Rail Survey 2017 Park & Ride Data Note

Contents

1. Introduction

In order to support the development of the Park & Ride Strategy, a specific analysis of the 2017 Rail Survey data has been undertaken.

The analysis can broadly be categorised into:

- Time series analysis to compare the 2011 Rail Survey data and earlier surveys with the 2017 survey;
- Additional analysis of the 2017 Rail Survey data;
- and geospatial analysis of the 2017 Rail Survey data.

All analysis refers to survey responses from the weekday morning peak, unless explicitly stated otherwise.

2. Access Mode Time Series

This section gives a high level overview over how people get to the stations and compares data from four different years:

- 1996 Census Day count by the council [1]
- 2007 GWRC parking occupancy survey [1]
- 2011 Rail Survey [2]
- 2017 Rail Survey [3]

The methodology of these surveys differs considerably and caution should be taken when comparing the data.

Limitations include:

- The 1996 data is raw (unexpanded) data whilst 2007 – 2017 data was factored to match average peak-hour counts.
- The 2007 survey was a count of cars in carparks; an average vehicle occupancy of 1.35 assumed for the purpose of this note to estimate rail user numbers.
- The Johnsonville line shows some inconsistencies: the high car share in 2011 seems questionable, while the 2017 car share seems rather low. This may be partially explained by the fact that the Johnsonville line results are based on relatively small numbers. For example only 5 people in the 2017 survey were passengers in cars. Furthermore, analysis of the Johnsonville Line may be less critical for the development of the P&R Strategy so that the main focus of this note will be on Hutt Valley and Kapiti Lines.
- The timing of the surveys was irregular; an eleven year gap between 1996 and 2007 in comparison with a four year gap between 2007 and 2011; some surveys were undertaken during winter, others during the summer period.

- Because of the limitations of the Johnsonville Line data, the analysis presented in this note mainly covers the Hutt Valley Lines and Kapiti Line data.

Table 1 and Figure 1 below show the change in access mode share by line and time period between 1996 and 2017, in both absolute and percentage terms. For brevity the access mode is categorised as 'car' or 'other'.

Table 1: Mode used to access rail stations, AM peak, 1996 to 2017

	Kapiti & Hutt Valley Lines Combined			
Year	1996	2007	2011	2017
By Car	2050	4800	6450	7150
Walk, bus & other	8450	7700	5950	6250
Total	10500	12500	12400	13400

	Kapiti & Hutt Valley Lines Combined			
Year	1996	2007	2011	2017
By Car	19%	38%	52%	53%
Walk, bus & other	81%	62%	48%	47%
Total	100%	100%	100%	100%

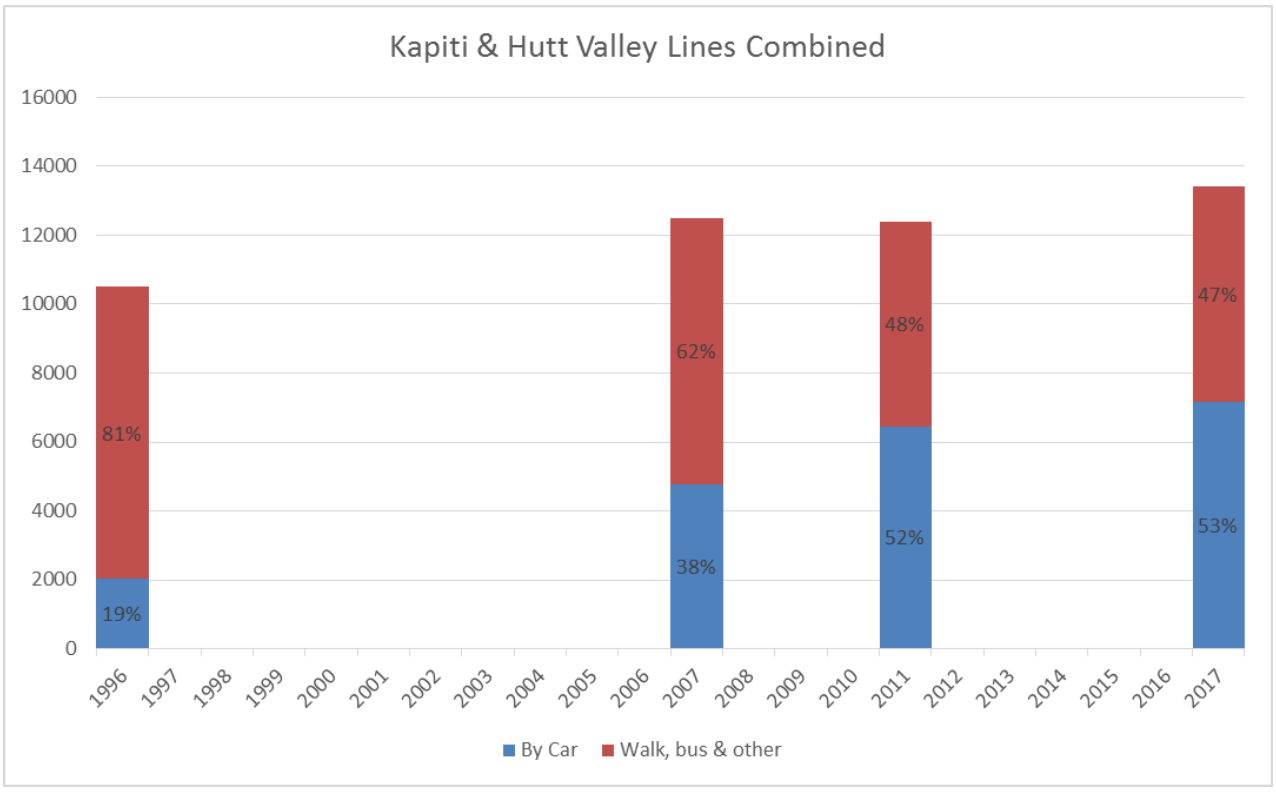


Figure 1: Mode used to access rail stations, AM peak, 1996 to 2017

For quick reference, Figure 2 shows the components of the broad categories of "cars" and "others" of the 2017 data in more detail.

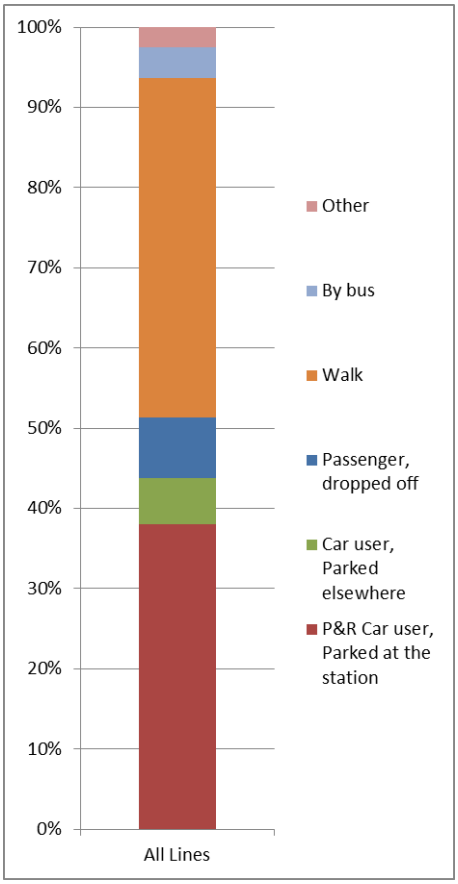


Figure 2: 2017 Mode used to access rail network

Table 2 and Table 3 and Figure 3 to Figure 5 provide more detail regarding changes in observed access mode share through time (noting the limitations with Johnsonville line data highlighted above).

Given the differences in sample rates and slight differences in survey methodology, it is suggested that this information be used to understand broad trends / patterns as opposed to providing specific figures.

Table 2: Access mode to rail network, by mode and line, AM Peak, 1996 to 2017 (absolute figures)

	Hutt Valley Line				Johnsonville Line				Kapiti Line			
Year	1996	2007	2011	2017	1996	2007	2011	2017	1996	2007	2011	2017
By Car	1150	2500	3300	3300	150	300	600	250	850	2300	3150	3850
Walk, bus & other	4750	4350	3350	3650	950	1200	750	1350	3750	3400	2550	2650
Total	5900	6850	6700	6950	1100	1500	1350	1600	4600	5700	5700	6450

Table 3: Access mode to rail network, by mode and line, AM Peak, 1996 to 2017 (percentage figures)

	Hutt Valley Line				Johnsonville Line				Kapiti Line			
Year	1996	2007	2011	2017	1996	2007	2011	2017	1996	2007	2011	2017
By Car	20%	37%	50%	48%	12%	19%	46%	15%	19%	40%	55%	59%
Walk, bus & other	80%	63%	50%	52%	88%	81%	54%	85%	81%	60%	45%	41%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

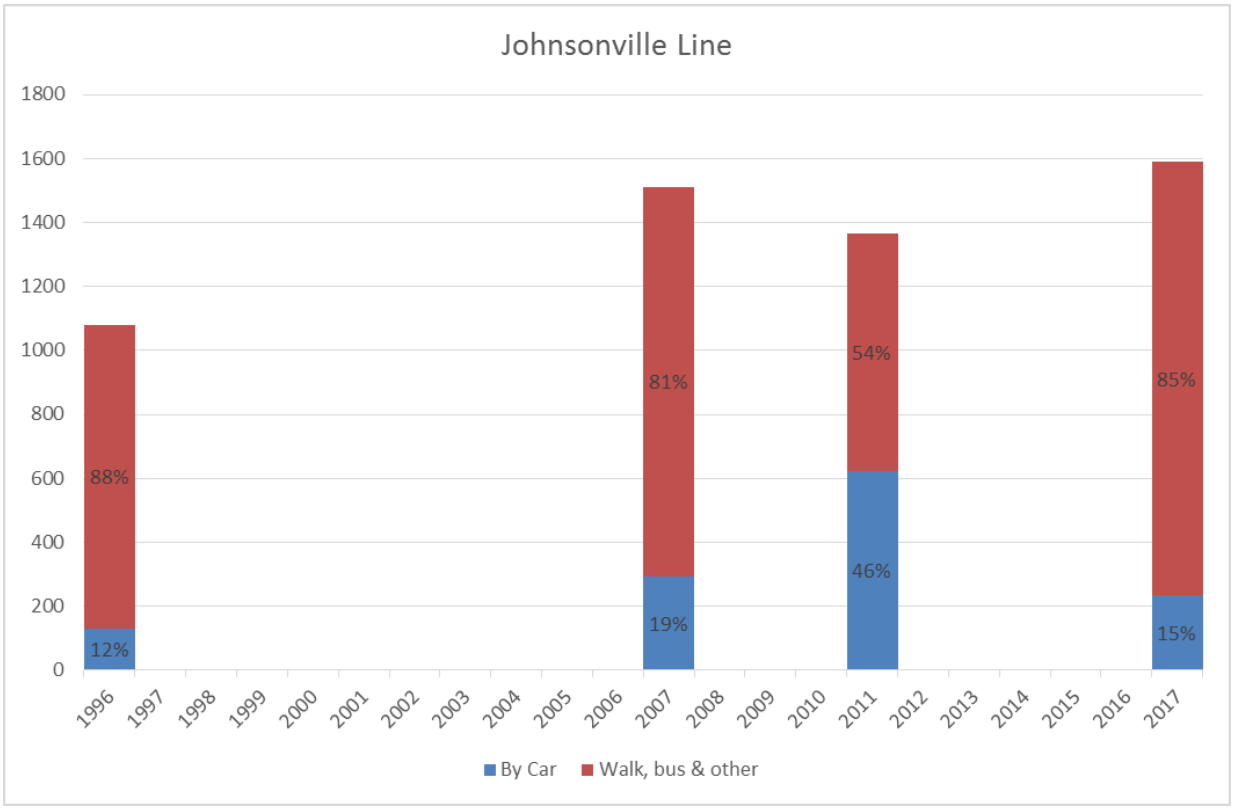


Figure 3: Johnsonville line - access mode to rail stations (percentage)

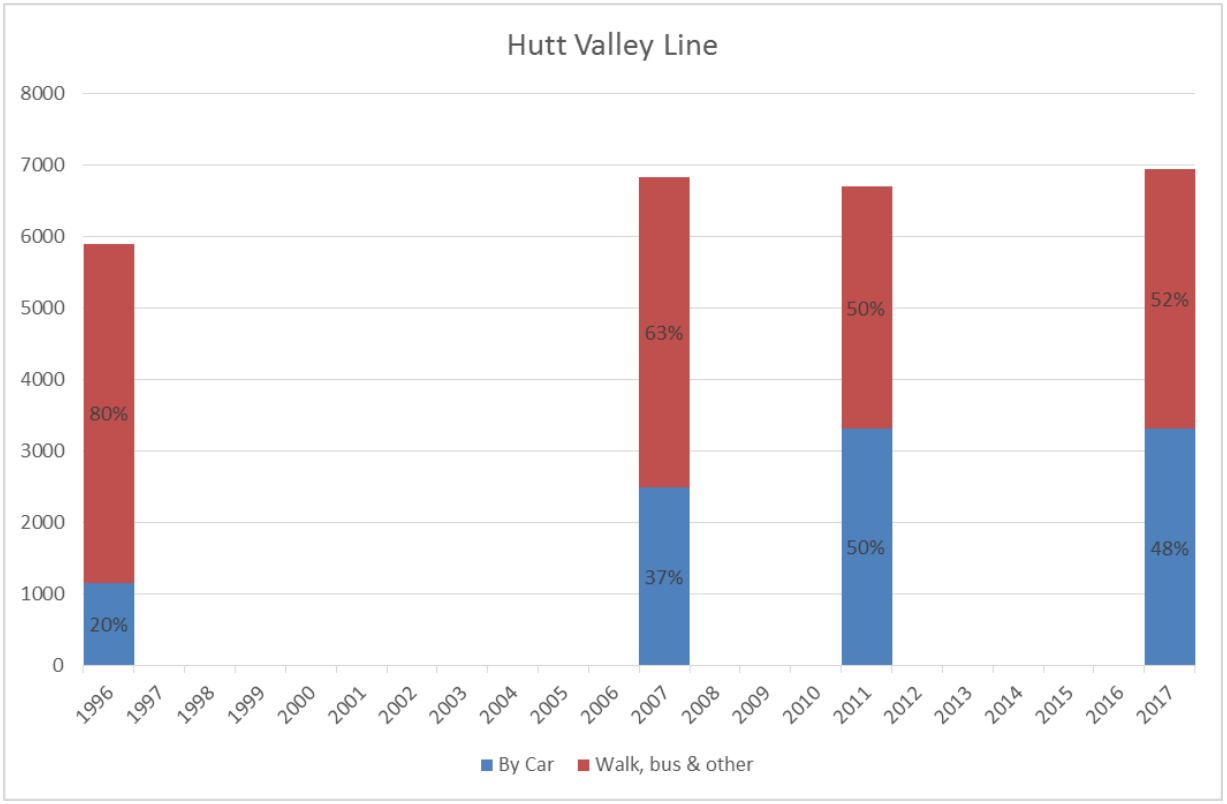


Figure 4: Hutt Valley line - access mode to rail stations (percentage)

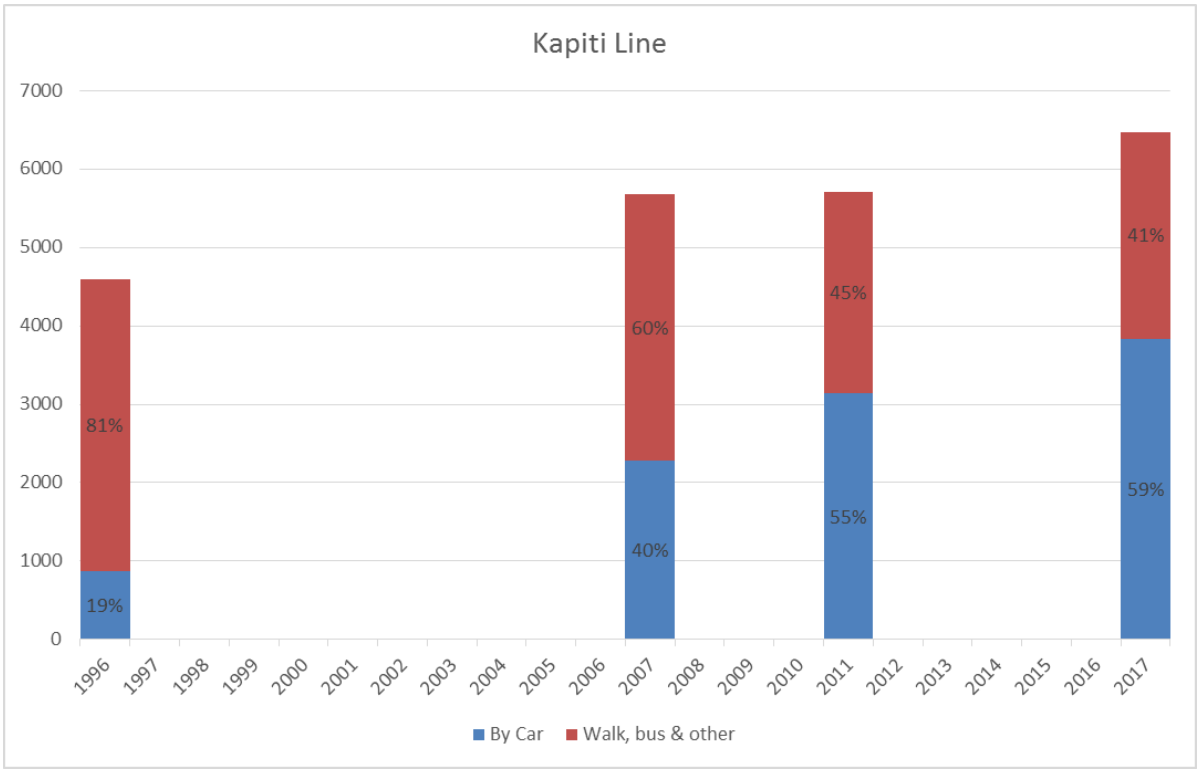


Figure 5: Kapiti line - access mode to rail stations (percentage)

Focusing on the Kapiti and Hutt Valley lines, we observe the following trends:

- Kapiti Line and Hutt Line show an increase in overall passenger numbers between 1996 and 2007. There is little change between 2007 and 2011 and increase again between 2011 and 2017.
- The increase of overall passenger numbers is greater on the Kapiti Line than on the Hutt Line, likely caused by a higher population growth rate at the Kapiti Coast.
- The share of people getting to the station in cars increased steadily from ~20% in 1996 to around 50% (Hutt Line) and 55% (Kapiti Line) in 2011. The 2017 data shows a further increase to ~60% on the Kapiti Line while there is no further increase on the Hutt Line.
- On both lines, the car mode share increased faster than the overall passenger numbers – i.e. not only the percentage, but also the number of passengers using other modes decreased.
- The number of people walking or taking the bus to access the rail network on both the Kapiti and Hutt Valley line has declined between 1996 and 2017, despite overall patronage growing by 15% (Hutt Valley) and 40% (Kapiti line) during the same period

The majority of population growth up the western corridor (Kapiti, Porirua) over the past 20 years has been due to greenfield development, with most development sites located outside of walk-up catchment areas for the rail stations, requiring people to drive to the station.

Aside from the observation above, the data shows that a proportion of people who might have walked or taken the bus to access the rail network in 1996/2001, now drive to the station.

3. 2017 Rail Survey Detailed Analysis of Access Mode

In the 2017 Rail Survey, one question asked whether people using a car to access the rail network, drove alone or with passengers and about the location of the car (parked at the station or nearby).

