Identifying Urban Canopy Changes in the Perth and Peel Regions

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1. Summary

This report examines changes in urban tree canopy across the Perth and Peel regions between 2020 and 2024, using Urban Forest parcel data and 2021 ABS Census information. The analysis assesses canopy distribution across Local Governments, suburbs and land use types, and explores trends in population demographics in low-canopy areas. Overall canopy cover increased from 20.72% to 22.46% over the four-year period, but the growth was uneven and insufficient to address widespread canopy deficits in metropolitan areas. In 2024, 90.91% of Local Governments remained below the State's 30% canopy target, and 63.2% of suburbs recorded less than 15% cover. Canopy gains were largely reliant on peri-urban Local Governments containing State Forest, and residential street blocks had the greatest contribution to canopy declines.

Population analysis showed that low-canopy suburbs disproportionately accommodate residents. In the Perth and Peel regions, 39.73% of the population lived in suburbs with less than 10% canopy, while only 2.63% resided in suburbs above the 30% target. Aboriginal and Torres Strait Islander peoples and older residents were overrepresented in low-canopy areas, indicating inequitable access to urban tree benefits.

These findings demonstrate that recent canopy gains are not occurring where population exposure and heat risk are greatest. Achieving the State's 30% canopy target by 2040 will require coordinated action to retain existing trees and expand canopy within metropolitan areas, supported by consistent and accessible canopy data to monitor progress over time.

2. Introduction

Urban tree canopy provides benefits that substantially improve the liveability and sustainability of metropolitan regions. Not only do trees mitigate against climate change by reducing heat and improving biodiversity and air quality, but their presence also improves visual amenity and property values, as well as promoting physical and psychological wellbeing[1, 2]. Despite their widespread benefits, a declining canopy is of significant concern for the Perth and Peel regions. Previous analyses estimate that approximately 41% of urban Local Governments (LGs) in Western Australia have experienced a significant canopy decline, largely driven by clearing on the urban fringe and infill or redevelopment of existing properties in established suburbs[3, 4]. These losses have cumulative effects that are worsened by climate change, reducing urban liveability.

Local Governments recognise the importance of maintaining and increasing canopy cover but require robust and regular urban canopy data to inform strategic planning, policy and on-ground action. Comparability between years has been limited by the methodology revision in the 2024 Urban Monitor tree canopy data, published by the Department of Lands, Planning and Heritage (DPLH) in May 2025, following a four-year data gap. The revision aimed to provide future improvements in comparability by including all areas regardless of capture history or land use designation. However, it means the 2024 dataset is not directly comparable to previous years for all Local Governments. The inability to compare canopy changes over time restricts assessment of policy effectiveness and progress towards canopy targets, many of which fall between 20-30% by 2030-2050 for Perth LGs[5].

The purpose of this project is to identify how canopy cover has changed across the Perth and Peel regions between 2020 and 2024 and where those changes are occurring. Specifically, it investigates urban canopy across multiple geographic scales and land use categories. Comparing changes at the Local Government and suburb levels can identify priority areas for policy action. These key statistics

and trends are essential to guide future policy decisions, including planning mechanisms to retain existing trees and the strategic placement and investment in the planting of new trees.

3. Methodology

3.1. Data Collection

Urban canopy analysis was based on the 2020 and 2024 Urban Forest Parcel datasets, obtained as geodatabases through Landgate's SLIP system[6, 7].These datasets contained polygon-based vegetation mapping and were classified into Urban Forest land use categories derived from a combination of cadastre and Australian Bureau of Statistics (ABS) Mesh Block information. Urban Forest Parcel categories are assigned based on parcel centroids. The categories included were street block, parks, roads, other infrastructure, other, rural and water (Table 1). Rural, water and other infrastructure categories are published on the Urban Tree Canopy Dashboard (UTCD) for 2024 but not prior years.

Table 1. Summary of Urban Forest land category criteria

Category	Details
Street Block	Lots zoned for residential, commercial, industrial, hospital/medical, educational, some agricultural and transport uses
Roads	Reserved verges of roads and streets managed by State and local governments
Parks	Public parks, open space, private recreation grounds, State Forest
Other Infrastructure	Lots zoned for infrastructure and public utilities (excludes lots in 'Roads')
Water	Lots not included in 'Roads' or 'Other Infrastructure' or mainly covered in water
Rural	Lots not included in the above categories, zoned for agricultural or rural uses or described as rural
Other	All lots not included in the above categories

Mesh Block categories from the ABS were also incorporated for finer analysis to characterise the canopy within the street block land use. These categories reflected the dominant land use of all the parcels and other features in the mesh block area. Mesh Block categories included commercial, education, hospital/medical, industrial, other, parkland, primary production, residential, transport and water (Table 2).

Table 2. Summary of Mesh Block land category criteria

Category	Details
Commercial	Various businesses. Zero population count where possible
Education	Education facilities. May contain population in non-private dwellings (e.g., boarding schools, universities)
Hospital/Medical	Hospitals or medical facilities (e.g., aged care facilities)
Industrial	Various businesses. Zero population count where possible
Parkland	Parks, nature reserves, public open space, other minimal use protected or conserved areas. May include sporting arenas or facilities, including racecourses, golf courses and stadiums. Zero population count where possible
Primary Production	More than half the area is used for primary production
Residential	Houses, duplexes, apartments, townhouses, gated communities, caravan parks, retirement villages, residential military bases, and prisons
Transport	Road or rail features. Zero population count where possible
Water	Various bodies of water, including lakes, rivers and canals. Zero population count where possible

Other	Not easily placed in the above categories due to nature of land use or evidence of high mixed use

To examine potential demographic relationships, 2021 Census geopackages for Western Australia were downloaded from the Australian Bureau of Statistics[8]. Median age (from the G02 Selected Medians and Averages table) and total population were used as the primary demographic variables of interest because of their relevance in identifying vulnerable community groups. Other variables, such as median rent or income, were assessed but showed little correlation with canopy because they were more strongly influenced by other factors such as location (e.g., coastal proximity, distance to the CBD).

An exploratory analysis was also scoped to compare canopy on public versus private land, but multiple limitations ultimately made this unachievable. Access to Organisation Type Codes within the Land Tenure and Government Property Register datasets was heavily restricted, and joining ownership attributes to parcel-level canopy data across the entire Perth and Peel regions was not feasible due to the scale of the data, limited access to information and ownership complexity within some parcels. As such, public vs private comparisons were excluded from the final analysis and identified as a recommendation for future work.

Boundary layers were obtained from the 2021 ABS edition and used for mapping and spatial visualisation. It was noted that the 2020 Urban Forest data had originally been zoned using the 2016 ABS edition, which introduced additional steps to modify differences between versions.

3.2. Data Tidying and Analysis

Project analysis occurred in ArcGIS Pro and Microsoft Excel. All spatial datasets were first imported into ArcGIS Pro and clipped to the Perth and Peel Region Scheme boundary[9]. Parcels intersecting the boundary were manually inspected and removed where necessary. Given the large size of the original datasets, with approximately 852,000 parcels in 2020 and 928,000 in 2024, direct parcel-level analysis was not possible. Instead, summary statistics were generated in ArcGIS Pro to aggregate canopy area and total parcel area at the LGA, suburb, Urban Forest land use category and Mesh Block category levels. These summaries were exported into Microsoft Excel, where canopy percentage was recalculated for each group as the proportion of canopy relative to total parcel area. It was noted that percentages were calculated using aggregated parcel boundaries rather than administrative polygon boundaries, meaning the values represent canopy as a proportion of all parcels having data recorded within a region. Data cleaning included the manual removal of null fields, blank values and incomplete records produced during summarisation.

Several inconsistencies arising from differences in ABS editions and methodology required addressing during analysis. The 2024 Urban Forest dataset contained 413 suburbs, while the 2020 dataset included 409. Four suburbs (Bushmead, Doobarda, Garden Island, Lake Coogee) were present in the 2024 data but were previously omitted or did not exist. These suburbs were included in the 2024-only analyses but excluded from temporal comparisons to avoid artificial canopy change. All suburb-level maps used the 2021 ABS boundaries, which excluded Doobarda, Lesley, Oakley and Point Grey. In addition, some suburbs spanned multiple LGs or were grouped differently

between years. For example, some Town of Bassendean parcels were grouped under the City of Bayswater in 2024. As no authoritative source exists to reliably reassign parcels, original classifications were retained to minimise subjective reallocation and further inconsistencies.

When analysing by land use, some parcels that were wholly or partially water did not receive a Mesh Block assignment. These parcels were omitted from analyses involving Mesh Block categories because there was no valid attribute to which they could be assigned. Once inconsistencies were addressed, canopy summaries were combined with 2021 Census variables using ArcGIS Pro to examine potential demographic relationships. It was noted that nineteen suburbs lacked Census data during the analysis. Analytical outputs included summary tables, charts and maps depicting canopy cover, change and correlation to Census variables at multiple scales.

4. Results

4.1. Overall Canopy Cover

The analysis identified several key patterns in urban canopy cover across the Perth and Peel regions between 2020 and 2024. Overall canopy cover increased from an average of 20.72% in 2020 to 22.46% in 2024. However, this 1.79% growth was unevenly distributed across Local Governments, suburbs and land use types.

4.2. Canopy Cover by Region

4.2.1. Local Government Level

4.2.1.1. Canopy Cover Overview

Substantial variation in canopy distribution was observed across the 33 Local Governments analysed. In 2024, canopy cover ranged from below 10% in several coastal and central LGs to over 40% in peri-urban area (Figure 2). A total of 90.91% of LGs did not meet the 30% target in 2024, compared to 93.94% in 2020. Only Armadale, Kalamunda and Waroona currently surpass the State Government's benchmark of 30% canopy cover, noting that this target is for the collective Perth and Peel regions as a whole rather than individual LGs (Figures 1, 2).

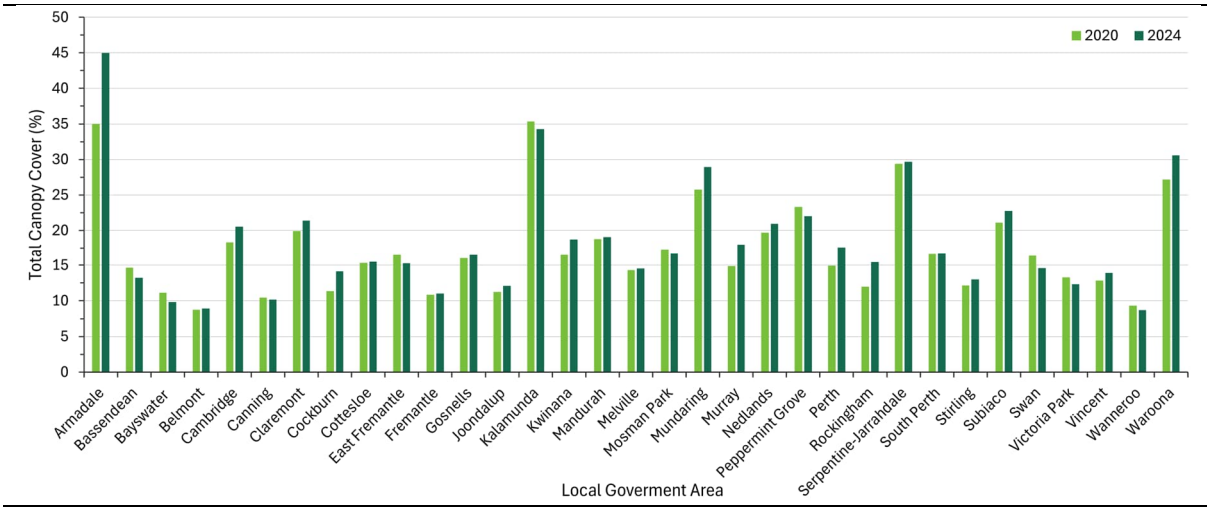


Figure 1. Total urban canopy cover (2020, 2024) across Perth and Peel Local Governments

