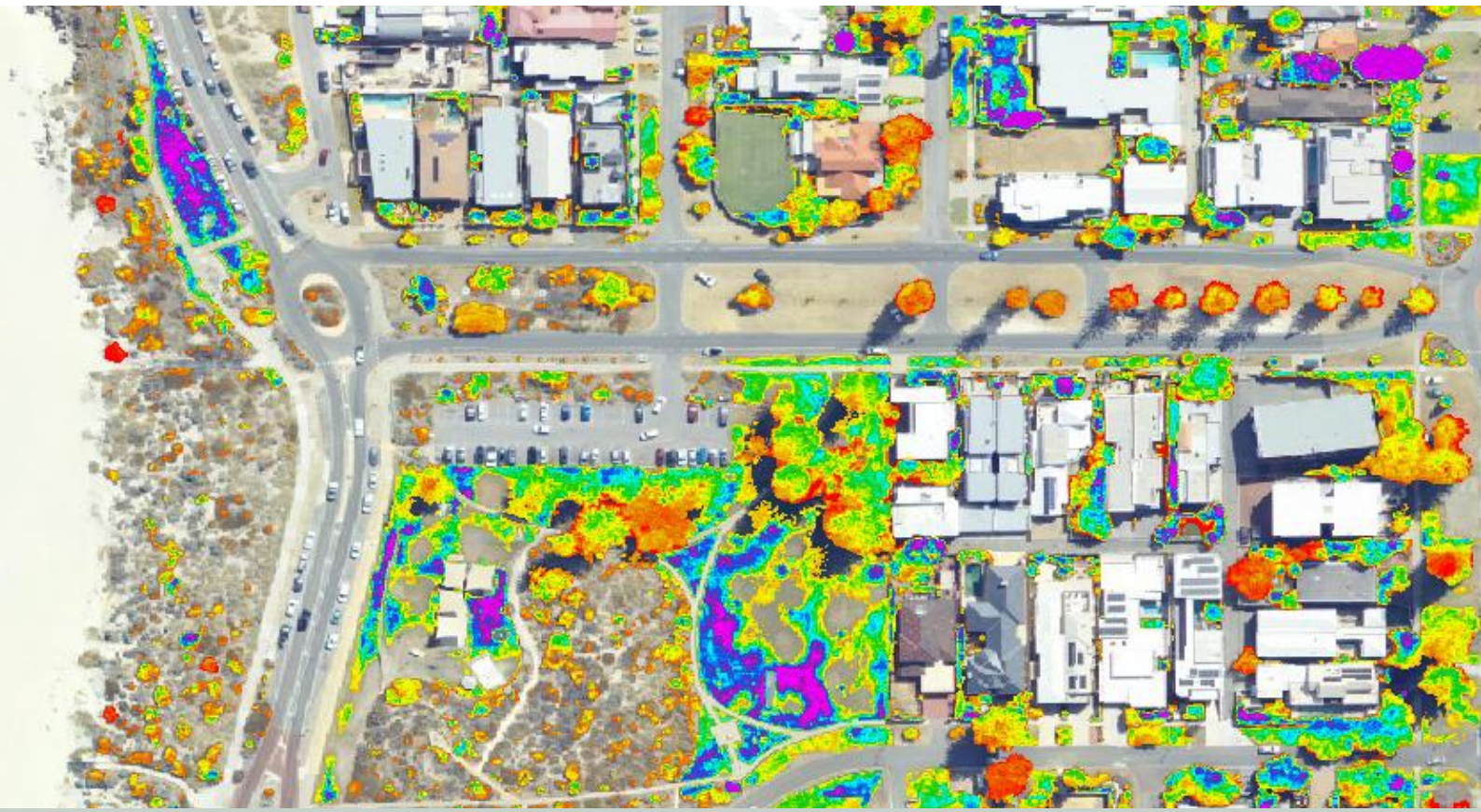
ArborCarbon *Creating Sustainable Ecosystems*



ArborCam Acquisition of Town of Cottesloe

Town of Cottesloe

Report No. J24002

27 July 2026

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Any conclusion and/or recommendation contained in this document reflect the professional opinion of ArborCarbon Pty Ltd and the author(s) using the data and information supplied. ArborCarbon Pty Ltd has used reasonable care and professional judgement in its interpretation and analysis of data in accordance with the contracted Scope of Works.

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Executive Summary

ArborCarbon was engaged to deliver high-resolution airborne imagery over the Town of Cottesloe in March 2026 for vegetation cover and condition monitoring. Using the ArborCam® camera system, multispectral and thermal imagery was acquired at 8,000 ft above ground level in cloudless conditions on the 17th of March 2026. The data was processed to produce a range of outputs to support vegetation management, including height-stratified vegetation cover mapping. Vegetation cover statistics were calculated across the entire local government area (LGA), as well as within public and private land, and changes in cover since the previous acquisition in 2023 were analysed.

Overall, canopy cover increased from 13.0% in March 2023 to 13.5% in March 2026, representing an increase of 2.0 ha. This reverses the trend of declining canopy cover identified between 2020 (14.1%) and 2023 (13.0%). The increase in canopy cover was accompanied by a decrease in vegetation below 3m tall, from 20.1% to 15.9%, a decrease of 16.5 ha. Much of the vegetation below 3m comprises turf and grass, which is more temporally variable due to seasonal conditions and irrigation.

The main findings of this report are:

- In total, 115.4 ha (29.4%) of the Town's area (392.9 ha) is covered by vegetation, and 53.0 ha (13.5%) covered by canopy (vegetation >3m)
- This represents a decrease in total vegetation cover since 2023 (33.1%), but an increase in canopy cover (13.0%).
- Public land (30.3 ha, 14.8%) within the Town had higher canopy cover than private land (22.7 ha, 12.0%), both in total area and as a percentage.

Based on the findings of this report, we recommend the following:

- Produce a significant canopy loss dataset, to identify areas of excessive tree loss.

- Produce a VCI change dataset to detect decline in vegetation at the individual tree or branch level. VCI change can highlight subtle declines in vigour, indicating areas to target for ground-based inspection. Targeted inspection of declining vegetation can focus resources on key areas, increasing the chances of early detection of outbreaks such as Polyphagous Shot-Hole Borer (PSHB).