This data can be used for a more detailed analysis of current rail user behaviour, with the number P&R car parks and number of peak hour services added for reference.

One limitation with this analysis relates to the car driver / car passenger split.

When we compare the number of people who drove a car (parked at the station or nearby) to the number of people who were passengers in a car (parked at the station or nearby, **not** dropped off) we get a occupancy of just ~1.1.

This appears low compared with previous surveys. In the 2011 survey the implied occupancy rate was 1.4 and car occupancy observed from annual surveys on the highway network around 1.35.

A possible explanation could be that if a couple (driver & passenger) were both handed survey forms, only one respondent might reply (i.e. the driver) or both might reply but from the driver's perspective.

For the purpose of this analysis we have therefore grouped the drivers and passengers into "car users".

It has to be kept in mind that this analysis –especially for the minor modes and the smaller stations, is based on a small sample size and should be taken as indicative rather than as precise values.

Please also notice that this data includes the pre-peak from 6-7am, but is limited to IB passengers only, as OB passenger data could distort the results at this level of detail because of high expansion factors associated with that data.

Table 4: Hutt Valley Lines, AM peak Access mode share (percentage)

	Passenger, dropped off	P&R Car user, Parked at the station	Car user, Parked elsewhere	P&R car parks	Number of Peak hour Services	Walk	By bus	Other	Grand Total
Western Hutt	6%	16%	25%	0	3	47%	3%	3%	100%
Melling	6%	55%	11%	200	3	23%	0%	6%	100%
Petone	9%	60%	6%	487	6	17%	7%	2%	100%
Ava	2%	16%	0%	0	3	80%	0%	2%	100%
Woburn	2%	36%	4%	160	3	54%	2%	1%	100%
Waterloo	7%	34%	6%	601	5	41%	7%	5%	100%
Epuni	4%	17%	8%	0	3	71%	0%	0%	100%
Naenae	10%	15%	3%	0	3	73%	0%	0%	100%
Wingate	0%	8%	0%	0	3	92%	0%	0%	100%
Taita	10%	49%	4%	61	5	20%	14%	2%	100%
Pomare	10%	65%	0%	39	3	25%	0%	0%	100%
Manor Park	0%	0%	13%	42	3	88%	0%	0%	100%
Silverstream	5%	46%	14%	59	3	32%	0%	3%	100%
Heretaunga	0%	22%	0%	0	3	78%	0%	0%	100%
Trentham	4%	30%	2%	134	3	62%	2%	0%	100%
Wallaceville	8%	33%	3%	126	3	56%	0%	0%	100%
Upper Hutt	18%	48%	2%	352	3	27%	0%	5%	100%
Grand Total	7%	38%	5%	2261	3	43%	4%	3%	100%

Table 5: Hutt Valley Lines, AM peak Access mode (absolute)

	Passenger, dropped off	P&R Car user, Parked at the station	Car user, Parked elsewhere	P&R car parks	Number of Peak hour Services	Walk	By bus	Other	Grand Total
Western Hutt	7	18	29	0	3	55	4	4	117
Melling	24	214	42	200	3	89	0	24	392
Petone	74	502	52	487	6	140	59	15	842
Ava	8	62	0	0	3	302	0	8	380
Woburn	13	214	27	160	3	328	13	7	603
Waterloo	133	667	109	601	5	800	133	97	1939
Epuni	5	22	11	0	3	92	0	0	130
Naenae	25	38	6	0	3	183	0	0	253
Wingate	0	9	0	0	3	98	0	0	107
Taita	37	179	15	61	5	74	52	7	365
Pomare	16	105	0	39	3	41	0	0	162
Manor Park	0	0	6	42	3	39	0	0	45
Silverstream	25	221	65	59	3	156	0	16	483
Heretaunga	0	43	0	0	3	149	0	0	192
Trentham	13	104	6	134	3	214	6	0	344
Wallaceville	24	105	8	126	3	177	0	0	314
Upper Hutt	104	274	9	352	3	151	0	28	567
Grand Total	509	2776	386	2261	3	3090	268	206	7235

Table 5 and Table 4 present the data for the Hutt Valley Lines and Figure 6 gives a visual overview.

The data shows a lot of variation between the stations. The largest station, Waterloo, is visited by almost two thousand passengers during the morning peak whereas the smallest stations, like Western Hutt, Epuni, Wingate and Manor Park are used by less than 150 passengers each.

Access mode share varies widely from station to station and the car access mode share ranges from less than 20% to more than 50%.

Stations with higher car access mode share, such as Waterloo, Petone, Taita, are generally stations with either larger parking facilities or higher service frequencies. In some cases such as Melling, this is a strategic location and has a relatively small walk-up catchment.

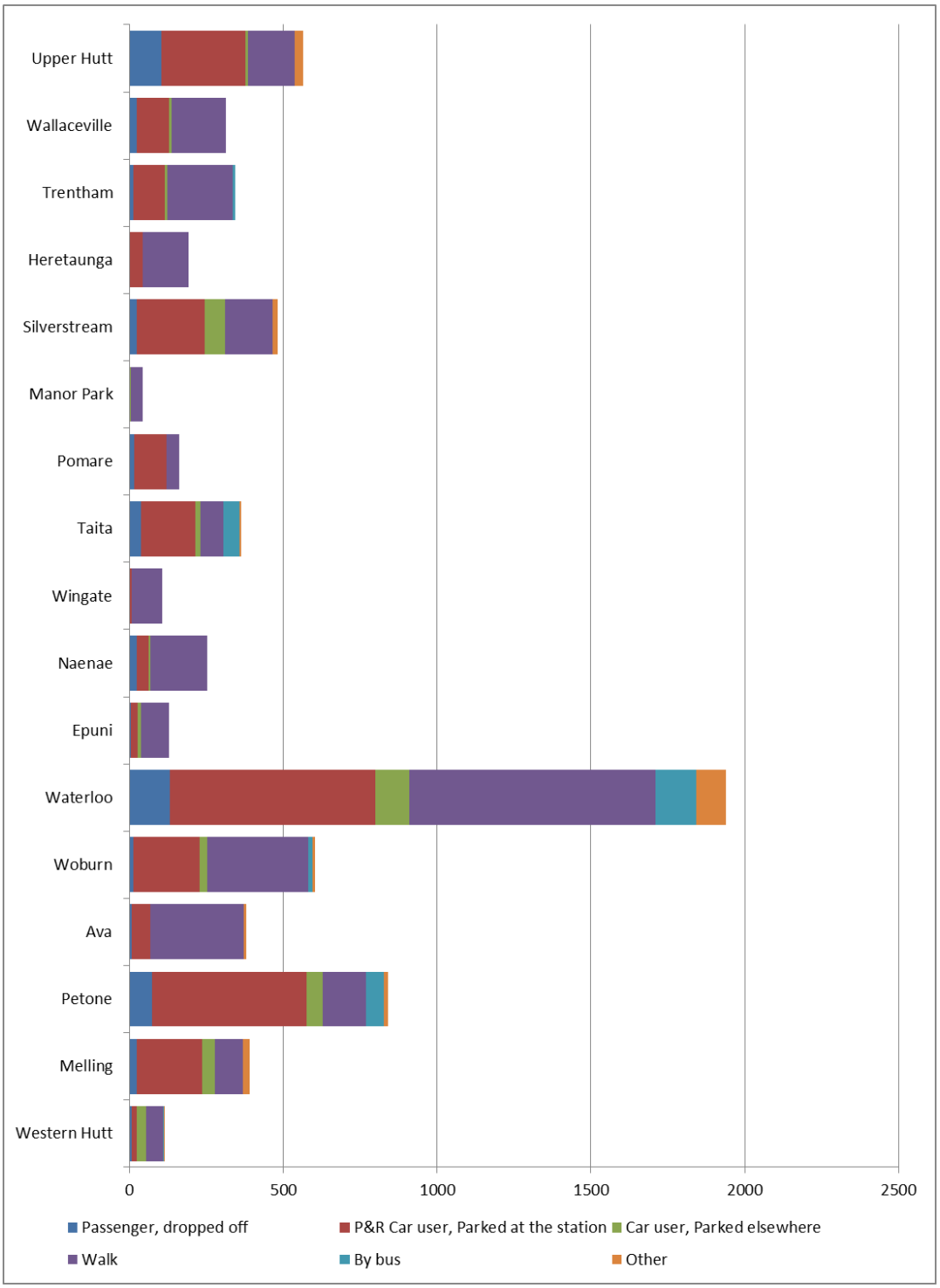


Figure 6: Hutt Valley Lines, AM peak Access mode number of passengers

Table 6, Table 7 and Figure 7 present an analysis for the Kapiti line.

Stations between Wellington and Porirua tend to have a higher walking mode share as compared to the stations from Porirua out to Waikanae. This is largely due to the walk-up catchment areas associated with stations in the Tawa basin; low P&R provision and no significant greenfield development areas that might feed these stations.

The exception here is Pukerua Bay with more than 80% of rail users walking to the station.

On the Kapiti Coast, both Paraparaumu and Waikanae stations have relatively low walk access mode share (and high car access mode share). This is linked to the relatively small walk-up catchment areas (particularly Paraparaumu) and greenfield developments / feeder areas such as Paraparaumu / Waikanae beaches that lend themselves to P&R.

In Paraparaumu, however, around 25% of rail passengers access the rail station using the bus feeder network (bus services are free for those holding rail monthly pass tickets).

Table 6: Kapiti Line, AM peak Access mode share (percentage)

	Passenger, dropped off	P&R Car user, Parked at the station	Car user, Parked elsewhere	P&R car parks	Number of Peak hour Services	Walk	By bus	Other	Grand Total
Takapu Road	0%	38%	10%	134	4	49%	0%	3%	100%
Redwood	5%	28%	6%	135	4	60%	0%	2%	100%
Tawa	7%	44%	2%	188	4	47%	0%	0%	100%
Linden	4%	10%	6%	0	4	80%	0%	0%	100%
Kenepuru	0%	0%	20%	0	4	60%	0%	20%	100%
Porirua	16%	72%	1%	814	6	5%	6%	0%	100%
Paremata	6%	55%	6%	219	5	17%	13%	3%	100%
Mana	6%	49%	0%	40	5	46%	0%	0%	100%
Plimmerton	10%	38%	0%	108	5	45%	0%	7%	100%
Pukerua Bay	4%	11%	0%	31	3	85%	0%	0%	100%
Paekakariki	3%	36%	3%	79	3	44%	0%	14%	100%
Paraparaumu	11%	46%	4%	581	3	9%	25%	5%	100%
Waikanae	4%	54%	20%	407	3	13%	6%	3%	100%
Grand Total	9%	47%	5%	2797	3	29%	7%	3%	100%

Table 7: Kapiti Line, AM peak Access mode share (absolute)

	Passenger, dropped off	P&R Car user, Parked at the station	Car user, Parked elsewhere	P&R car parks	Number of Peak hour Services	Walk	By bus	Other	Grand Total
Takapu Road	0	113	30	134	4	144	0	8	295
Redwood	18	110	24	135	4	238	0	6	396
Tawa	29	174	7	188	4	188	0	0	398
Linden	15	37	22	0	4	292	0	0	367
Kenepuru	0	0	10	0	4	31	0	10	51
Porirua	198	882	8	814	6	58	74	0	1220
Paremata	28	242	28	219	5	76	55	14	443
Mana	13	109	0	40	5	103	0	0	225
Plimmerton	27	102	0	108	5	122	0	20	271
Pukerua Bay	6	18	0	31	3	135	0	0	159
Paekakariki	4	55	4	79	3	68	0	21	153
Paraparaumu	103	422	34	581	3	86	224	43	913
Waikanae	26	322	122	407	3	78	35	17	600
Grand Total	467	2586	291	2736		1619	388	140	5491

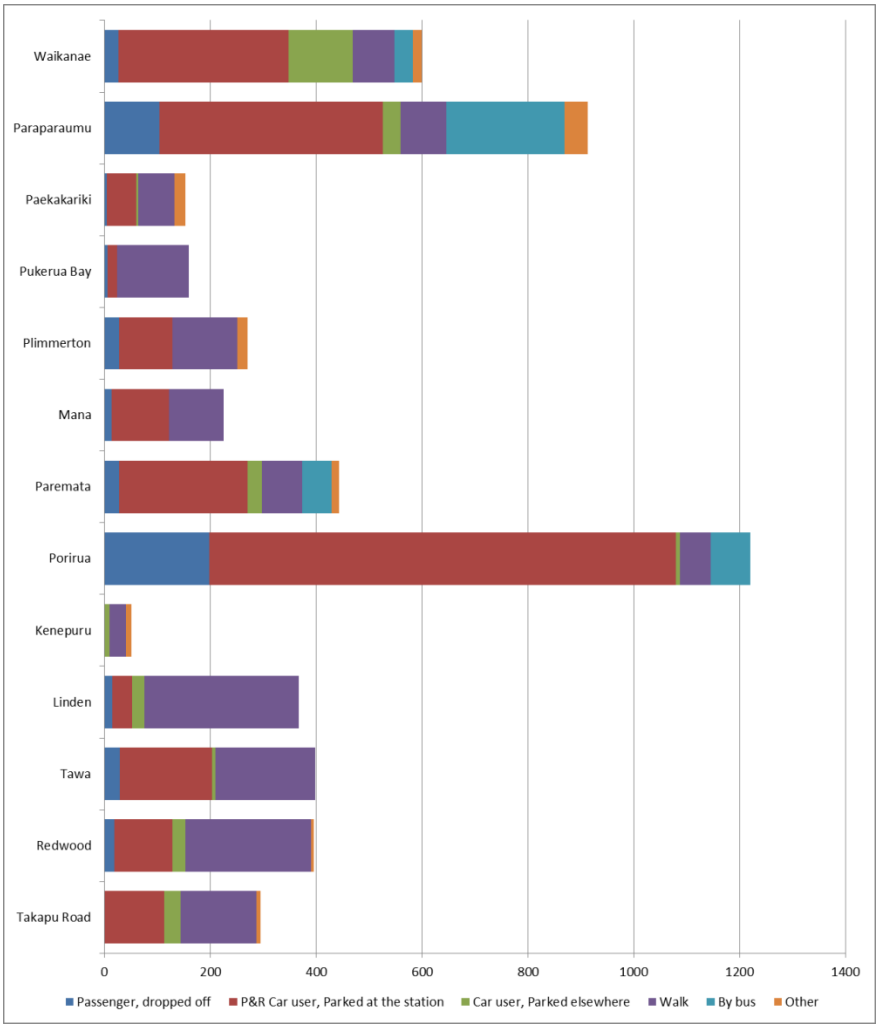


Figure 7: Kapiti Line, AM peak Access mode share (absolute)

Table 8 and 9, together with Figure 8, show access mode to rail stations for the Johnsonville line.

Table 8: Johnsonville Line, AM peak Access mode share percentages

	Passenger, dropped off	P&R Car user, Parked at the station	Car user, Parked elsewhere	P&R car parks	Number of Peak hour Services	Walk	Other	Grand Total
Crofton Downs	0%	33%	0%	54	4	63%	4%	100%
Ngaio	0%	32%	0%	48	4	68%	0%	100%
Awarua Street	0%	0%	4%	0	4	96%	0%	100%
Simla Crescent	3%	21%	0%	9	4	76%	0%	100%
Box Hill	0%	0%	22%	0	4	78%	0%	100%
Khandallah	0%	12%	0%	14	4	88%	0%	100%
Raroa	0%	30%	0%	45	4	70%	0%	100%
Johnsonville	3%	3%	19%	35	4	76%	0%	100%
Grand Total	1%	17%	6%	205		76%	1%	100%

Table 9: Johnsonville Line, AM peak Access mode number of passengers

	Passenger, dropped off	P&R Car user, Parked at the station	Car user, Parked elsewhere	P&R car parks	Number of Peak hour Services	Walk	Other	Grand Total
Crofton Downs	0	60	0	54	4	113	8	181
Ngaio	0	56	0	48	4	118	0	174
Awarua Street	0	0	7	0	4	150	0	157
Simla Crescent	5	35	0	9	4	129	0	169
Box Hill	0	0	16	0	4	58	0	74
Khandallah	0	18	0	14	4	135	0	153
Raroa	0	65	0	45	4	151	0	216
Johnsonville	9	9	64	35	4	256	0	338
Grand Total	14	243	87	205		1111	8	1462

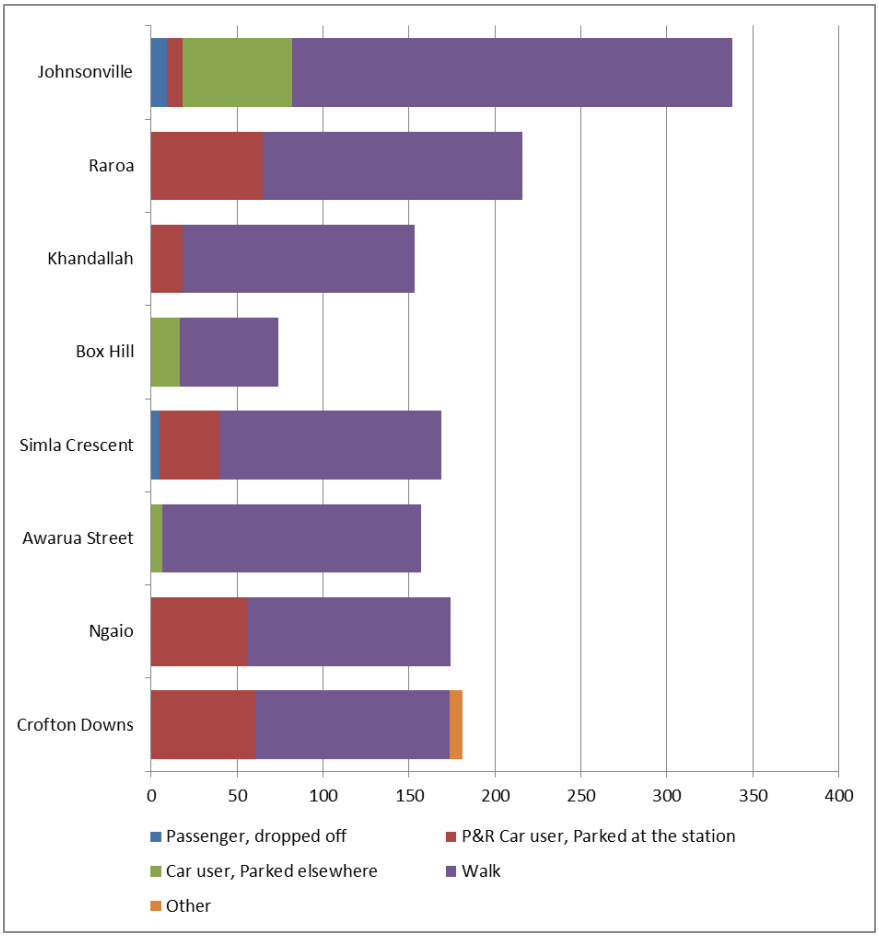


Figure 8: Johnsonville Line, AM peak Access mode to rail station (absolute)

The number of available P&R spaces on the Johnsonville line is relatively low. This is combined with a relatively high number of people within 1km of each of the stations, the speed of the rail service and short distance to Wellington. The Johnsonville line effectively operates like a bus / light rail service as opposed to longer distance rail, because it favours walk access over car access.

Of note is the observation that the majority passengers driving to the Johnsonville station - park elsewhere (i.e. not in the designated P&R spaces). No passengers interchange between rail and bus at Johnsonville station because travel times to Wellington CBD are similar for both modes, with an additional fare payment if transferring being an additional deterrence for transferring.

