs Required (PPG)
<b>Option 1:</b> Queen's Drive overbridge and Margaret Street connection.	-	-	-
<b>Option 2:</b> Queen's Drive overbridge, Margaret Street and single Harbour View connection (Red, Points 2 to 3).	165m	14%	Yes
<b>Option 3:</b> Queen's Drive overbridge, Margaret Street, Harbour View Connections and City View Grove extension (Yellow, Red, Points 0 to 3).	237m	23%	Yes
<b>Option 3A:</b> Queen's Drive overbridge, Margaret Street, Harbour View Connections and City View Grove extension (Orange)	253m	24% <sup>11</sup>	Yes

2.1.1.3 Indicative Costs

Property Costs

All options would traverse HCC land including Jubilee Park (identified as a General Recreation area in the HCC District Plan) and therefore are likely to require additional authorisations or approvals; however, there is unlikely to be any direct property acquisition costs for this segment, as this facility would ultimately be owned by HCC.

Option 3 (and 3A) will have property acquisition costs based on the proposed alignments, presented in Figure 2-2 below and Appendix F. High level estimation of property acquisition costs were based on the assumption that properties affected would range from partial (10%) to full acquisition. While Option 3A would connect directly to City View Grove, Option 3 connects to a shared private access and may incur additional property costs not directly considered. The total property cost for each option is presented in the Table 2-3 below.

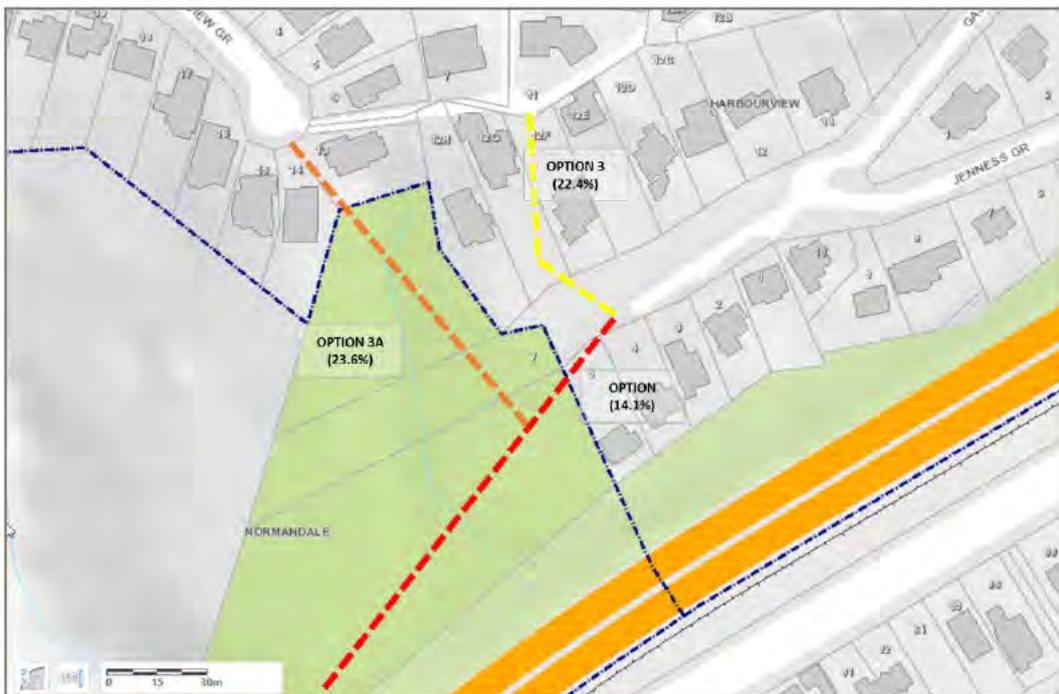


Figure 2-2: Option Property Impacts

<sup>10</sup> Refer to Appendix E for more details.

<sup>11</sup> Google Earth data

### Overall Costs

Rough order cost estimates were developed, based on a rate of \$2,500/m<sup>2</sup> for a simple footbridge, covering the entire structure length, including approach ramps and stairs. For the purposes of this assessment, the footbridge width has been assumed as 4m with a 3m width adopted for the ramps and stair components<sup>12</sup>.

It is noted that as part of the wider Melling Interchange improvements, a new gantry would be required across SH2 in order to provide necessary interchange signage. This presents an opportunity to reduce costs on providing a new pedestrian connection over SH2, as the incremental costs of providing a new pedestrian overbridge (with associated highway signage) compared to a new gantry system is considered to be relatively low.