- Undertake ArborCam vegetation surveys over the Town on a triennial basis to track temporal changes and identify trends in vegetation cover and condition more readily.

- Develop a tree inventory dataset derived from ArborCam imagery, to enable the monitoring of vegetation condition at the individual tree level.

1 Introduction

The Town of Cottesloe (the Town) covers approximately 393 ha (3.9 km2) of land north of Fremantle, extending west from Stirling Highway to the coastline. Since 2020, ArborCarbon has undertaken vegetation cover and condition monitoring for the Town using the ArborCam® camera system. The ArborCam is a unique 11-band airborne multispectral camera optimized for the detection of vegetation, vegetation height, and subtle changes in vegetation condition.

The datasets produced by the ArborCam camera system, particularly the height-stratified vegetation cover dataset, provide detailed information on vegetation cover, canopy cover (vegetation >3m tall) and vegetation condition. By extracting key statistics across various land tenure boundaries, including the entire local government area (LGA) and public and private land categories, the Town can gain insights into the composition and distribution of their urban forest. With repeated acquisitions over time, these statistics can also be used to monitor trends in vegetation cover and condition, identify areas of canopy loss or growth, and support evidence-based urban forest planning and management.

This report presents the results of the March 2026 ArborCam acquisition and analyses changes in vegetation cover since the previous acquisition undertaken in March 2023. The report includes vegetation cover statistics across multiple height classes, assessment of canopy cover change, and interpretation of vegetation condition patterns across the Town.

2 Methods

2.1 Airborne imagery acquisition

High-resolution airborne multispectral imagery was acquired over the Town with cloudless conditions on the 17th of March 2026. Imagery was acquired for this project with the ArborCam system with a ground sample distance (GSD) ranging from 7 cm/pixel to 21 cm/pixel dependent on the spectral band. The thermal imagery was acquired with a GSD of 96 cm/pixel. The maximum temperature recorded on the 17th of March 2026 in Swanbourne (BoM reference: 009215) was 35.5°C. (bom.gov.au). Height stratified vegetation cover statistics were extracted from the 2026 data and analysed across the Town as a whole, and within public and privately owned land.

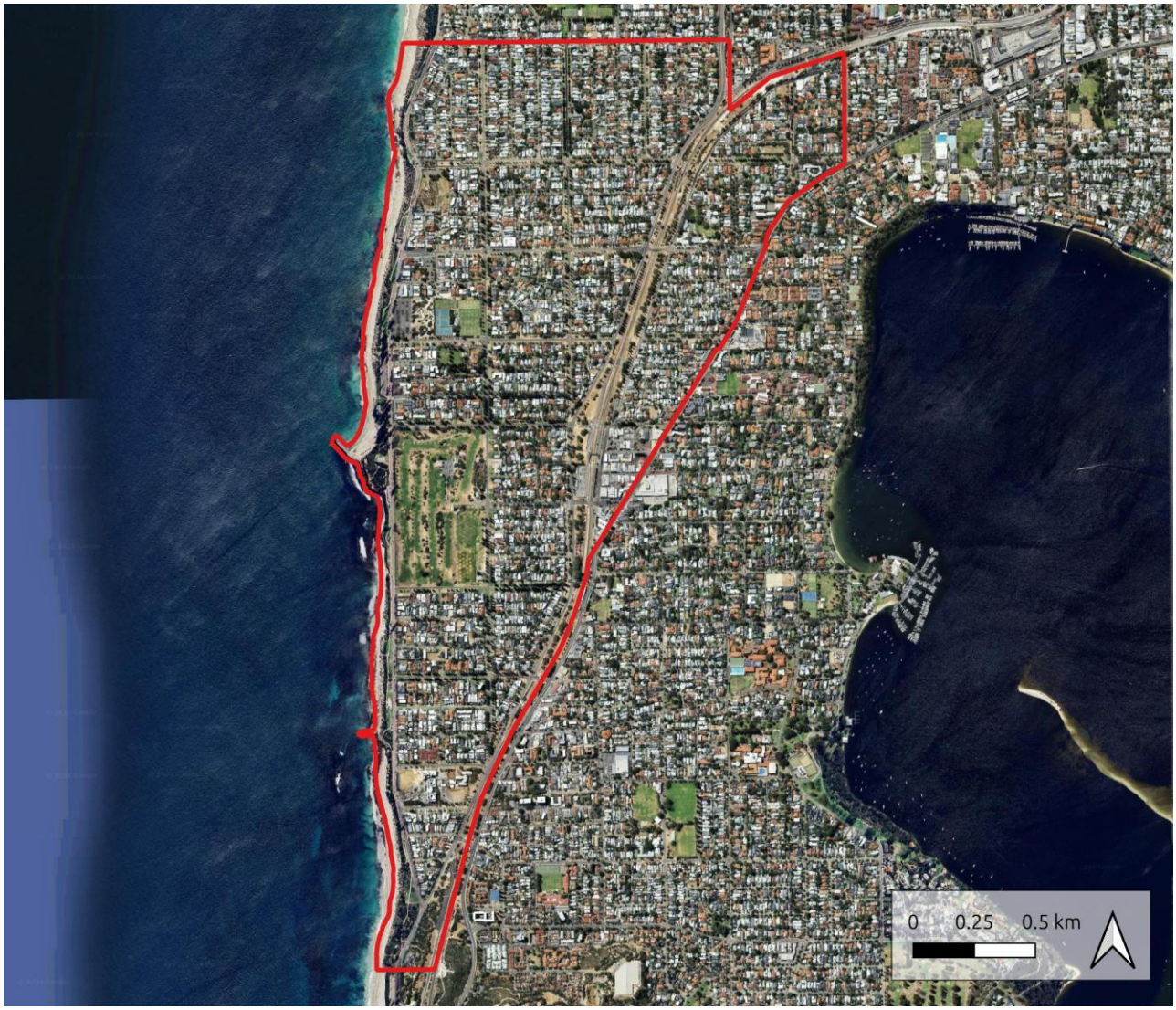


Figure 1: The Town of Cottesloe LGA boundary (red) overlayed on Google Satellite imagery.