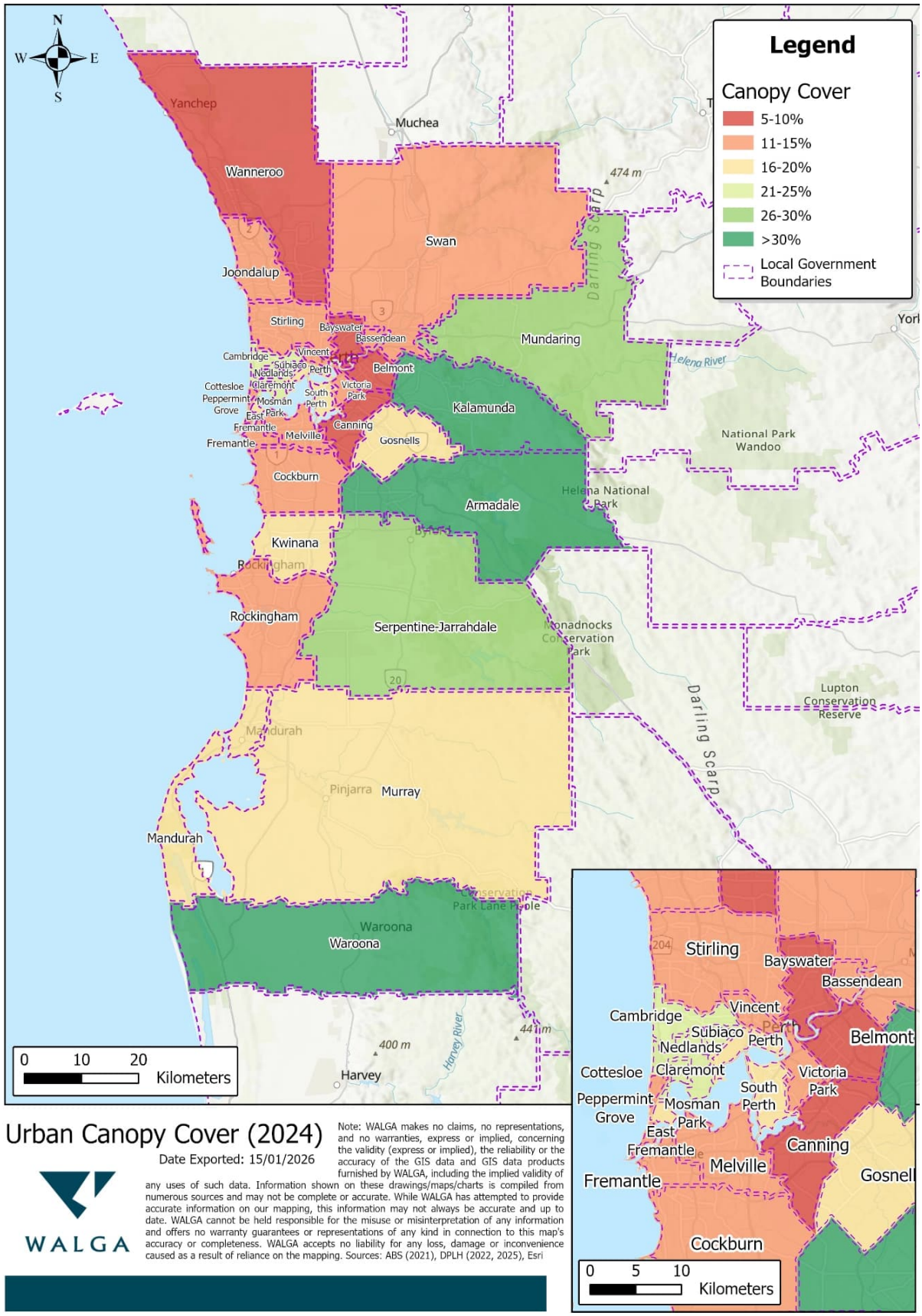


Figure 2. Total urban canopy cover (2024) across Perth and Peel Local Governments

Nearly half of the Local Governments (48.48%) remained below 15% canopy in both years, demonstrating limited movement across the lower brackets (Figures 3, 4). Across the study period, three LGAs moved downward into a lower canopy bracket, while five moved upward. These smaller shifts positively impacted the 21-25% and >30% brackets, which both gained a LG since 2020.

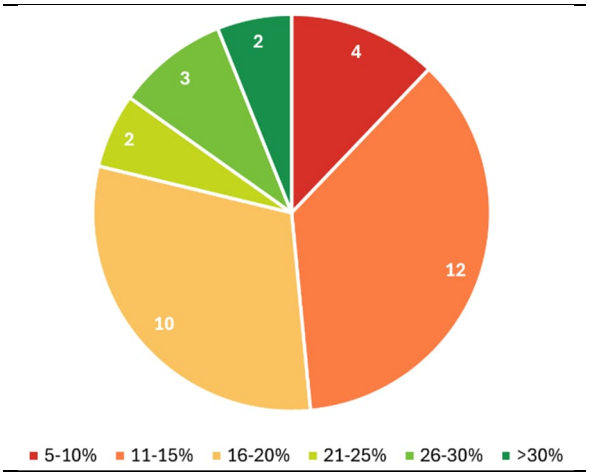


Figure 3. Number of Local Governments within each total urban canopy cover bracket (2020)

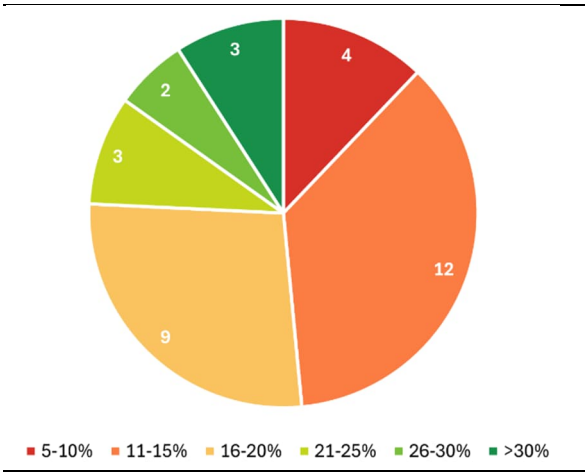


Figure 4. Number of Local Governments within each total urban canopy cover bracket (2024)

4.2.1.2. Canopy Cover Change

Every Local Government experienced canopy change across the four years (Figure 5). A total of 30.30% of LGs experienced canopy loss, with an average decline of -1.05% across 10 LGs. In contrast, 69.70% of LGs recorded canopy gains, with an average increase of +1.82% across the 23 LGs.

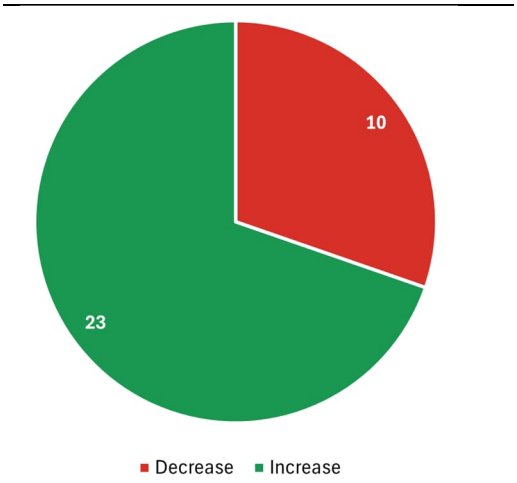


Figure 5. Number of Local Governments within each total urban canopy cover change type (2020-2024)

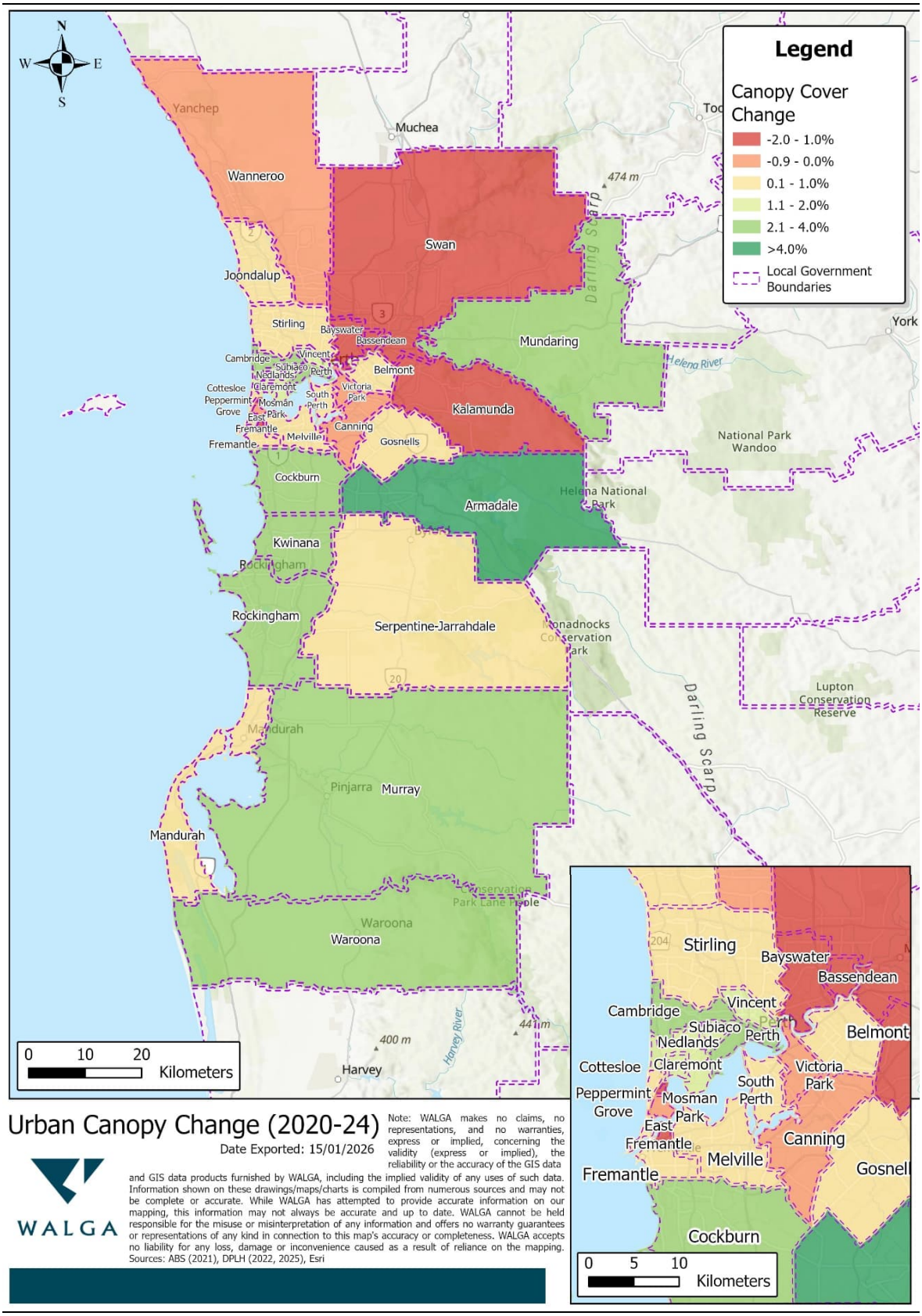


Figure 6. Total urban canopy cover change (2020-2024) across Perth and Peel Local Governments

4.2.1.3. State Forest Contribution

To determine the contribution of State Forests to overall canopy cover, the 33 Local Governments were divided into two groups. Six Local Governments with high State Forest area inclusion were identified and separated (i.e. Armadale, Kalamunda, Mundaring, Murray, Serpentine-Jarrahdale and Waroona) from the remaining 27 Local Governments. These six areas were mostly located in the Darling Scarp and the outer edges of the Perth and Peel boundaries.

The exclusion of naturally vegetated state land drastically lowered overall canopy cover. The LGs without State Forest recorded 14.93% canopy cover in 2020 and 15.39% in 2024. The City of Subiaco contained the largest average canopy cover with 22.78%, while the City of Wanneroo recorded the lowest with 8.72%. Canopy only improved by +0.46% across the four years, which is 1.33% lower than the region-wide average. The greatest increase was observed in the City of Rockingham, which grew by +3.43%. The largest decrease was within the City of Swan, whose canopy declined by -1.77%.

In contrast, the six Local Governments containing considerable State Forest recorded a +3.16% increase in canopy cover, which is 1.37% greater than the region average. Their canopy increased from 27.92% in 2020 to 31.08% in 2024, exceeding the State Government's 30% target. The City of Armadale recorded both the highest canopy cover (44.96%) and the largest increase (+9.96%) within the group. Of these six LGs, the Shire of Murray contained the lowest canopy of 17.98% and was the only LG with an overall canopy below 25%. The only canopy decline of the six LGs was within the Shire of Kalamunda, which lost -1.04% of recorded canopy.

The 15.69% difference between the two groups' average 2024 canopy highlights unequal canopy distribution and the possible reliance on large areas of State Forests to meet canopy targets. Additionally, 33.33% of LGs with little State Forest exhibited a canopy decline, compared to the 16.67% of LGs with extensive State Forest.

The highest canopy cover in Local Governments with State Forest was recorded in the park's land use, with an average of 43.47% in 2024 (Figure 7). This category had the largest contribution to overall canopy cover as it covered 46.35% of recorded land area. The water category had the lowest canopy cover (17.83% in 2024). Similarly, the street block land use also recorded low canopy cover (18.09%) and was the only category that exhibited a canopy decline (-1.44%). This canopy decrease may be attributed to the -3.40% decline in land size between analysed years. It was noted that only one of the six LGs (Kalamunda) had data for the 2024 'other' land use, skewing the visual depiction.

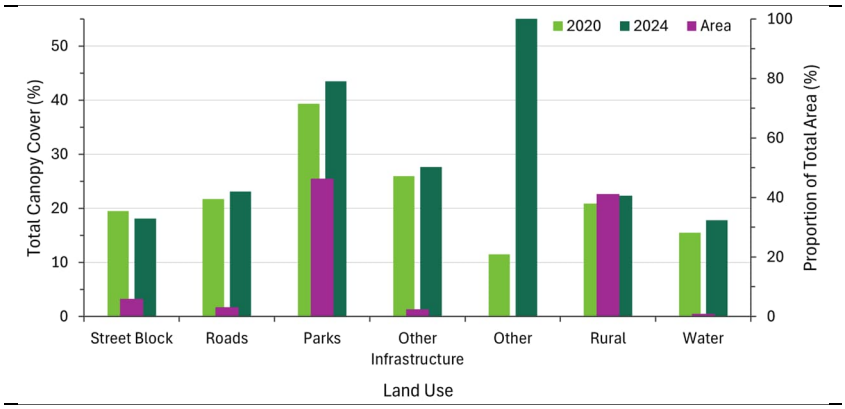


Figure 7. Local Governments with State Forest's total canopy cover (2020, 2024) and relative land area (2024) across Urban Forest land use categories

Local Governments without large State Forest areas also recorded the highest canopy cover and area proportion in the parks land use, with 2024 values of 23.56% and 33.15%, respectively (Figure 8). Street blocks contained the lowest canopy of 11.70% in 2024 and covered 28.40% of total land area. A -0.57% decline in canopy cover was observed from 2020. Similarly, the water land use declined in canopy cover by -0.79% from 2020 to 2024. The largest canopy growth (11.25%) occurred in the other land use, but its overall contribution was minimal as it covered 0.11% of the total area and lacked consistent data for 21 LGs.

