

# *Social needs for transport and gaps in transit service: Enniscorthy and other parts of County Wexford*

*Dr James Reynolds*

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## *Introduction*

Currie et al<sup>1</sup> developed a methodology for assessing spatial gaps between social needs for transport and transit supply, suggesting this would be “substantially more useful than the presentation of anecdotal evidence, which is the most common means of identifying transport needs in local transport studies through the world” (Currie 2010). While Currie et al reported results for Adelaide, Melbourne and Hobart in Australia, this approach does not appear to have been widely adopted or used in many other places to assess the extent to which public transport service provision is meeting communities’ needs for transport.

The CONUNDRUM project relates to sustainable transport, community mobility and co-creation, and is using Enniscorthy in County Wexford, Ireland, as a test bed. It does not appear that the Currie et al<sup>2</sup> methodology has been used in Ireland.

This note, therefore, applies the Currie et al methodology to Enniscorthy and County Wexford, using a recently developed package of software tools<sup>3</sup> that enable this analysis approach to be undertaken using General Transit Feed Specification (GTFS) data as an input. The next section of this note outlines the background, and describes the Transit Supply Index (SI) and categorisations, and Social Needs Index and categorisations developed by Currie et al. The methodology used for this analysis is then described, followed by the presentation of results. These include mapping and other reporting of transit supply and social need for

<sup>1</sup> “Quantitative Approaches to Needs Based Assessment of Public Transport Services: The Hobart Transport Needs Gap Study,” Journal Article, 2003, [https://www.semanticscholar.org/paper/2c049091caf56c66efc532ad2bdd774d8efc0eb/](https://www.semanticscholar.org/paper/2c049091caf56c66efc532ad2bdd774d8efc0eb;); “Gap Analysis of Public Transport Needs: measuring Spatial Distribution of Public Transport Needs and Identifying Gaps in the Quality of Public Transport Provision,” *Transportation Research Record* 1895 (2004): 137–46, doi:10.3141/1895-18; “Identifying Spatial Gaps in Public Transport Provision for Socially Disadvantaged Australians: The Melbourne ‘Needs Gap’ Study,” 2007; Graham Currie, “Quantifying Spatial Gaps in Public Transport Supply Based on Social Needs,” *Journal of Transport Geography* 18, no. 1 (2010): 31–41.

<sup>2</sup> “Quantitative Approaches to Needs Based Assessment of Public Transport Services”; “Gap Analysis of Public Transport Needs”; “Identifying Spatial Gaps in Public Transport Provision for Socially Disadvantaged Australians”; Currie, “Quantifying Spatial Gaps in Public Transport Supply Based on Social Needs.”

<sup>3</sup> See <https://github.com/James-Reynolds/gtfssupplyindex>

## *Background*

The Currie et al social needs-gap approach involves the calculation of three components for a particular area of interest:

- A Transit Supply Index (SI), based on the frequency and coverage of public transport services;
- A Social Needs Index, based on the combination of various indicators relating to the population living in each area of interest, and the distance between the area of interest and the centre of major urban areas;

- Categorising of each area of interest's SI and Social Needs Index scores based on city/county/state/district averages<sup>4</sup> so that areas with Very High social needs for transit, but Zero or Very Low levels of transit supply can be identified.

The SI score, Social Needs Index and other further details are described in the following.

### *Transit supply*

Supply Index (SI) scores are based on the number of transit service arrivals at stops in and around each area of interest. Adjustments are made for the amount of each area that is within a typical walking distance of each stop, according to the following formula:

$$SI_{area,time} = \sum \frac{Area_{Bn}}{Area_{area}} SL_{n,time}$$

where:

- $SI_{area,time}$  is the Supply Index for the area of interest and a given period of time;
- $Area_{Bn}$  is the buffer area for each stop (n) within the area of interest<sup>5</sup>;
- $Area_{area}$  is the area of the area of interest; and
- $SL_{n,time}$  is the number of transit arrivals for each stop within the given time period.

As such, the SI combines coverage (accessibility to transit) and service frequency (accessibility by transit) into a single indicator. It is a relative index, allowing comparison between different areas of interest, based on transit supplied over a specific time period. In the results reported in Currie (2010) transit supply was assessed based on an entire week, and compared across Census Collection Districts (CCDs) within Greater Melbourne. Figure 1 shows the resulting map of transit supply across Greater Melbourne. In general, areas of higher transit supply tended to be located in central areas and close to the suburban railway lines

### *Social needs for transport*

In Currie (2010) the Social Needs Index was similarly calculated for CCDs within Greater Melbourne, and was based on various metrics available from the Australian Bureau of Statistics (ABS). These included the Index of Relative Socio-Economic Advantage/Disadvantage

<sup>4</sup> Transit supply categories: Zero Supply, three equal categories with lower than the average SI score (Very Low, Low and Below Average) and three equal categories with higher than the average SI score (Above Average, High and Very High). Social Needs Index scores are similarly categorised into six groups (excluding the zero category).

<sup>5</sup> In Currie, "Quantifying Spatial Gaps in Public Transport Supply Based on Social Needs" this was based on a radius of 400 metres for bus and tram stops, and 800 metres for railway stations. The same definition is used here.

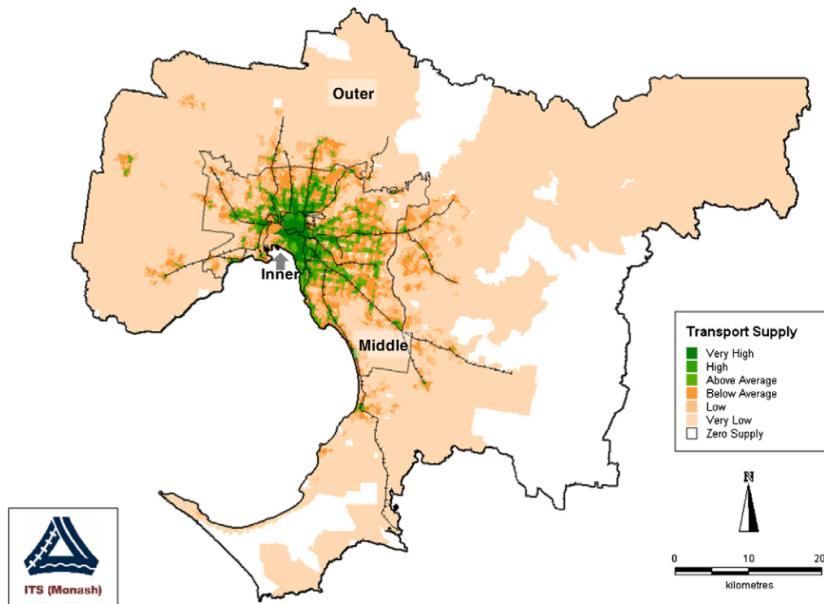


Figure 1: Melbourne 2006: distribution of transit supply

(IRSAD), which is reported directly by the ABS based on 31 weighted indicators and data collected during the census. A transport-specific need index, based on eight weighted indicators<sup>6</sup> was also included.

Figure 2 shows the resultant map of social needs for transport across Greater Melbourne. In general social needs tended to be higher in the middle northern, western and south-eastern suburbs, and in the outer north-east, south-east and south.

### *Needs-gaps*

The final step was to compare social needs for transport with the amount of transit supplied in each area of interest. Figure 3 maps CCDs with Very High needs, but Zero or Very Low supply, which tended to be in the outer north-west, south-east and south, and in the middle northern and western suburbs. A key finding was that "8.2% of Melbourne residents ha(d) 'very high' needs but 'zero', 'low' or 'very low' public transport supply", reflective of areas of greater need and least supply often being in places on urban fringes or otherwise often remote from transit infrastructure and services.

More broadly, it was suggested that the developed methodology might be "substantially more useful than the presentation of anecdotal evidence which is the most common means of identifying transport needs in local transport studies throughout the world"<sup>7</sup>.

<sup>6</sup> Adults without cars (0.19), distance to the Melbourne Central Business District (0.15), persons aged over 60 years (0.14), persons on a disability pension (0.12), low income households (0.10), adults not in the labour force (0.09), students (0.09) and persons 5-9 years (0.12).

<sup>7</sup> Currie, "Quantifying Spatial Gaps in Public Transport Supply Based on Social Needs."

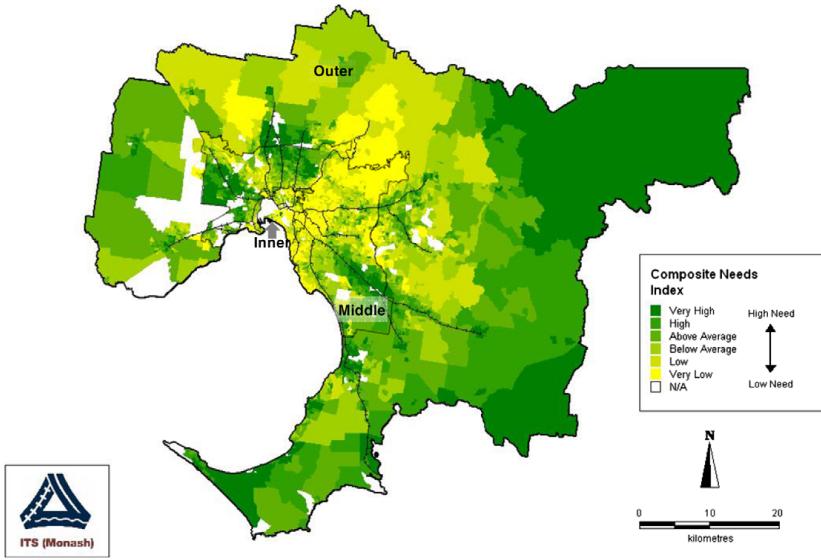


Figure 2: Melbourne 2006: social needs for transport

### R Package: gtfssupplyindex

Results reported by Currie et al were based on applying the SI and needs-gap analysis approaches to public transport timetable data, including a database provided by the Melbourne transit operator. This required bespoke data cleaning and analysis. However, in the intervening years public transport timetable and spatial data has become much more widely available because of the development of the General Transit Feed Specification (GTFS), which supports online route planning systems (such as Google Maps) and other analysis. GTFS provides a standardized format in which transit systems can release timetable, spatial and other data, which has been widely adopted around the world.