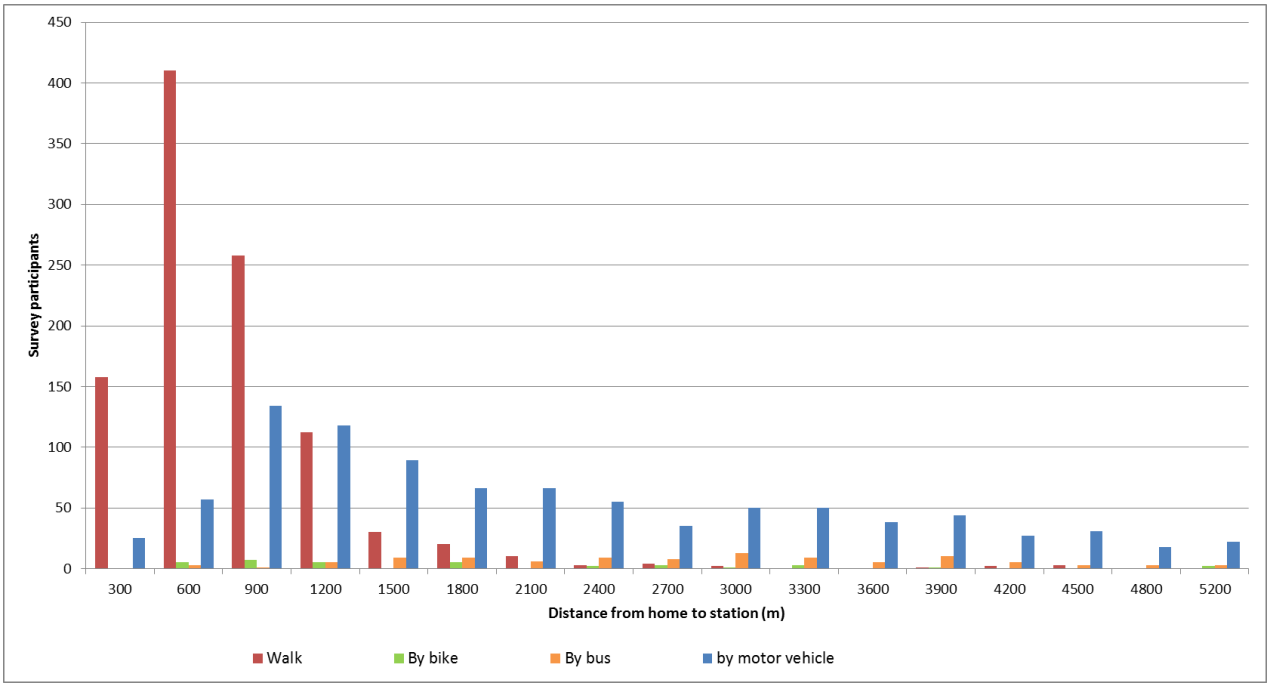


Figure 9: Distance travelled to station by mode, AM

Figure 9 shows the distances travelled to the station in the morning for all lines and by mode (for distances up to 5.2 km). The majority of passenger's who walked to the station, live within 1200 metres of the station (93%). Those that travel by motor vehicle also live close to the station, with 56% living within 1.8 km of the station and then 22% from 2100 to 5200 metres and 12% who travel from 5.3 to 50km to catch the train. The distance for those cycling to the station varied from up to 1 km to over 3 km; with equal proportions of cyclists in the three groups for distance shown in Figure 10. Most bus travellers used the bus for distances of at least 1 to 3km (54%) or greater than 3km (42%).

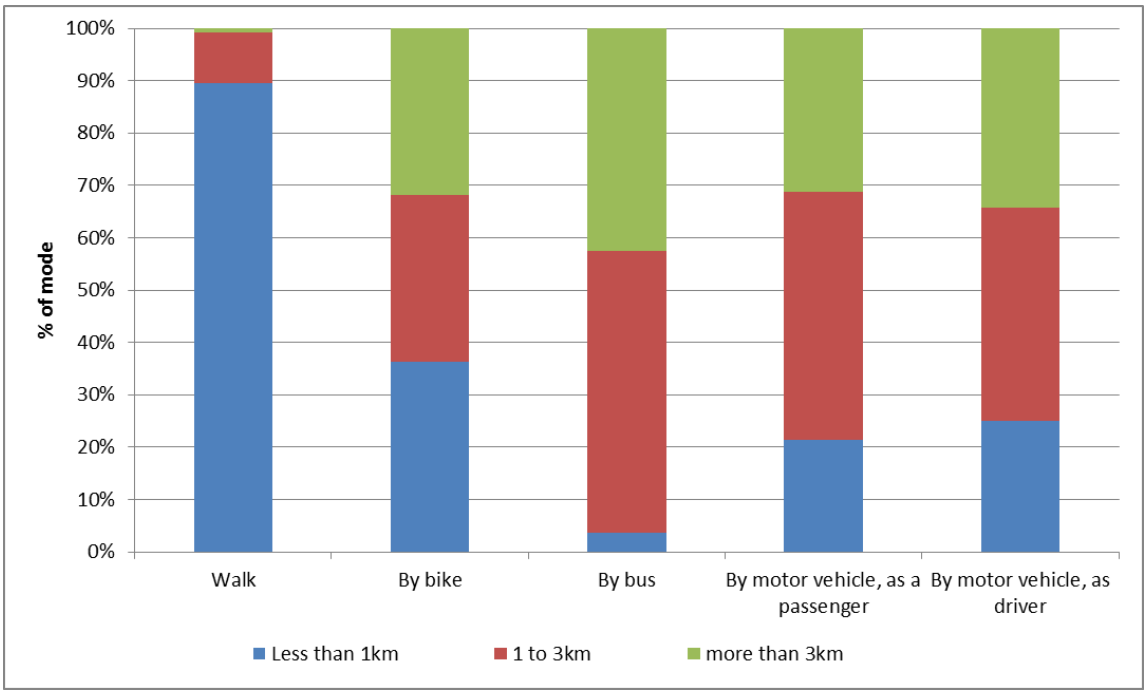


Figure 10: Distance to station by mode for AM peak (%)

4. 2017 Rail Survey Access Mode Maps

Maps were produced to show how people access the Rail network. As the survey asked for street names but not numbers, the addresses are anonymised and indicative only.

Two types of maps were created:

- At a corridor level, giving an overview over which station people use in relation to their origin (all access modes combined)
- At a station level, detailing which mode people used to reach a specific station (busiest stations have been selected for this analysis)

4.1.Corridor Level Maps

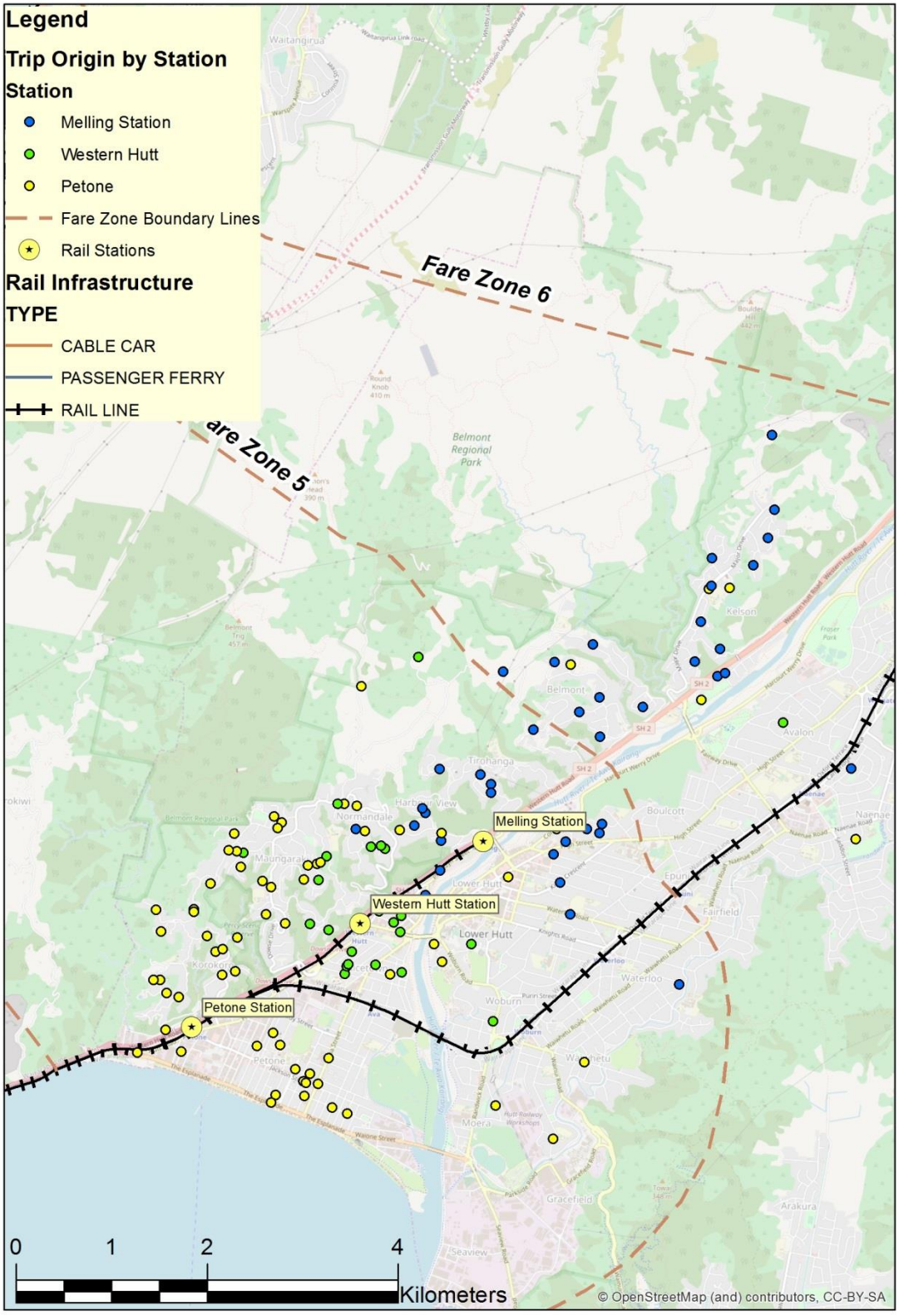
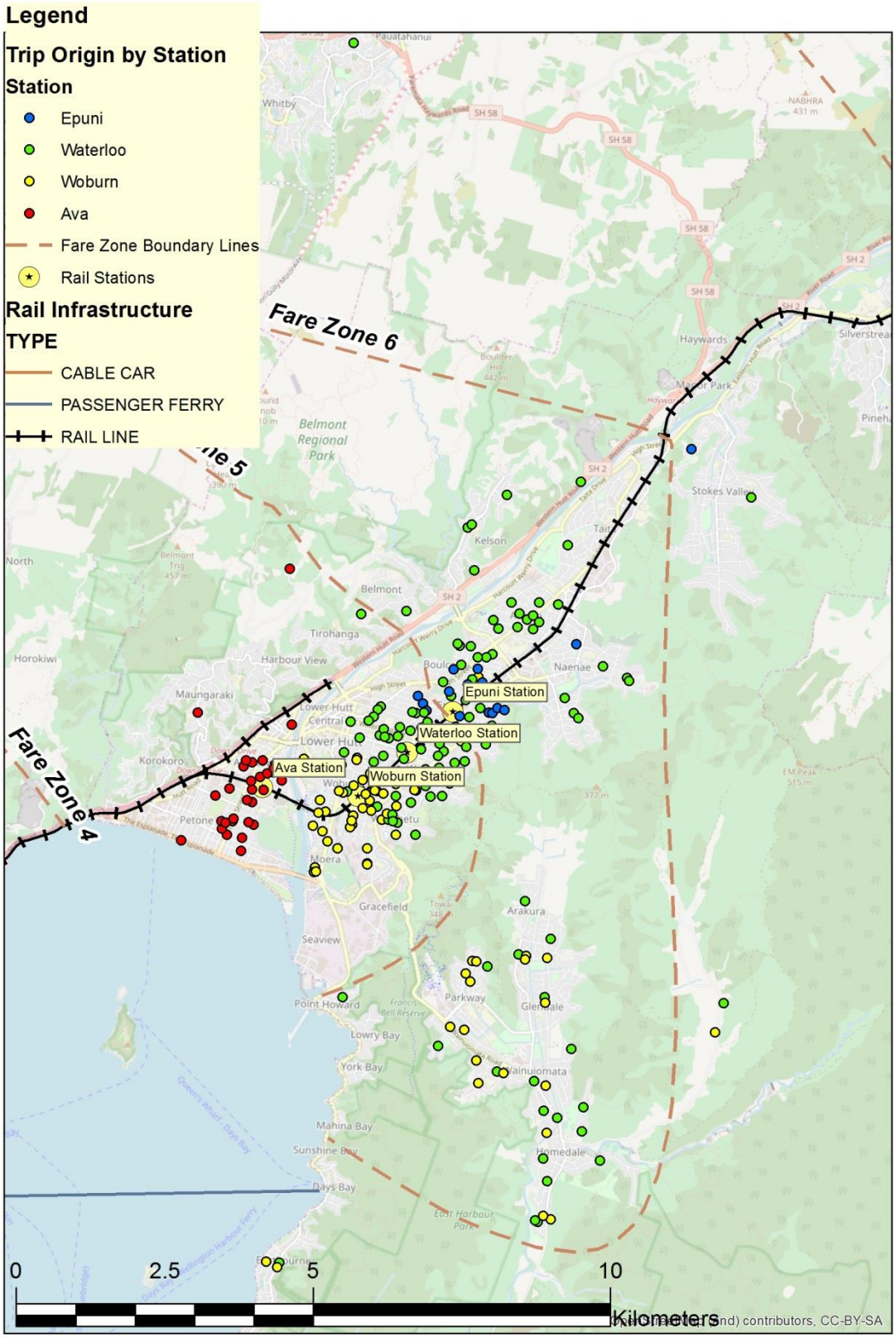


Figure 11: Melling Line Stations


Legend
Trip Origin by Station
Station
Epuni
Waterloo
Woburn
Ava
Fare Zone Boundary Lines
Rail Stations
Rail Infrastructure
TYPE
CABLE CAR
PASSENGER FERRY
RAIL LINE
Fare Zone 6
Fare Zone 5
Fare Zone 4
Epuni Station
Waterloo Station
Ava Station
Woburn Station
Belmont Regional Park
Pauatahanui
Whitby
Haywards
Stokes Valley
Kelson
Belmont
Tirohanga
Harbour View
Naenae
Maungaraki
Korokoro
Petone
Moera
Gracefield
Seaview
Point Howard
Lowry Bay
York Bay
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Parkway
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0
2.5
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Kilometers