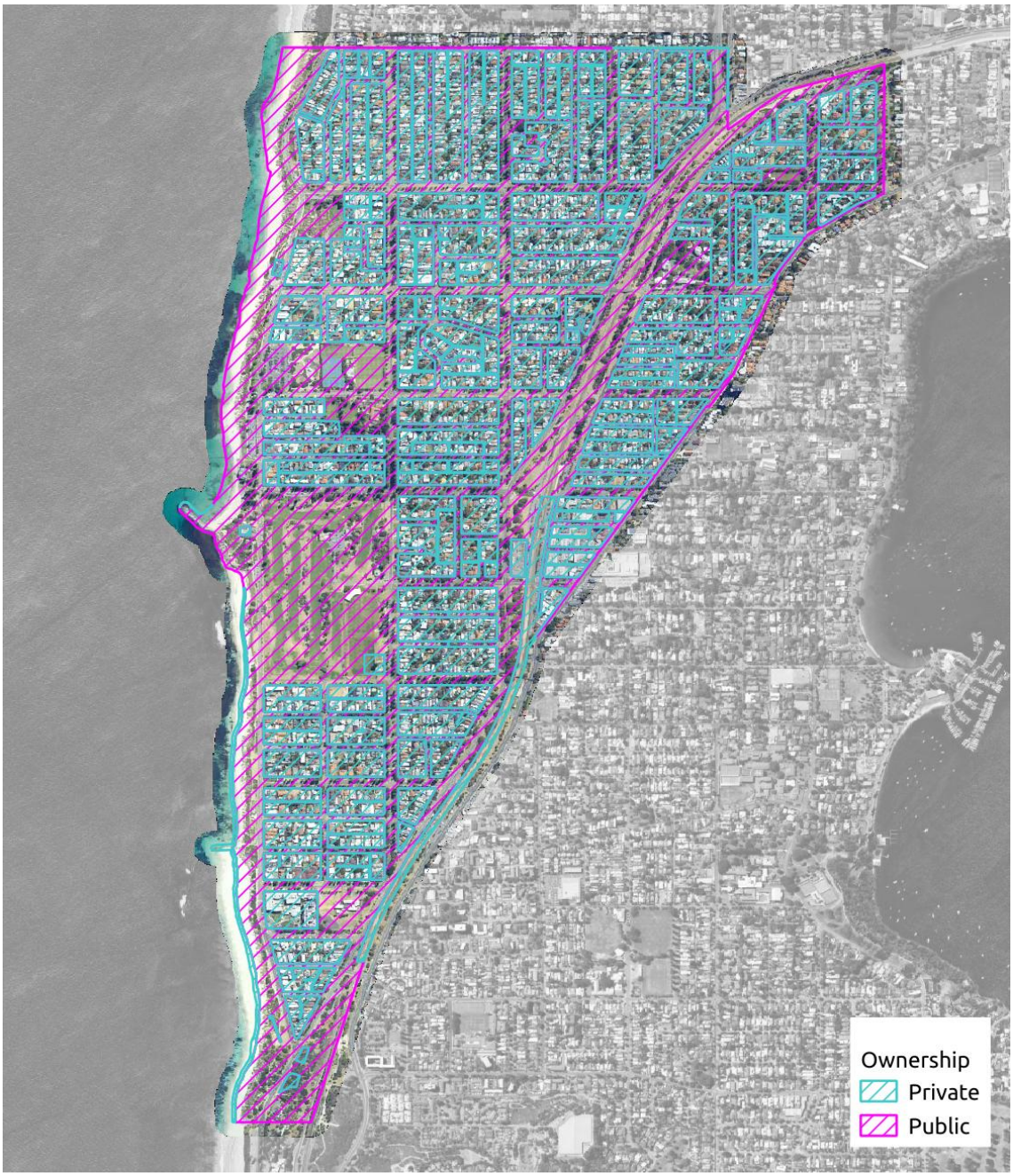


Figure 2. Land ownership boundaries within the Town of Cottesloe used for vegetation cover analysis.