A set of software tools that allow GTFS datasets to be used as an input to SI and needs-gap calculation has recently been developed, and is reported in James Reynolds, Graham Currie, and Yanda Qu<sup>8</sup>. The tools are written in the R programming language<sup>9</sup>. Figure 4 shows an example of the output, being the transit supply across Greater Melbourne as it was in 2021.

Applying these software tools to the Ireland GTFS data provides the motivation for this work note, as discussed in the following section.

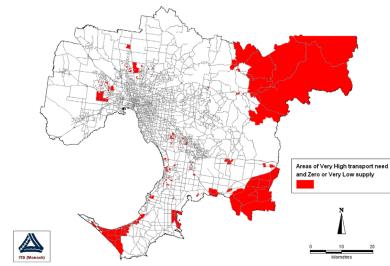


Figure 3: Melbourne 2006: CCDs with Very High needs and Very Low or Zero supply. Source: Currie (2010)

<sup>8</sup> "Social Needs for Transport and Gaps in Transit Service: New GTFS Tools," Submitted to Australasian Transport Research Forum. November, Auckland, NZ., under review.

<sup>9</sup> See <https://github.com/James-Reynolds/gtfssupplyindex>

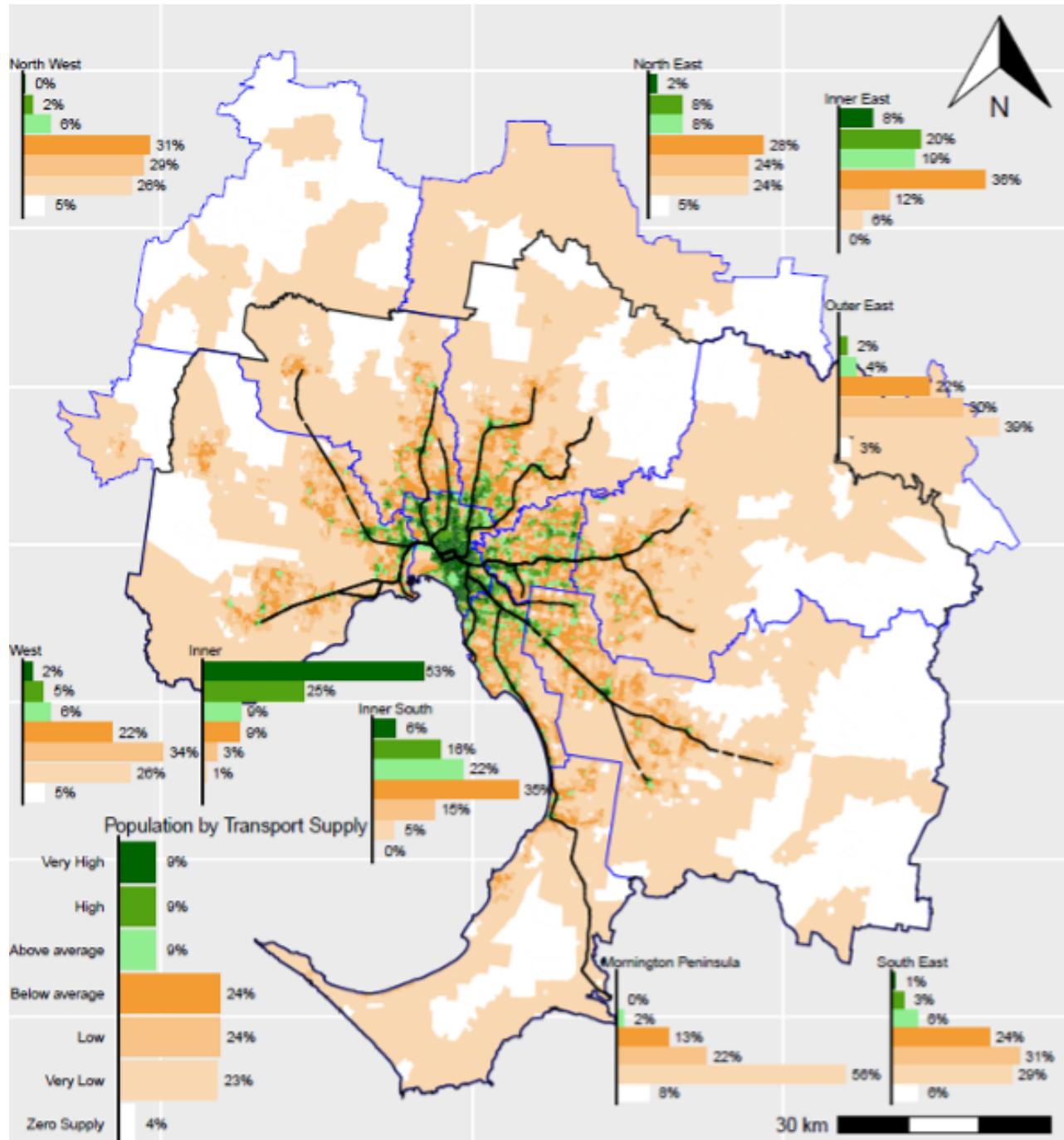


Figure 4: Melbourne 2006: CCDs with Very High needs and Very Low or Zero supply. Source: Currie (2010)

## *Methodology*

This analysis uses the all-Ireland GTFS dataset, as downloaded on April 23, 2025. It reports scores for transit services provided on that same date<sup>10</sup> with the “Small Area” National Statistical Boundaries from 2022 adopted as the areas of interest. Results for County Wexford are reported, with the allocation of scores to categories based on the average SI score across all of the Small Areas within the county.

Assessment of social needs for transport for Small Areas within County Wexford is based on various indicators reported in the 2022 Irish Census. Unfortunately the available indicators do not match those used in the Currie et al analyses, which were drawn from Australian censuses. However, there are some indicators that are similar<sup>11</sup>. As such, this analysis adapts the Currie (2007) approach and uses the same weighting for the following indicators: households without cars (0.19); distance to Wexford (0.15); persons aged 60 years and over (0.14), persons unable to work due to permanent sickness or disability (0.12), those aged 15 years or older who are not at work; students (0.09) and people aged 5-9 years (0.12). Each of these indicators were normalised across all of the Small Areas in County Wexford, weighted as indicated to develop a combined value that was then weighted by the total population in each Small Area to produce the indicator of social need for transport used in this analysis.

## *Results*

### *County Wexford*

TRANSIT SUPPLY: Figure 1 maps Small Areas across County Wexford by transit supply category. Table 1 shows summary statistics for SI score and population, overall and split by transit supply category.

The total population of County Wexford is 163,919, of whom 82% (134,542) live in Small Areas where the SI score is below the County Wexford average (21.3). This includes the 52,946 people (32%) who live in Small Areas with no transit at all.

<sup>10</sup> Being the first Wednesday after Easter

<sup>11</sup> Item T15\_1\_NC is the number of households without a motor car. Items T1\_1\_AGE60-64T, T1\_1\_AGE65-69T, ..., T1\_1\_AGE80-84T and T1\_1\_AGE85T report persons aged 60 years and older; T8\_1\_UTWSDT reports the total number of people unable to work due to permanent sickness or disability; T8\_1\_TT reports the total population aged 15 years and over, while T8\_1\_WT reports the total at work, thereby allowing calculation of the number of adults (15+) not in the labour force; T8\_1\_ST reports the number of people aged 15 years and over who are students; and T1\_1AGE5T, T1\_1AGE6T ... T1\_1AGE9T report the number of people aged 5 through 9. There does not appear to be any data available about low income households at the “Small Area” geographic area. As well, there does not appear to be a IRSAD or similar socio-economic indicator available.

Table 1: Summary statistics, SI & pop.