Figure 12: Hutt Valley South

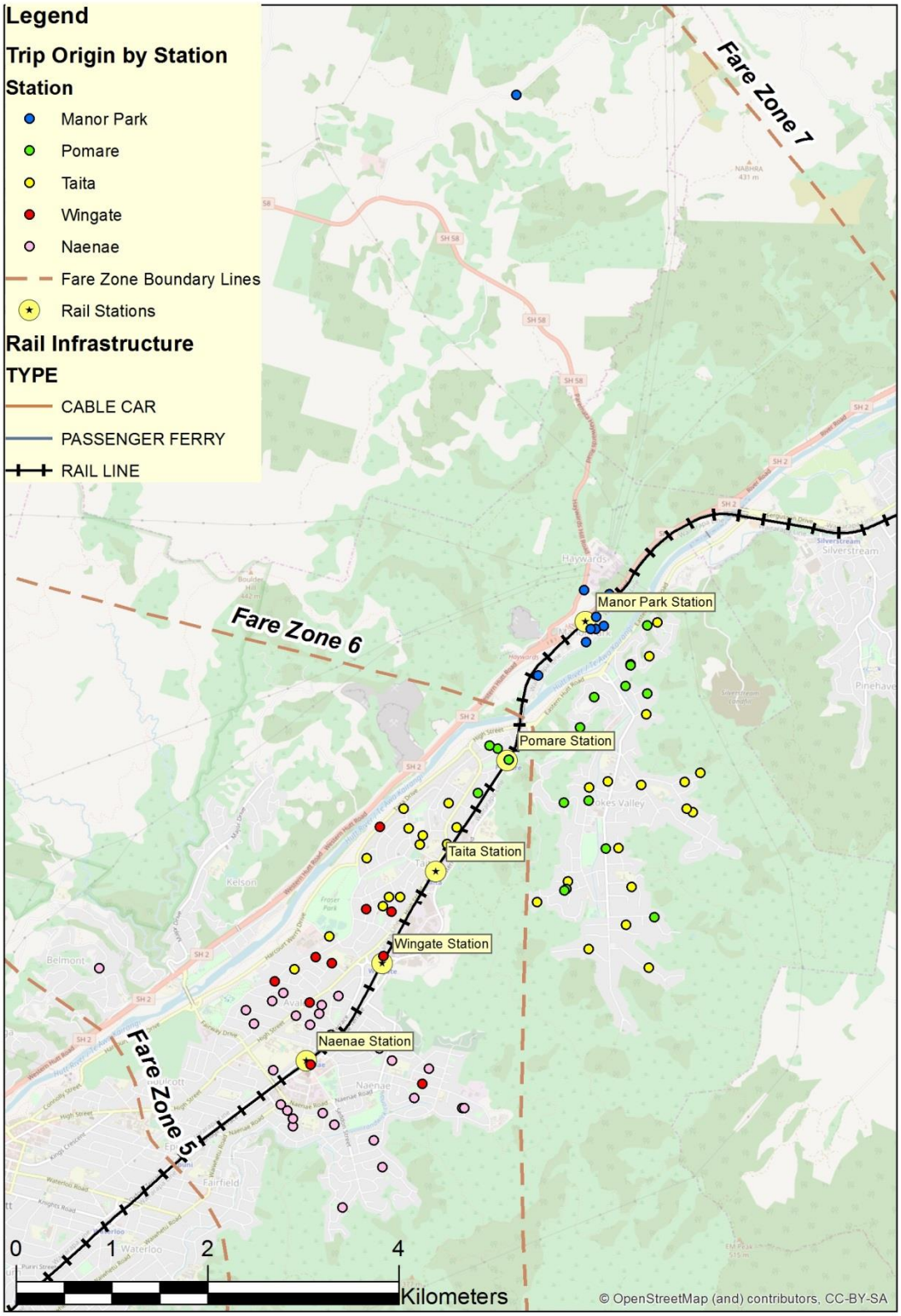

Figure 13: Hutt Valley Central

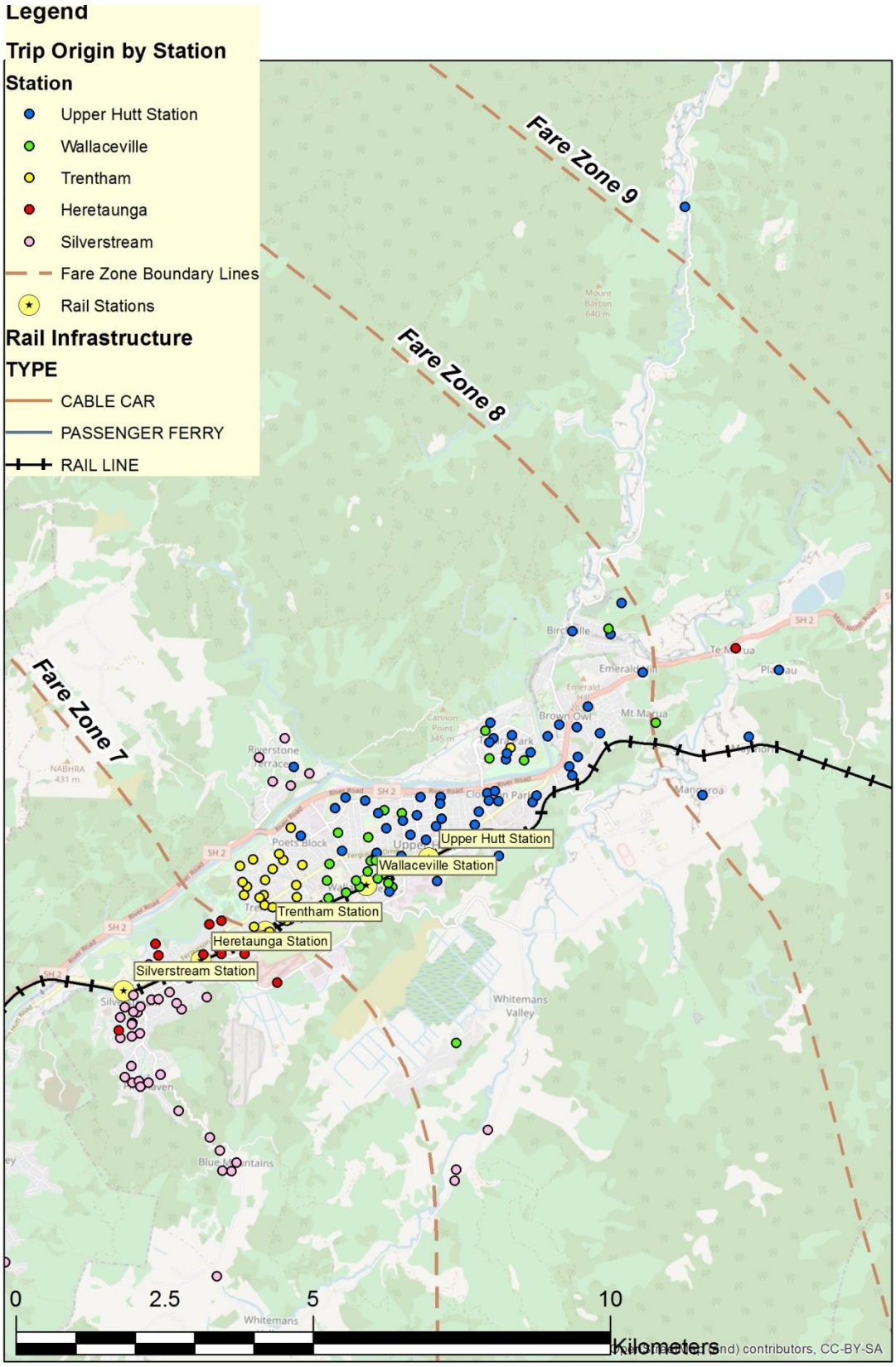

Figure 14: Upper Hutt

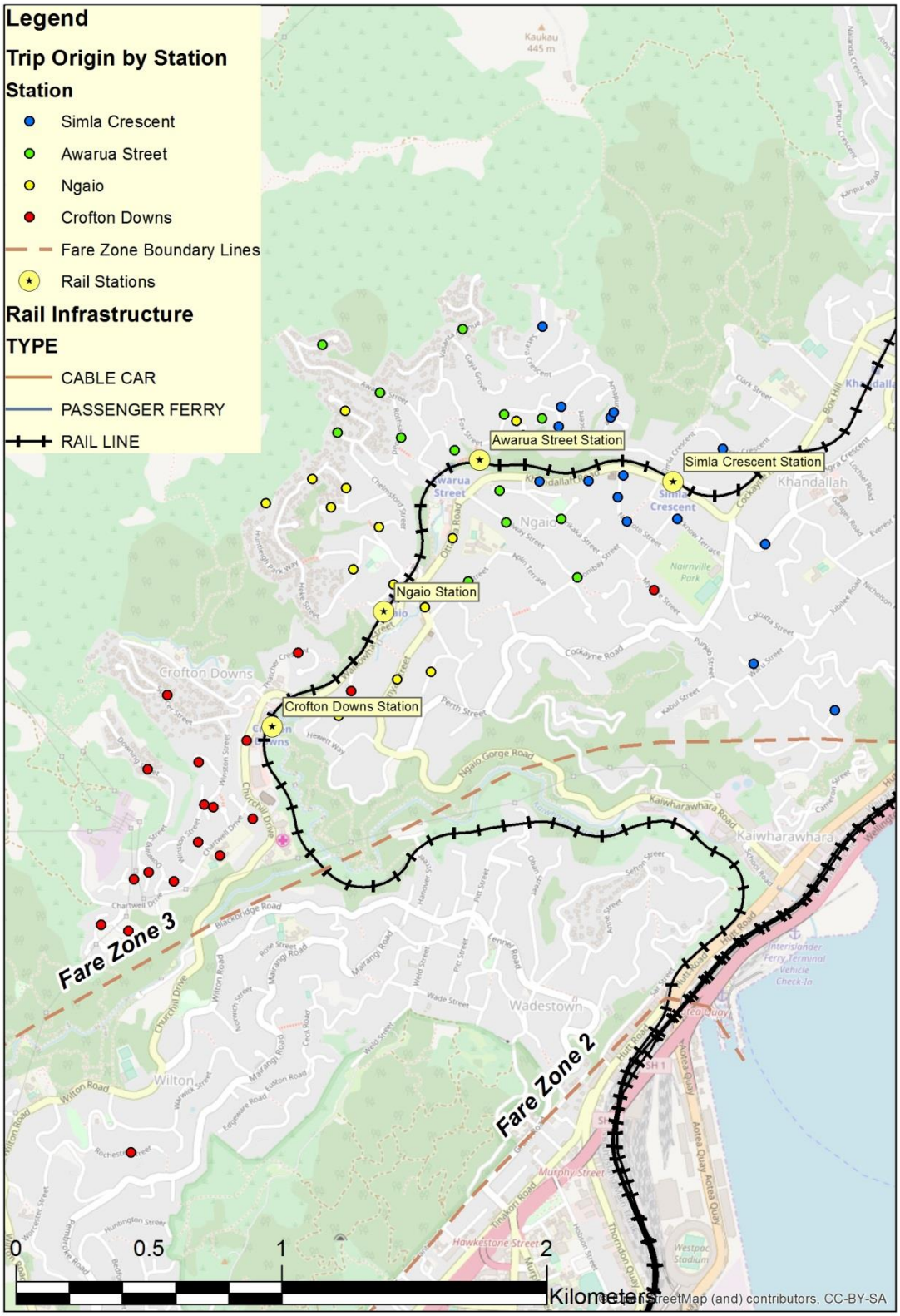

Figure 15: Johnsonville Line South

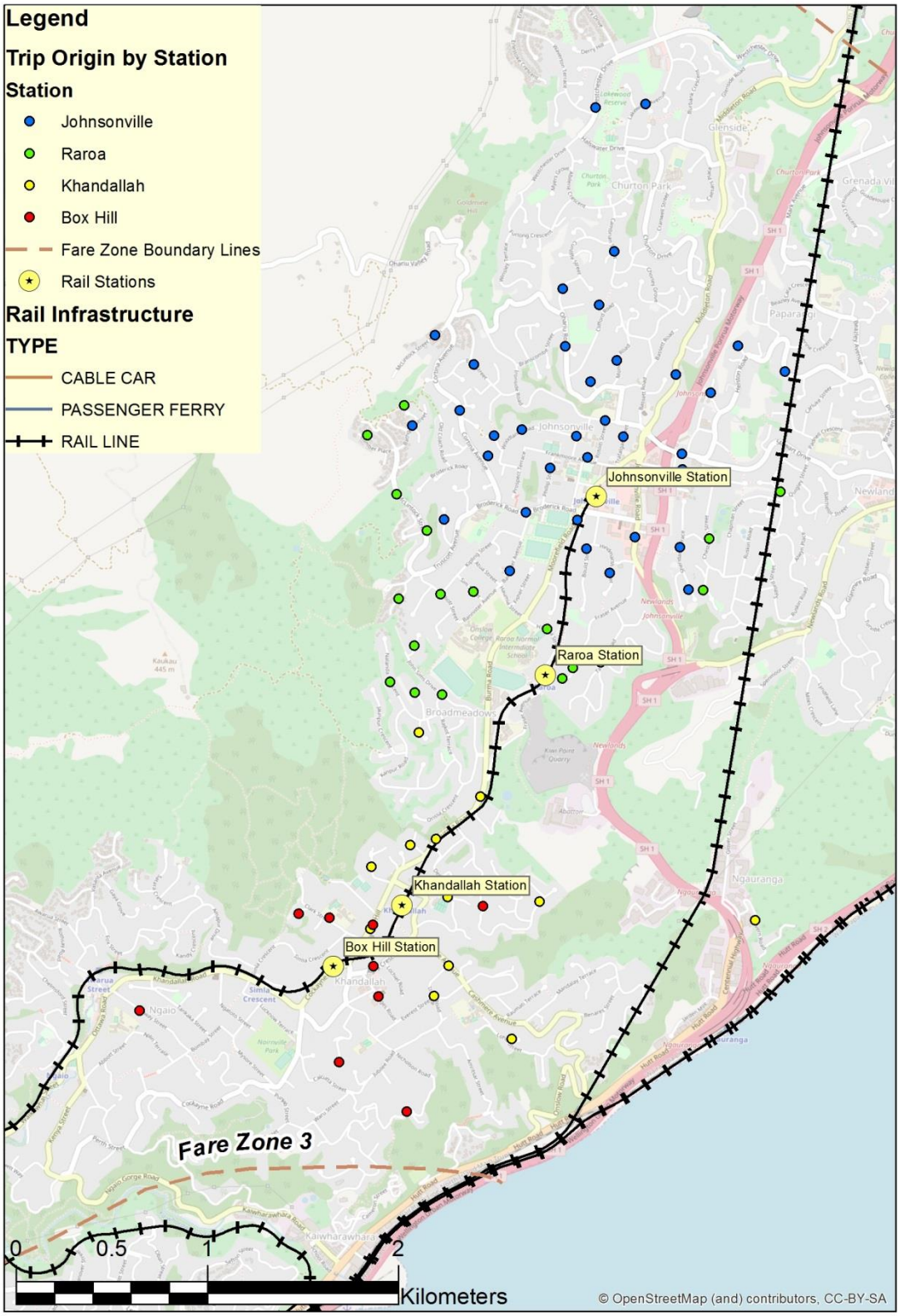

Figure 16: Johnsonville Line North

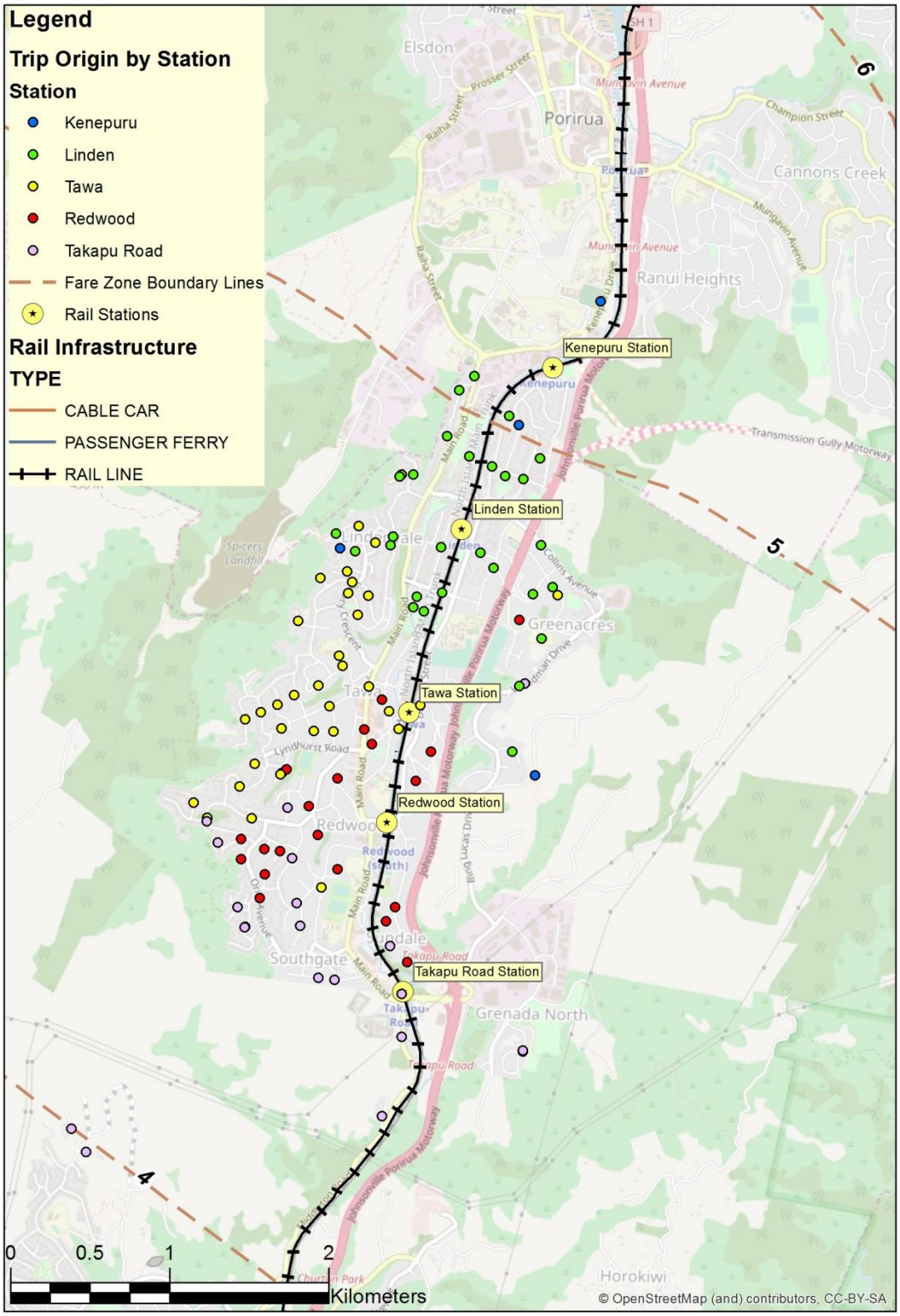

Figure 17: Kapiti Line South

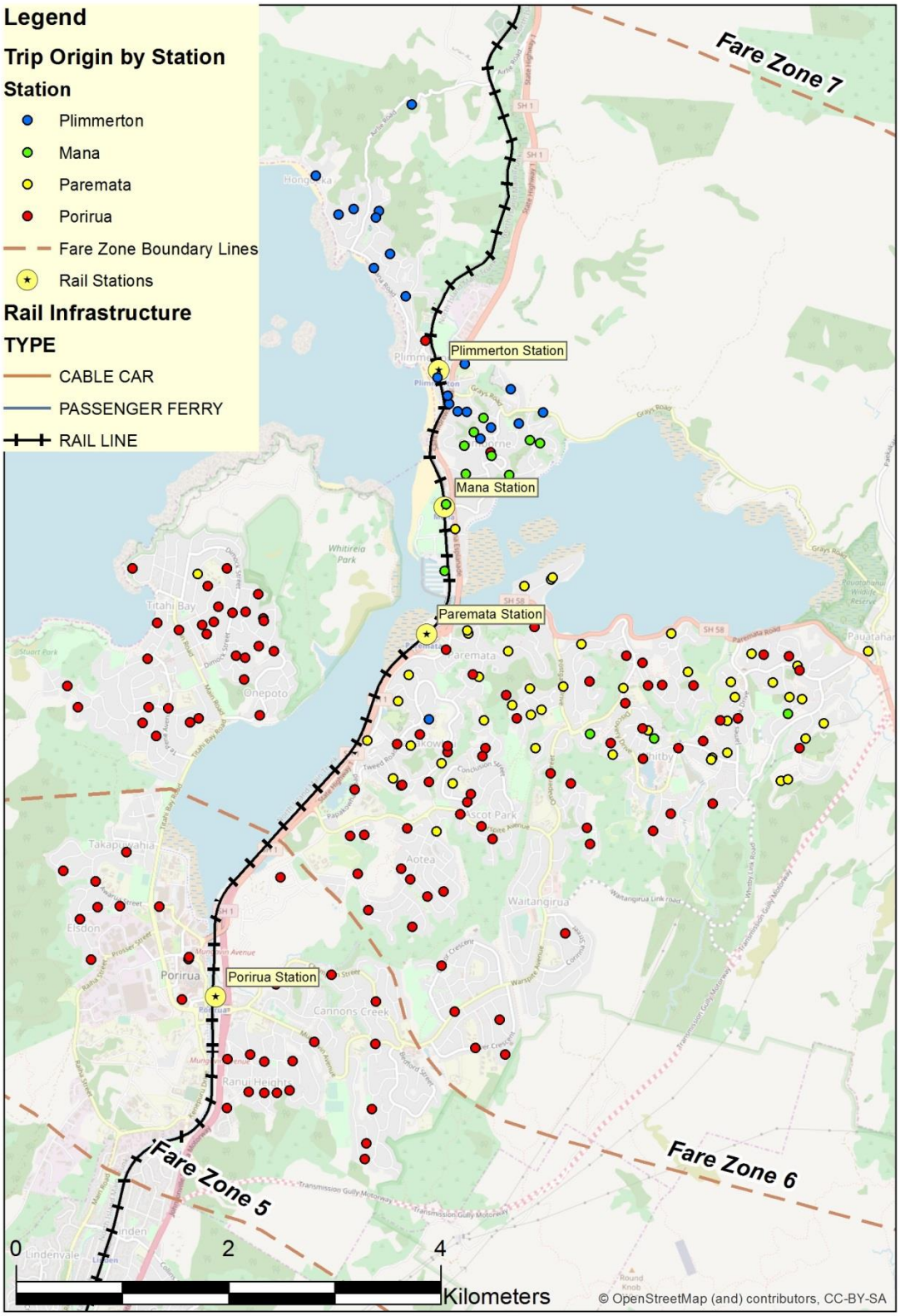