Table 2-3 below outlines the rough order costs for all options, which range from \$2.1M for Option 2 to a maximum of \$4.2M for Option 3, assuming full property acquisition costs. If opportunities around the gantry are realised, this could reduce the total cost by up to \$0.6M (noting that the actual savings would depend on the incremental upgrade cost of installing a pedestrian overbridge rather than a gantry structure).

**Table 2-3: Pedestrian Connection and Costs**

Option	Combined Length (m)	Rough Order Costs			
		Property Costs (\$M)	Construction Cost (\$M)	Total Rough Order Costs (\$M)	Total Rough Order Costs (\$M) – excluding the 60m overbridge
<b>Option 1:</b> Queen's Drive overbridge and Margaret Street connection.	-	-	-	-	-
<b>Option 2:</b> Queen's Drive overbridge, Margaret Street and single Harbour View connection.	260m	-	\$2.1M	\$2.1M	\$1.5M
<b>Option 3:</b> Queen's Drive overbridge, Margaret Street, Harbour View Connections and City View Grove extension.	355m	\$140K - \$1.4M <sup>13</sup>	\$2.8M	\$2.9M - 4.2M	\$2.3M - 3.6M
<b>Option 3A:</b> Queen's Drive overbridge, Margaret Street, Harbour View Connections and City View Grove extension.	377m	\$70K - \$700K <sup>14</sup>	\$3.0M	\$3.1M - 3.7M	\$2.5M - 3.1M

<sup>12</sup> A structural or geotechnical feasibility assessment of providing the overbridge and associated connections has not been carried out. However, it is considered that due to the steepness of the grades, stairs will be required. Therefore, the accessible route will be along Harbour View Road and the new Interchange.

<sup>13</sup> Estimated property value was based on data from homes.co.nz

<sup>14</sup> Estimated property value was based on data from homes.co.nz

### 3 Summary

As part of RiverLink, the NZ Transport Agency is investigating improvements to the Melling intersection. However, all short-listed Melling interchange options would require the station to be moved to enable the interchange to operate safely and efficiently. As part of the station re-location, the impacts of providing additional pedestrian connections from the station across SH2 to Harbour View Road have been investigated.

- Three future network options have been analysed alongside the existing network:
  - Option 1: The first network includes the station relocation, interchange development and the additional Margaret St footbridge. This option has no additional connections over SH2 for the Western Hills suburbs.
  - Option 2: The second network includes all the improvements of the first option with an additional pedestrian connection over SH2 to Harbour View Road. This additional connection provides a much quicker route to the station, and Hutt CBD, for residents of Harbour View.
  - Option 3 and 3A: The third network includes all improvements of the second option with an additional connection to City View Grove. Whilst this does not impact the walking distances or times shown in Table 2-1, the population increase within walking catchment of the new station does increase.
- The additional pedestrian connections from the station to Harbour View were found to have the following impacts:
  - Harbour View impact:

The additional distance for Harbour View residents is largely offset by reduced waiting times to cross SH2 with the Melling interchange in place.