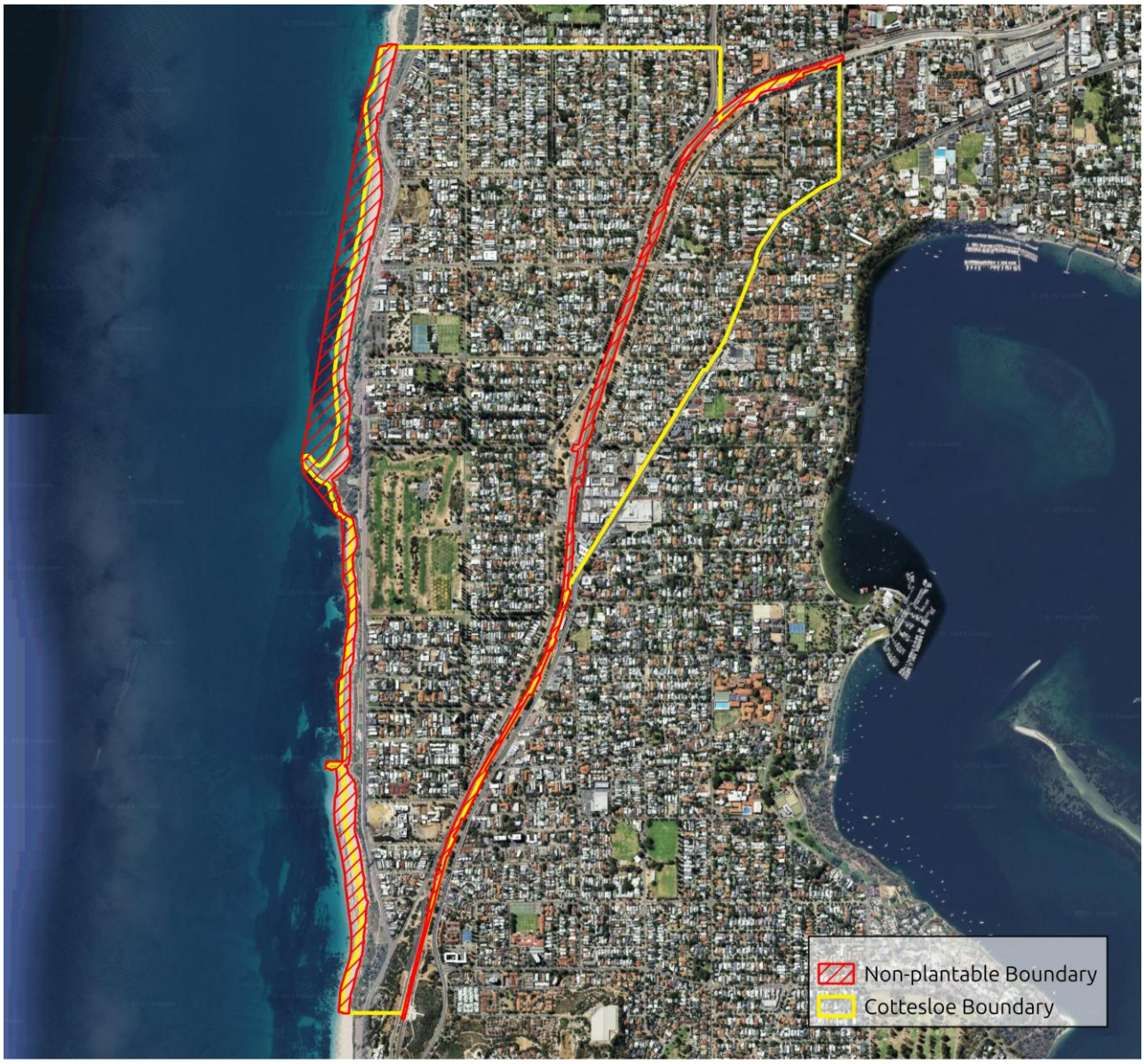


Figure 3: Non-plantable regions highlighted within the Town of Cottesloe boundary in red

3 Results and Discussion

3.1.1 Imagery

The acquired airborne ArborCam data was processed to produce high-resolution RGB (red green blue) imagery (Figure 4), False Colour Composite (FCC) imagery (Figure 5), height-stratified vegetation cover (Figure 6), Vegetation Condition Index (VCI) (Figure 7), and surface temperature (Figure 8) datasets across the Town of Cottesloe.



Figure 4: High-resolution RGB imagery of the Town of Cottesloe

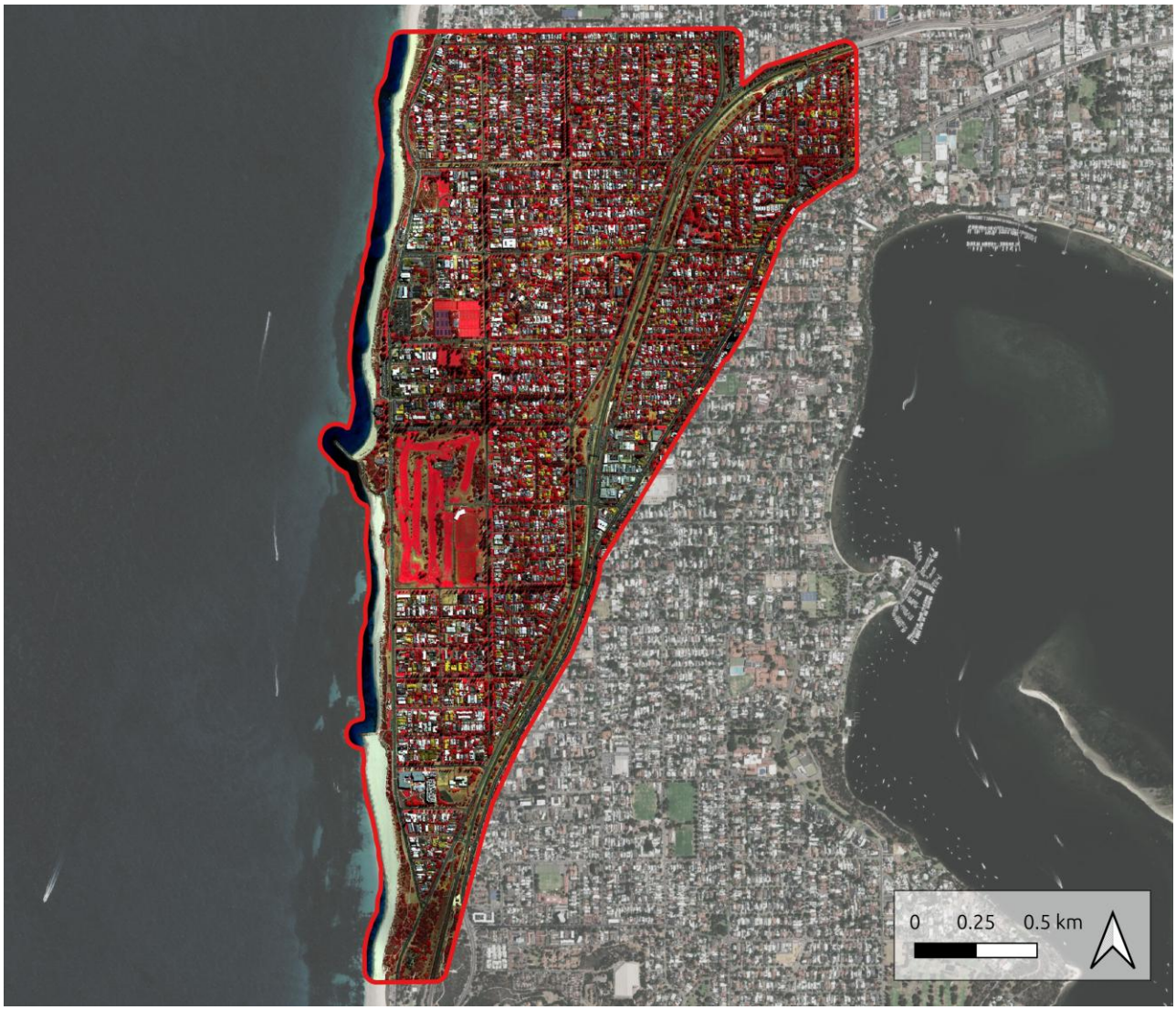


Figure 5: False colour composite of the Town of Cottesloe showing vegetation (red pixels)

The FCC dataset (Figure 5) was derived from a 3-band subset of the multispectral imagery (NIR, red and green). FCC imagery is commonly used in remote sensing to illustrate vegetation cover, which is displayed as red pixels.