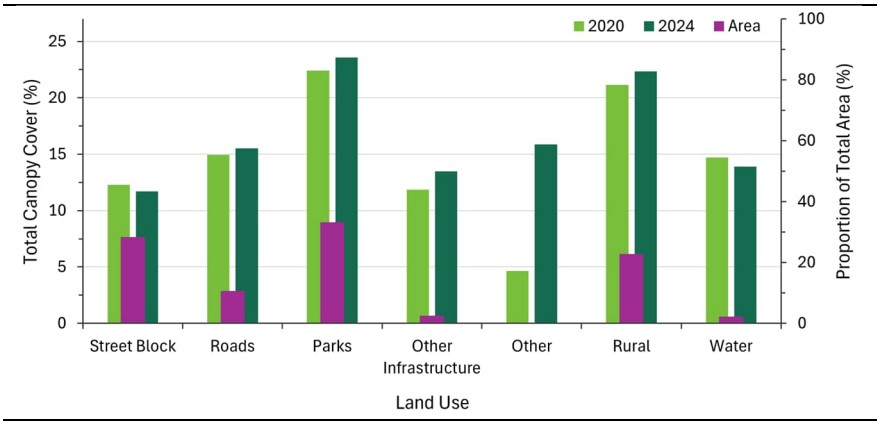


Figure 8. Local Governments without State Forest's total canopy cover (2020, 2024) and relative land area (2024) across Urban Forest land use categories

4.2.1.4. Local Government Case Studies

Variation between Local Governments is further illustrated through three selected case studies. The City of Armadale recorded the highest canopy in 2024 (44.96%) and the largest increase across the region (+9.96%) (Figure 9). Street blocks and other were the only Urban Forest land use categories that declined in canopy cover, decreasing by -0.69% and -0.03% respectively. All other land uses exhibited a growth in canopy cover, with the highest increase in parks (+12.81%), which covered 66.93% of all recorded parcels. Although rural and other infrastructure land categories also recorded high canopy (38.64% and 40.79%, respectively), their contribution was limited by their total area proportion (12.51% and 3.18%, respectively).

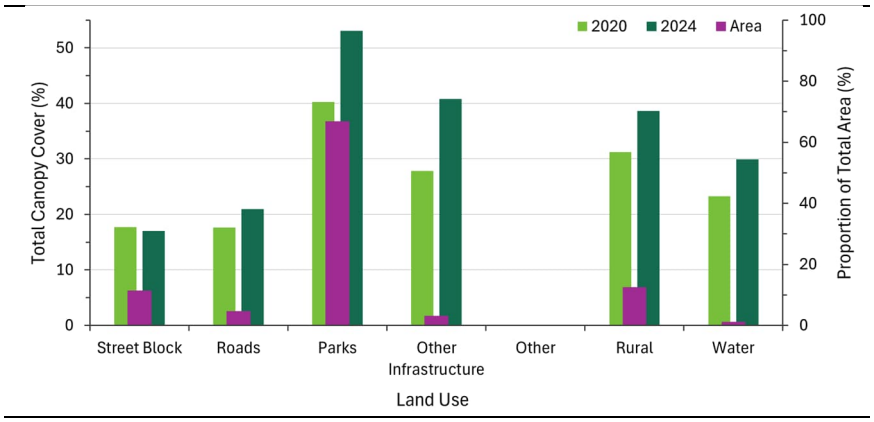


Figure 9. City of Armadale's canopy cover (2020, 2024) and relative land area (2024) across Urban Forest land use categories

The City of Wanneroo recorded the lowest overall canopy cover of all Local Governments (Figure 10). Its 2024 canopy cover was 8.72% in 2024, which declined from 9.34% in 2020. The other land use recorded the highest canopy (29.91%), which had a +28.19% growth from 2020. However, it had little overall contribution because it covered >0.001% of Wanneroo's total area. Despite parks covering the highest proportion of total area (52.84%), the land use only had 9.66% canopy cover in 2024.

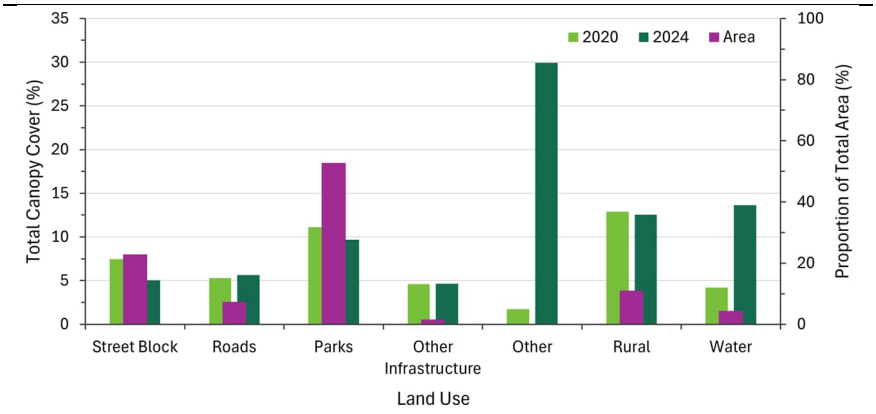


Figure 10. City of Wanneroo's canopy cover (2020, 2024) and relative land area (2024) across Urban Forest land use categories

Although the City of Swan had 14.60% canopy in 2024, its decline of -1.77% was the largest of all analysed Local Governments (Figure 11). However, less than half (42.86%) of its recorded Urban Forest land categories contributed to the loss. The park's land use experienced a -3.40% drop in canopy and covered 36.27% of Swan's total documented area. Similarly, rural areas declined by -1.41% and covered 42.92% of the total land. In contrast, the areas that experienced an increase in canopy had little overall contribution because of their smaller land sizes. For example, canopy in the other land category grew by +3.11% but only covered 0.09% of Swan's total recorded area.

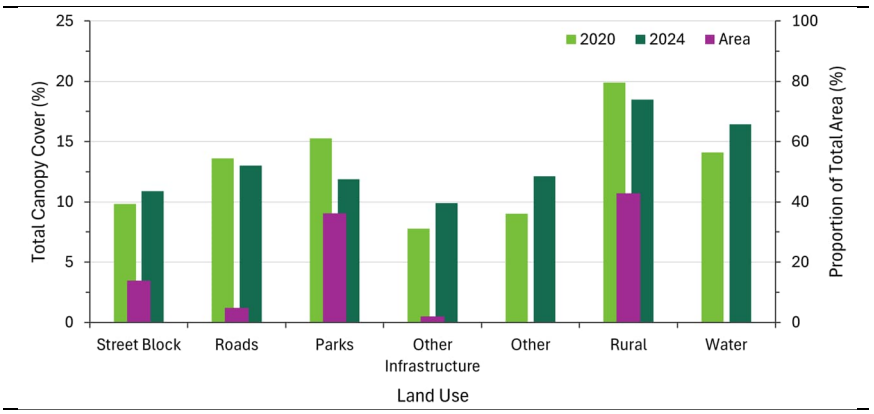


Figure 11. City of Swan's canopy cover (2020, 2024) and relative land area (2024) across Urban Forest land use categories

4.2.2. Suburb Level

4.2.2.1. Canopy Cover Overview

A suburb-level analysis of canopy cover followed similar trends to the Local Government analysis, but with greater variation. In 2024, canopy cover ranged from 0.93% to 69.73% across the region (Figure 16). A total of 89.35% of suburbs did not meet the State Government's 30% target in 2024, which marginally decreased from 89.98% in 2020. This -0.63% shift reflected canopy increases in Hovea and Wungong and the inclusion of Bushmead as a new suburb. Over half of all suburbs (63.20%) had canopy cover below 15% in 2024, compared to 67.24% in 2020 (Figures 12, 13). Additionally, almost a third of all suburbs (31.48%) had canopy below 10% in 2024, and 7.26% had canopy below 5%.

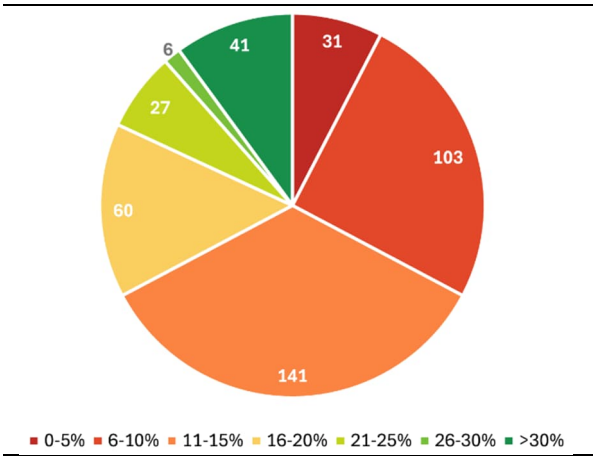


Figure 12. Number of suburbs within each total urban canopy cover bracket (2020)

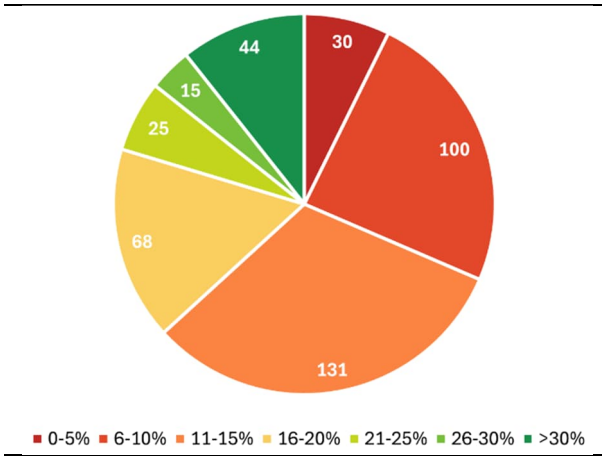


Figure 13. Number of suburbs within each total urban canopy cover bracket (2024)

Despite only 44 suburbs (10.65%) containing canopy above 30%, the bracket covered the largest proportion (25.29%) of recorded land area in 2024 (Figure 15). In 2020, suburbs containing 11-15% canopy covered 31.08% of recorded land, which decreased to 20.30% in 2024 (Figures 14, 15). This -10.78% decrease led to a +5.90% area increase for the 16-20% canopy bracket, and a +5.19% increase for 6-10% canopy.

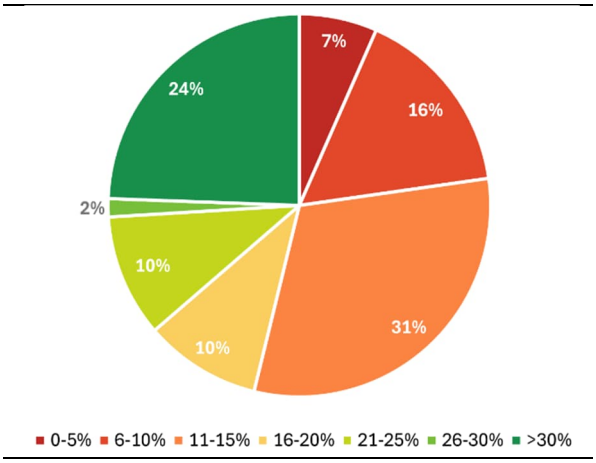


Figure 14. Area proportion of suburbs within each total urban canopy cover bracket (2020)

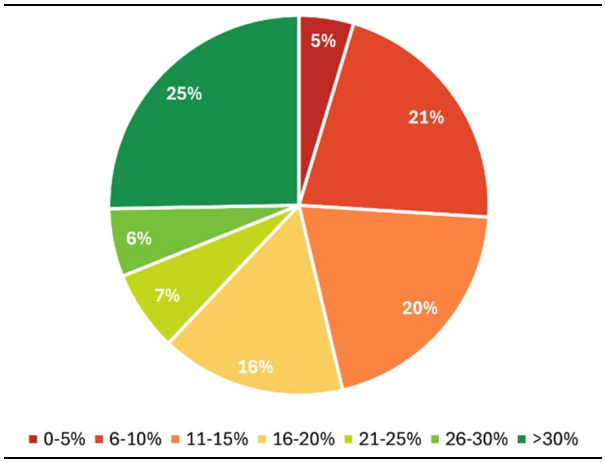


Figure 15. Area proportion of suburbs within each total urban canopy cover bracket (2024)