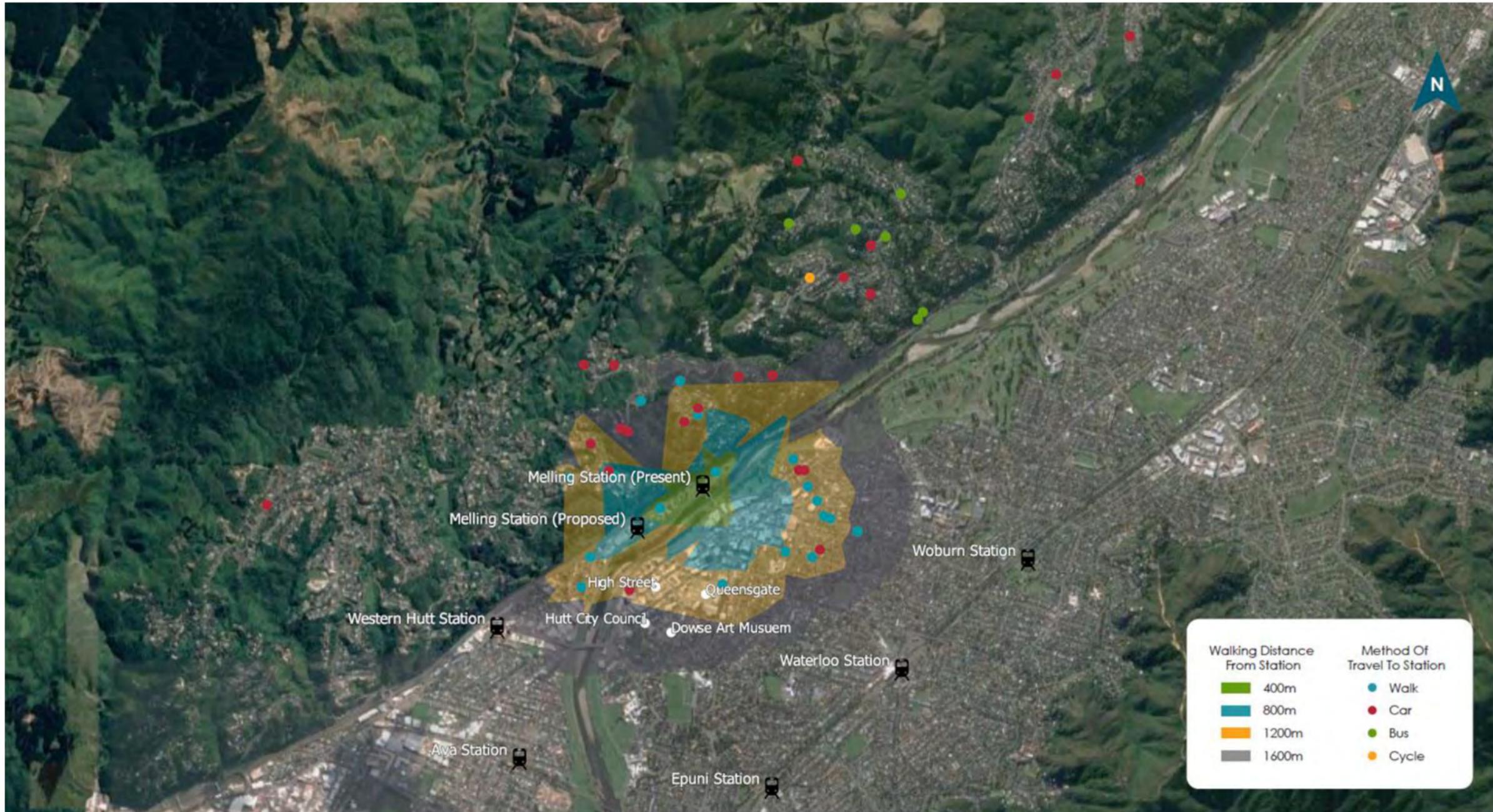
    - Option 1: This option does not include any additional connections to the Harbour View. Whilst the proposed Melling Interchange is closer to the Harbour View than the current crossing, there is an increase of approximately 4 minutes by foot due to the relocated station. Option 1 reduces the total population in Harbour View within walking distance by approximately 470 people.
    - Option 2: The proposed Harbour View connection results in a large reduction in walking time and distance compared to Option 1 whilst also more than offsetting the reduction in the walking catchment resulting from the station relocation. Compared to the existing situation, Option 2 shows only a small increase in walking distance (64m), but critically, no increase in walking time when the reduced waiting times to cross SH2 with the Melling Interchange in place are taken into account.
    - Option 3 and 3A: Walking times and distances are the same as Option 2, but the population within walking catchment increases.
    - Based on the journey to work data, connection usage is likely to be in the range of 55-110 daily trips to and from the railway station.
  - Increased access to the Lower Hutt CBD and Bus Services
    - Points of interest within the CBD which would become walkable with an SH2 overbridge from Harbour View include; Hutt City Council, Dowse Art Museum and High Street.
    - With Riverlink, the additional connections outlined in Options 2 and 3 in particular would also allow for easier access to the proposed Promenade.
    - A further 55-110 daily trips could be expected based on increased connectivity between Harbour View to the CBD, due to increased walking trips to both school and CBD points of interest.
- Based on the Pedestrian and Planning Guidelines, stairs will be required for Option 2 and Option 3/3A as the average gradients for the alignments are higher than 8%.
- All options would traverse HCC land including Jubilee Park (identified as a General Recreation area in the HCC District Plan) and therefore are likely to require additional authorisations or approvals; however, there is unlikely to be any property acquisition costs. Option 3 (and 3A) will have property acquisition costs based on the proposed alignments to connect to City View Grove, ranging from \$70,000 to \$1.4M, depending on the extent of acquisition required.