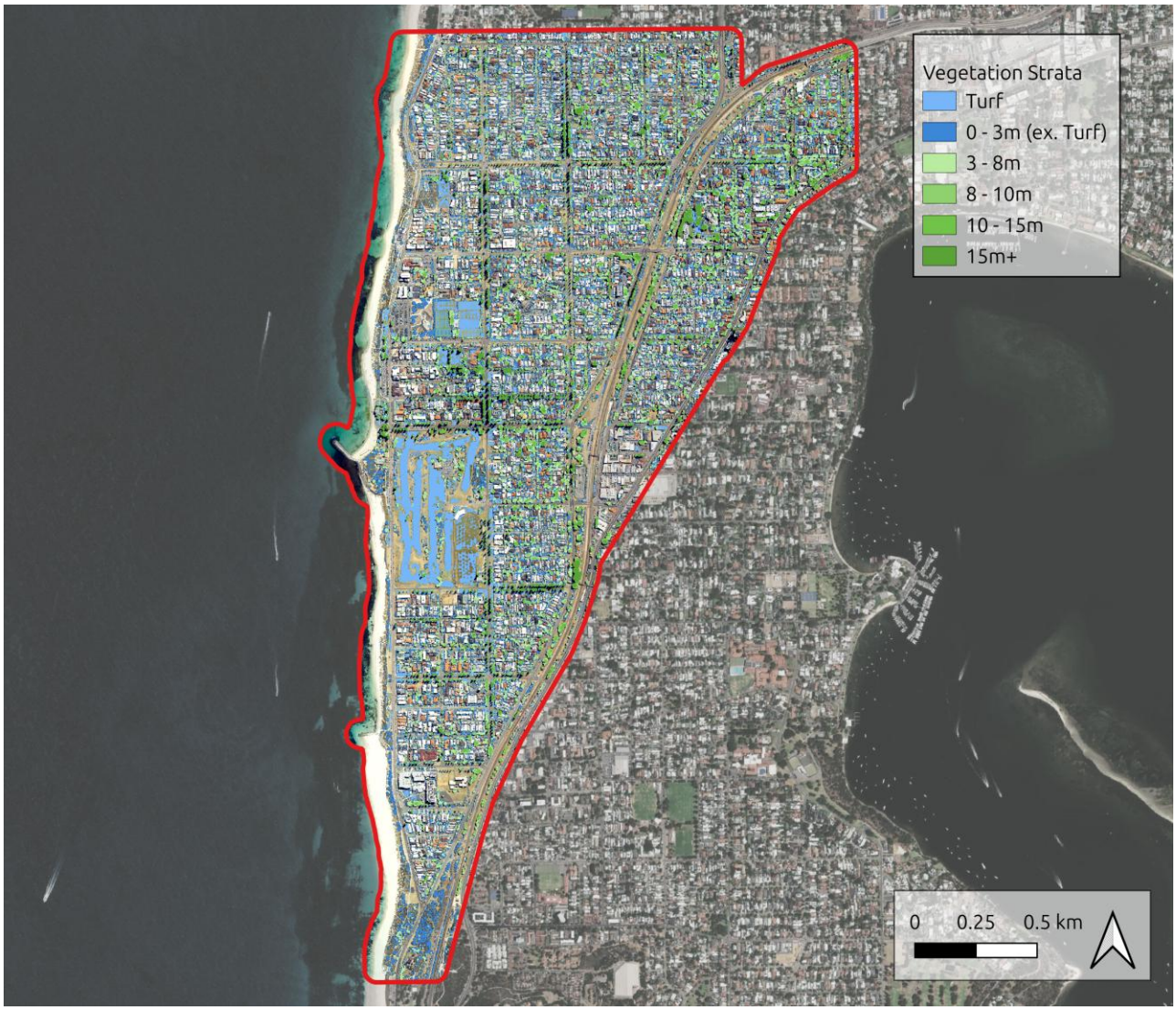


Figure 6: Height-stratified vegetation cover dataset of the Town of Cottesloe with each stratum displayed as a different colour.

The height-stratified vegetation cover dataset (Figure 6) is comprised of specific height strata colourised as follows: shown in the legend. This colour scheme is used in all illustrations of the height-stratified vegetation dataset in this report.