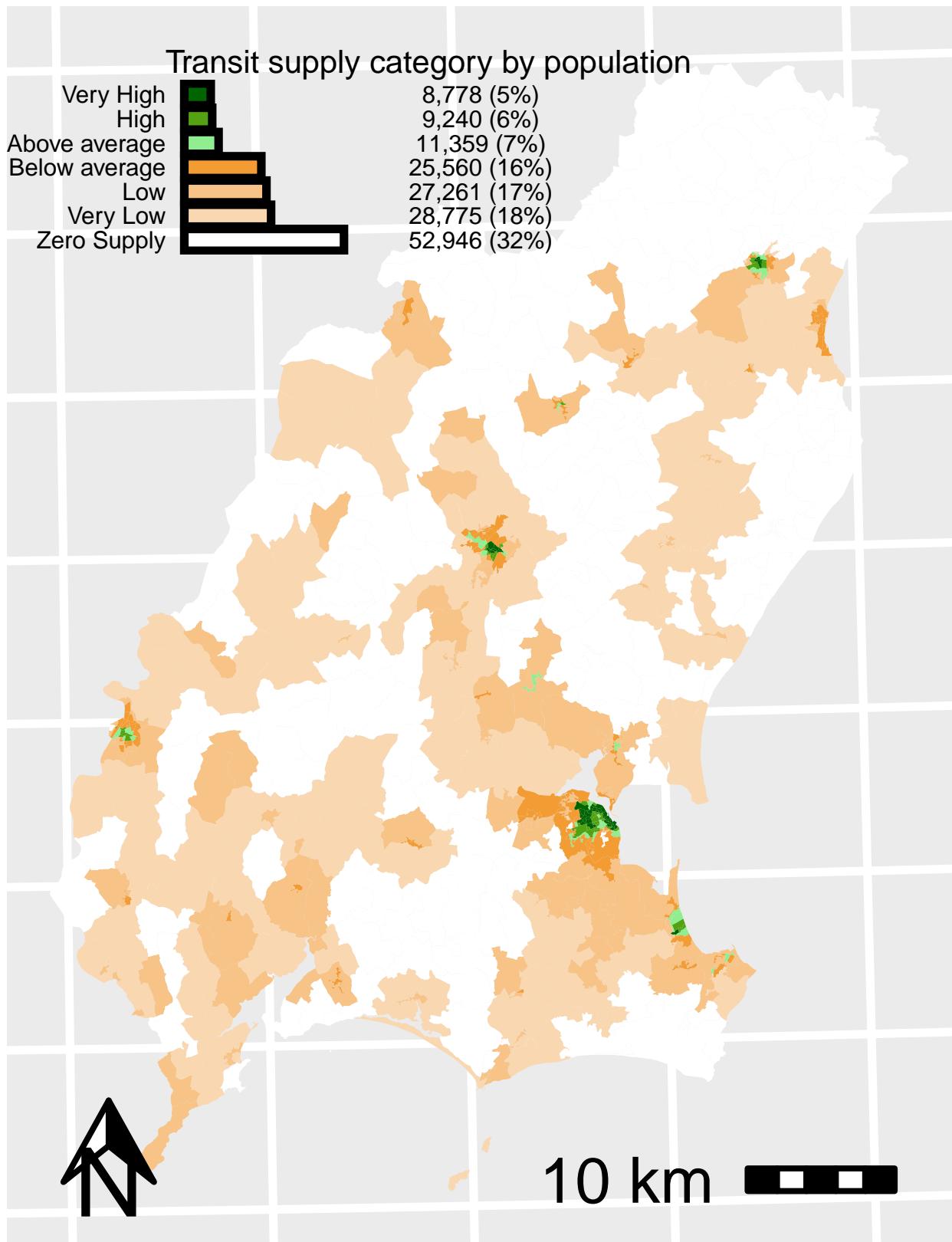


Figure 5: County Wexford: Small Areas by transit supply category

Characteristic	Overall N = 620	Transit supply category						
		Zero Supply N = 191	Very Low N = 102	Low N = 101	Below average N = 101	Above average N = 42	High N = 41	Very High N = 42
SI								
Min	0.0	0.0	0.0	0.8	10.0	31.5	54.9	91.7
Q1	0.0	0.0	0.1	1.4	13.3	35.5	61.9	115.4
Mean	21.3	0.0	0.3	3.9	19.1	40.5	68.5	151.3
Q3	23.1	0.0	0.4	6.4	23.8	45.1	75.1	181.7
100% Centile	280.9	0.0	0.8	10.0	30.5	53.6	88.4	280.9
Sum	13,219.3	0.0	29.8	395.7	1,929.9	1,699.6	2,810.1	6,354.1
population								
Min	73	73	121	135	105	97	127	93
Q1	203	217	221	216	187	220	177	150
Mean	264	277	282	270	253	270	225	209
Q3	311	321	338	318	299	294	276	240
100% Centile	623	623	545	552	548	525	369	510
Sum	163,919	52,946	28,775	27,261	25,560	11,359	9,240	8,778

A Lorenz Curve of distribution of County Wexford's transit supply to the population is shown in Figure 2. The Gini co-efficient is 0.80, indicating a relatively unequal distribution. In total, the SI score across all of County Wexford is approximately 13,000, but 40% of this goes to Small Areas that are home to just 5% of the total population. 85% of the population live in Small Areas that, in combination, receive just 25% of the total supply. This is perhaps not surprising, given that providing transit services in rural and low density areas is challenging.

Approximately 50% of the county's population (80,000 people) live in Small Areas that are within one of the 45 named 'urban areas' within the county. Figure 3 shows the total population and aggregate SI scores across each named urban area. Boxplots of the SI scores for Small Areas within each of the various urban areas are shown in Figure 5.

In general terms, places with larger populations tend to have higher SI scores, but this does not appear to be consistent. Instead, some places have much higher or lower SI scores than others with similar population sizes<sup>12</sup>. Towards the lower end of the scale, some urban areas have no transit at all, despite having higher populations than others that do have transit services<sup>13</sup>. Further details are provided in Table XX, in the Appendix.

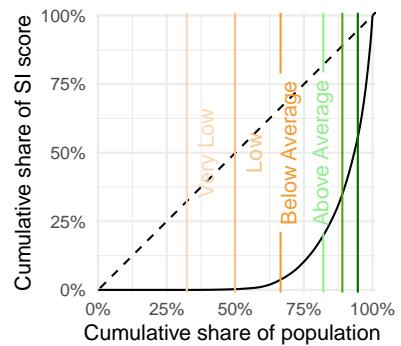


Figure 6: County Wexford: Lorenz curve

<sup>12</sup> For example, Rosslare (population 1,795) has an aggregate SI score of 419, which is 3.2% of the total for County Wexford. Castlebridge (population 1,850), however, has an SI of only 69 (0.5%) of the total for County Wexford.

<sup>13</sup> For example, Kilmuckridge (792) and Ballymurn (607) do not have any transit service at all, despite being of similar size to Taghmon (population 740), which has an SI score of 44 (0.3%) of the county total.

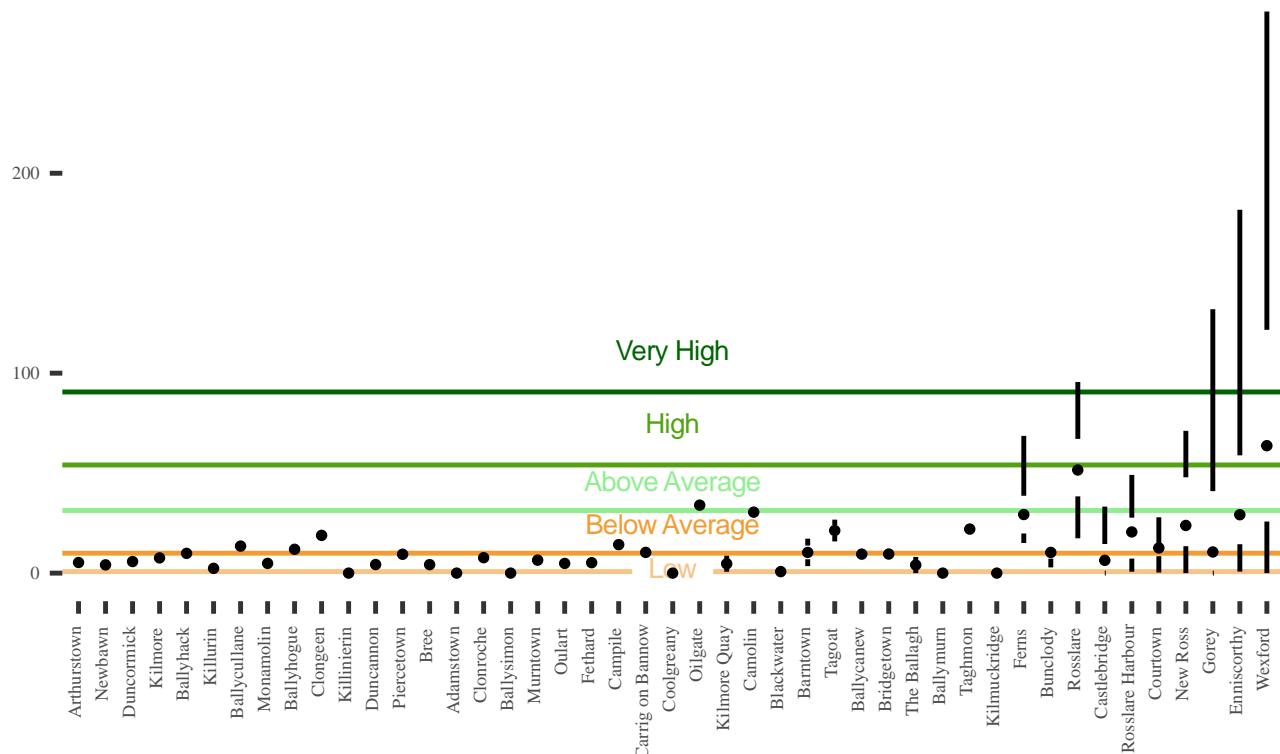
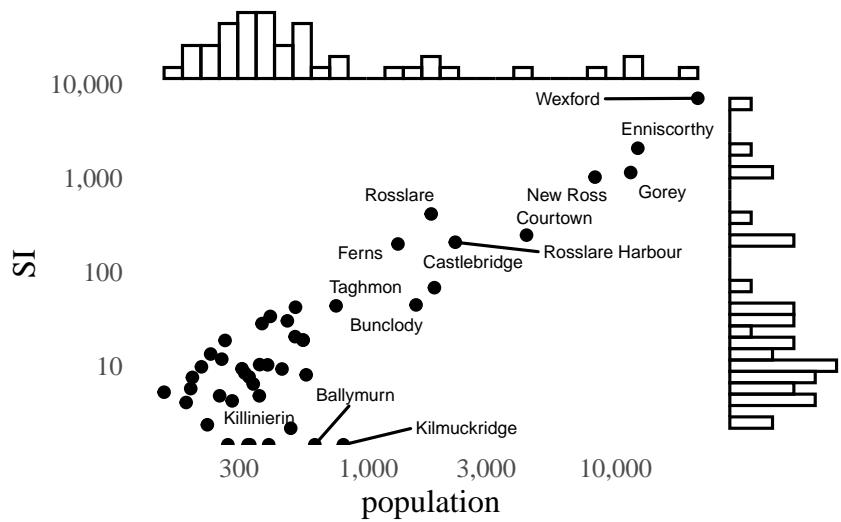


Figure 8: County Wexford urban areas: boxplot of Small Area SI scores, ordered by population size

SOCIAL NEEDS FOR TRANSPORT: The average social needs index score across County Wexford is 30.9. Figure 5 maps the social needs categories across County Wexford, while Figure 6 shows the grouping by population.