- Rough order cost estimates for providing the additional pedestrian connections into Harbour View range from \$2.1M for Option 2 to maximum of \$4.2M for Option 3, including property purchase.
- If opportunities around the gantry are realised, this could reduce the total cost by up to \$0.6M (noting that the actual savings would depend on the incremental upgrade cost of turning a gantry structure into a pedestrian overbridge).
- One of the investment objectives of the Melling intersection improvements is "*The quality of infrastructure constrains access to alternative modes and leads to unnecessary car travel between SH2 and Lower Hutt at Melling*". Provision of an additional pedestrian crossing over SH2 would strongly align with this objective.

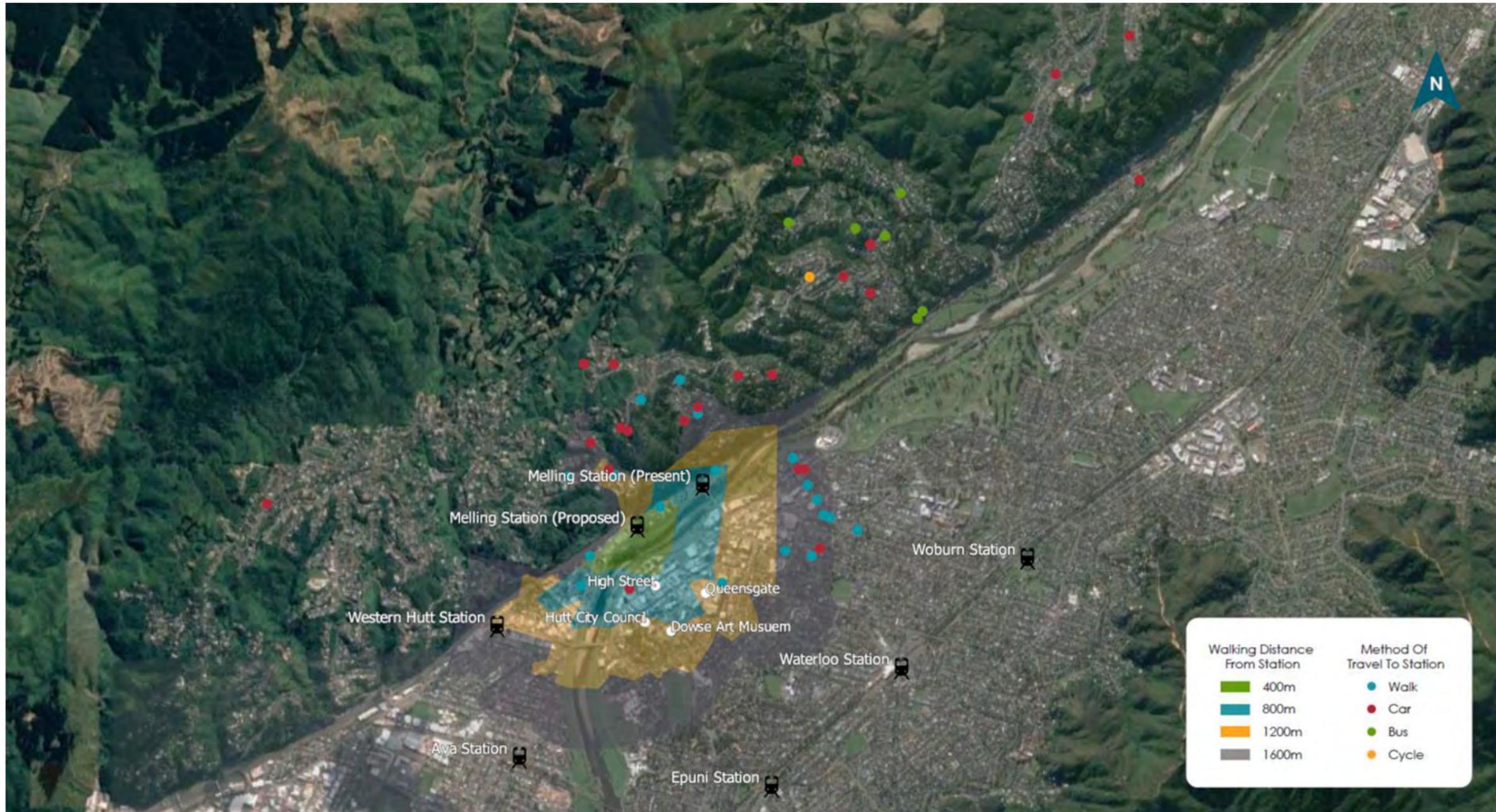
Based on the increased catchment, potential to attract over 200 daily trips, the ability to share costs with the gantry, the ability to reduce the walking time impacts of moving the Railway Station and the alignment with the Melling investment objectives.