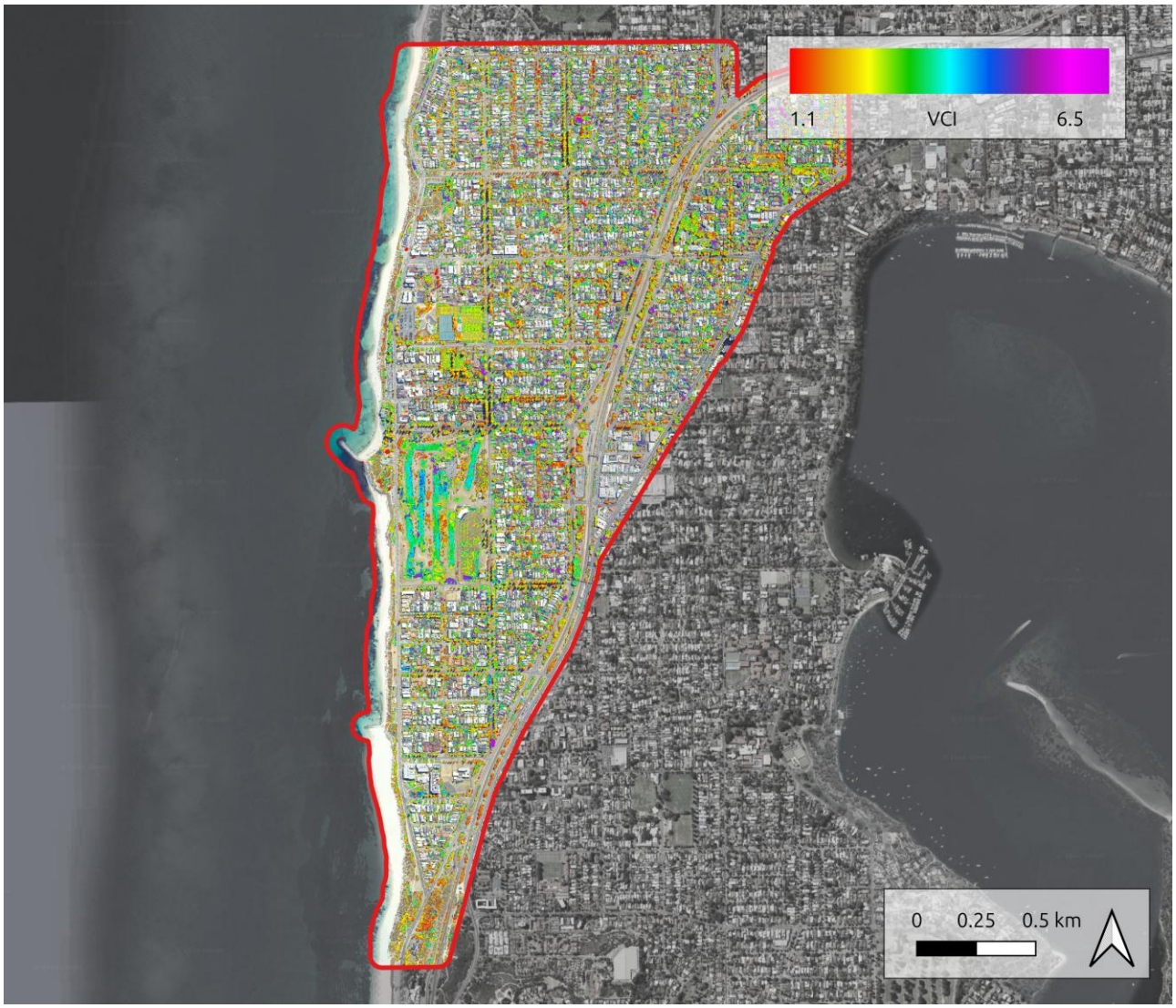


Figure 7: Vegetation Condition Index (VCI) orthomosaic showing vegetation condition across the Town of Cottesloe, ranging from lower VCI reflectance (red) to higher VCI reflectance (purple).

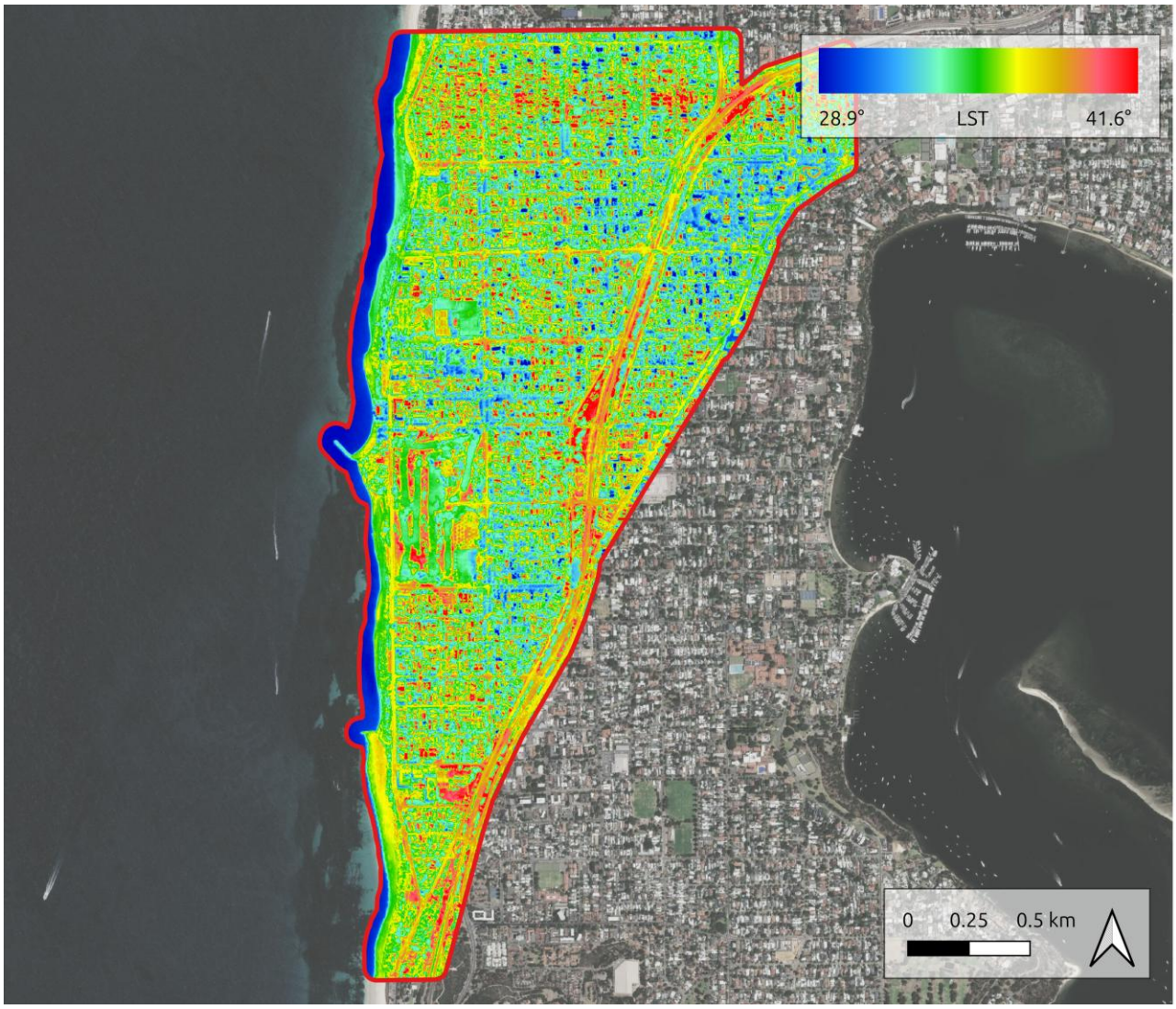


Figure 8: Radiometrically corrected thermal orthomosaic of the Town of Cottesloe, colour-scaled from lower surface temperature (blue) to higher surface temperature (red).