There are 90,203 people living in Small Areas that have social need for transport scores that are above the County Wexford average, representing some 55% of the total population (163,919). This includes the 36,511 people (22%) living in Small Areas with Very High social needs for transport.

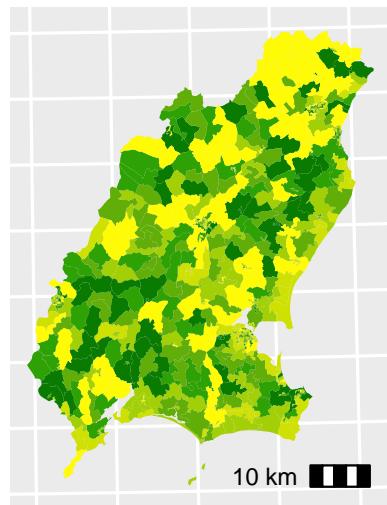


Figure 9: County Wexford: Small Area, by social need for transport category

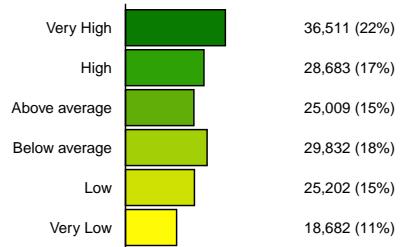


Figure 10: County Wexford: population living in Small Areas, by social need for transport category

NEEDS-GAP: Table 2 shows summary statistics for SI score and transit supply category, overall and split by social needs category, for Small Areas across County Wexford. Figure 7 shows boxplots of SI scores for Small Areas across County Wexford, by social need for transport category.

Table 2: Small Areas: SI score and transit supply category, by needs category.

Characteristic	Overall N = 620	Social needs category						p-value
		Very High N = 88	High N = 88	Above average N = 89	Below average N = 118	Low N = 118	Very Low N = 119	
SI								<0.001
Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Q1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
Mean	21.3	8.7	10.4	14.6	17.3	21.8	47.3	
Q3	23.1	4.6	8.1	12.6	19.9	28.0	77.3	
100% Centile	280.9	179.0	212.8	263.2	280.9	193.7	238.1	
Sum	13,219.3	761.5	915.1	1,296.8	2,041.4	2,571.7	5,632.8	
transit_supply								<0.001
Zero Supply	191 (31%)	35 (40%)	31 (35%)	33 (37%)	40 (34%)	30 (25%)	22 (18%)	
Very Low	102 (16%)	22 (25%)	20 (23%)	12 (13%)	16 (14%)	16 (14%)	16 (13%)	
Low	101 (16%)	12 (14%)	17 (19%)	17 (19%)	21 (18%)	22 (19%)	12 (10%)	
Below average	101 (16%)	11 (13%)	13 (15%)	17 (19%)	16 (14%)	22 (19%)	22 (18%)	
Above average	42 (6.8%)	6 (6.8%)	3 (3.4%)	4 (4.5%)	12 (10%)	12 (10%)	5 (4.2%)	
High	41 (6.6%)	1 (1.1%)	2 (2.3%)	3 (3.4%)	10 (8.5%)	10 (8.5%)	15 (13%)	
Very High	42 (6.8%)	1 (1.1%)	2 (2.3%)	3 (3.4%)	3 (2.5%)	6 (5.1%)	27 (23%)	

<sup>1</sup> n (%)

<sup>2</sup> Kruskal-Wallis rank sum test; Pearson's Chi-squared test

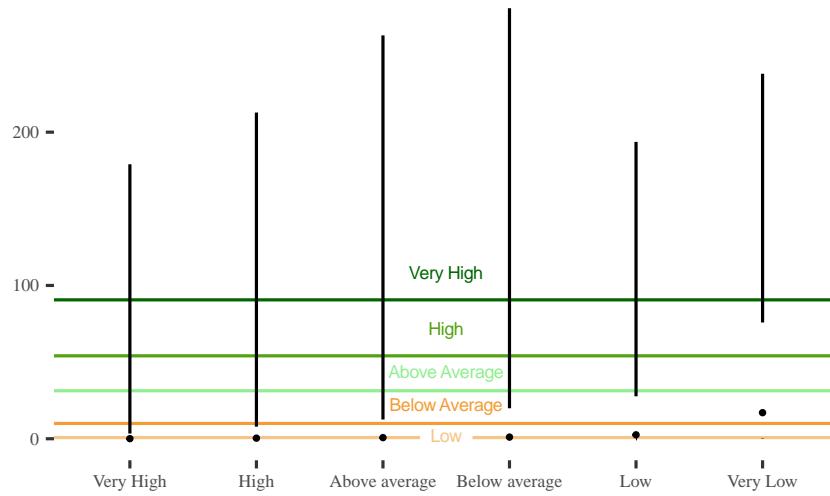


Figure 11: County Wexford, SI score by needs category

Differences in the SI score between Small Areas in different social needs categories are statistically significant<sup>14</sup>. The average SI score for Small Areas with Very Low social needs for transport is 47.3, compared to only 8.7 for those with Very High social needs for transport, which is the opposite to what might be desired to improve social equity.

<sup>14</sup> Kruskal-Wallis rank sum test(df=5)=49.0, p=0.0000

Differences in the share of Small Areas in each transit supply category across the different social need for transport groups were statistically significant<sup>15</sup>. However, exploring this as it relates to the population living in Small Areas with each combination of each combination of the transit supply and social need for transport categories, as shown in Table 1, may be of more interest.

<sup>15</sup>  $\chi^2(30) = 106.33, p < .001$

Table 1: County Wexford, population in each Transit Supply and Combined Needs grouping

Transit Supply Category	Combined Needs Index Category						Total
	Very High	High	Above average	Below average	Low	Very Low	
Zero Supply	39.7% (14,506)	34.4% (9,861)	37.0% (9,259)	33.2% (9,910)	25.0% (6,289)	16.7% (3,121)	32.3% (52,946)
Very Low	24.8% (9,039)	22.5% (6,446)	13.0% (3,246)	13.5% (4,015)	13.6% (3,437)	13.9% (2,592)	17.6% (28,775)
Low	13.6% (4,964)	19.6% (5,613)	19.4% (4,863)	17.6% (5,236)	18.5% (4,662)	10.3% (1,923)	16.6% (27,261)
Below average	12.5% (4,576)	15.3% (4,378)	18.6% (4,641)	13.2% (3,944)	18.0% (4,543)	18.6% (3,478)	15.6% (25,560)
Above average	7.0% (2,547)	3.5% (999)	4.6% (1,162)	10.7% (3,192)	10.5% (2,650)	4.3% (809)	6.9% (11,359)
High	1.0% (369)	2.1% (613)	3.6% (888)	8.9% (2,669)	9.0% (2,280)	13.0% (2,421)	5.6% (9,240)
Very High	1.4% (510)	2.7% (773)	3.8% (950)	2.9% (866)	5.3% (1,341)	23.2% (4,338)	5.4% (8,778)
Total	100.0% (36,511)	100.0% (28,683)	100.0% (25,009)	100.0% (29,832)	100.0% (25,202)	100.0% (18,682)	100.0% (163,919)

Some 14,506 people in County Wexford (9% of the total population) live in Small Areas with Very High Needs, but no transit supply. A further 9,039 (6%) live in Small Areas with Very High Needs, but Very Low Supply, while another 9,861 (6%) are in Small Areas with High Needs, but Zero Supply. These people are those with the largest needs-gaps in County Wexford, but outnumber those at the other end of the spectrum<sup>16</sup>. This relates to the general pattern that those with higher social needs for transport appear to be more likely to live in Small Areas with less transit supply. For example, 42% of those living in Small Areas with Very High social needs for transport had below average transit supplies, compared to just 70% of those living in Small Areas with Very Low social needs for transport. Out of the total 163,919 population of County Wexford, some 9,015 (5%) live in Small Areas with social needs for transport that are above the County average, but where there is no transit supply at all.

Figure 8 maps Small Areas across County Wexford by the magnitude of the needs-gap. In general it appears that Small Areas with larger needs gaps are in more rural areas, as might be expected given that these areas have little or no transit supply. However, at a county-

<sup>16</sup> Some 8,100 people live in Small Areas with Very Low needs and Very High or High supply, or Low needs and Very High supply, representing just 5% of the total population.