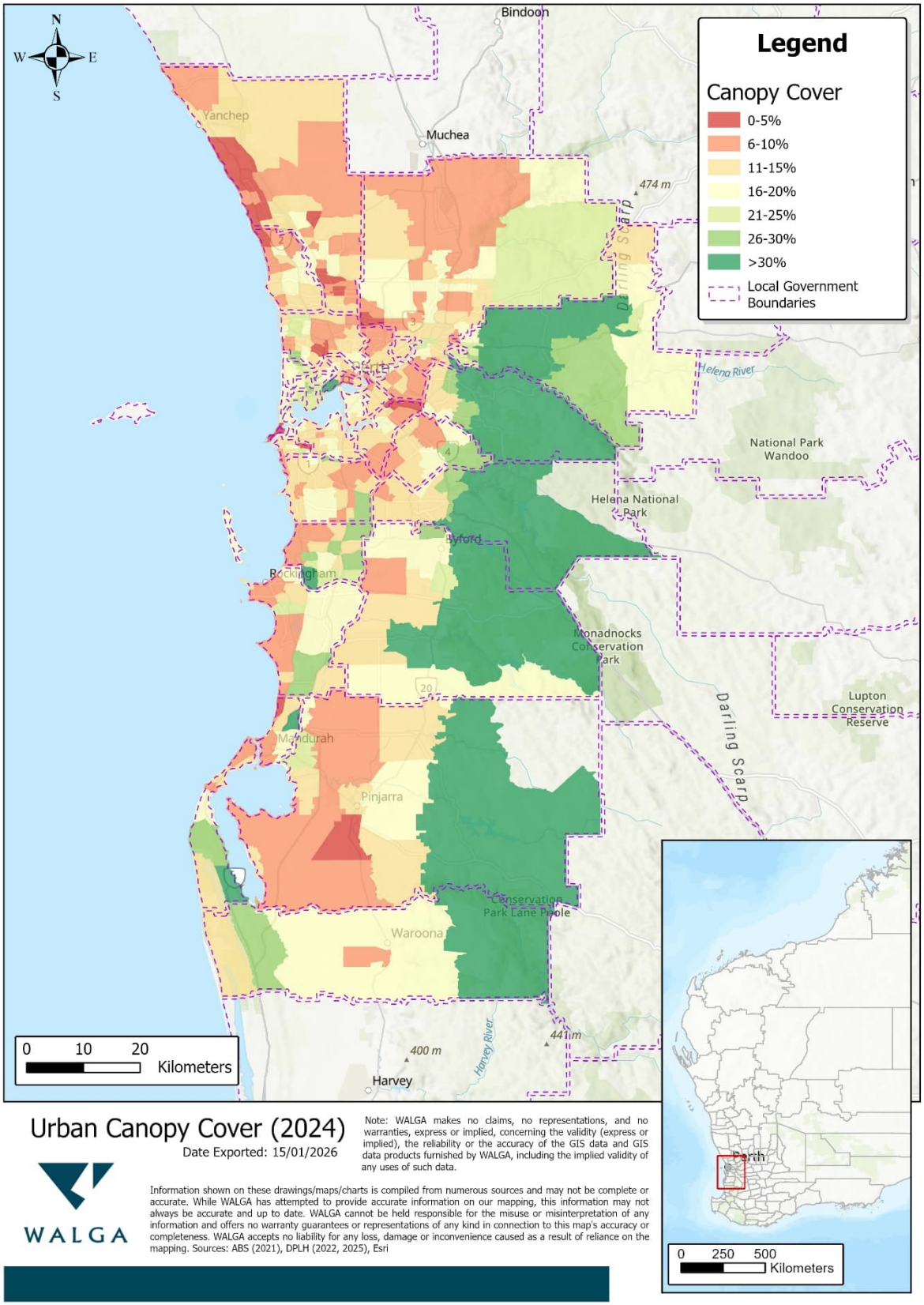


Figure 16. Total urban canopy cover (2024) across Perth and Peel suburbs

4.2.2.2. Canopy Cover Change

All the 409 comparable suburbs experienced canopy change across the four-year period (Figure 17). A total of 33.01% of suburbs experienced canopy loss, with an average decline of -1.09% across the 135 suburbs. In contrast, 66.99% of suburbs recorded canopy gains, with an average increase of +1.92% across the 274 suburbs. Spatially, canopy gains were more common in outer suburbs containing established vegetation reserves and State Forest, while losses primarily occurred in newly developing suburbs (Figure 16).

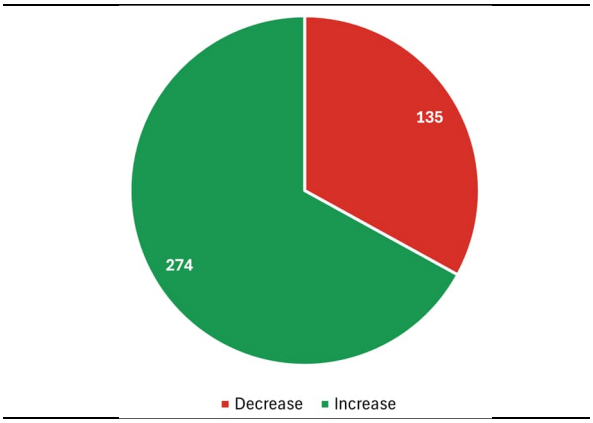


Figure 17. Number of suburbs within each total urban canopy cover change type (2020-2024)

4.3. Canopy Cover by Land Use

4.3.1. Urban Forest Categories

4.3.1.1. Canopy Cover Overview

Canopy cover varied considerably between Urban Forest land use categories in both years (Table 3; Figure 18). Parks had the highest canopy cover for both years (32.05% and 33.48%) and showed moderate growth (+1.43). In contrast, water recorded the lowest canopy cover for 2020 (3.64%), and its substantial growth of +9.00% was limited by its proportional land size (1.47%). Street blocks had the lowest canopy for 2024 (11.26%) and were the only category that declined (-0.94%). This shift reflects changing canopy within residential and mixed urban areas. The other and other infrastructure land uses recorded notable increases (+7.68% and +4.25%, respectively), while roads, rural and water categories also increased.

Table 3. Summary of total urban canopy cover (2020-2024) and relative land area (2024) across Urban Forest land use categories

Land Use	Canopy Cover (%)			Area (%)
	2020	2024	Change	
Street Block	12.20	11.26	-0.94	15.52
Roads	13.97	14.68	+0.71	6.36
Parks	32.05	33.48	+1.43	40.73
Other Infrastructure	15.49	19.74	+4.25	2.52
Other	7.13	14.81	+7.68	0.05
Rural	15.51	16.37	+0.86	33.36
Water	3.64	12.63	+9.00	1.47

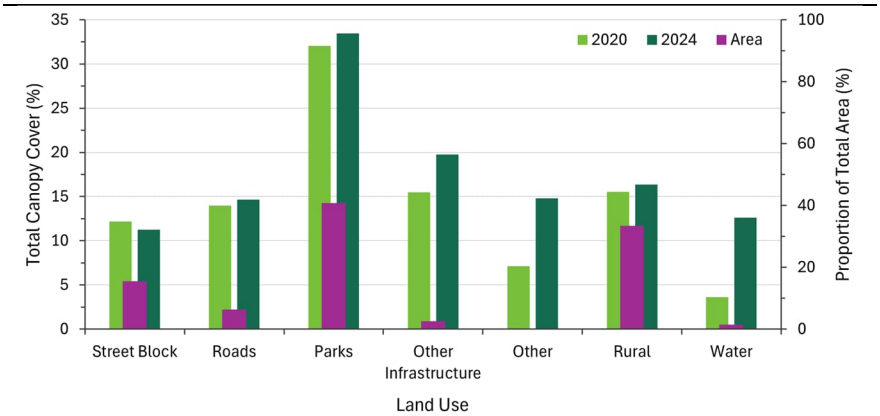


Figure 18. Total urban canopy cover (2020, 2024) and relative land area (2024) across Urban Forest land use categories

Street blocks were further broken down by Mesh Block categories to determine the greatest contributing land uses to the overall canopy decline (Table 4). Hospital/medical, industrial and commercial areas recorded small increases, and the education category had the largest canopy cover and growth (19.47% and +1.01%, respectively). In contrast, residential, parkland, primary production and other categories recorded declines. The residential category contained the largest land proportion (62.71%) and had a -0.94% canopy loss. The largest reduction occurred in the other category (-2.99%), which covered 8.44% of land, and industrial zones had the lowest canopy cover (5.84%). The commercial land use showed no canopy change, and there were no record parcels of transport and water land uses within street blocks for 2024.

Table 4. Summary of street block canopy cover (2020-2024) and relative land area (2024) across Mesh Block land use categories

Land Use	Canopy Cover (%)			Area (%)
	2020	2024	Change	
Commercial	6.82	6.82	0.00	2.62
Education	18.46	19.47	+1.01	3.81
Hospital/Medical	16.54	17.33	+0.79	0.30
Industrial	5.67	5.84	+0.17	10.76
Other	14.38	11.40	-2.99	8.44
Parkland	15.10	14.36	-0.74	2.41
Primary Production	10.20	9.27	-0.93	8.94
Residential	12.93	11.99	-0.94	62.71
Transport	28.06			0
Water	14.41			0

4.3.1.2. Spatial Canopy Cover Change

The seven Urban Forest land uses were spatially represented to determine where canopy change occurred across Local Governments. The distribution of canopy change in street block areas showed declines dispersed across a wide range of Local Governments (Figures 19, 20). Over two-thirds (69.70%) of LGs had a decline in street block canopy cover, with decreases ranging from -0.01% (City of Fremantle) to -6.07% (Shire of Waroona). Many established suburbs also recorded lower canopy percentages and small declines, possibly reflecting ongoing redevelopment and limited available space for canopy retention. Ten Local Governments (30.30%) recorded canopy increases within street blocks, which ranged from +0.41% (City of Subiaco) to +2.79% (City of Nedlands).

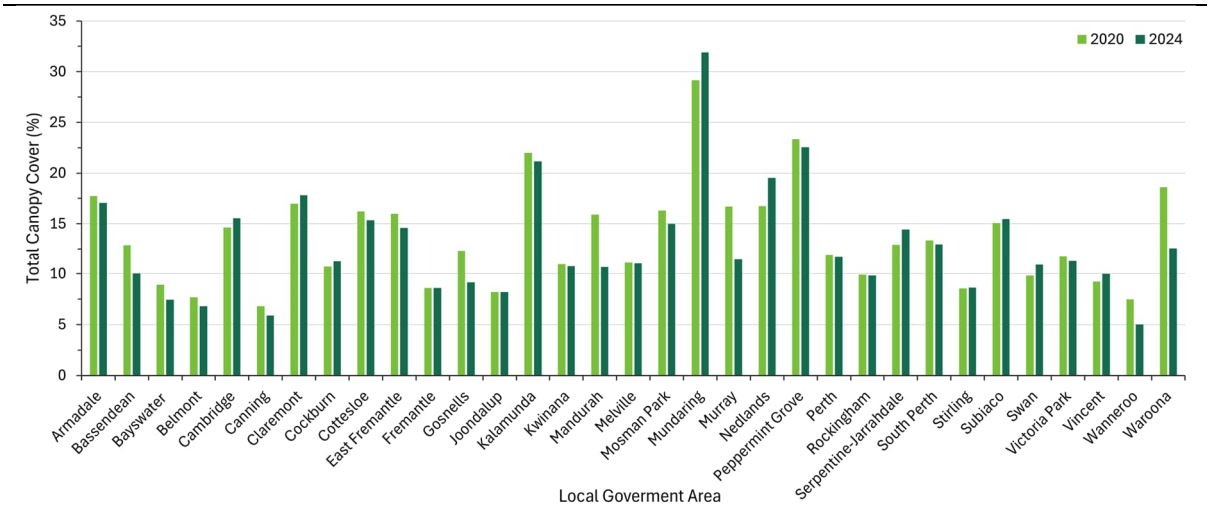


Figure 19. Street block canopy cover (2020, 2024) across Perth and Peel Local Governments