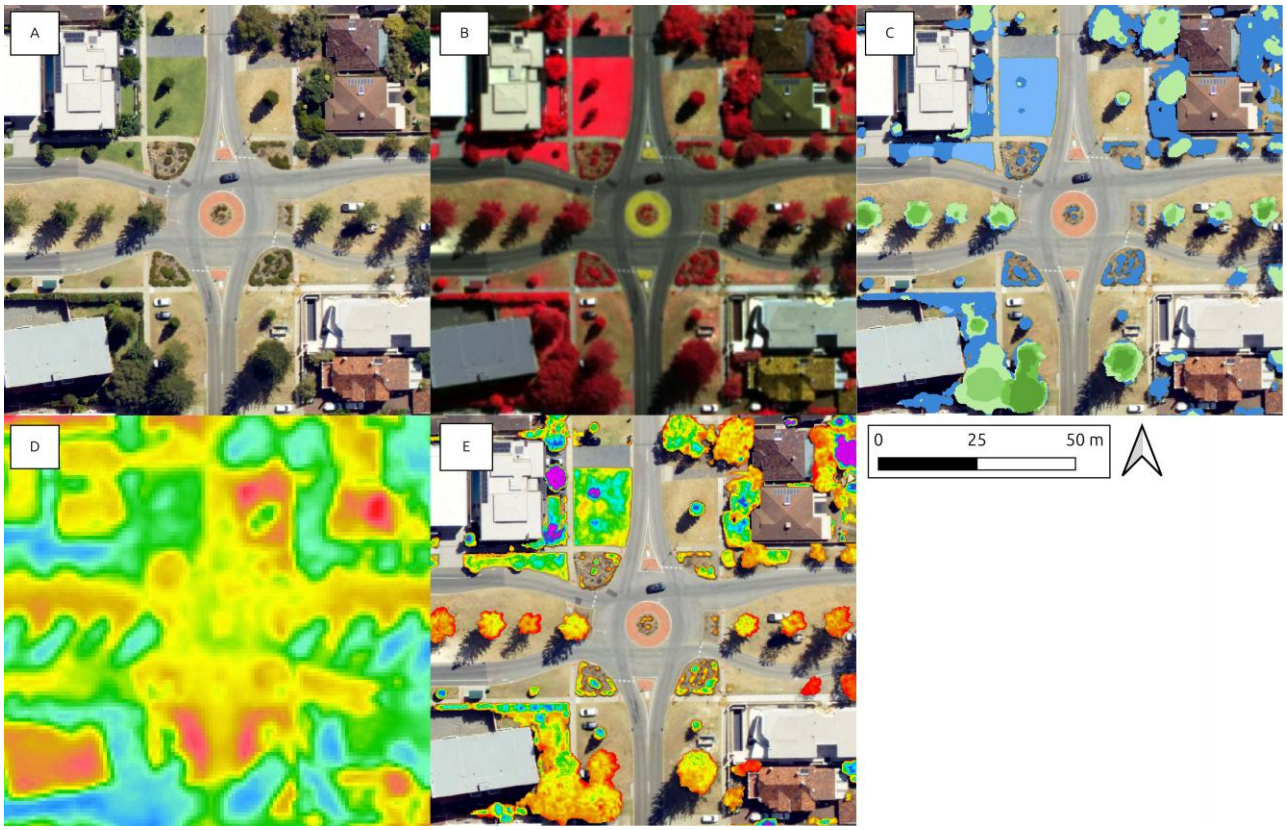


Figure 9: Close-up image of each of the datasets generated for the Town of Cottesloe: A) High-resolution RGB imagery; B) False Colour Composite (FCC) showing vegetation in red; C) Height-stratified vegetation cover, with each stratum displayed as a different colour; D) Land Surface Temperature (LST) ranging from 28.9°C (blue) to 41.6°C (red); and E) Vegetation Condition Index (VCI) ranging from low VCI reflectance (red) to high VCI reflectance (purple).

3.2 Vegetation Cover

3.2.1 Vegetation Cover Statistics - LGA

The Town has a total area of 392.9 ha, of which 29.4% (115.4 ha) was covered by vegetation. The remaining 70.6% (277.5 ha) was non-vegetated surfaces, such as buildings, roads, exposed soil and dead grass (Figure 8). Vegetation classified as turf occupied 5.0% (19.7 ha) of the area, and 10.9% (42.7 ha) was classified as vegetation 0-3m in height. Canopy (vegetation 3m and above) covered 13.5% (53 ha) of the Town.

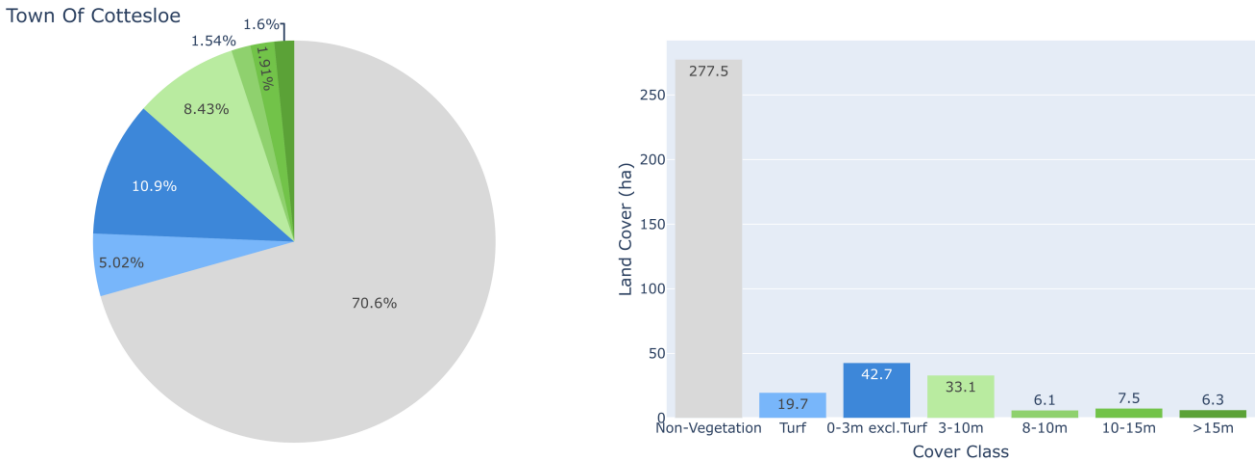


Figure 10: Town classification proportion (%) (left) and hectare coverage (right) of different height strata for the Town of Cottesloe in 2026.