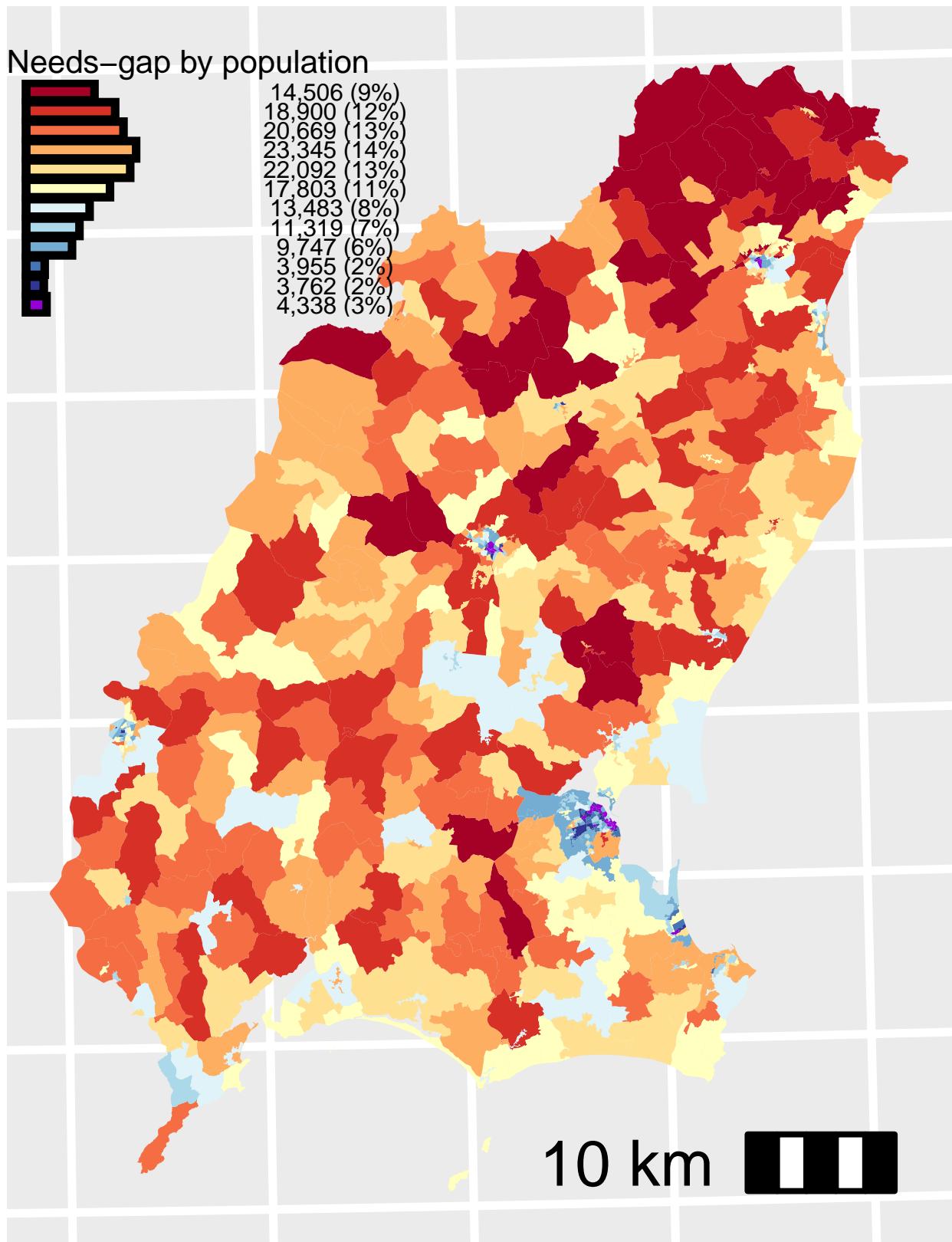


Figure 12: County Wexford, Needs-gap by Small Area (red = highest gap)

wide scale it is difficult to see the detail and make comparisons between the various urban areas. These are examined in the following.

### *Enniscorthy*

TRANSIT SUPPLY: Figure 9 maps Small Areas across Enniscorthy by transit supply category. Table 3 shows summary statistics for SI score and population, overall and split by transit supply category.

Table 3: Enniscorthy: summary statistics, SI & pop.

Characteristic	Overall N = 48	Transit supply category				
		Low N = 8	Below average N = 17	Above average N = 10	High N = 7	Very High N = 6
SI						
Min	0.8	0.8	10.8	31.5	58.7	91.7
Q1	13.9	1.9	15.0	32.7	59.4	99.4
Mean	43.8	5.6	19.7	39.2	68.6	141.8
Q3	59.1	8.3	26.6	47.2	77.3	169.0
100% Centile	181.7	9.0	30.0	49.4	82.6	181.7
Sum	2,102.3	45.1	334.1	391.6	480.5	851.0
population						
Min	93	251	150	205	127	93
Q1	184	287	215	223	168	142
Mean	256	332	281	241	203	174
Q3	299	369	311	252	230	184
100% Centile	548	491	548	285	312	296
Sum	12,310	2,658	4,781	2,406	1,420	1,045

The minimum SI score for Small Areas within Enniscorthy is 0.77, which is just higher than the upper threshold of the “Very Low” transit supply category (0.75). Hence, none of the 12,310 Enniscorthy residents live in Small Areas with “Very Low” or “Zero Supply” transit supply, although 60% (7,439) live in Small Areas where the SI score is below the County Wexford average (21.3).

A Lorenz Curve of distribution of Enniscorthy’s transit supply to the population is shown in Figure 11. The Gini co-efficient is 0.52, indicating that transit supply is more evenly distributed to the population than is the case across County Wexford as a whole. The SI score aggregated all of Enniscorthy is approximately 2,100, but 45% of this goes to Small Areas that are home to just 14% of the population. 19% of the population live in Small Areas that, in combination, receive just 3% of the total supply.

In general, and as shown in Figure 9, the transit supply in Enniscorthy appears to be higher in more central areas. Figure 12 plots SI score against distance to the main post office in Enniscorthy, which indicates that transit supply is High or Very High for almost all Small Areas with centroids closer than around 500 metres, yet these areas generally appear to have small populations. Further away from the centre of town, however, there appears to be less of a link between

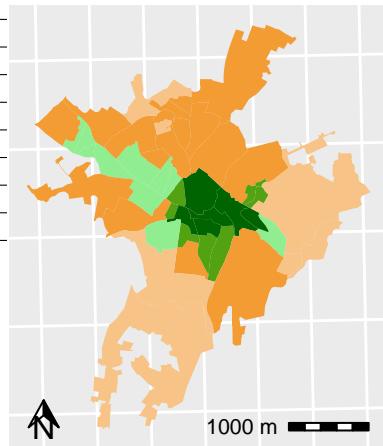


Figure 13: Enniscorthy: Small Areas by transit supply category

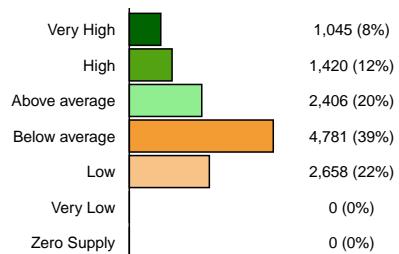


Figure 14: Enniscorthy: population by transit supply category

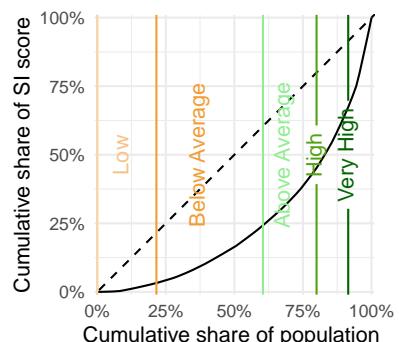


Figure 15: Enniscorthy: Lorenz curve

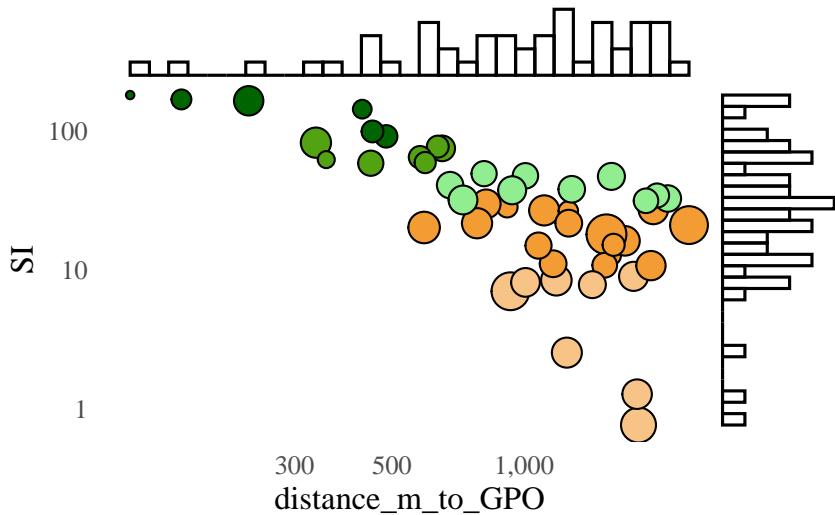


Figure 16: Enniscorthy: SI and distance (from Small Area's centroid) to post office, sized by population

distance and transit supply. Notably there appears to be a swathe of Small Areas with “Above Average” transit supply and populations in the 200-250 range, mostly located along a WNW corridor<sup>17</sup>, whereas northern, .

**SOCIAL NEEDS FOR TRANSPORT:** The average social needs index score across Enniscorthy is 29.4. Figure 13 maps the social needs categories across County Wexford, while Figure 14 shows the grouping by population.

There are 6,478 people living in Small Areas that have social need for transport scores that are above the County Wexford average, representing some 53% of the Enniscorthy population (12,310). This includes the 1,948 people (16%) living in Small Areas with Very High social needs for transport.

<sup>17</sup> Bellefield Road (R702).