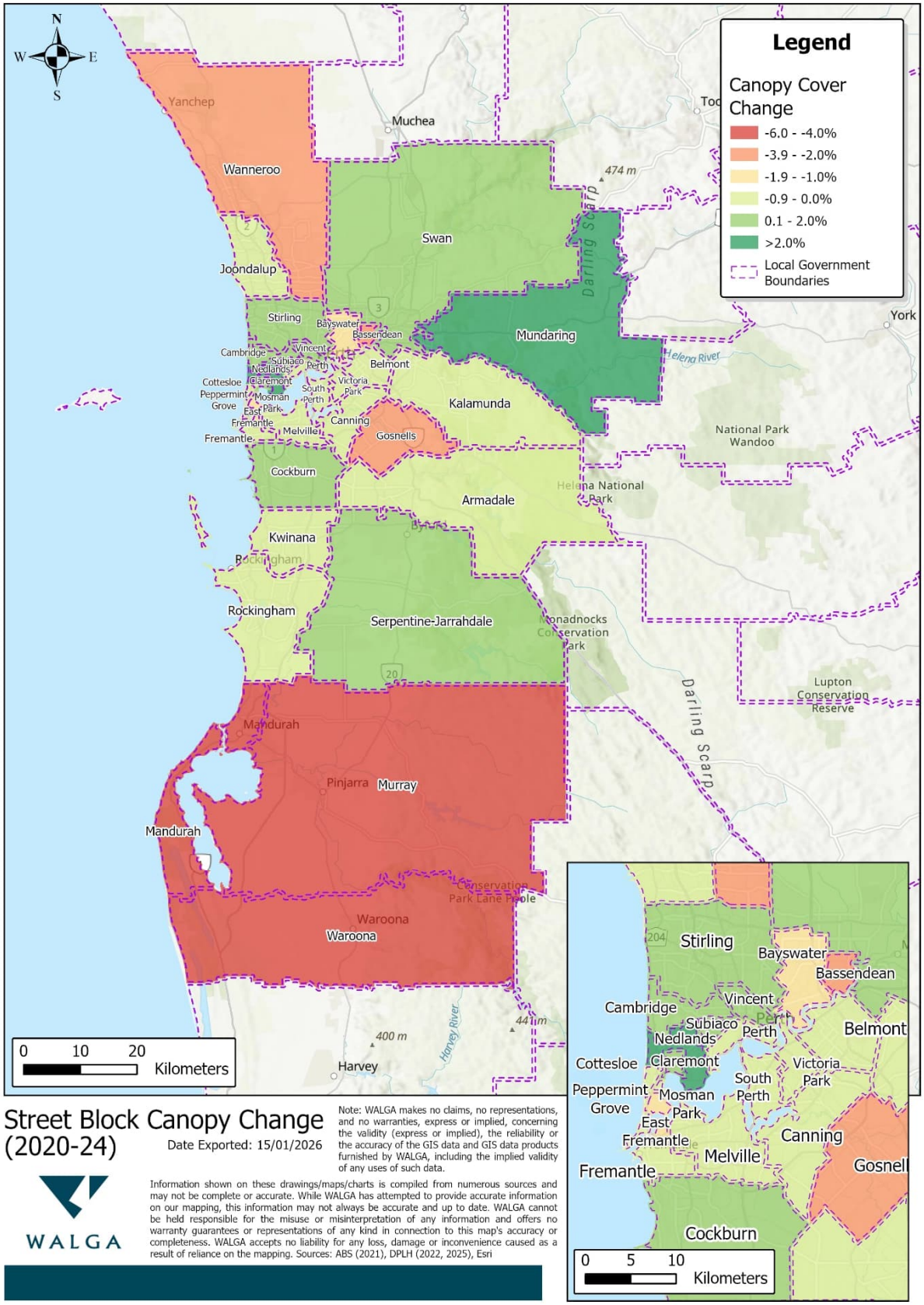
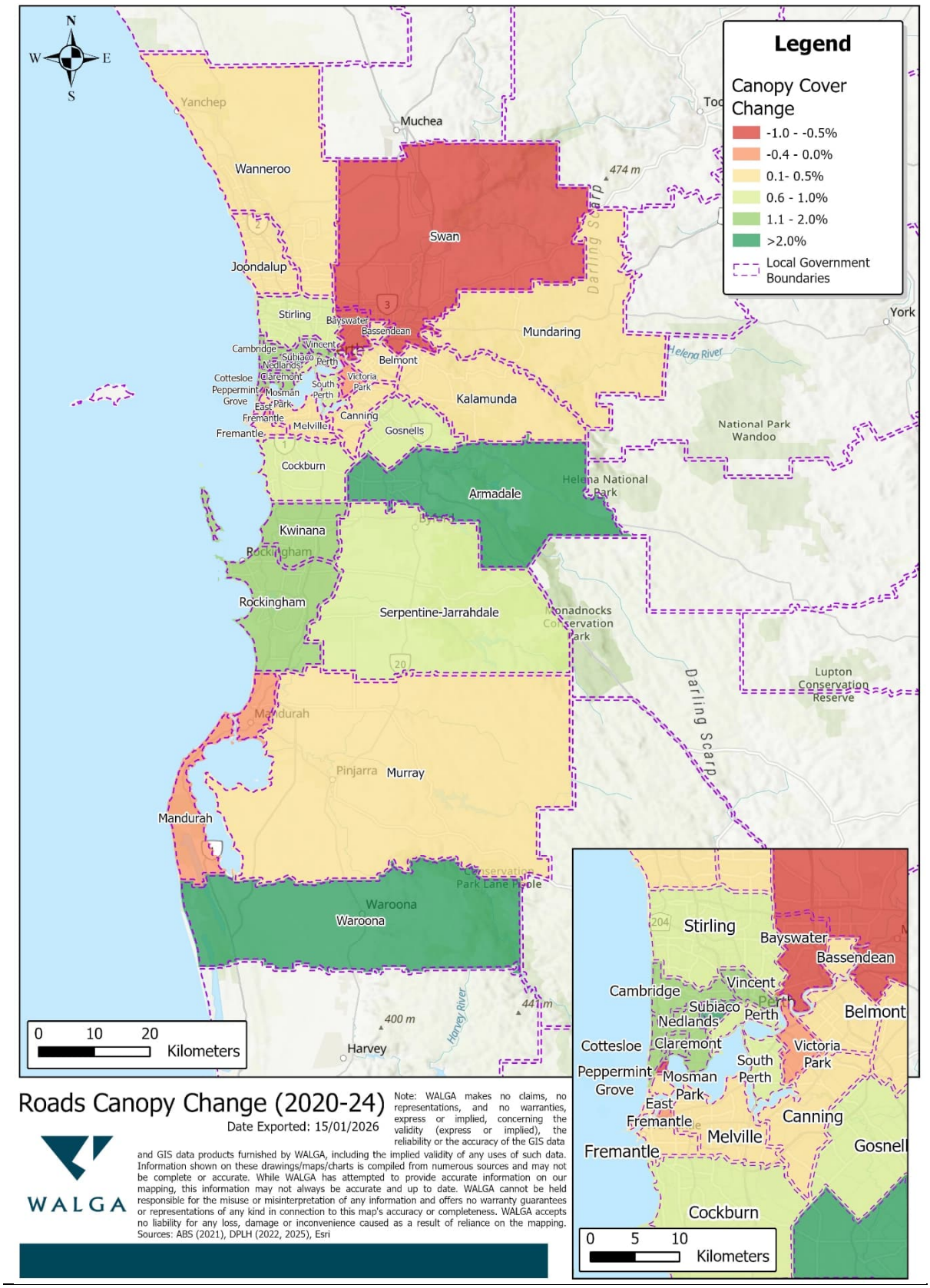


Figure 20. Street block canopy cover change (2020-2024) across Perth and Peel Local Governments



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Figure 21. Roads canopy cover change (2020-2024) across Perth and Peel Local Governments

Canopy changes in roads displayed a different geographic pattern (Figures 21, 22). Canopy decreases were far less common, with only 18.18% of Local Governments exhibiting a decline. The largest reduction was -0.85% (City of Bayswater), and the smallest was -0.43% (City of Mandurah). In contrast, 81.82% of Local Governments noted an increase in road canopy cover, with an average growth of +1.01% across the 27 LGs. Both changes were spread across the broader Perth and Peel regions.

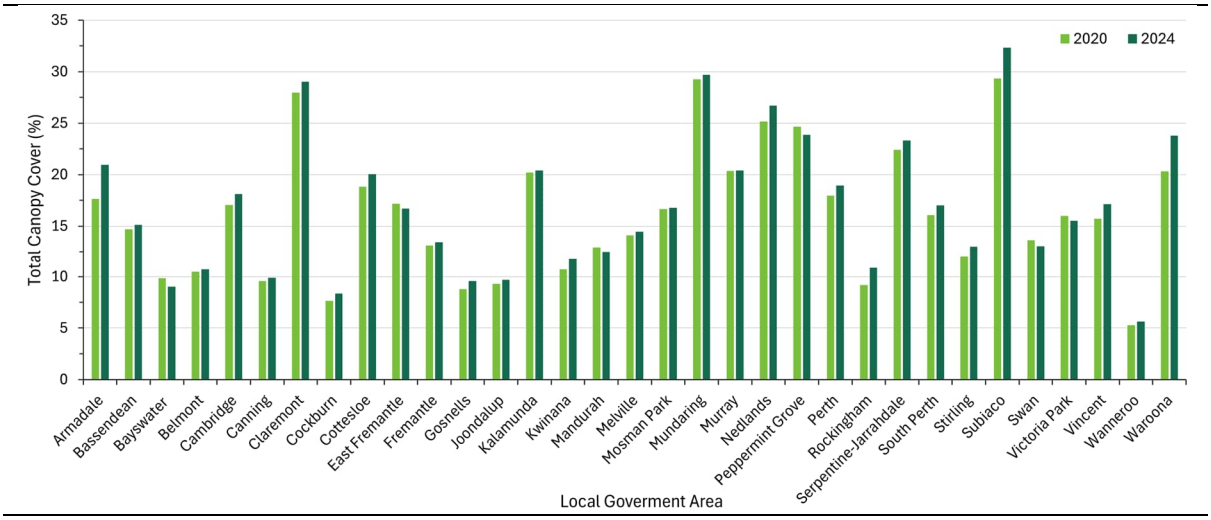


Figure 22. Roads canopy cover (2020, 2024) across Perth and Peel Local Governments

Spatial changes within parks revealed widespread canopy increases across the Perth and Peel regions (Figures 23, 24). Over two-thirds of analysed Local Governments (69.70%) recorded gains in this category, spanning both metropolitan and peri-urban areas. The magnitude of this change varied considerably, from a +12.81% increase in the City of Armadale to a -4.76% decline in the City of Nedlands. Despite the recorded decreases, the consistently high overall canopy gain recorded in parks reflects its ongoing contribution to overall canopy cover.

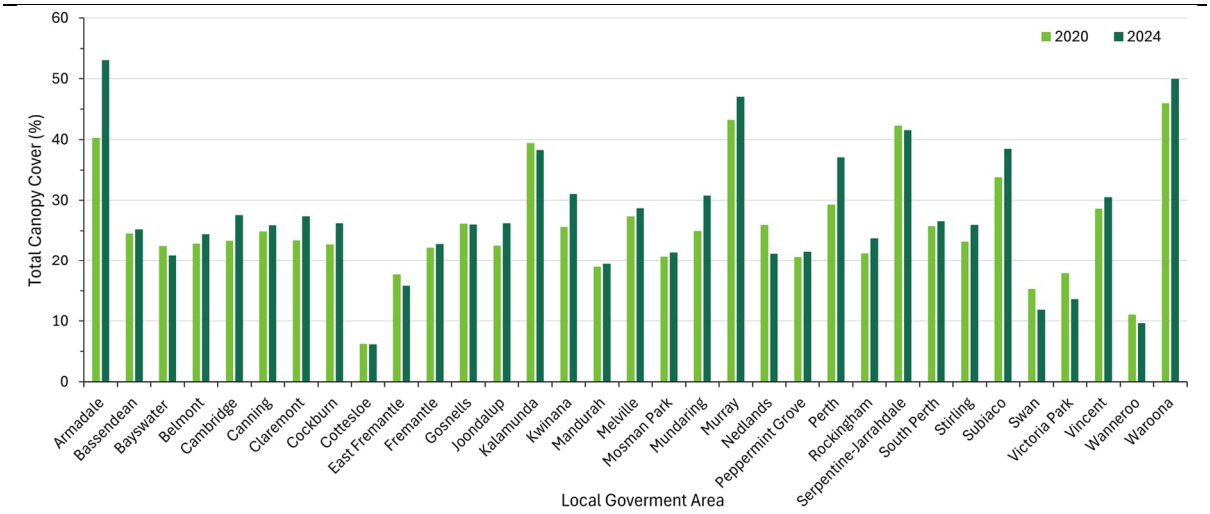
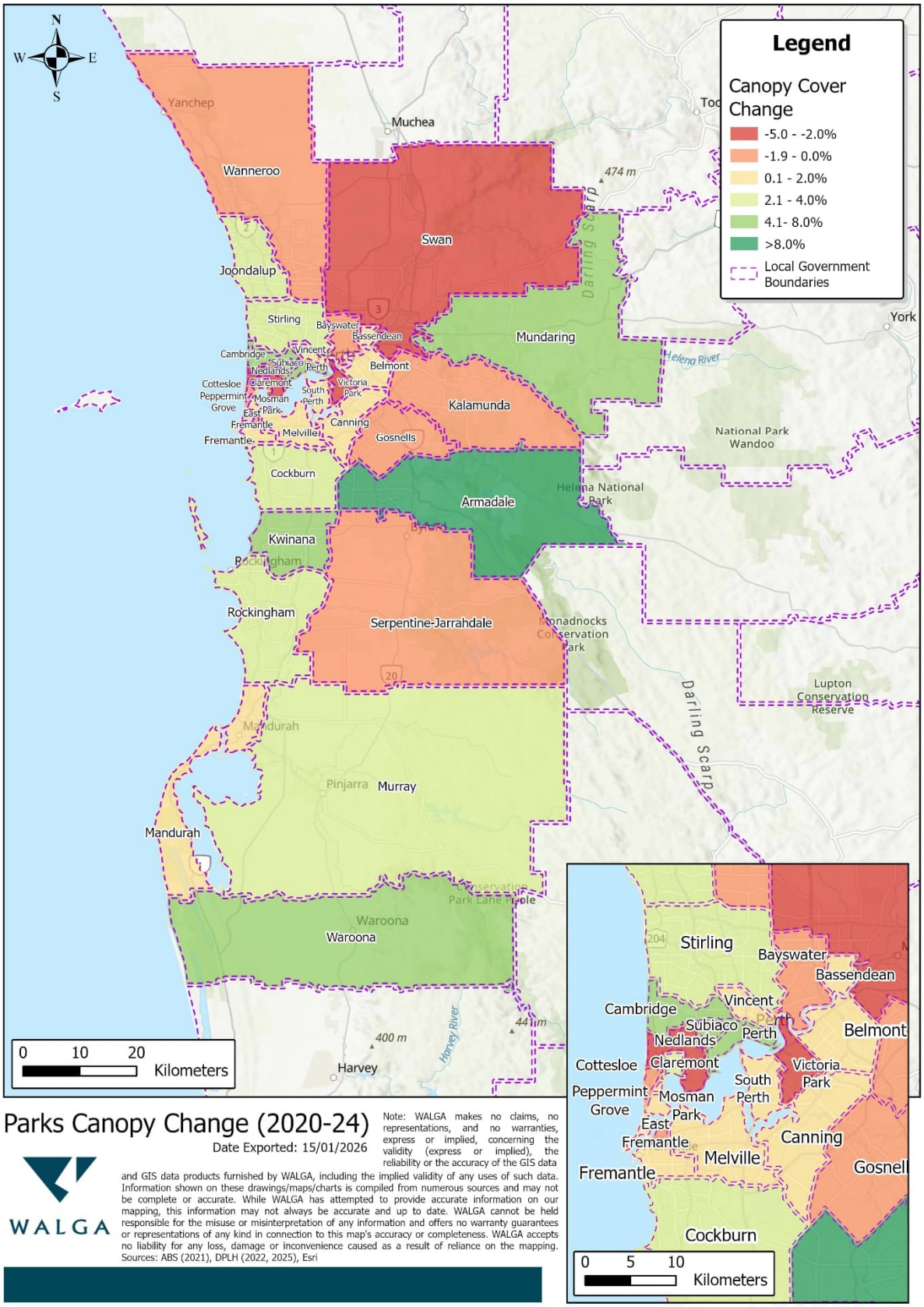


Figure 23. Parks canopy cover (2020, 2024) across Perth and Peel Local Governments



Parks Canopy Change (2020-24)

Date Exported: 15/01/2026

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Figure 24. Parks canopy cover change (2020-2024) across Perth and Peel Local Governments

For other infrastructure, canopy change patterns were more variable across Local Governments (Figure 25). Only 6 LGAs (18.75%) experienced decreases in this category, with declines ranging from -0.07% (Shire of Serpentine-Jarrahdale) to -9.24% (Shire of Mundaring). The other 26 (81.25%) Local Governments increased their canopy cover, with growth ranging from +0.04% (City of Wanneroo) to +12.96% (City of Armadale). The City of Swan contained no other infrastructure parcels.