Figure 18: Kapiti Line Central

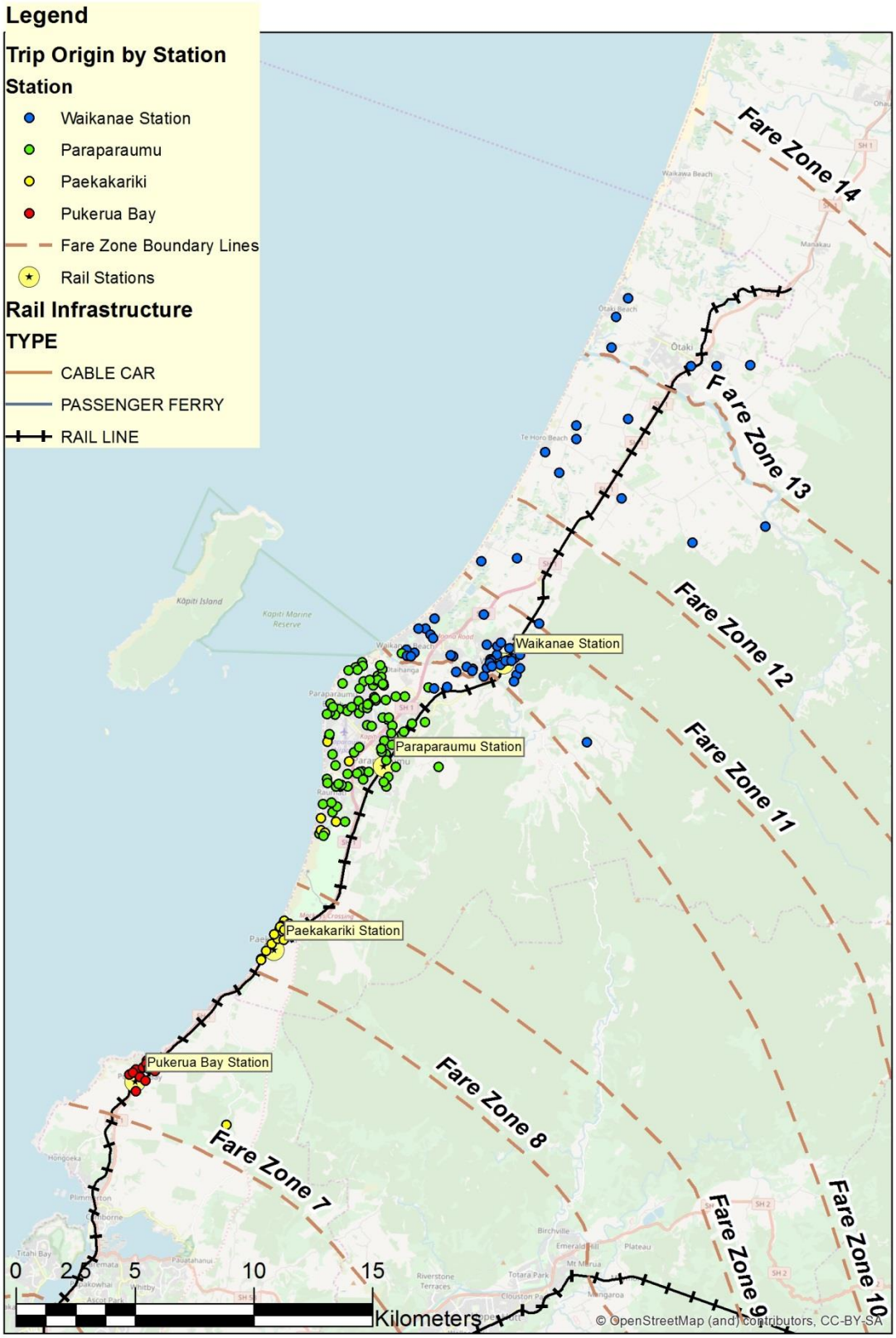

Figure 19: Kapiti Coast

4.2.Station Level Maps

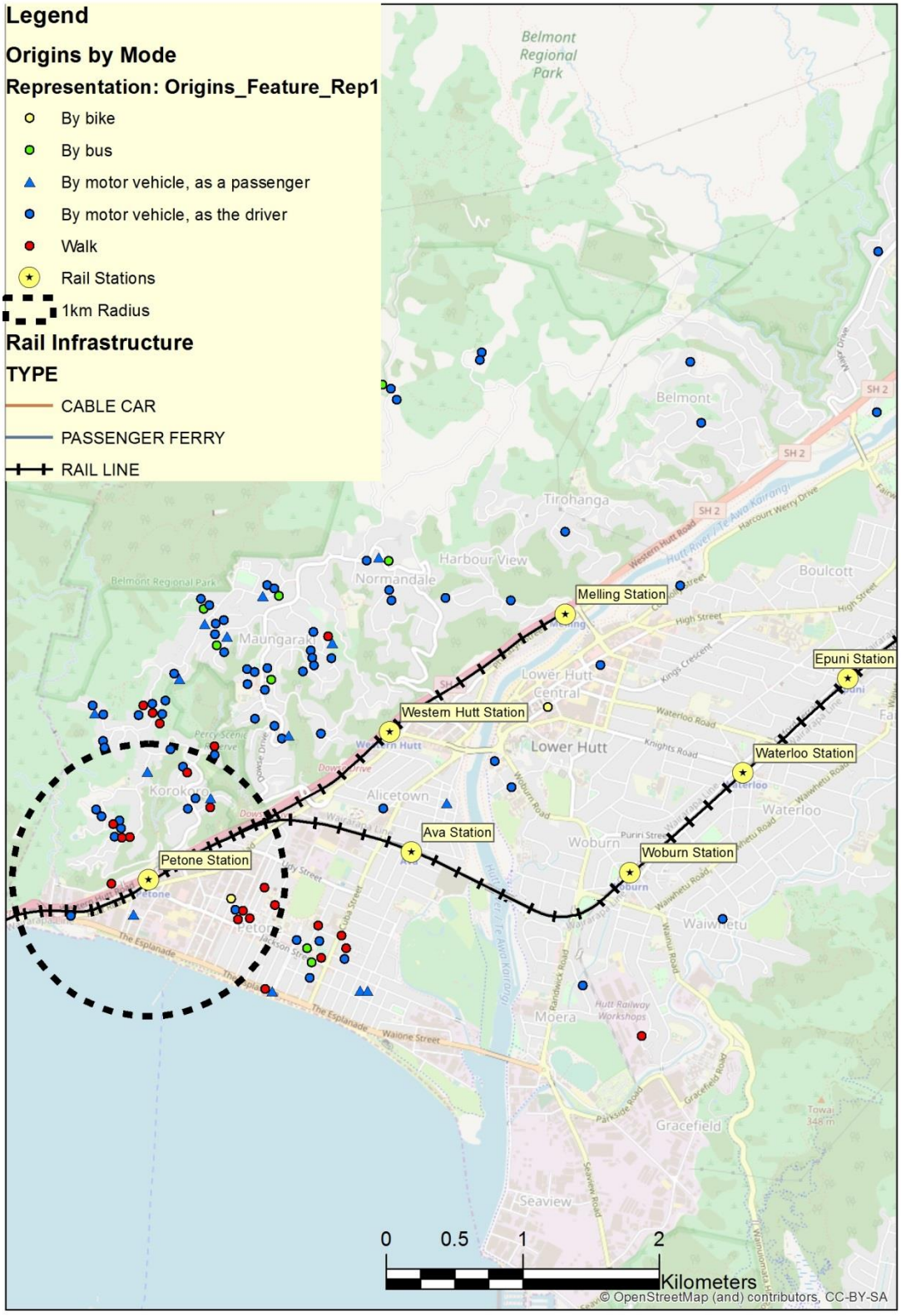

Figure 20: Access Mode Petone Station

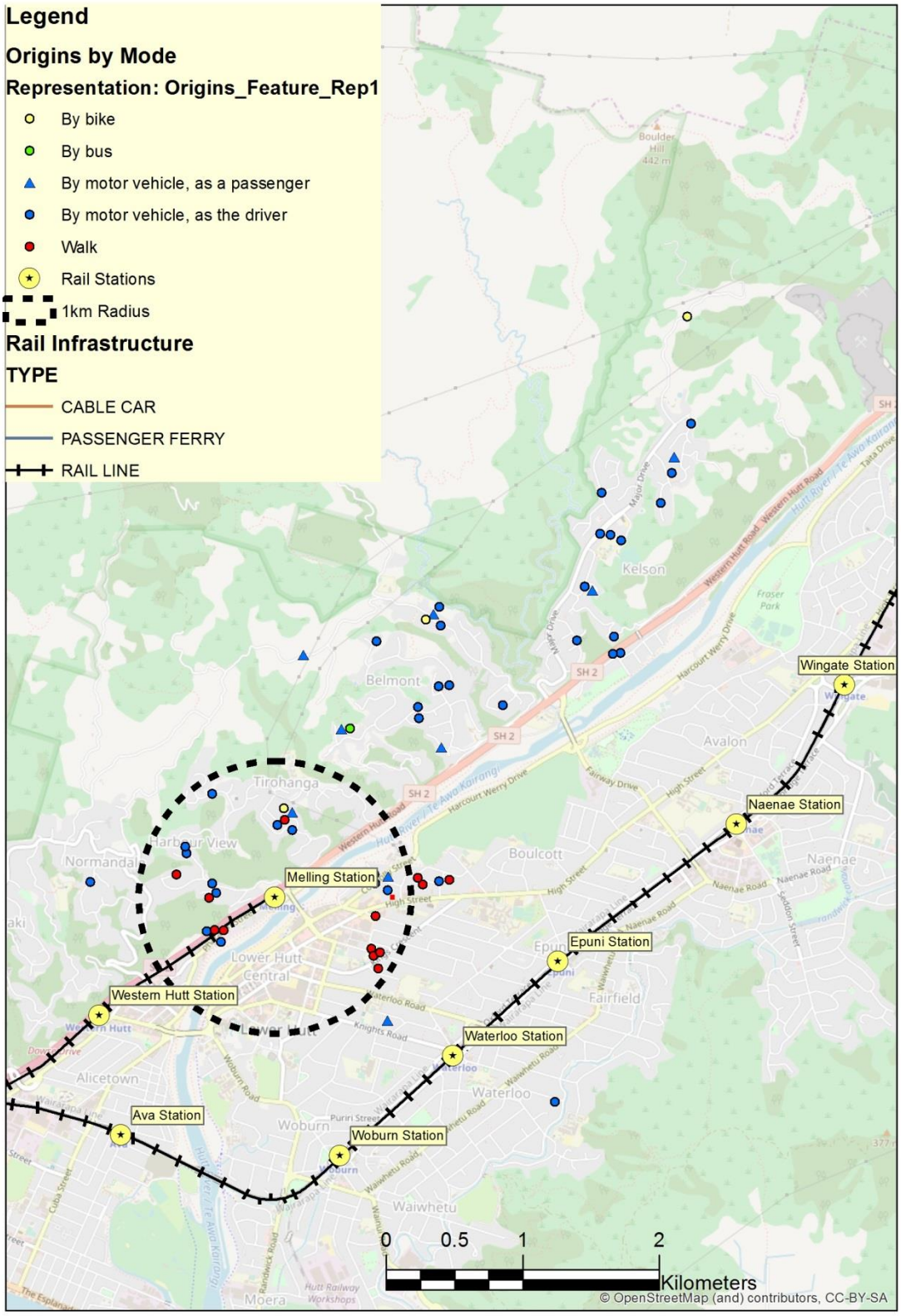

Figure 21: Access Mode Melling Station

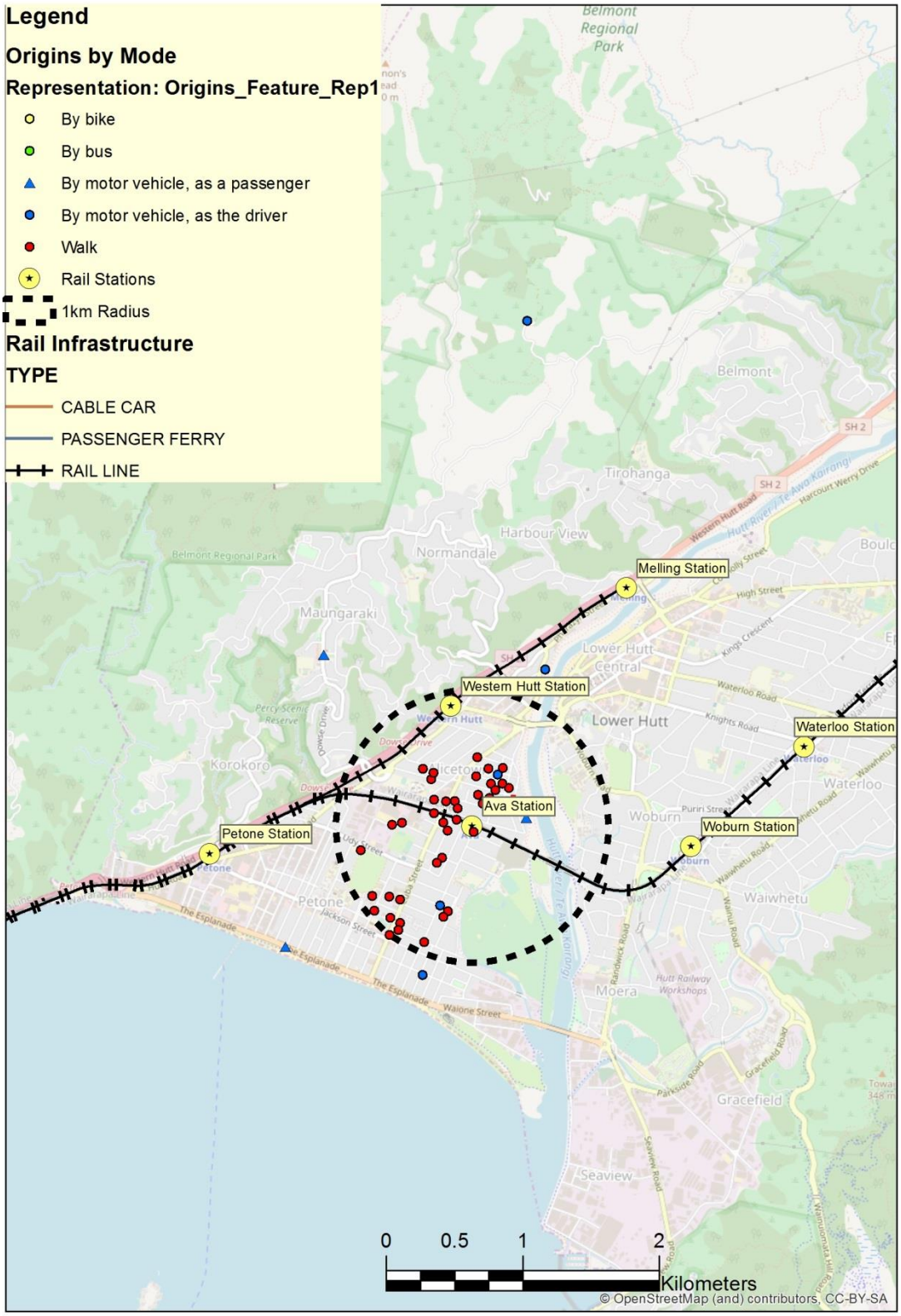

Figure 22: Access Mode Ava Station

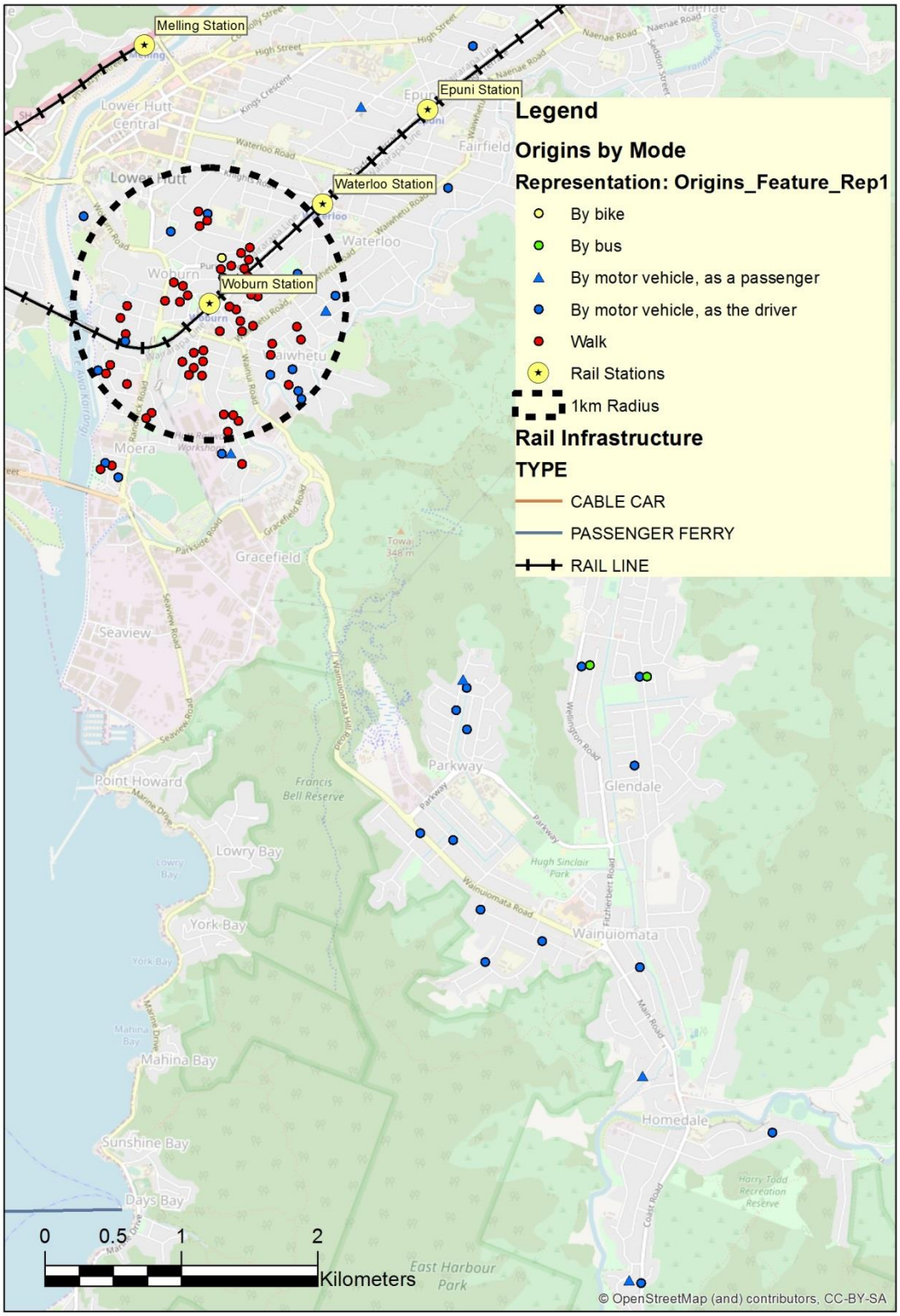

Figure 23: Access Mode Woburn Station