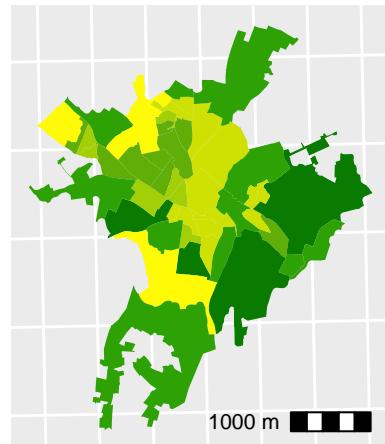


Figure 17: Enniscorthy: Small Area, by social need for transport category

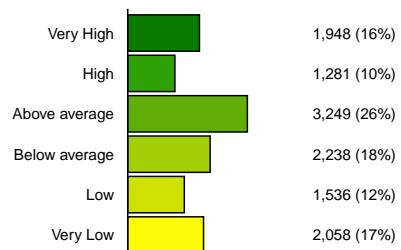


Figure 18: Enniscorthy: population living in Small Areas, by social need for transport category

NEEDS-GAP: Table 4 shows summary statistics for SI score and transit supply category, overall and split by social needs category, for Small Areas across Enniscorthy. Figure 15 shows boxplots of SI scores for Small Areas across Enniscorthy, by social need for transport category.

Table 4: Enniscorthy Small Areas: SI score and transit supply category, by needs category.

Characteristic	Overall N = 48	Social needs category						p-value
		Very High N = 4	High N = 4	Above average N = 11	Below average N = 9	Low N = 7	Very Low N = 13	
SI								0.007
Min	0.8	0.8	8.5	1.3	7.9	10.8	12.8	
Q1	13.9	3.9	14.4	8.2	15.0	31.5	28.4	
Mean	43.8	11.7	19.3	35.0	28.0	44.0	79.4	
Q3	59.1	19.6	24.3	32.0	38.2	58.7	99.4	
100% Centile	181.7	21.1	26.9	165.3	47.2	75.1	181.7	
Sum	2,102.3	47.0	77.3	385.1	252.2	307.8	1,032.8	
transit_supply								
Low	8 (17%)	2 (50%)	1 (25%)	4 (36%)	1 (11%)	0 (0%)	0 (0%)	
Below average	17 (35%)	2 (50%)	3 (75%)	4 (36%)	3 (33%)	1 (14%)	4 (31%)	
Above average	10 (21%)	0 (0%)	0 (0%)	1 (9.1%)	5 (56%)	4 (57%)	0 (0%)	
High	7 (15%)	0 (0%)	0 (0%)	1 (9.1%)	0 (0%)	2 (29%)	4 (31%)	
Very High	6 (13%)	0 (0%)	0 (0%)	1 (9.1%)	0 (0%)	0 (0%)	5 (38%)	

<sup>1</sup> n (%)

<sup>2</sup> Kruskal-Wallis rank sum test

## NULL

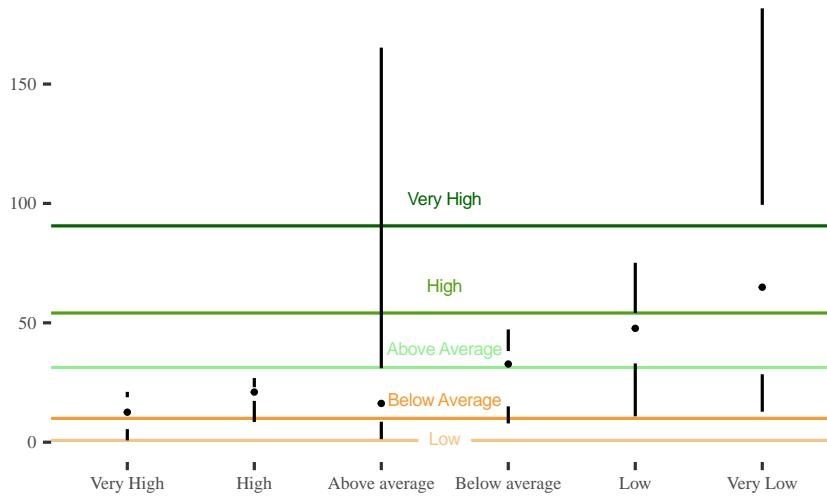


Figure 19: Enniscorthy, SI score by needs category

Differences in the SI score between Small Areas in different social needs categories are statistically significant<sup>18</sup>. The average SI score for Small Areas with Very Low social needs for transport is 79.4, compared to only 11.7 for those with Very High social needs for transport, which is the opposite to what might be desired to improve social equity.

<sup>18</sup> Kruskal-Wallis rank sum test(df=5)=16.1, p=0.0067

Differences in the share of Small Areas in each transit supply category across the different social need for transport groups were statistically significant<sup>19</sup>. Again, this is explored further with respect to the aggregate population in each combination of categories in the following.

Table 2: Enniscorthy, population in each Transit Supply and Combined Needs grouping

Transit Supply Category	Combined Needs Index Category						Total
	Very High	High	Above average	Below average	Low	Very Low	
Zero Supply	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)
Very Low	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)
Low	46.7% (909)	24.9% (319)	36.3% (1,179)	11.2% (251)	0.0% (0)	0.0% (0)	21.6% (2,658)
Below average	53.3% (1,039)	75.1% (962)	36.2% (1,177)	32.8% (734)	14.0% (215)	31.8% (654)	38.8% (4,781)
Above average	0.0% (0)	0.0% (0)	8.8% (285)	56.0% (1,253)	56.5% (868)	0.0% (0)	19.5% (2,406)
High	0.0% (0)	0.0% (0)	9.6% (312)	0.0% (0)	29.5% (453)	31.8% (655)	11.5% (1,420)
Very High	0.0% (0)	0.0% (0)	9.1% (296)	0.0% (0)	0.0% (0)	36.4% (749)	8.5% (1,045)
Total	100.0% (1,948)	100.0% (1,281)	100.0% (3,249)	100.0% (2,238)	100.0% (1,536)	100.0% (2,058)	100.0% (12,310)

Figure 16 summarises the magnitude of the needs-gap across the Enniscorthy population, while Figure 17 maps the needs-gaps. Although there are no Small Areas in Enniscorthy in the two largest needs-gaps categories (dark red, red), There are 5,836 people living in the Small Areas in the upper half of the needs-gaps categories (i.e. yellow or orange), being 47% of the total Enniscorthy population. As shown in the map in Figure 17, these people appear to mostly living in outer parts of Enniscorthy.

#### Comparing Enniscorthy to other urban areas

Figures 3 and 4, above, have provided some comparisons between transit supply in different urban areas. This section, however, compares transit service and needs-gaps in Enniscorthy with those in Wexford (population 21,524), Gorey (11,517) and New Ross (8,262). Together with Enniscorthy these urban areas are home to 53,613 people, which is 67% of the total county population.<sup>20</sup>

TRANSIT SUPPLY: Figure 18 shows maps of the transit supply for Small Areas in Wexford, Gorey and New Ross, while Figure 19 shows the share of population in each transit supply category. Table 5 shows summary statistics.

<sup>19</sup> Fisher's Exact Test for Count Data with simulated p-value (based on 2000 replicates), p=0.001