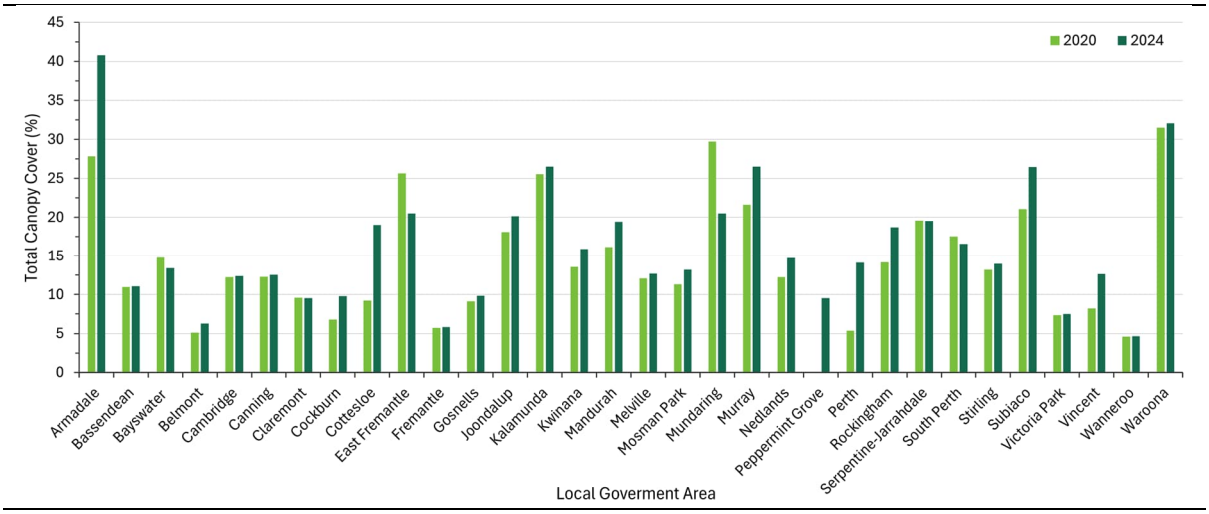


Figure 25. Other infrastructure canopy cover (2020, 2024) across Perth and Peel Local Governments

The other category also showed inconsistent canopy patterns across LGs (Figure 26). Only 15 of the original 33 Local Governments (45.45%) contained parcels belonging to this land use. A total of 40.00% of the included LGs exhibited canopy declines, while 60.00% recorded increases. The City of Kalamunda had the largest growth (+77.99%) because it contained no 'other' parcels in 2020, while the Shire of Mundaring had the largest decline (-33.14%) for the opposite reason. This pattern was consistent in 60.00% of the Local Governments, with only 6 LGAs (40.00%) containing data for both years.

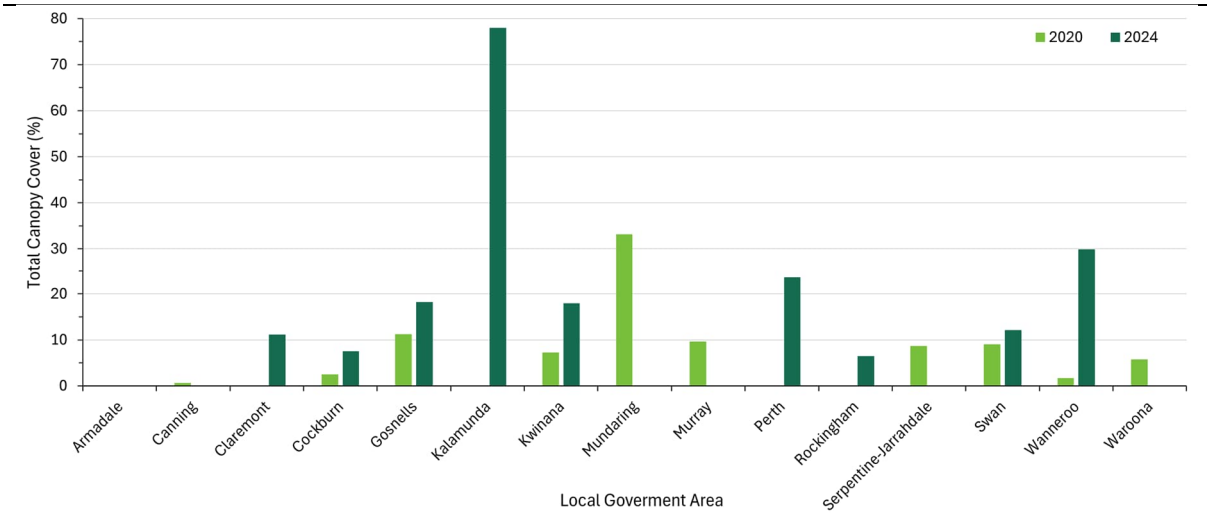


Figure 26. Other canopy cover (2020, 2024) across Perth and Peel Local Governments

In the rural category, canopy change was more modest and only included data for 14 Local Governments (42.42%) (Figure 27). Within this, 35.71% of LGAs declined in rural canopy cover, while 64.29% increased. The greatest increase was observed in the City of Cockburn (+12.59%), while the greatest decrease was within the City of Mandurah (-5.94%). Despite these larger differences, the category had an overall canopy change of +0.86%.

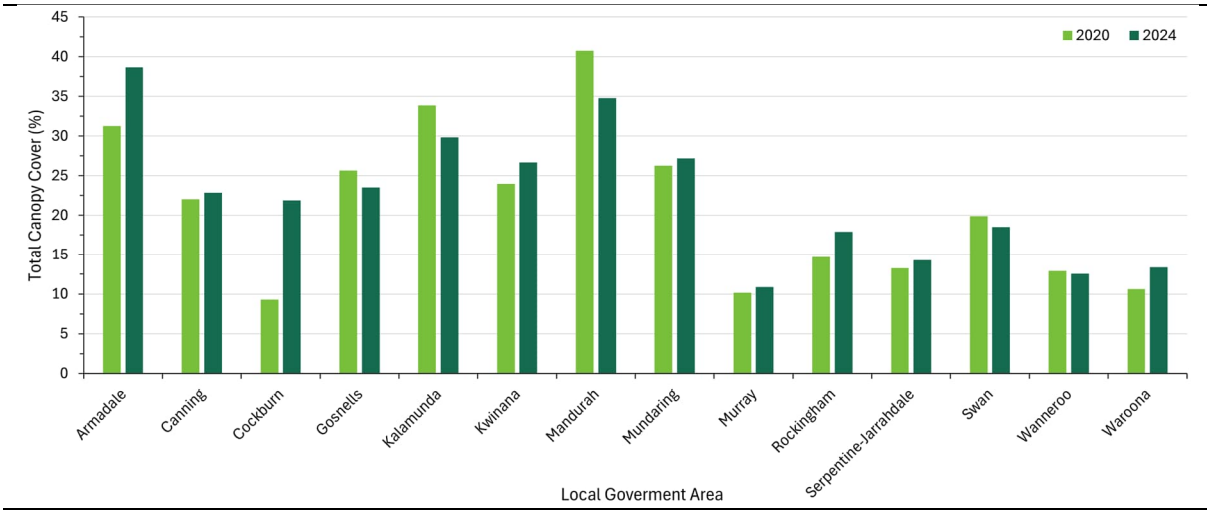


Figure 27. Rural canopy cover (2020, 2024) across Perth and Peel Local Governments

Spatial patterns in canopy cover for the water land use category showed numerous changes across Local Governments (Figure 28). 8 LGAs (24.24%) contained no water parcels, and 2 others (6.06%) only contained data for one year. Of the 25 included Local Governments, over half (52%) recorded an increase in canopy cover. This was most evident in the City of Cockburn, whose canopy grew by 10.34%. In contrast, the City of Melville experienced a -34.98% decline because it contained no water parcels for 2024.

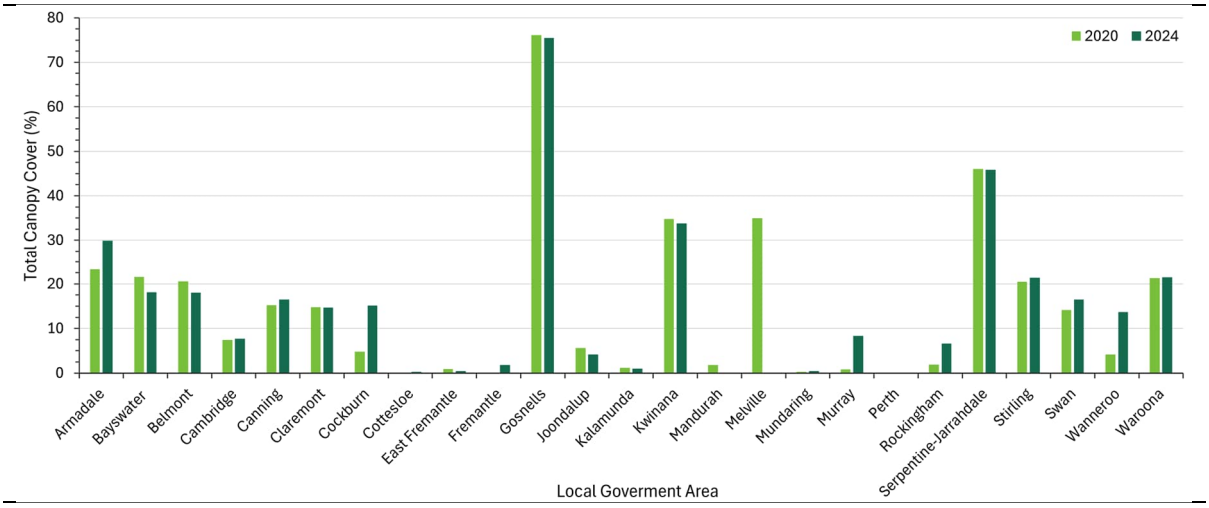


Figure 28. Water canopy cover (2020, 2024) across Perth and Peel Local Governments

4.3.2. Mesh Block Categories

Urban canopy cover was also analysed by Mesh Block land uses. When categorising, some parcels did not receive a Mesh Block assignment. 103 parcels (0.01%) were omitted from the 2020 analysis, and 151 parcels (0.02%) were excluded from 2024 analysis. This exclusion only covered 0.19% and 2.56% of total area recorded for 2020 and 2024, respectively.

All eleven Mesh Block land uses experienced an increase in canopy cover between 2020 and 2024, though the magnitudes varied (Table 5; Figure 29). The majority (87.39%) of the recorded land belonged to parkland (39.95%), residential (23.85%) and primary production (23.59%) categories, which also contained some of the highest canopy levels. Parkland remained the highest-canopy category, increasing from 31.41% to 32.77% between 2020 and 2024. The largest relative increase occurred in the water category, which rose by +2.42%, but only covered 1.12% of land. This change was consistent with the +9% increase in the Urban Forest water land use. Moderate gains were observed in institutional categories, such as hospital/medical (+1.10%) and education (+0.76%). The smallest increases were recorded in transport (+0.25%) and industrial (+0.48%) land uses. For both 2020 and 2024, canopy cover was lowest in the industrial category (6.54% and 7.02%, respectively).