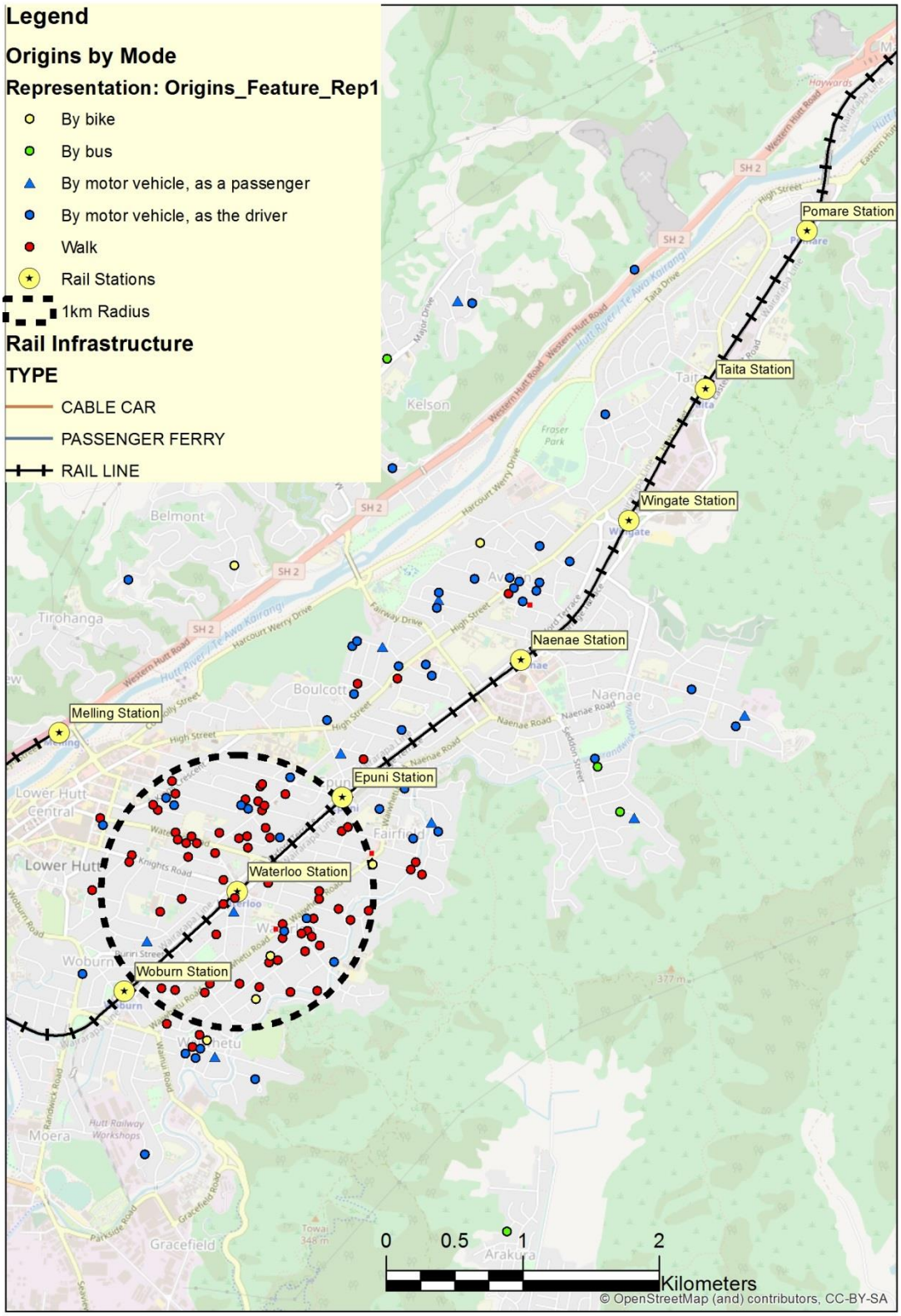

Figure 24: Access Mode Waterloo Station

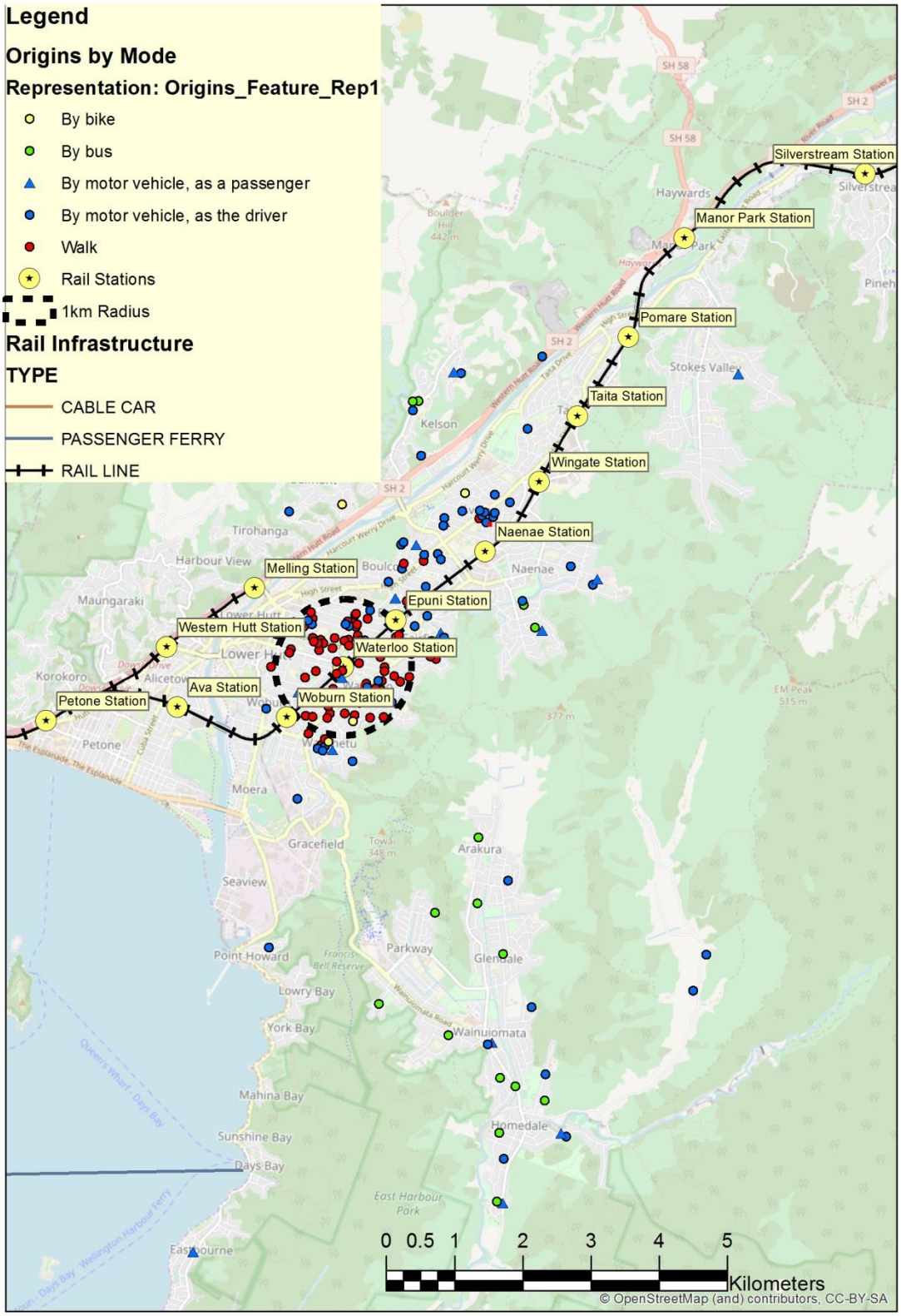

Figure 25: Access Mode Waterloo Station (large scale)

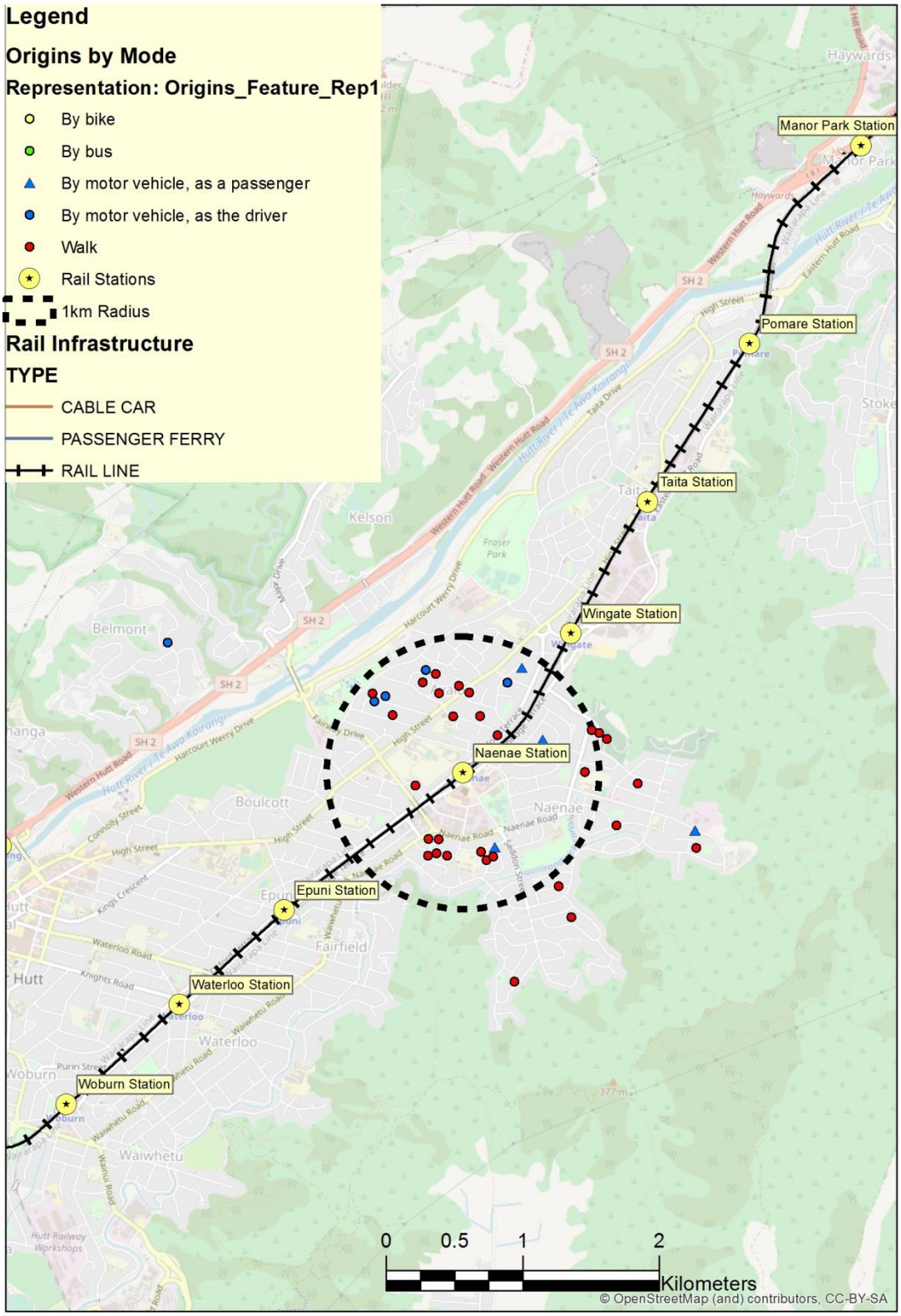

Figure 26: Access Mode Naenae Station

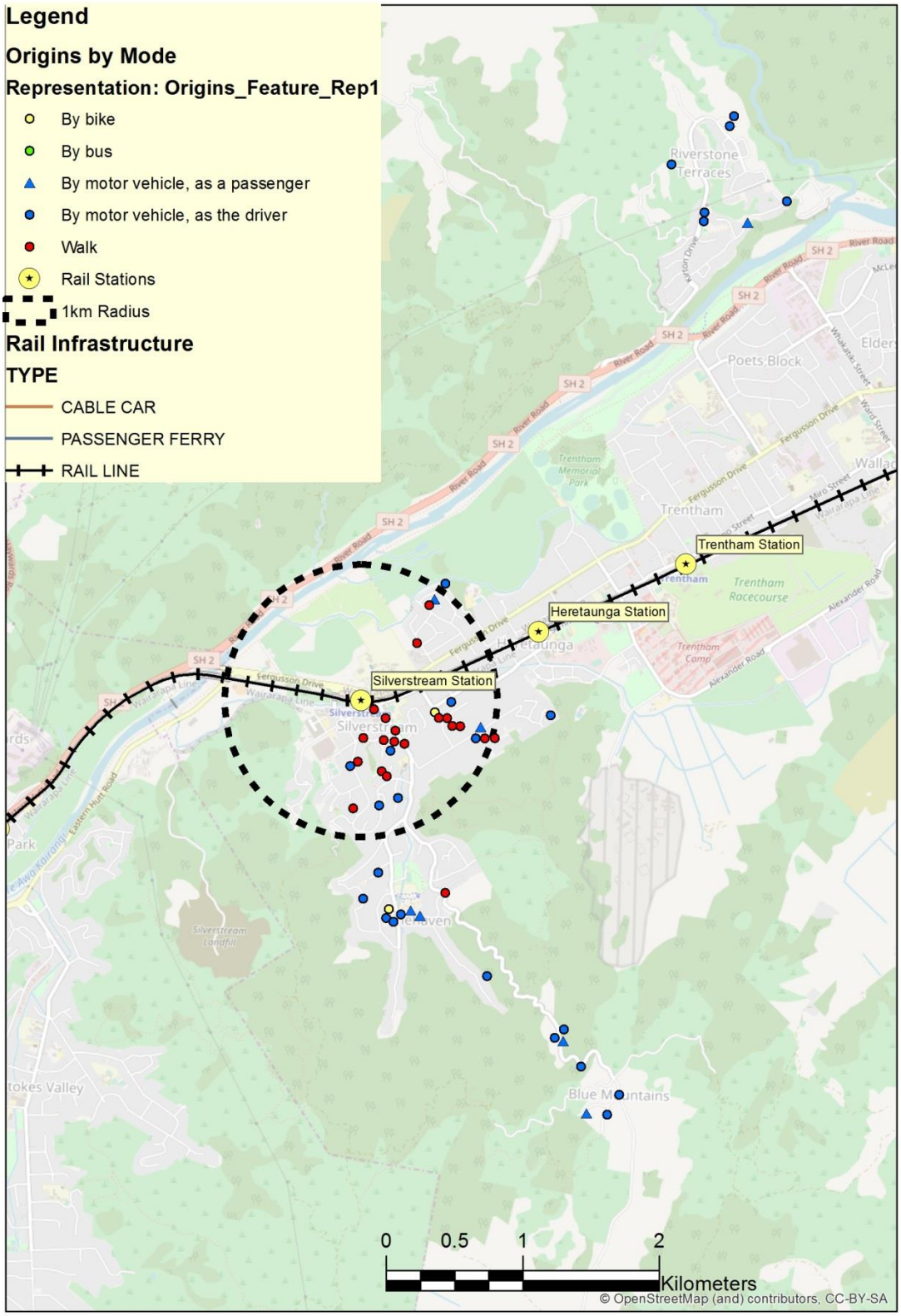

Figure 27: Access Mode Silverstream Station

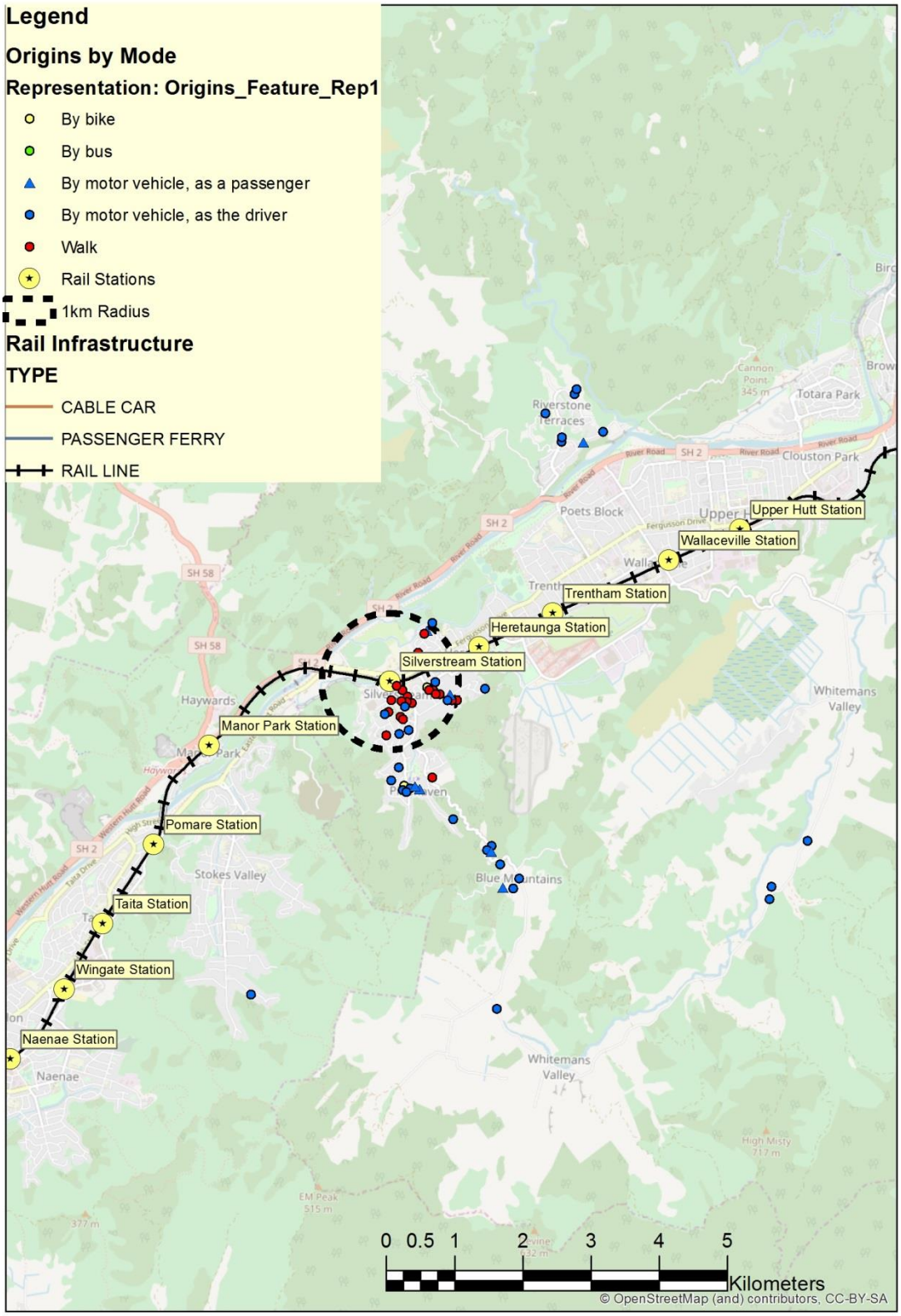

Figure 28: Access Mode Silverstream Station (large scale)