It is recommended that further detailed investigation into the feasibility of providing improved pedestrian connections into Harbour View is undertaken – including costs, property acquisition, connection details (feasibility of stairs) and consenting requirements.

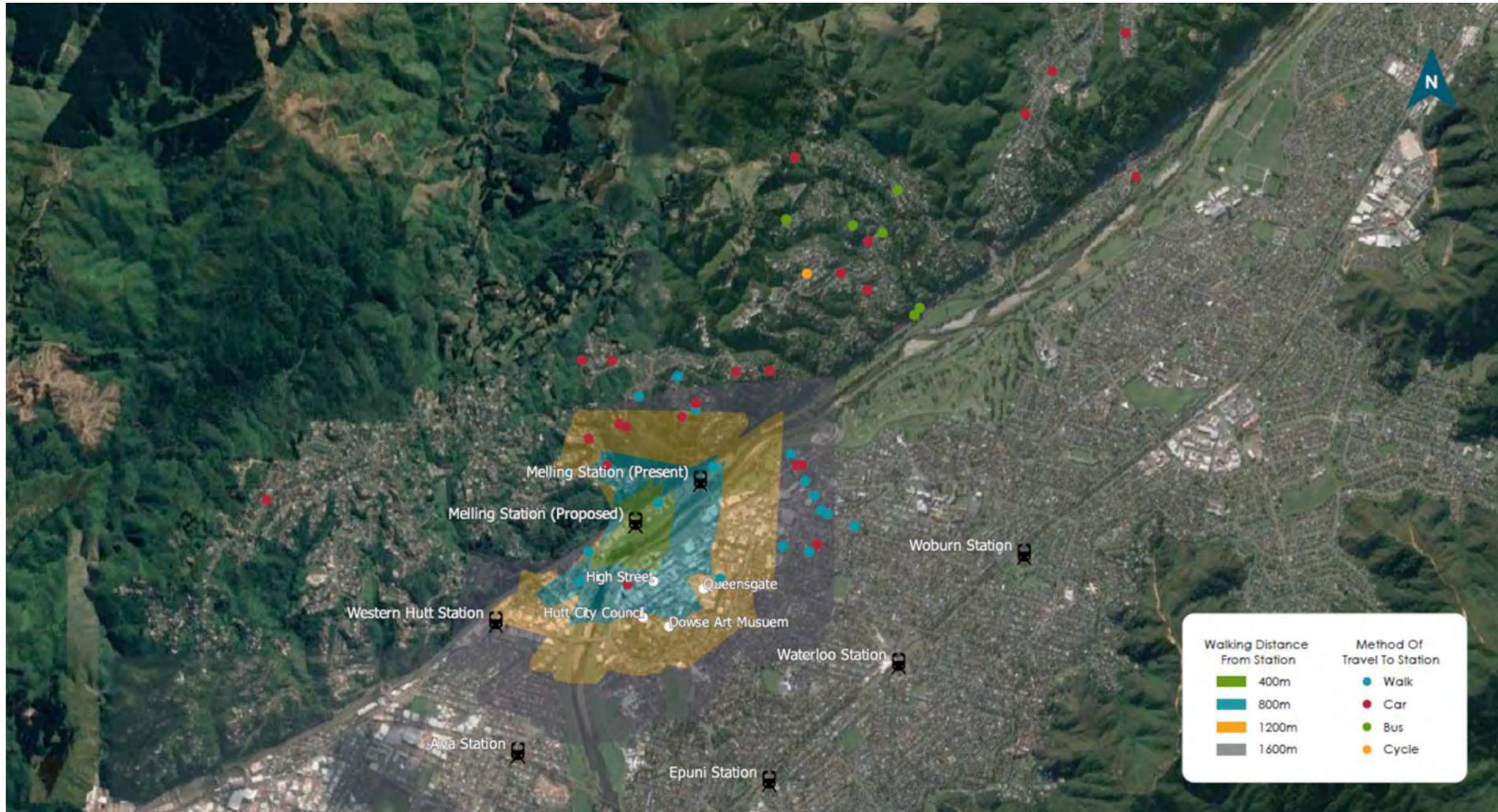
### Appendix A: Walking catchment for existing Melling network