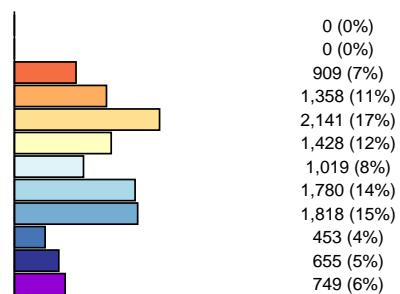


Figure 20: Enniscorthy: Needs-gap by population

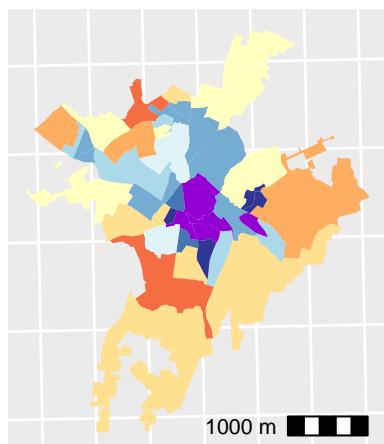


Figure 21: Enniscorthy: Needs-gap by Small Area

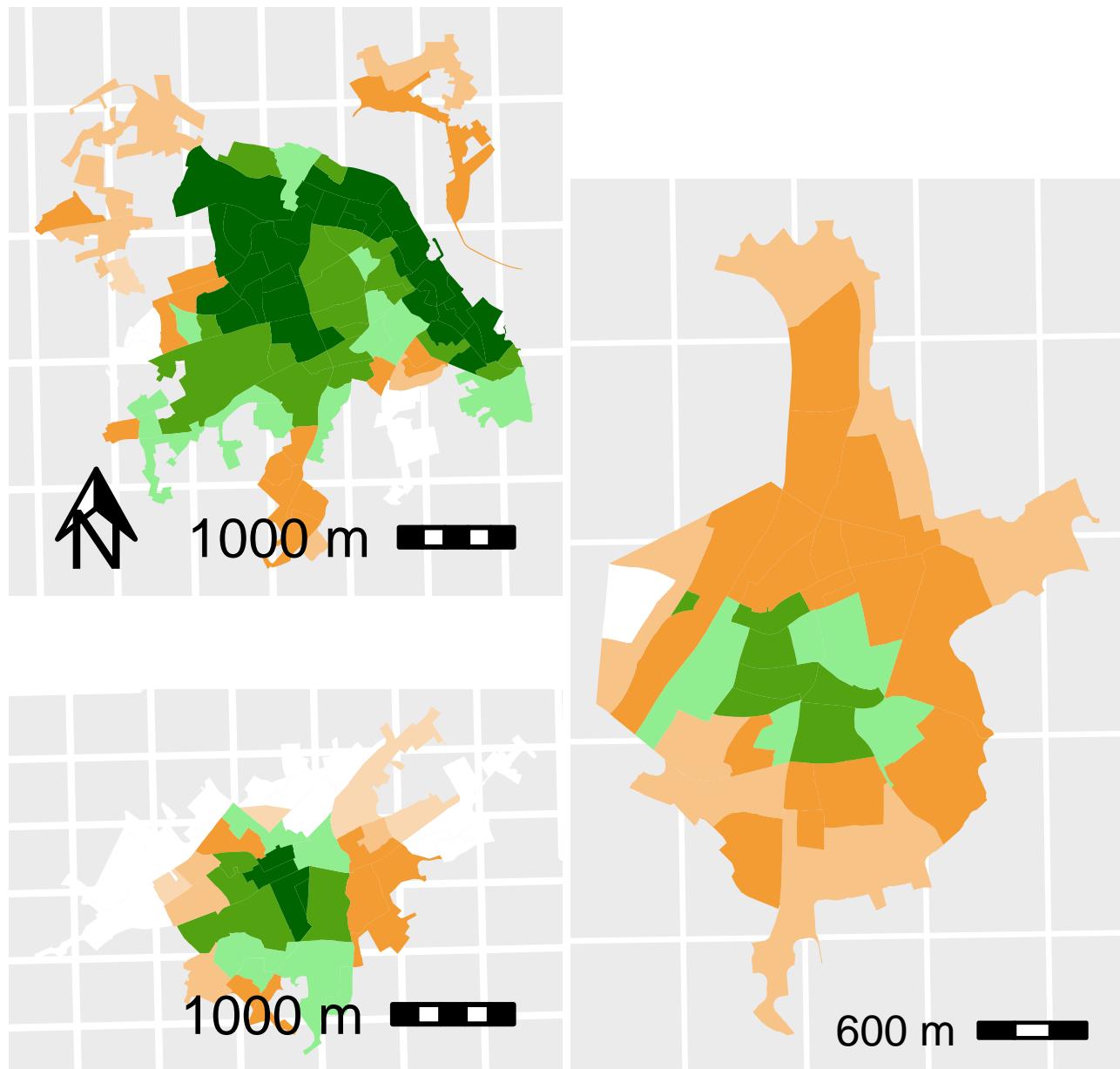


Figure 22: Wexford (top), Gorey (centre) and New Ross (bottom): Transit Supply by Small Area

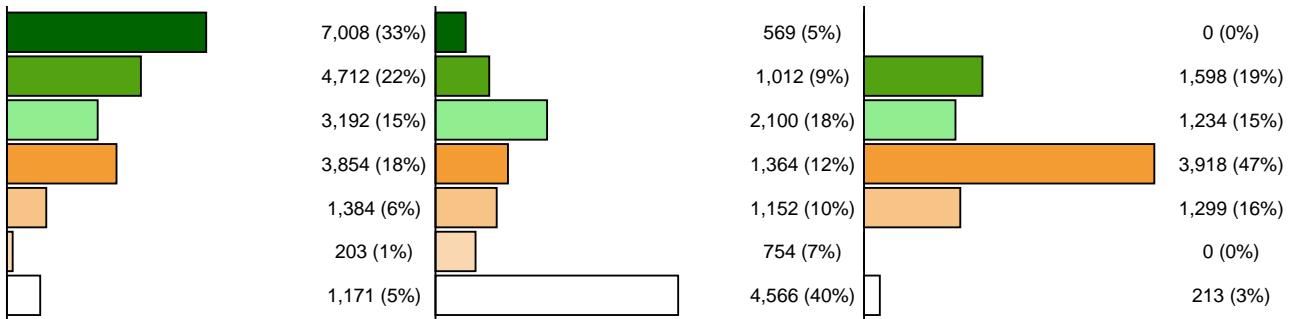


Figure 23: Wexford (l), Gorey (c) and New Ross (r): Transit Supply by population

Table 5: Enniscorthy, Gorey, New Ross and Wexford: Summary statistics.

Characteristic	Urban Area				p-value
	Enniscorthy N = 48	Gorey N = 39	New Ross N = 35	Wexford N = 89	
SI					<0.001
Min	0.8	0.0	0.0	0.0	
Q1	13.9	0.0	13.3	25.8	
Mean	43.8	29.7	29.6	80.4	
Q3	59.1	42.2	49.4	121.7	
100% Centile	181.7	132.0	71.2	280.9	
Sum	2,102.3	1,159.2	1,035.4	7,152.3	
transit_supply					
Zero Supply	0 (0%)	12 (31%)	1 (2.9%)	4 (4.5%)	
Very Low	0 (0%)	3 (7.7%)	0 (0%)	1 (1.1%)	
Low	8 (17%)	4 (10%)	5 (14%)	6 (6.7%)	
Below average	17 (35%)	6 (15%)	17 (49%)	14 (16%)	
Above average	10 (21%)	6 (15%)	5 (14%)	13 (15%)	
High	7 (15%)	4 (10%)	7 (20%)	20 (22%)	
Very High	6 (13%)	4 (10%)	0 (0%)	31 (35%)	
population					0.073
Min	93	124	127	97	
Q1	184	216	183	190	
Mean	256	295	236	242	
Q3	299	364	267	286	
100% Centile	548	623	394	510	
Sum	12,310	11,517	8,262	21,524	

<sup>1</sup> n (%)

<sup>2</sup> Kruskal-Wallis rank sum test

Despite having similar populations, the aggregate SI score for Gorey is only 55% of that for Enniscorthy. New Ross, in contrast, has an aggregate SI score that is 49% of that of Enniscorthy, despite having only a population that is 94% of the size of Enniscorthy.

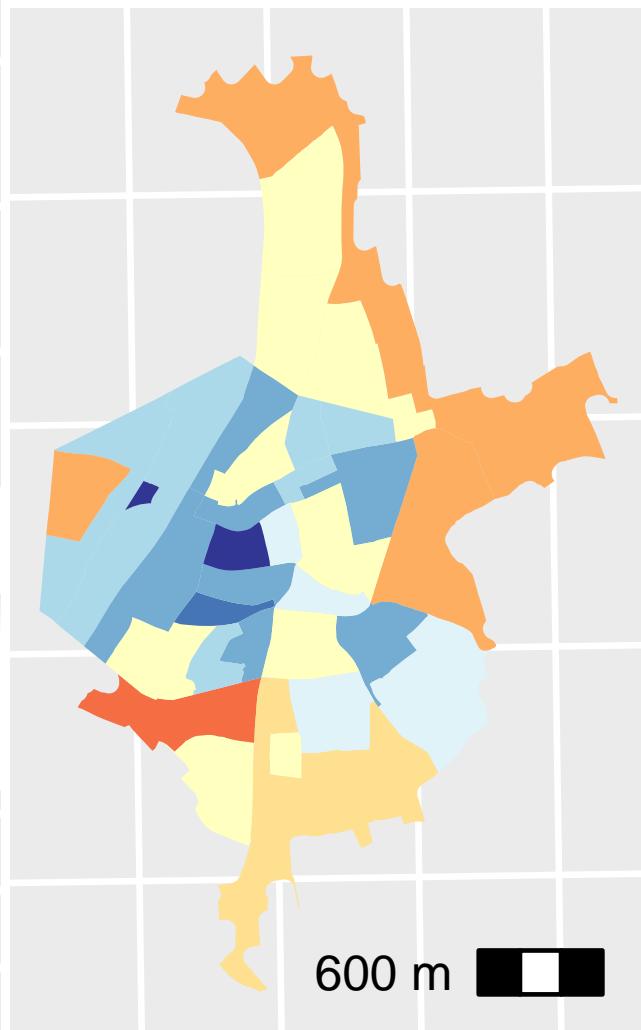
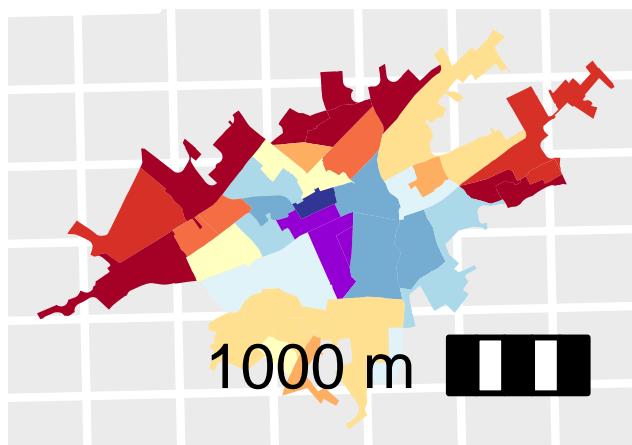
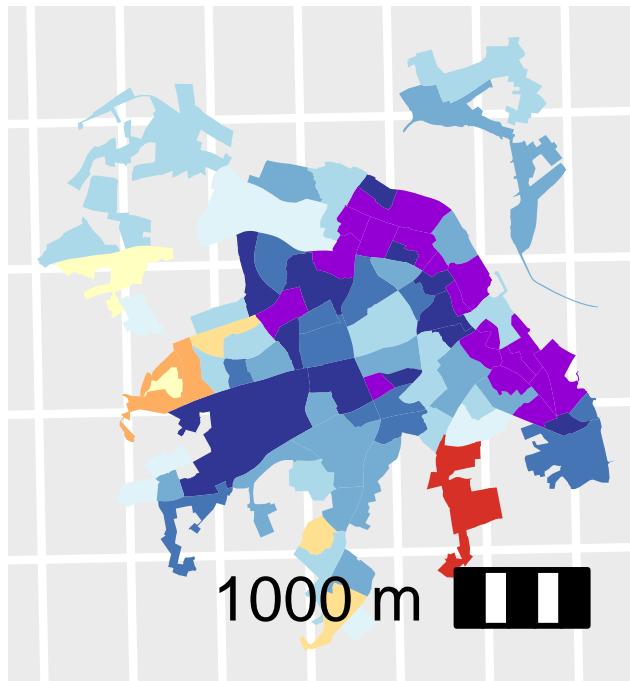
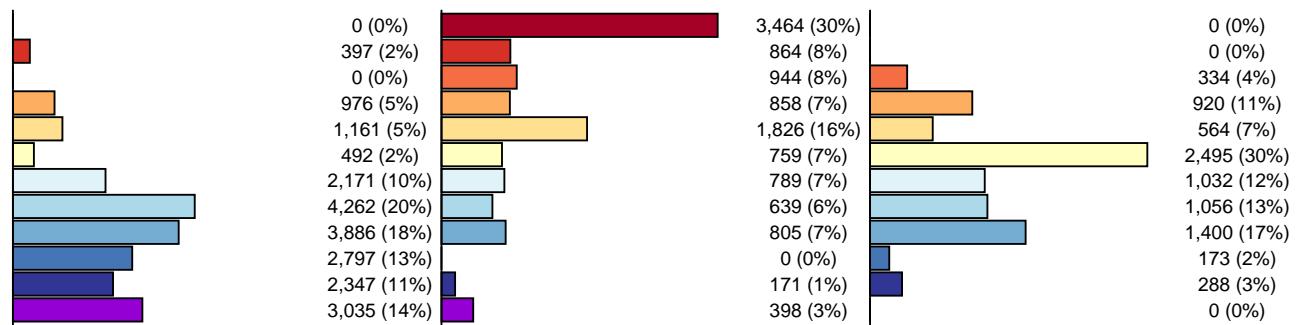