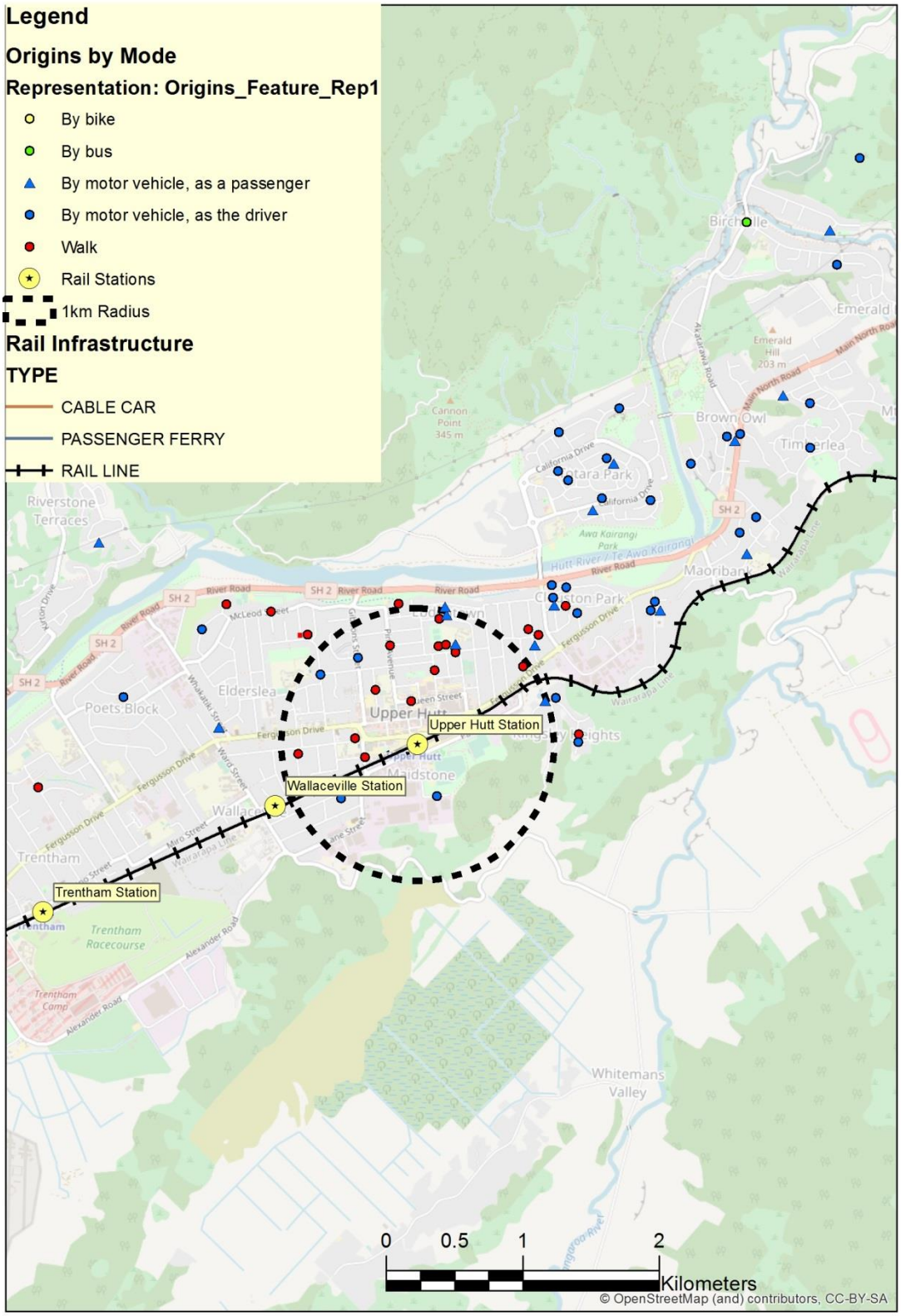

Figure 29: Access Mode Upper Hutt Station

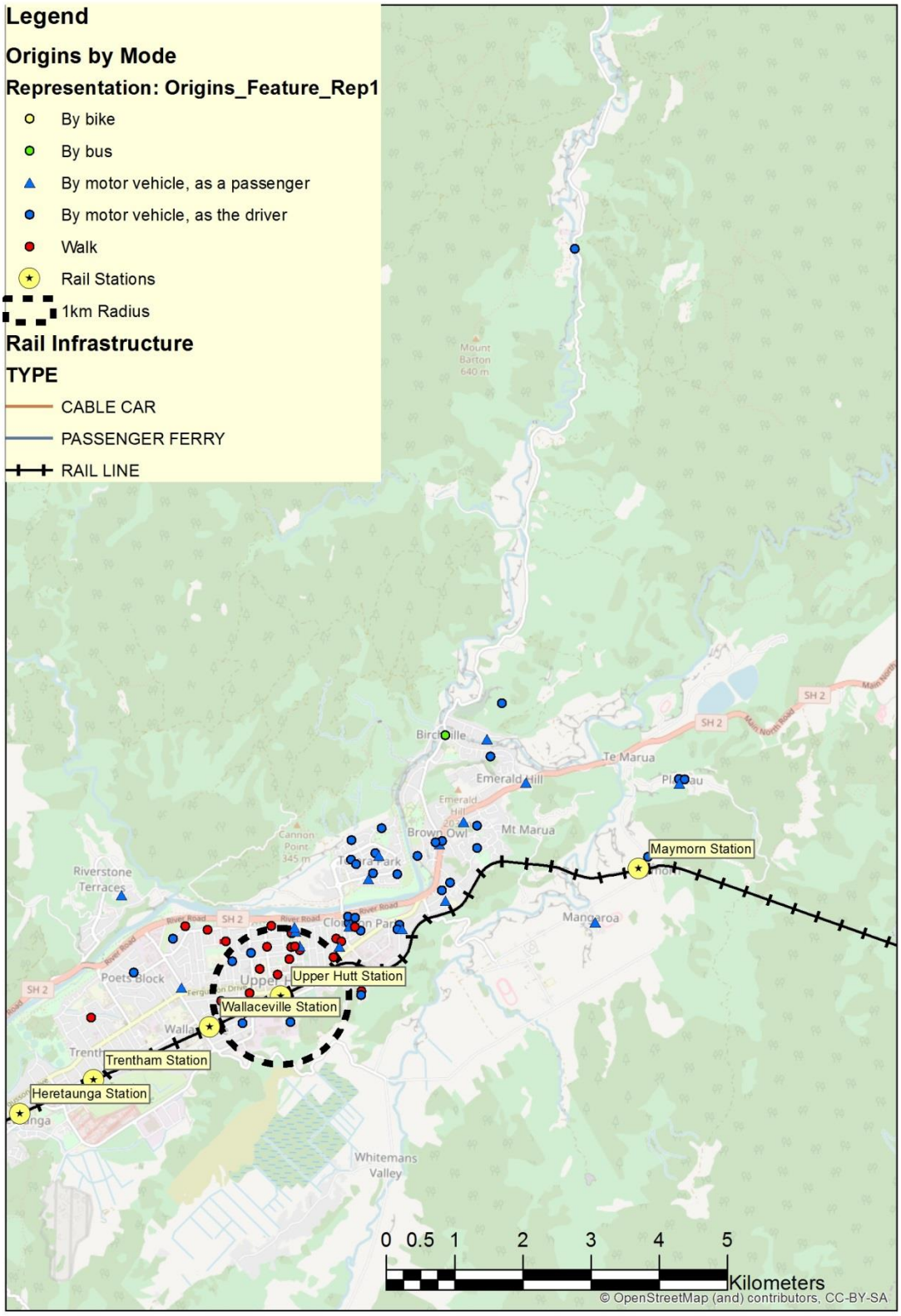

Figure 30: Access Mode Upper Hutt Station (large scale)