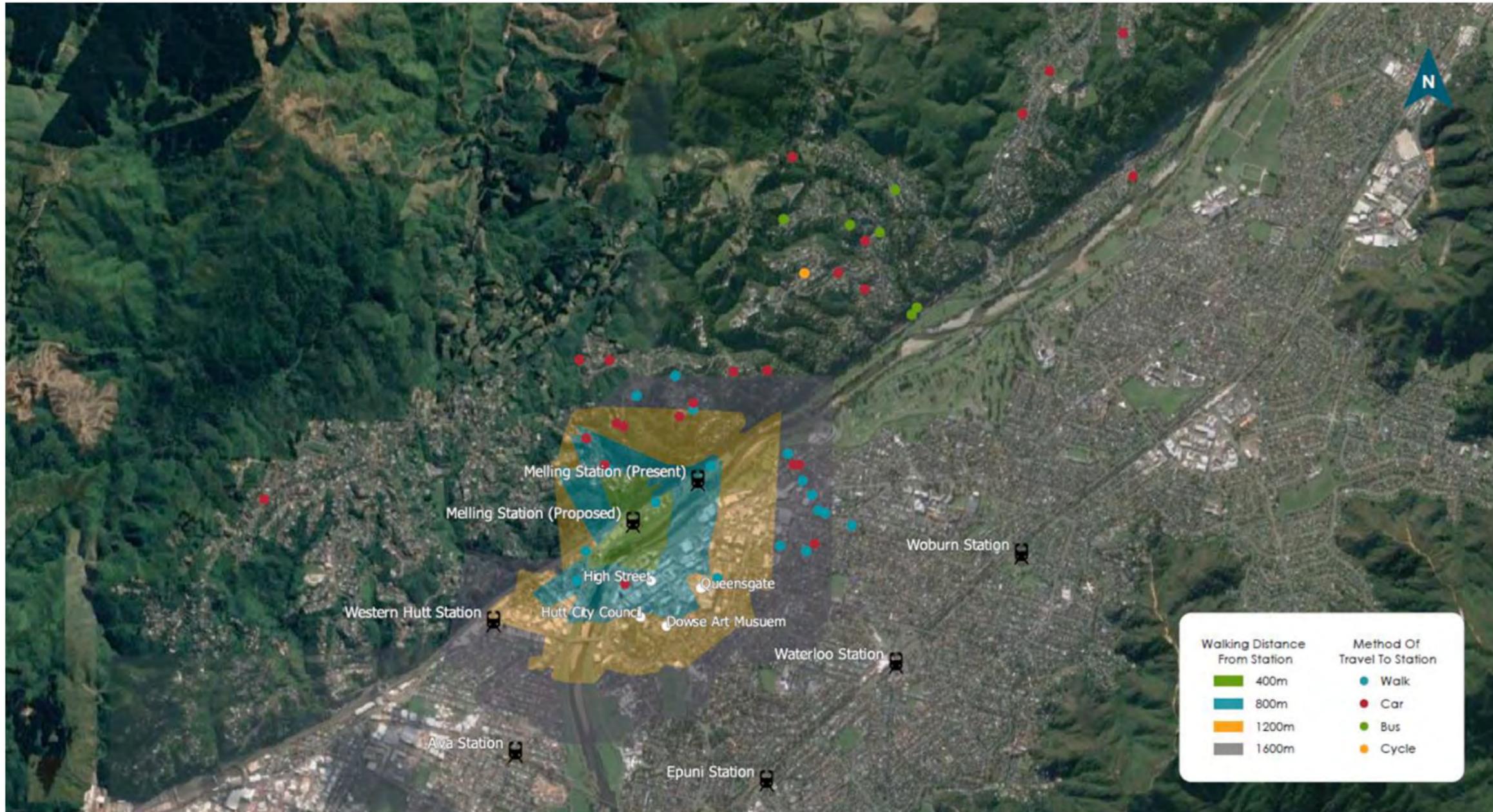
Appendix B: Walking catchment for future Melling network (Option 1)