Figure 24: Wexford (top-left), Gorey (bottom-left) and New Ross (right): Needs-gap by Small Area

The geographic distribution of transit supply appears to be similar to that in Enniscorthy for the other three urban areas shown in Figure 19, with outer areas generally having less transit. However, Gorey for having 12 Small Areas with no transit supply at all, despite these areas being home to 40% of its population. In general, transit supply appears to be unevenly distributed to the population, especially in Gorey, as shown in the Lorenz Curves in Figure 20. The Gini co-efficient is lowest in New Ross (0.387), followed by Wexford (0.485) and Enniscorthy (0.516) and highest in Gorey (0.706).

Figure 21 shows the distribution of population to each of the needs-gaps groups, while Figure 22 shows maps for Wexford, Gorey and New Ross.



Differences in the share of Small Areas to needs-gap colour groups across Wexford, Gorey, New Ross (Figure 21) and Enniscorthy (Figure 16) are statistically significant<sup>20</sup>. Needs-gaps appear to be lowest in Wexford, then Enniscorthy and New Ross, and then highest in Gorey, where 76% of the population (8,715 people) are in the upper half of need-gap categories (yellow to dark red), including the 30% of the population (3,464 people) have Very High needs, but Zero Supply (dark red).

Differences between Enniscorthy and New Ross appear to be less pronounced, but are still statistically significant<sup>21</sup>. In Enniscorthy 47% of the population (5,836 people) are in the upper half of need-gap categories (yellow to dark red), whereas for New Ross it is 52% of the population (4,313 people).

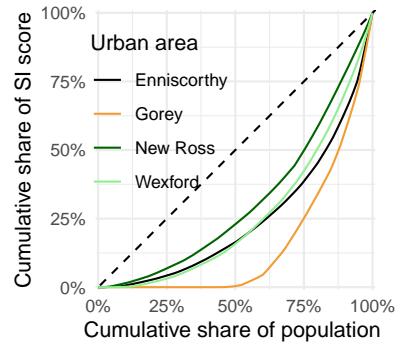


Figure 25: Enniscorthy, Gorey, New Ross and Wexford: Lorenz curves

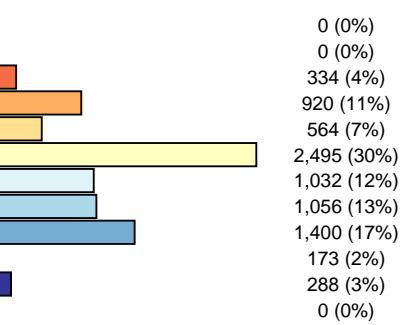


Figure 26: Wexford (l), Gorey (c) and New Ross (r): Needs-gap by population

<sup>20</sup> Fisher's Exact Test for Count Data with simulated p-value (based on 2000 replicates), p=0.000

<sup>21</sup> Fisher's Exact Test for Count Data, p=0.041.

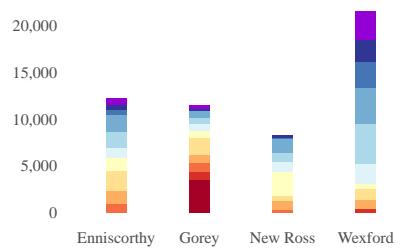


Figure 27: Needs-gap by population

## Appendix

Table 3: County Wexford: urban populations in each Transit Supply grouping

Urban area	Transit Supply category							Total
	Zero Supply	Very Low	Low	Below av.	Above av.	High	Very High	
Wexford	5.4% (1,171)	0.9% (203)	6.4% (1,384)	17.9% (3,854)	14.8% (3,192)	21.9% (4,712)	32.6% (7,008)	100.0% (21,524)
Enniscorthy	0.0% (0)	0.0% (0)	21.6% (2,658)	38.8% (4,781)	19.5% (2,406)	11.5% (1,420)	8.5% (1,045)	100.0% (12,310)
Gorey	39.6% (4,566)	6.5% (754)	10.0% (1,152)	11.8% (1,364)	18.2% (2,100)	8.8% (1,012)	4.9% (569)	100.0% (11,517)
New Ross	2.6% (213)	0.0% (0)	15.7% (1,299)	47.4% (3,918)	14.9% (1,234)	19.3% (1,598)	0.0% (0)	100.0% (8,262)
Courtown	0.0% (0)	4.2% (184)	24.6% (1,073)	71.2% (3,108)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (4,365)
Rosslare Harbour	0.0% (0)	8.3% (187)	30.6% (687)	36.2% (814)	24.9% (559)	0.0% (0)	0.0% (0)	100.0% (2,247)
Castlebridge	38.2% (706)	0.0% (0)	13.8% (255)	33.0% (611)	15.0% (278)	0.0% (0)	0.0% (0)	100.0% (1,850)
Rosslare	0.0% (0)	0.0% (0)	0.0% (0)	20.0% (359)	52.4% (940)	18.9% (340)	8.7% (156)	100.0% (1,795)
Buncloody	0.0% (0)	0.0% (0)	44.3% (690)	55.7% (869)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (1,559)
Ferns	0.0% (0)	0.0% (0)	0.0% (0)	69.1% (910)	18.9% (249)	12.0% (158)	0.0% (0)	100.0% (1,317)
Kilmuckridge	100.0% (792)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (792)
Taghmon	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (740)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (740)
Ballymurn	100.0% (607)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (607)
The Ballagh	49.1% (275)	0.0% (0)	50.9% (285)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (560)
Ballycanew	0.0% (0)	0.0% (0)	49.1% (267)	50.9% (277)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (544)
Bridgetown	0.0% (0)	0.0% (0)	50.6% (275)	49.4% (269)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (544)
Tagoat	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (507)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (507)
Barntown	0.0% (0)	0.0% (0)	66.3% (335)	33.7% (170)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (505)
Blackwater	0.0% (0)	67.6% (328)	32.4% (157)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (485)
Camolin	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (470)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (470)
Kilmore Quay	0.0% (0)	47.4% (212)	52.6% (235)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (447)
Oilgate	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (401)	0.0% (0)	0.0% (0)	100.0% (401)
Coolgreany	100.0% (395)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (395)
Carrig on Bannow	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (391)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (391)
Campile	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (371)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (371)
Fethard	0.0% (0)	0.0% (0)	100.0% (363)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (363)
Oulart	0.0% (0)	0.0% (0)	100.0% (362)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (362)
Murntown	0.0% (0)	0.0% (0)	100.0% (342)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (342)
Ballysimon	100.0% (331)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (331)
Clonroche	0.0% (0)	0.0% (0)	100.0% (329)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (329)
Adamstown	100.0% (326)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (326)
Bree	0.0% (0)	0.0% (0)	100.0% (316)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (316)
Piercetown	0.0% (0)	0.0% (0)	100.0% (308)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (308)
Duncannon	0.0% (0)	0.0% (0)	100.0% (281)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (281)
Killinierin	100.0% (270)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (270)
Clongeens	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (263)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (263)
Ballyhogue	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (255)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (255)
Monamolin	0.0% (0)	0.0% (0)	100.0% (250)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (250)
Ballycullane	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (230)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (230)
Killurin	0.0% (0)	0.0% (0)	100.0% (223)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (223)
Ballyhack	0.0% (0)	0.0% (0)	100.0% (211)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (211)
Kilmore	0.0% (0)	0.0% (0)	100.0% (194)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (194)
Duncormick	0.0% (0)	0.0% (0)	100.0% (191)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (191)
Newbawn	0.0% (0)	0.0% (0)	100.0% (183)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (183)
Arthurstown	0.0% (0)	0.0% (0)	100.0% (149)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (149)

Total	12.1% (9,652)	2.3% (1,868)	18.1% (14,454)	30.7% (24,531)	14.2% (11,359)	11.6% (9,240)	11.0% (8,778)	100.0% (79,882)
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