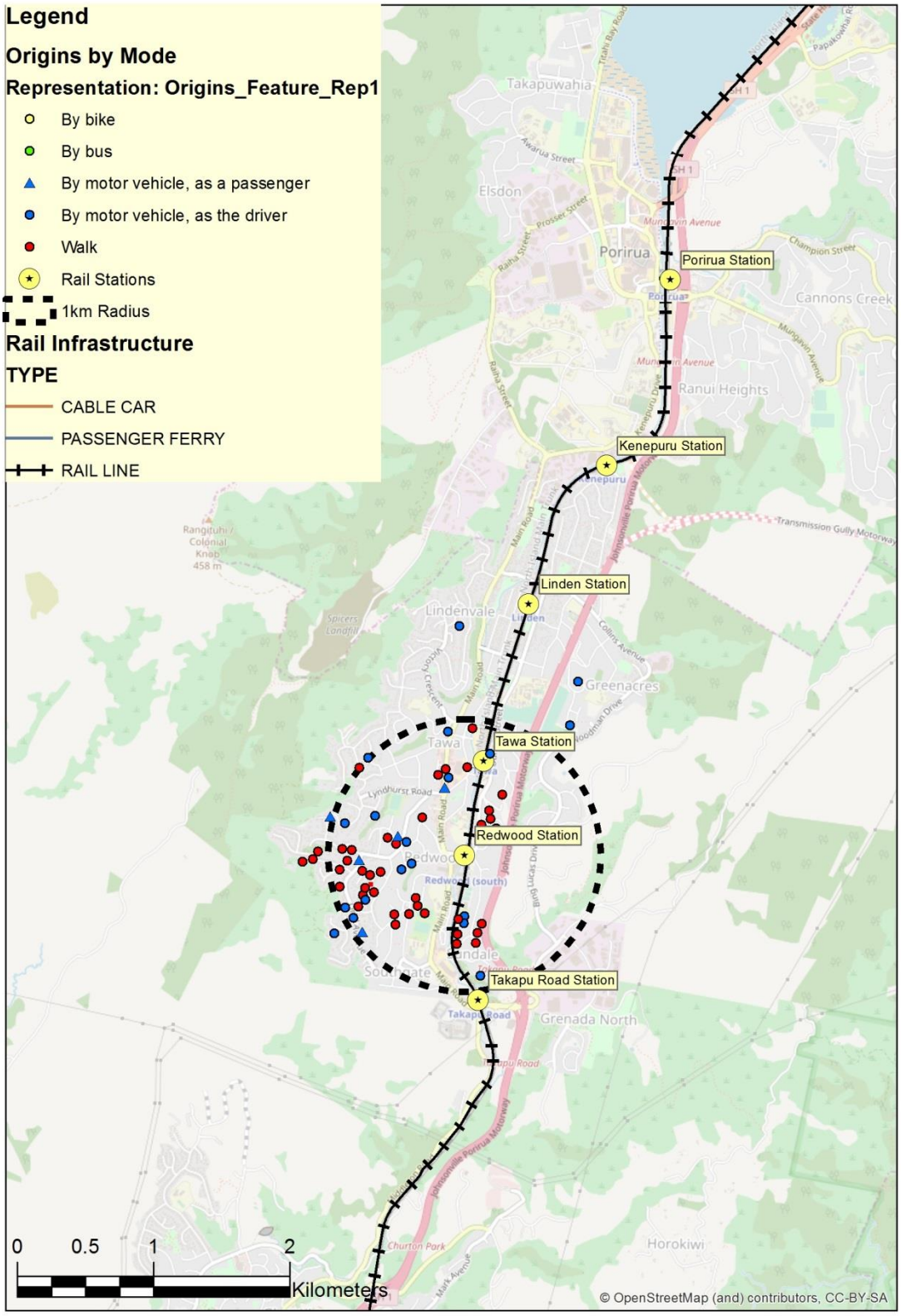

Figure 31: Access Mode Redwood Station

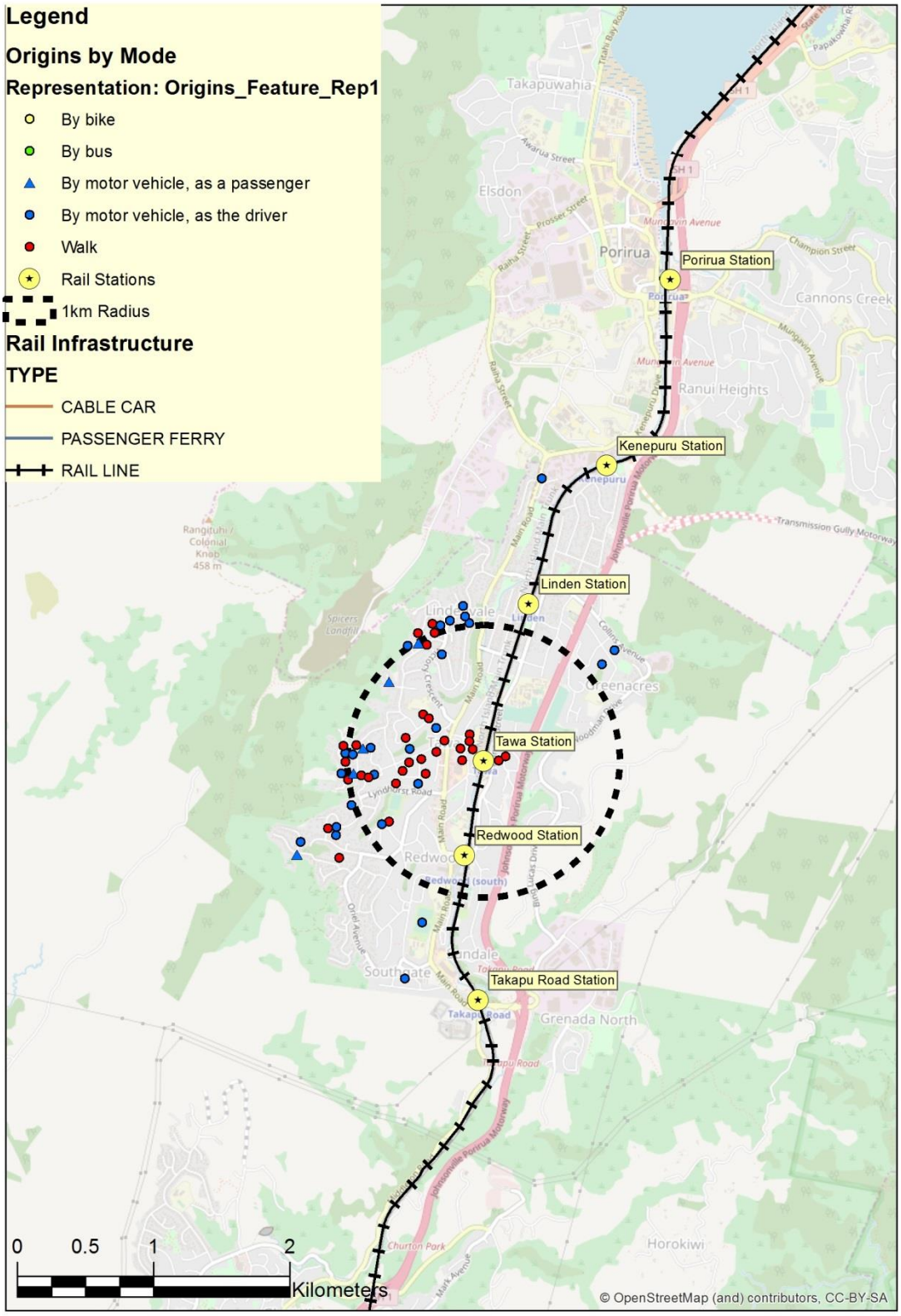

Figure 32: Access Mode Tawa Station

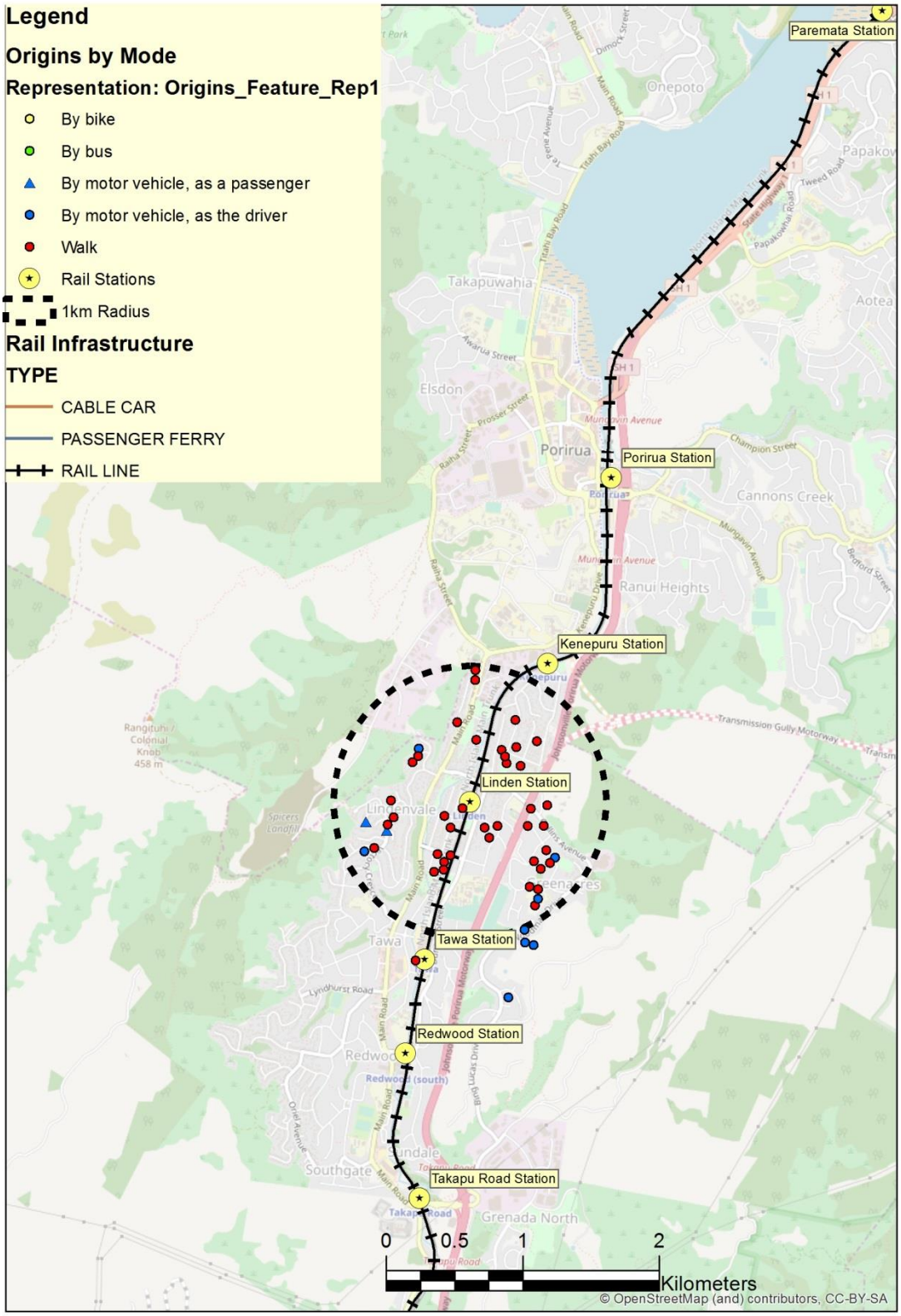

Figure 33: Access Mode Linden Station

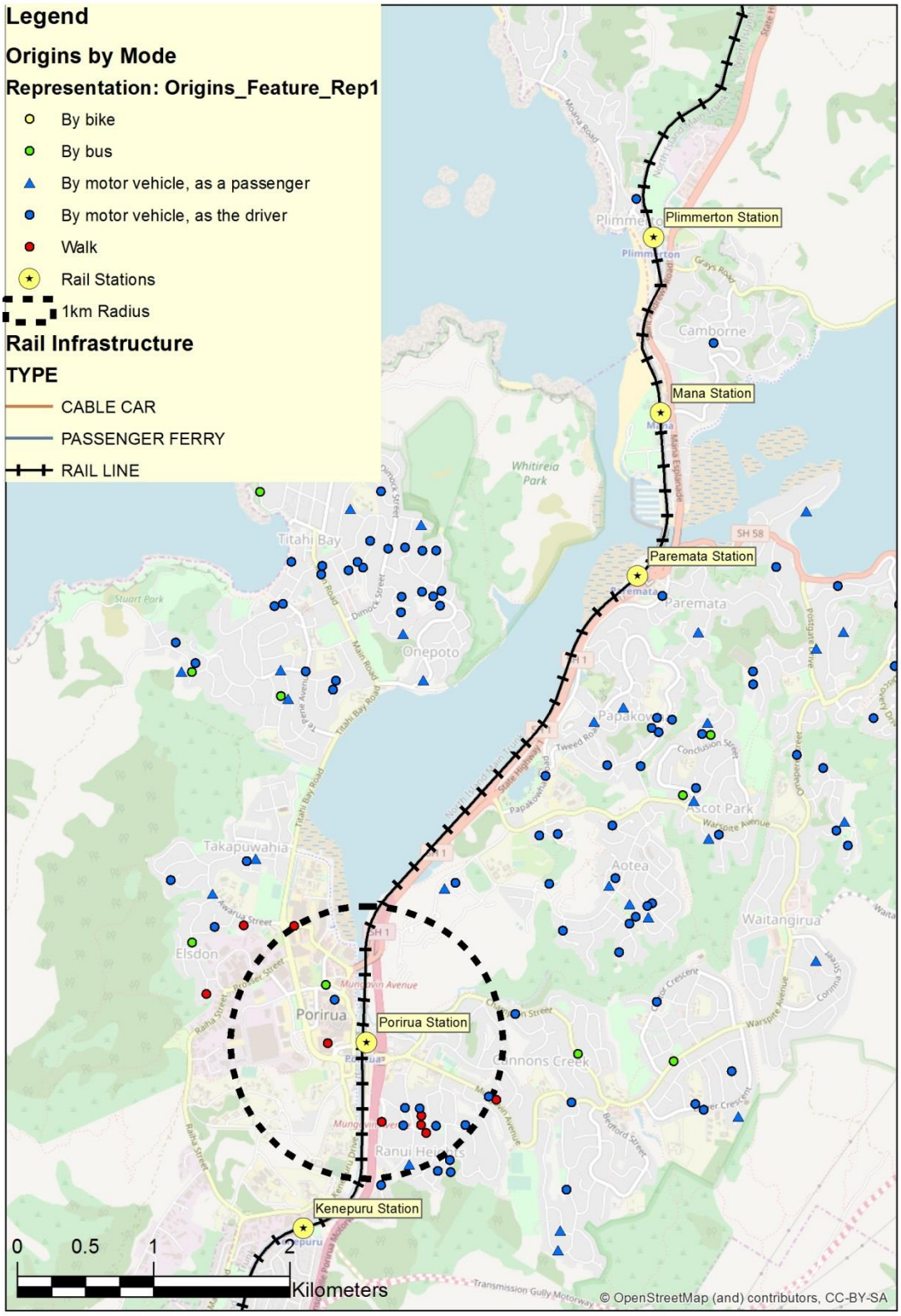

Figure 34: Access Mode Porirua Station

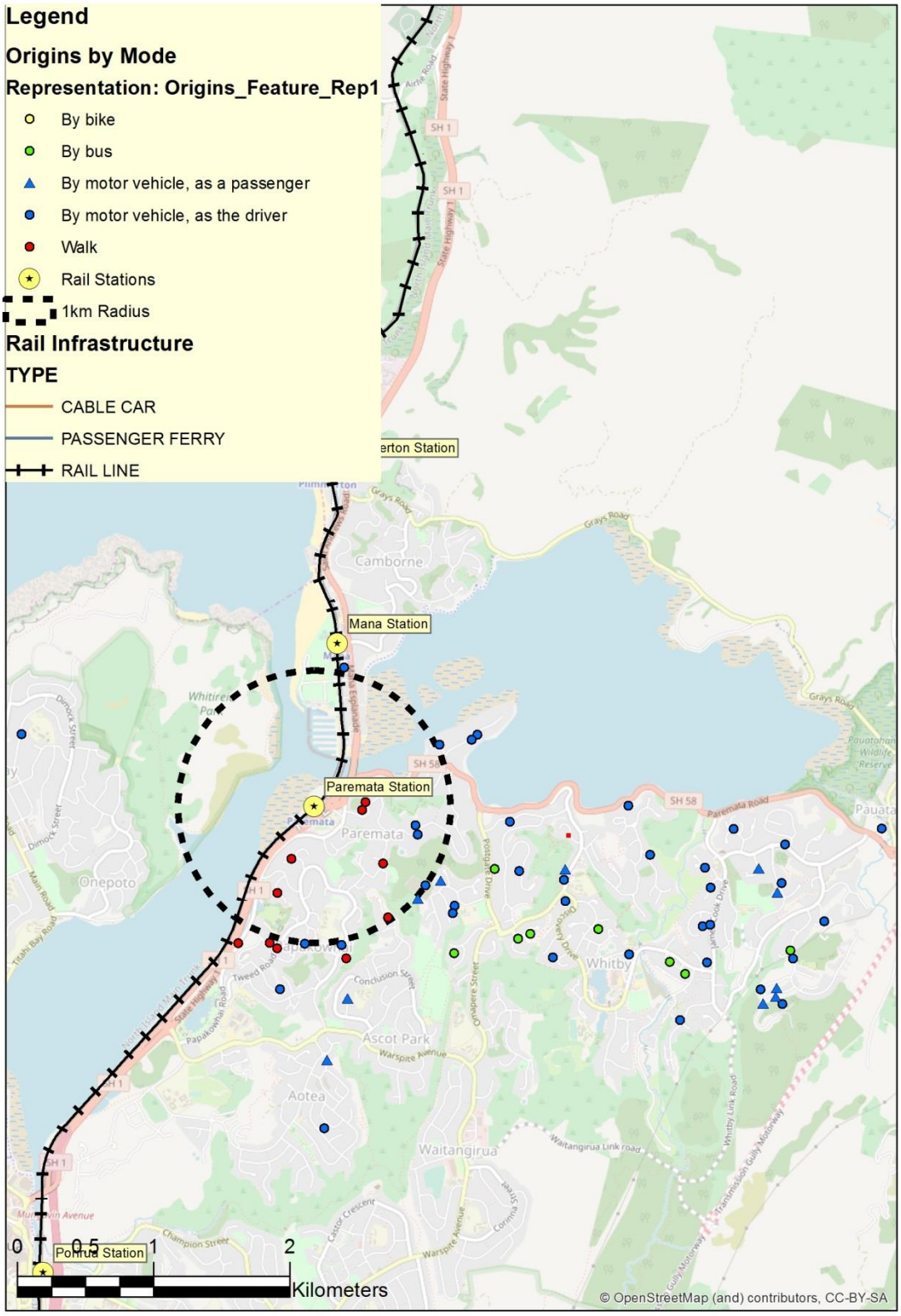

Figure 35: Access Mode Paremata Station

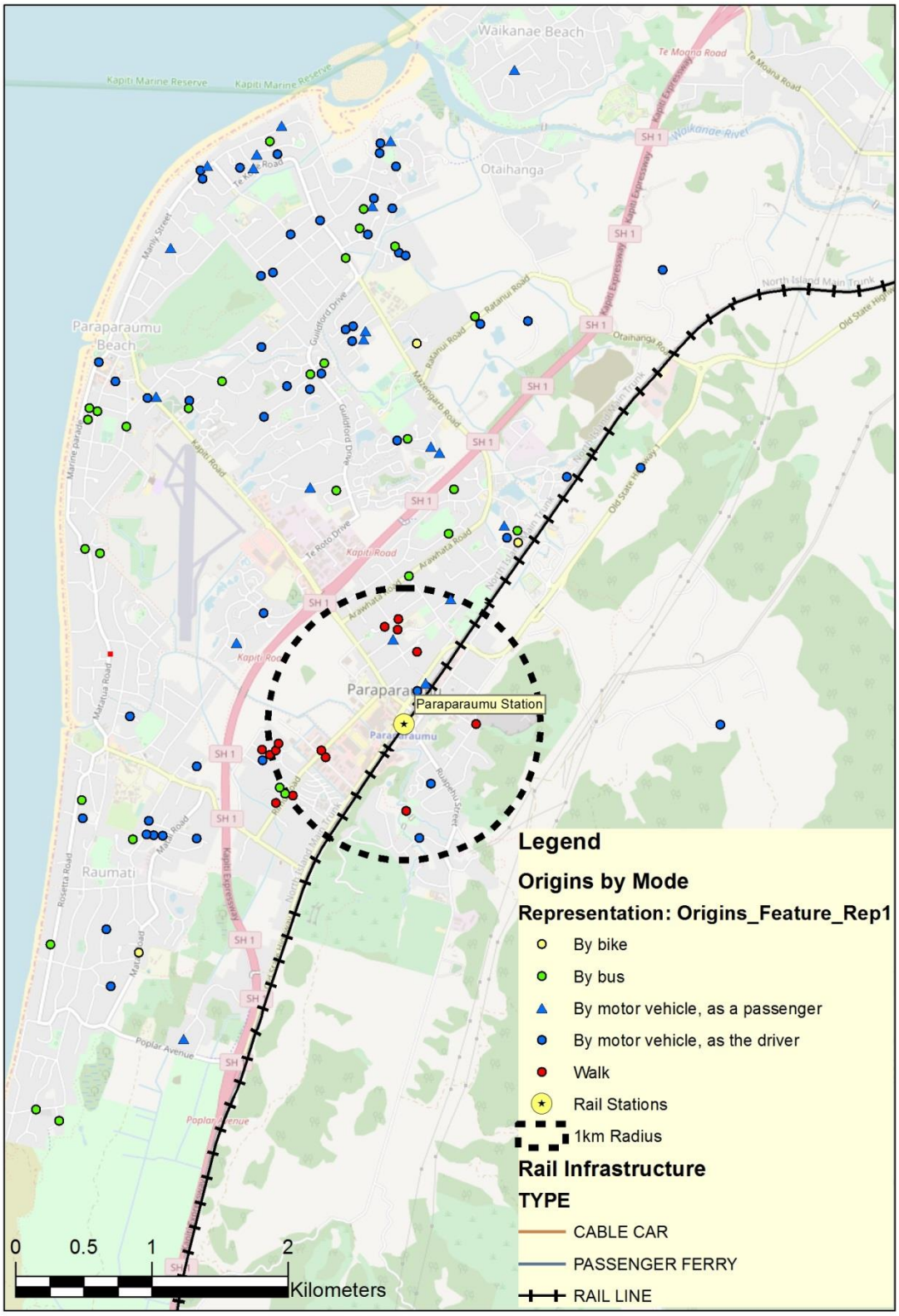

Figure 36: Access Mode Paraparaumu Station

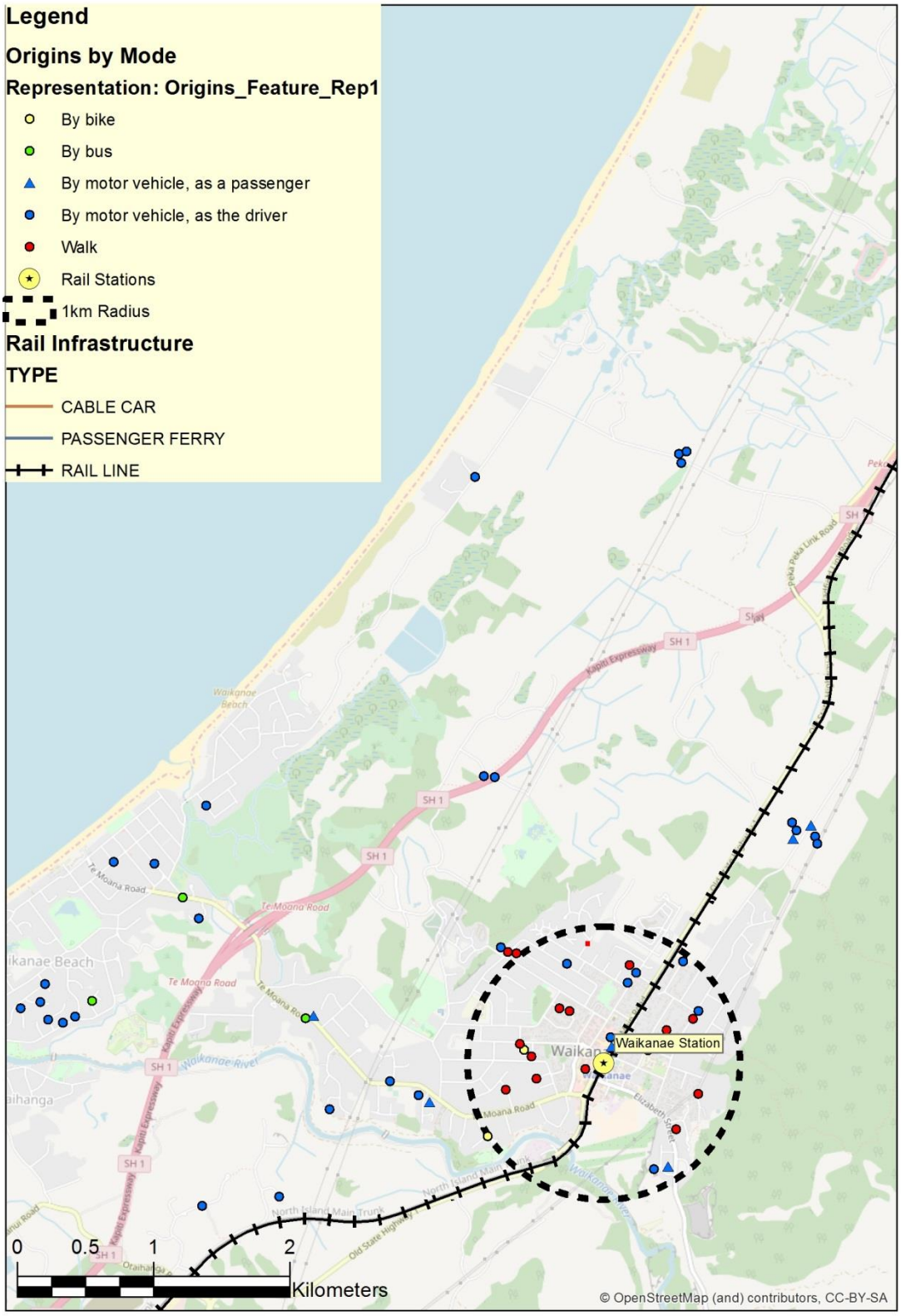

Figure 37: Access Mode Waikanae Station

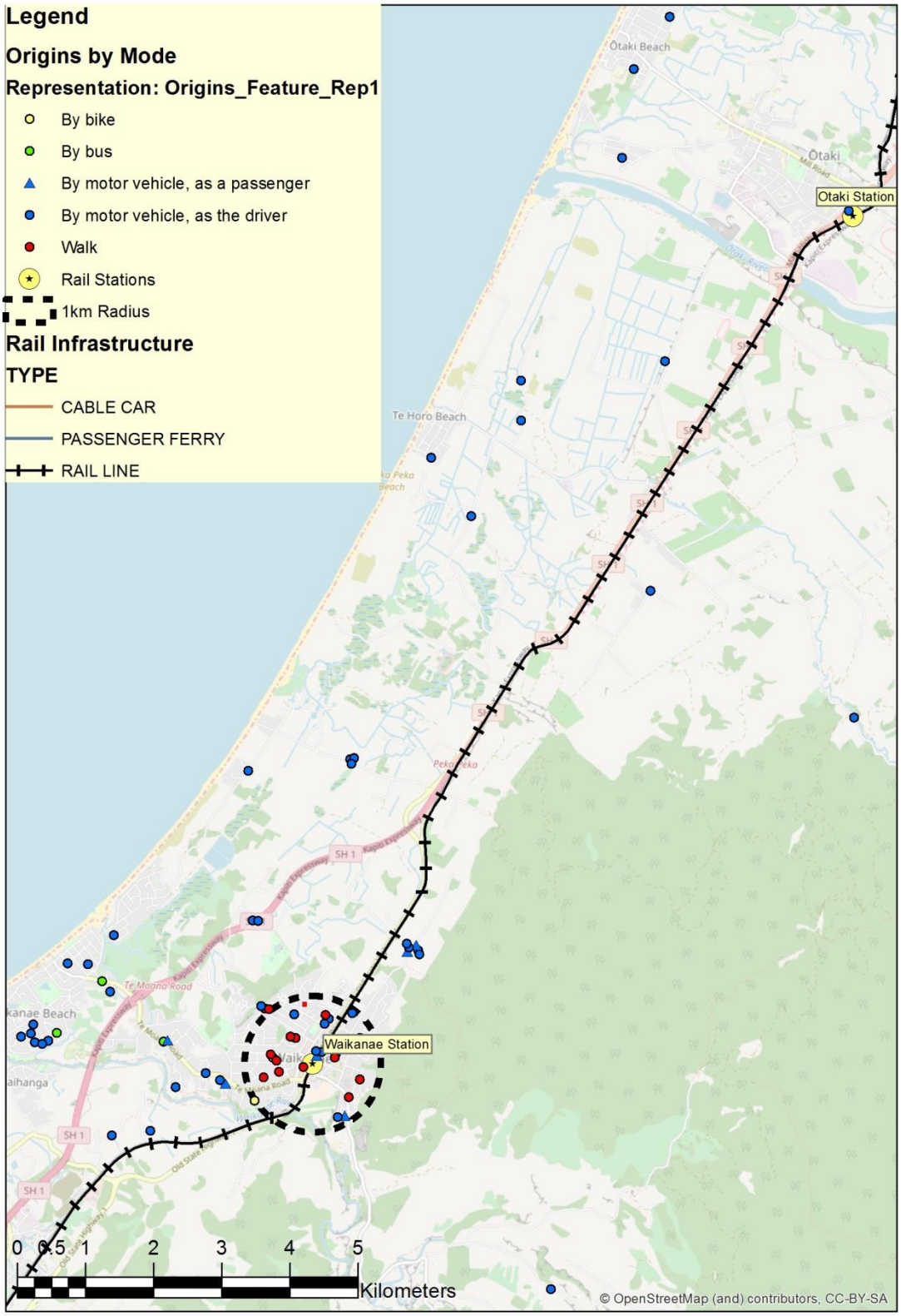

Figure 38: Access Mode Waikanae Station (large scale)

5. Summary

The main findings of this document can be summarised as follows:

From the time series data:

- Kapiti Line and Hutt Line show an increase in overall passenger numbers between 1996 and 2007. The numbers stagnate between 2007 and 2011 and increase again between 2011 and 2017.
- The increase of overall passenger numbers is greater on the Kapiti Line than on the Hutt Line, likely caused by a higher population growth rate at the Kapiti Coast.
- The share of people getting to the station in cars increased steadily from ~20% in 1996 to around 50% (Hutt Line) and 55% (Kapiti Line) in 2011. The 2017 data shows a further increase to ~60% on the Kapiti Line while there is no further increase on the Hutt Line.
- On both lines, the car mode share increased faster than the overall passenger numbers – i.e. not only the percentage, but also the number of passengers using other modes decreased.
- The number of people walking or taking the bus to access the rail network on both the Kapiti and Hutt Valley line has declined between 1996 and 2017, despite overall patronage growing by 15% (Hutt Valley) and 40% (Kapiti line) during the same period

From the 2017 Rail Survey data:

There are large variations along the Hutt Line:

- The largest station, Waterloo, sees almost two thousand passengers during the morning peak whereas the smallest stations, like Western Hutt, Epuni, Wingate and Manor Park are used by less than 150 passengers each.
- Access mode share varies widely from station to station and the car access mode share ranges from less than 20% to more than 50%.
- Stations with higher car access mode share, such as Waterloo, Petone, Taita, are generally stations with either larger parking facilities, higher service frequencies (higher service frequencies = more popular = more demand for P&R = more P&R supply) and in the case of some stations, strategic location and relatively small walk-up catchments (i.e. Melling)

Kapiti Line is split in two:

- Stations between Wellington and Porirua tend to have a higher walking mode share as compared to the stations from Porirua out to Waikanae; largely a function of the walk-up catchment areas associated with stations in the Tawa basin, low P&R provision and no significant greenfield development areas that might feed these stations.
- On the Kapiti Coast, both Paraparaumu and Waikanae stations have relatively low walk access mode share (and high car access mode share), a function of the relatively small walk-up catchment areas (particularly Paraparaumu) and greenfield developments / feeder areas such as Paraparaumu / Waikanae beaches that lend themselves to P&R.
- In Paraparaumu, however, around 25% of rail passengers access the rail station using the bus feeder network (bus services are free for those holding rail monthly pass tickets).

From the geospatial analysis:

- Catchments of the different stations overlap significantly in Lower Hutt and Porirua, but are relatively disjoint throughout the rest of the network.
- People often use the car to access the rail network, even if there is a station close to their home address.

Bibliography

[1] MWH_2008_Payment regime for commuter parking - Stage 1 General feasibility

[2] http://www.gw.govt.nz/assets/Transport/Regional-transport/Regional-Transport-Analysis/Analysis-of-the-Rail-Survey-data-201112.pdf

[3] www.gw.govt.nz/assets/2017-Rail-Survey-report20-07-2017.pdf