Appendix C: Walking catchment for future Melling network (Option 2)

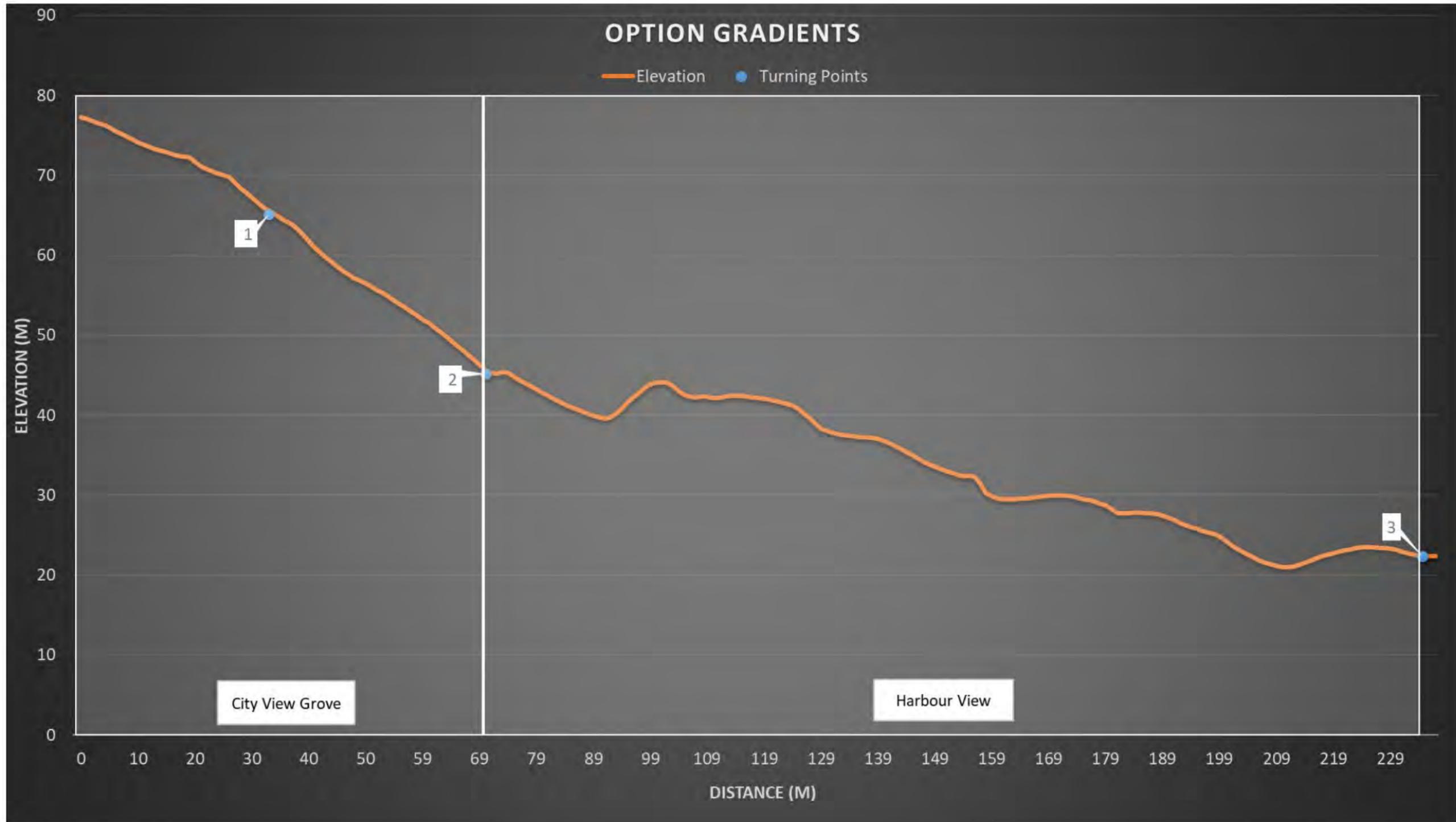


Appendix D: Walking catchment for future Melling network (Option 3)



### Appendix E: Gradient Profiles in LIDAR and Google Earth

Option	Section	Length (m)	Gradient		
			LIDAR	Google Earth	Section
Option 2	Harbour View	165	13.8%	14.1%	2-3
Option 3	City View Grove & Harbour View	237	23.2%	22.4%	0-3



Appendix F: Option Property Impacts