Table 5. Summary of total urban canopy cover (2020-2024) and relative land area (2024) across Mesh Block land use categories

Land Use	Canopy Cover (%)			Area (%)
	2020	2024	Change	
Commercial	7.13	8.18	+1.05	0.67
Education	17.87	18.63	+0.76	0.68
Hospital/Medical	16.52	17.62	+1.10	0.07
Industrial	6.54	7.02	+0.48	2.26
Other	19.25	20.88	+1.63	7.38
Parkland	31.41	32.77	+1.36	39.95
Primary Production	11.02	11.61	+0.59	23.59
Residential	18.29	19.27	+0.98	23.85
Transport	8.74	8.99	+0.25	0.43
Water	10.76	13.18	+2.42	1.12

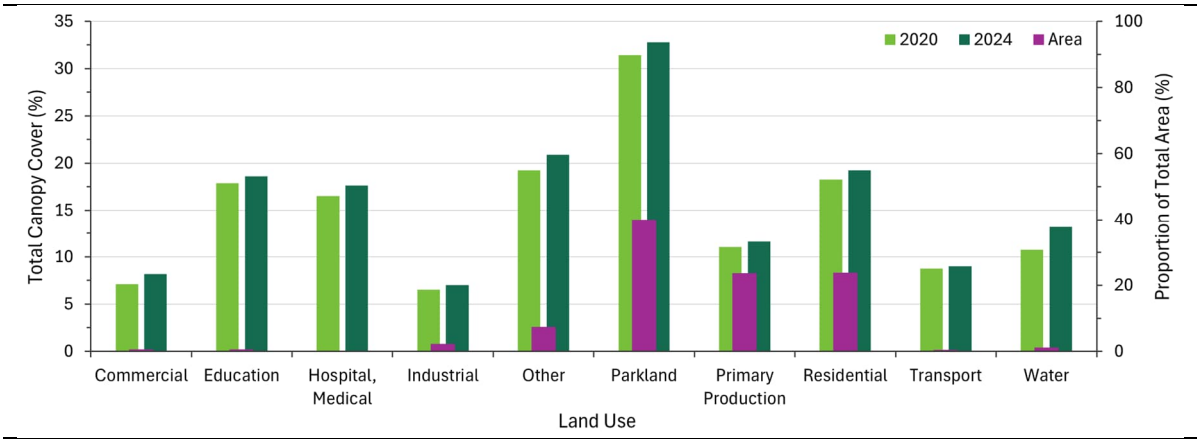


Figure 29. Total urban canopy cover (2020, 2024) and relative land area (2024) across Mesh Block land use categories

4.4. Demographic Comparisons

Canopy cover was compared to selected demographic factors from the 2021 ABS Census to identify possible vulnerable hotspots across the Perth and Peel regions. It was noted that fifteen suburbs lacked 2021 Census data as the area had no people or a very low population: Banksiadale, Clifton, Etmilyn, Gorrie, Herdsman, Keralup, Malmalling, Melaleuca, Myara, Nanga Brook, Postans, Reservoir, Tamala Park, The Spectacles, Walyunga National Park. Additionally, four other suburbs were not present within the ABS data: Doobarda, Lesley, Oakley, Point Grey. Despite their exclusion having little impact on this aspect of the analysis, as the statistics are proportions of all recorded data, it limits comparison to other study sections which contain all suburbs.

4.4.1. Total Population

Incorporating total population data from the 2021 ABS Census revealed the proportion of citizens residing in various canopy cover brackets (Figures 30, 31). Over one third of the total recorded population (39.73%) lived in suburbs with less than 10% canopy cover, compared to only 2.63% of residents living in suburbs with canopy over 30%. Between 2020 and 2024, the proportion of the total population living in suburbs with canopy below 10% remained the same.

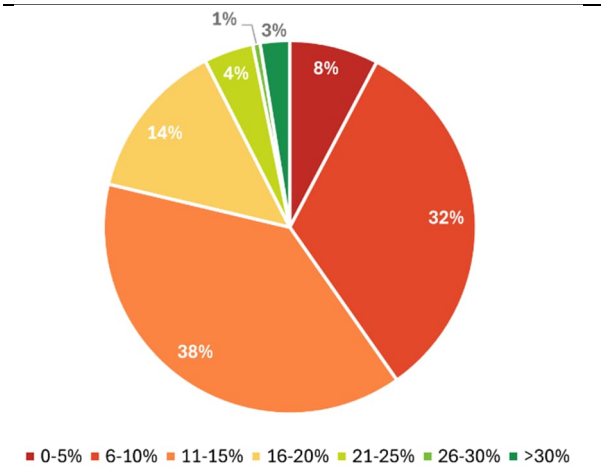


Figure 30. Total population proportion within each total urban canopy cover bracket (2020)

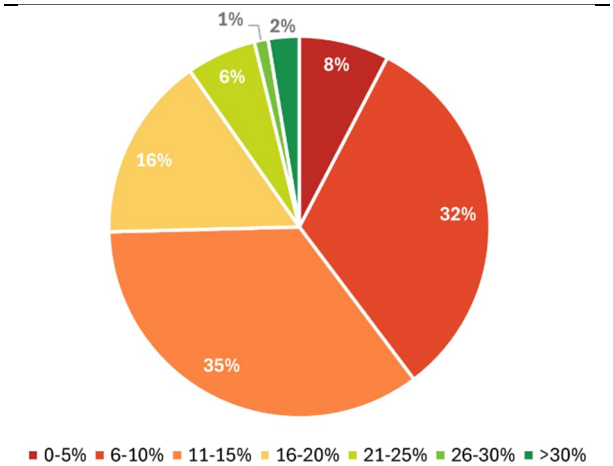


Figure 31. Total population proportion within each total urban canopy cover bracket (2024)

These analysis outputs were compared to the findings of a Nearmap AI analysis that utilised October 2020 to March 2021 canopy cover. It found that 22% of Perth city's population resided in suburbs that had >20% tree cover[10]. From this analysis, 9.74% of Perth and Peel residents lived in suburbs with canopy cover above 20% in 2024. This grew by +2.26% from 2020 findings, which found that only 7.47% of the population lived in suburbs with canopy cover above 20%. Despite the 12.26% population difference between studies, comparison is limited because Nearmap AI included trees above 2m, while this study defined canopy as trees above 3m. Additionally, Nearmap AI did not disclose which suburbs it incorporated during analysis.

Canopy cover was also mapped against the median person's age per suburb (Figure 32). It highlights several possible vulnerable areas where suburbs with older populations also had relatively low or moderate canopy levels. Although exploratory, this pattern indicates spatial overlap between demographic groups more vulnerable to heat and suburbs with limited canopy cover.

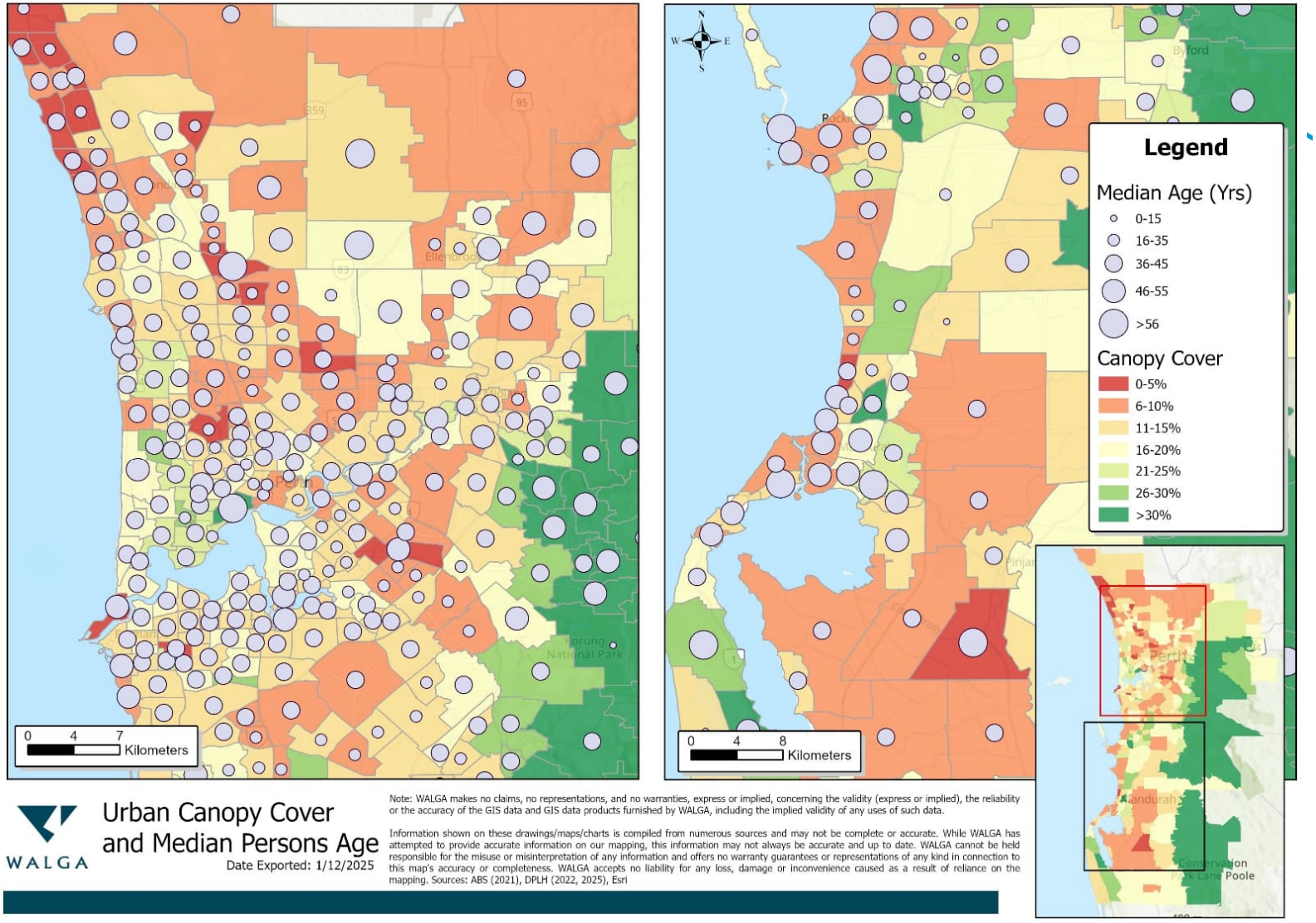


Figure 32. Total urban canopy cover (2024) and median population age (2021) across Perth and Peel Local Governments

4.4.2. Indigenous Population

Population data for Aboriginal and Torres Strait Islander peoples was analysed to highlight the proportion of people living in the different canopy cover brackets (Figures 33, 34). In 2024, almost three-quarters (74.30%) of the recorded Aboriginal and Torres Strait Islander population resided in suburbs with canopy below 16%, compared to 80.02% in 2020. Despite the 5.72% decrease, only 2.16% of recorded Aboriginal and Torres Strait Islander peoples live in suburbs with canopy above the 30% target.

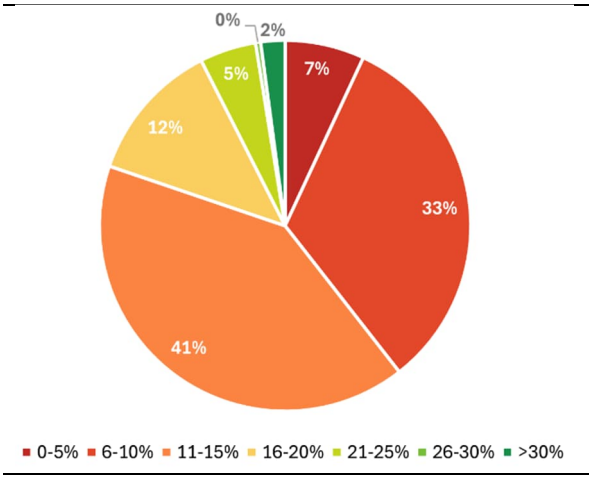


Figure 33. Indigenous population proportion within each total urban canopy cover bracket (2020)

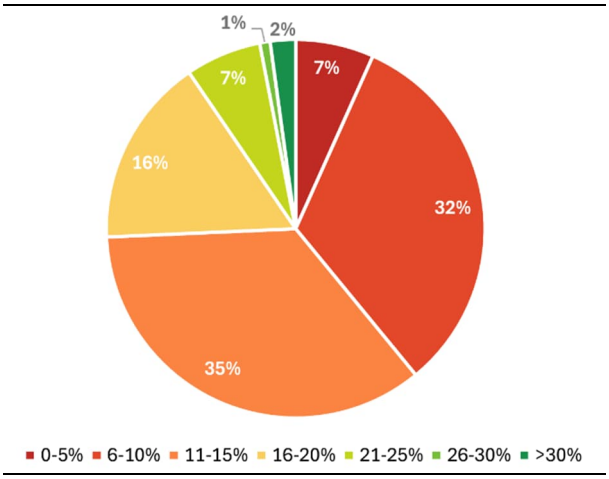


Figure 34. Indigenous population proportion within each total urban canopy cover bracket (2024)

4.4.3. Aged Population

Analysis was conducted on residents who were above 65 years old (Figures 35, 36) and above 85 years old (Figures 37, 38). In 2024, 71.82% of the recorded population older than 65 years were in suburbs with 15% or less canopy cover.