3.2.2 Vegetation Cover Statistics - Land Ownership

Vegetation cover statistics were calculated across public and private land within the Town. Canopy cover was higher on public land (30.3 ha, 14.8%) than private land (22.7 ha, 12.0%), both in terms of total area (Table 1) and as a percentage (Table 2). While private land had a higher percentage cover in the 0-3m and 3-8m strata, public land had higher percentage cover across all other vegetation height classes, with the difference increasing as vegetation height increased. For example, in the >15m class, cover was only 0.5% (0.9 ha) in private land, compared to 2.6% (5.4 ha) in public land.

Table 1. Height stratified vegetation cover (in hectares) across private and public land within the Town of Cottesloe.

		Vegetation Cover (ha)								
Ownership	Area (ha)	Non-Veg	Turf	0-3m	3-8m	8-10m	10-15m	>15m	Canopy	All Veg
Private	188.7	139.7	2.9	23.4	16.5	2.7	2.6	0.9	22.7	49.0
Public	204.2	137.8	16.8	19.3	16.6	3.4	4.9	5.4	30.3	66.4
Total	392.9	277.5	19.7	42.7	33.1	6.1	7.5	6.3	53.0	115.4

Table 2. Height stratified vegetation cover (as a percentage) across private and public land within the Town of Cottesloe.

		Vegetation Cover (%)								
Ownership	Area (ha)	Non-Veg	Turf	0-3m	3-8m	8-10m	10-15m	>15m	Canopy	All Veg
Private	188.7	74.0	1.5	12.4	8.7	1.4	1.4	0.5	12.0	26.0
Public	204.2	67.5	8.2	9.4	8.1	1.7	2.4	2.6	14.8	32.5
Total	392.9	70.6	5.0	10.9	8.4	1.5	1.9	1.6	13.5	29.4

3.2.3 Change Statistics

Overall, the Town saw a decrease in total vegetation cover from March 2023 to March 2026 (Table 3). This is solely attributed to a decrease in turf and low vegetation, with vegetation cover in this category decreasing from 20.1% to 15.9%. However, vegetation cover increased across all other height strata, resulting in an overall slight increase in canopy cover across the LGA. Canopy cover increased from 51 ha (13.0%) to 53 ha (13.5%) across the three years, an increase in canopy area of 3.9%.

Table 3: Change in proportion of land cover of the total LGA from 2023 to 2026 (%). Green indicates increase, red indicates decrease.

	Proportional Change (%) 2023 - 2026								
Class	**Non-Veg**	**Turf**	**0-3m**	**3-10m**	**10-15m**	**>15m**	**All Veg**	**Canopy**	**Non-Canopy Veg**
2023 (%)	66.9	6.5	13.5	9.8	1.7	1.4	33.1	13.0	20.1
2026 (%)	70.6	5.0	10.9	10	1.9	1.6	29.4	13.5	15.9
Change (%)	5.5	-23.2	-19.7	1.3	9.5	15.6	-11.1	3.9	-20.9

3.2.4 Plantable vs Non-plantable Canopy Statistics

A Supplementary analysis was undertaken to compare canopy cover statistics calculated across two spatial extends: (1) the entire Town of Cottesloe legal boundary, and (2) the plantable area only, derived by excluding non-plantable regions, i.e. the railway corridor and beach (Figure 3).

Excluding non-plantable areas produced a modest increase in canopy cover percentage across all acquisition years (Table 4).

Table 4: Canopy cover percentages for the district calculated across the full legal boundary and across the plantable area only (i.e. excluding the railway corridor and beach), for each acquisition year

	Canopy cover – full district (%)	Canopy Cover – plantable area only (%)
2026	13.5	14.3
2023	13.0	13.8
2020	14.1	14.3
2017	13.1	13.8

4 Conclusion and Recommendations

While total vegetation cover across the Town decreased from 33.1% to 29.4% between March 2023 and March 2026, the decreases were concentrated in the non-canopy vegetation classes. Much of the vegetation <3m tall is turf and grass, where vigour is more variable than shrubs and trees. Conditions preceding the data capture, such as rainfall, temperature, and irrigation levels, can all impact the level of photosynthetic activity and thus whether the vegetation is detected. For this reason, vegetation cover <3m tall is expected to vary more widely than other strata over time.

In contrast, total canopy cover (vegetation greater than 3m tall) across the Town increased from 13.0% (51.0 ha) in March 2023 to 13.5% (53.0 ha) in March 2026. This corresponds to an increase of 2.0 ha, or 3.9% of total canopy area, and reverts the trend of canopy loss reported in the 2020 to 2023 period, when canopy cover declined from 14.1% to 13.0%.

The removal of large trees across the Town, particularly in private land, is evident when comparing the height stratified imagery between 2023 and 2026. However, the overall increase in canopy cover indicates that this loss has been small enough to have been offset by consistent vegetation growth. This includes both shrubs gaining height since 2023, and larger established trees increasing in crown area. The largest proportional increases in vegetation cover between 2023 and 2026 occurred within the taller vegetation strata (10-15m and >15m), highlighting the importance of retaining large, mature trees to support long-term canopy cover targets.

Based on the findings of this report, we recommend the following:

- Produce a significant canopy loss dataset, to identify areas of excessive tree loss.
- Produce a VCI change dataset to detect decline in vegetation at the individual tree or branch level. VCI change can highlight subtle declines in vigour, indicating areas to target for ground-based inspection. Targeted inspection of declining vegetation can focus resources on key areas, increasing the chances of early detection of outbreaks such as Polyphagous Shot-Hole Borer (PSHB).
- Undertake ArborCam vegetation surveys over the Town on a triennial basis to track temporal changes and identify trends in vegetation cover and condition more readily.
- Develop a tree inventory dataset derived from ArborCam imagery, to enable the monitoring of vegetation condition at the individual tree level.