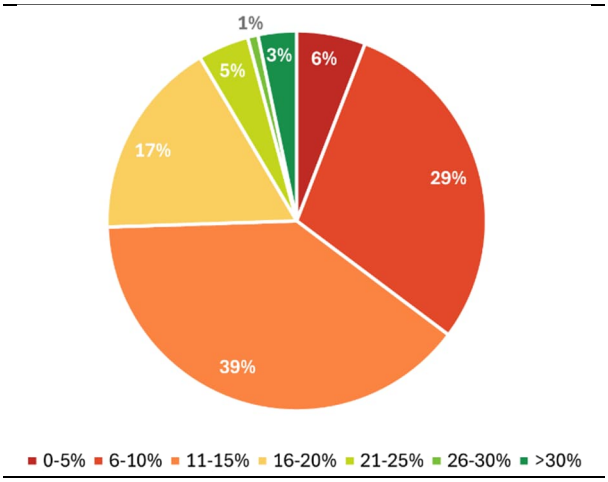


Figure 35. Aged population (>65yr) proportion within each total urban canopy cover bracket (2020)

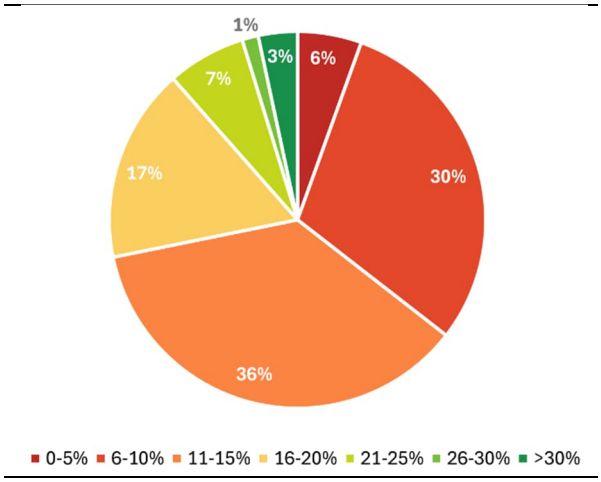


Figure 36. Aged population (>65yr) proportion within each total urban canopy cover bracket (2024)

Similarly to residents aged over 65 years, 71.27% of people aged over 85 years lived in suburbs containing less than 16% canopy cover in 2024. The largest increase (3.12%) occurred in suburbs with 21-25% canopy, where the proportion rose from 4.29% to 7.41%. This represented the highest share of residents within the 21-25% canopy bracket among all analysed community groups.

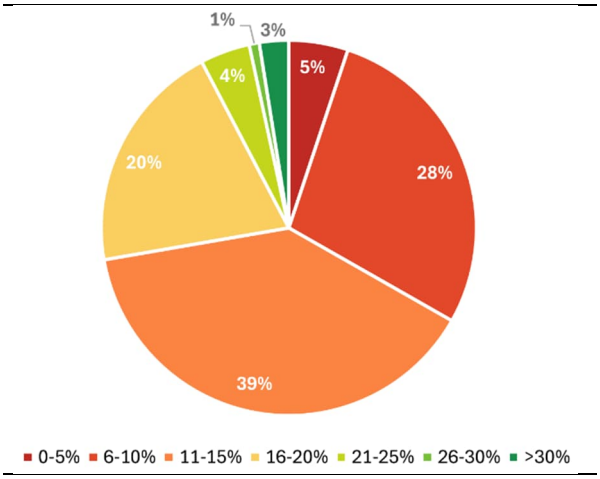


Figure 37. Aged population (>85yr) proportion within each total urban canopy cover bracket (2020)

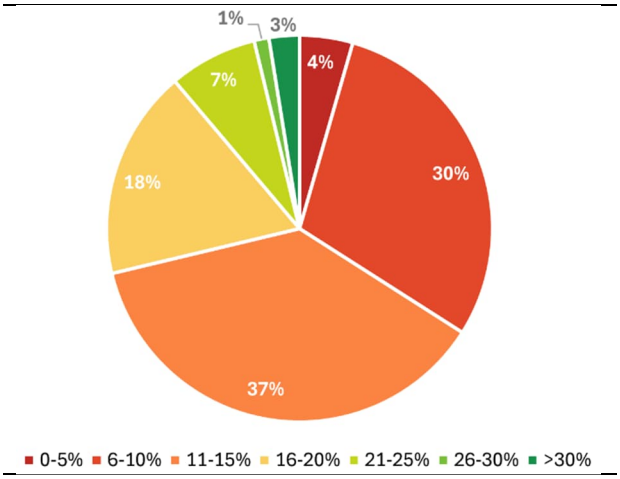


Figure 38. Aged population (>85yr) proportion within each total urban canopy cover bracket (2024)

5. Discussion

Analysis of urban canopy cover across the Perth and Peel regions between 2020 and 2024 reveals several patterns that highlight both persistent challenges and emerging opportunities for greening. While average canopy increased by 1.79% over the four-year period, this growth remains insufficient relative to the scale of low-canopy areas and ongoing developmental pressures across the metropolitan area. Over 90% of Local Governments continue to fall below the State Government's 30% canopy target for the Perth and Peel regions, with only three LGs (Armadale, Kalamunda and Waroona) exceeding this benchmark in 2024.

The majority of observed canopy gains were driven by the presence of extensive State Forest areas within Local Governments. LGs containing substantial State Forest recorded average canopy exceeding 30% in 2024 and experienced growth rates more than six times higher than those without such areas (+3.16% compared to +0.46%). In contrast, metropolitan Local Governments without State Forest averaged just 15.39% canopy cover and exhibited minimal improvement over time. The differing extent of parks as a land use canopy appears to strongly influence this contrast. Almost half (46.25%) of recorded land in Local Governments with State Forest was occupied by parks, compared to 33.15% in those without. The City of Armadale illustrates this pattern, with over two thirds (66.93%) of its land classified as parks and an overall canopy cover of 44.96% in 2024. These findings highlight a reliance on remnant vegetation and large protected reserves to meet canopy targets, rather than meaningful canopy expansion within built-up urban environments where heat exposure and population are greatest[1, 6]. This indicates that current greening efforts are not yet delivering canopy improvements equitably across the Perth and Peel regions.

Suburb-level analysis further underscores this imbalance. In 2024, 89.35% of suburbs remained below the 30% canopy target, and almost one third (31.48%) recorded canopy cover below 10%. These low-canopy suburbs covered 26.00% of the total land area yet disproportionately accommodated the region's population, containing almost 40% of residents. In contrast, suburbs exceeding the 30% target only housed 2.63% of the total population, despite accounting for approximately one quarter (25.29%) of recorded land area. This mismatch between land area and population exposure demonstrates that the benefits of urban trees are unevenly distributed and concentrated in lower-density or peri-urban areas.

Although canopy gains were observed in approximately two-thirds of suburbs (66.99%), these increases were generally small and insufficient to shift suburbs into higher canopy brackets. Losses were concentrated in metropolitan areas experiencing redevelopment or ongoing infill, reinforcing the influence of land use intensity and development pressure on canopy outcomes.

Demographic analysis demonstrates that this uneven canopy distribution has clear equity implications. Aboriginal and Torres Strait Islander peoples, older adults (>65 years) and very elderly residents (>85 years) were consistently overrepresented in suburbs with low canopy cover. In 2024, almost three-quarters of Aboriginal and Torres Strait Islander people lived in suburbs with less than 16% canopy, while only 2.16% resided in suburbs meeting the 30% target. Similarly, more than 70% of residents aged over 65 years and over 85 years lived in low-canopy suburbs. These patterns align with broader evidence that disadvantaged and vulnerable populations experience reduced access to urban green spaces, resulting in higher exposure to heat stress and fewer opportunities for physical and psychological wellbeing[2, 11, 12]. This is particularly significant for older populations, who are more susceptible to heat-related illness and derive substantial health and social benefits from accessible, shaded urban environments[2, 11].

Although this study did not explicitly distinguish between public and private land, previous research found that racial inequities in canopy distribution are often most significant on public land[7]. Addressing canopy deficits within publicly accessible spaces may produce disproportionate social benefits. For example, one study found a 40% greater crime reduction associated with trees located on public land compared to those on private property[13], highlighting the broader co-benefits of equitable urban canopy cover.

Land use analysis further illustrates the differing capacities of land categories to support vegetation. Parks consistently recorded the highest canopy cover (33.48% in 2024) and demonstrated stable growth (+1.43%), reflecting their relative protection and ongoing management. In contrast, street blocks, which are most representative of residential and mixed-use private land, experienced an overall decline in canopy cover (-0.94%). Residential street blocks, comprising nearly two-thirds of street block land area, accounted for much of this loss, suggesting that public planting efforts being offset by ongoing tree removal on private land. Redevelopment, infill housing and limited tree retention requirements are likely contributors to this trend, consistent with findings from other Australian cities experiencing similar development pressures[4]. Canopy gains were greatest within the water and other land use categories (9.00% and 7.68%, respectively). However, their very limited spatial extent constrained any meaningful benefit for urban residents.

5.1. Limitations

This study is subject to several limitations related to the nature of spatial data, classification methods and data availability, which should be considered when interpreting the results. Urban canopy analysis at a regional scale requires the integration of multiple large spatial datasets that differ in capture methods, resolution and classification systems. As a result, a degree of uncertainty is inherent when aggregating canopy, land use and demographic information across the entire Perth and Peel regions.

Land use classification, particularly at fine spatial scales, involves subjective and domain-relative decisions. Parcels that were wholly or partially water did not receive a Mesh Block assignment and were therefore omitted from analyses requiring this classification. While these excluded parcels represented a very small proportion of total area recorded (2.56% in 2024), their removal limits the completeness of fine-scale land use comparisons.

Suburb-level analysis was affected by inconsistencies in boundaries and classifications across datasets and years. The number of suburbs differed between the 2020 and 2024 Urban Forest datasets due to cadastre updates and the creation of new suburbs. In addition, some suburbs spanned multiple Local Government boundaries or were grouped differently between years, particularly where road parcels were reassigned. These inconsistencies required the retention of original parcel classifications to minimise subjective reallocation and further misalignment.

Additionally, fifteen suburbs lacked 2021 ABS Census data due to very low or absent populations, and four suburbs present in the Urban Forest datasets were not included in Census boundary files. As a result, population-based analyses were restricted to 394 suburbs containing both canopy and Census data. Consequently, the presented comparisons between canopy-only and canopy-population analyses should be interpreted as indicative rather than definitive. This is illustrated by suburbs with canopy cover exceeding 30%, which accounted for 25.29% of the recorded land area but only 2.63% of the population. Of the 44 suburbs within this canopy bracket, six (13.64%) lacked Census data, indicating that the reported population proportion may underrepresent the full demographic presence associated with high-canopy areas. However, sensitivity testing excluding these six suburbs showed that the remaining high-canopy suburbs still accounted for 22.06% of the total recorded land area, suggesting their omission in demographic analysis has a limited influence on the overall spatial patterns.

Further difficulty arose from the aggregation of multiple datasets across large spatial extents. Minor misalignments between suburb boundaries and Census records required extensive manual correction on multiple occasions, and small discrepancies had a measurable influence on derived population statistics. Although rigorous quality control was undertaken, the scale and complexity of the datasets introduce unavoidable potential for aggregation error.

Canopy estimates were also influenced by inconsistencies in aerial imagery capture. Variations in flight path, capture extent and the removal of parcels with incomplete imagery affected area coverage in some locations, such as Garden Island. In addition, changes in parcel classification between years, particularly in very small land use categories, occasionally produced exaggerated percentage changes that should be interpreted with caution. For example, the Shire of Kalamunda only recorded one parcel belonging to the ‘other’ land use category in 2024 (Figure 26).

The scope of the analysis was further constrained by restricted access to certain datasets. Specifically, the inability to reliably distinguish between public and private land ownership limited assessment of canopy cover distribution by tenure. Ownership complexity within large parcels, such as Perth Airport, and the absence of an authoritative source linking parcels to locally managed roads constrained fine-scale management analysis. These constraints reflect broader challenges faced by Local Governments, with many relying on internal datasets, local expertise and subjective interpretation when assessing canopy outcomes.

Finally, the size and complexity of the Urban Forest datasets presented practical limitations. The very large number of parcels and attributes required extensive summarisation, and finer land use

distinctions many influence mean canopy values, particularly for categories with limited spatial extent. All area-based proportions were calculated using 2024 parcel extents, which may introduce a minor bias when comparing values between years.

These limitations underscore the need for greater consistency in how urban canopy data is classified, processed and communicated. Variability in methodologies, data accessibility and classification frameworks complicates regional-scale analysis and limits the comparability of canopy over time. While alternative approaches to data delivery and classification may improve usability for LGAs and other bodies, any changes must carefully balance accessibility with data precision.

Despite the constraints, the findings present a consistent picture of urban canopy distribution and change across Perth and Peel. Persistent low canopy in metropolitan areas, combined with canopy gains concentrated in peri-urban reserves and State Forest, indicates that improvements are not translating into meaningful canopy expansion in areas of highest population exposure. Importantly, the alignment between low-canopy suburbs and vulnerable populations reinforces that canopy results are shaped by not only total cover, but where that cover is retained and expanded.

The analysis demonstrates that incremental gains driven by reserves and State Forest are insufficient to address canopy deficits in high-exposure urban areas. Achieving the State Governments 30% canopy target for Perth and Peel by 2040 will require a coordinated and sustained effort across government, industry and the community. Actions such as the retention of existing mature trees, particularly on private land, new planting initiatives and the provision of reliable data that allows comparisons across years are necessary to grow urban canopy and monitor progress. Without such action, current trends are unlikely to deliver equitable or climate-resilient urban canopy outcomes across the region.

6. Conclusion

This project fills a critical gap in analysis of urban canopy changes over time across the Perth and Peel regions. While overall canopy has increased slightly between 2020 and 2024, the majority of Local Governments remain below the State's 30% canopy target. Canopy growth has been primarily driven by peri-urban LGs containing State Forest, whereas inner metropolitan and more densely populated areas continue to exhibit low canopy cover and minimal growth. Declines in residential street blocks demonstrate the vulnerability of tree cover within developed urban environments, highlighting the importance of canopy retention alongside new planting initiatives.

Low-canopy suburbs also accommodate a disproportionate share of residents, including groups more vulnerable to heat-related impacts. As a result, regional canopy gains do not translate into improved outcomes where they are most needed. Substantially greater and sustained efforts will be required to meaningfully progress towards the State's 30% canopy target by 2040, with a strong focus on retaining existing trees and expanding canopy within metropolitan and high-exposure areas for the greatest benefits.

7. References

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