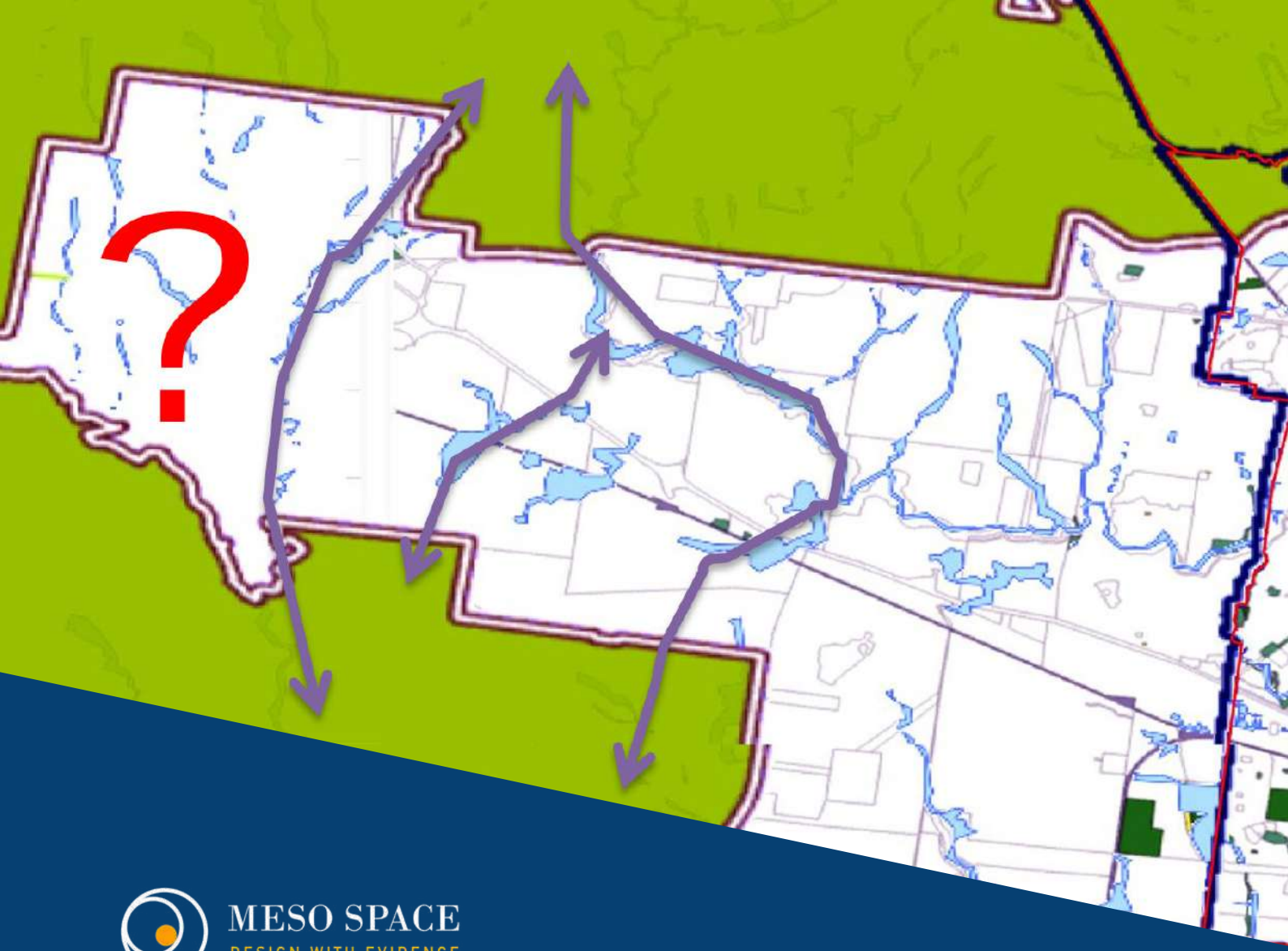

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Green Infrastructure in Melbourne's Growth Corridors:

A Melton Growth Area Case Study

Metropolitan Melbourne Green Infrastructure Research Program

Prepared by the Meso Space Research and Planning Team – March 2026

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Green Infrastructure, Urban Heat Vulnerability, and Habitat Connectivity:

A Growth Area Case Study

Findings from the Metropolitan Melbourne Green Infrastructure Research Program, with a pathway to action before growth areas are fully built out.

Research Lead: **Hamed Tavakoli, PhD**
Principal Urban Designer & Landscape Architect, Meso Space
Metropolitan Melbourne Green Infrastructure Research Program 2022–26
March 2026

Disclaimer:

This research case study presents the Meso Space Metropolitan Melbourne Green Infrastructure Research Program methodology applied to a rapidly growing outer metropolitan council. The City of Melton serves as the primary case study. The methodology, framework, and findings are directly applicable to comparable outer growth councils across metropolitan Australia.

This document is a Meso Space research publication. It does not represent a commissioned work or formal engagement with any council or government authority.

Who Should Read This Document

This publication is written for council officers, elected representatives, urban planners, and infrastructure decision-makers in Melbourne's outer growth corridors. It presents evidence-based findings and a practical framework for action, structured for use in precinct structure plan negotiations, open space plan reviews, urban forest strategy updates, and climate adaptation planning. The City of Melton is the primary case study; the findings and methodology are transferable to any comparable outer growth council.

Key Research Statistics at a Glance

Indicator	Melton	Metro Average
Urban canopy cover	4.1%	15.3%
Urban Heat Island ranking	#2 in Melbourne	n/a
Cost of acting now vs retrofitting later	15 to 20 per cent of equivalent retrofit cost	n/a
Peak land surface temperature differential	Up to 15°C above tree-canopied suburbs	n/a
Population growth trajectory	185,000 growing to over 400,000 by mid-2040s	n/a

1. Executive Summary

The Challenge

Melton is one of Australia's fastest-growing local government areas. Between now and the mid-2040s, its population is projected to more than double, from approximately 185,000 to over 400,000 residents. The growth area precincts that will house this population are currently moving through planning approval, early subdivision and construction at a pace that compresses the window for good decision-making.

That window is the central subject of this report.

Melton occupies a unique and critical position in Melbourne's western growth corridor. It sits between two systems of state-significant biodiversity value. To the north lies the northern green wedge, containing Jacksons Creek, native grasslands and threatened species populations. To the south lies the southern green wedge, anchored by the Werribee River, Eynesbury, Mount Cottrell and some of the most intact remnant vegetation remaining in the metropolitan region.

These two wedges are, in principle, connected through Melton's creek network and open space system. In practice, the urban growth filling the land between them is severing those connections incrementally and, at a certain point, irreversibly.

Melton also has an urban heat island problem that, on a 40°C summer day, produces land surface temperatures in its newer suburbs that are 15 degrees higher than in Melbourne's tree-canopied inner suburbs, which translates directly into cardiovascular stress, respiratory

illness, reduced outdoor activity and systemic disadvantage for children, the elderly and households without air conditioning.

What connects all of these considerations, the waterways, the green wedges, the canopy targets, the heat problem and the biodiversity risk, is the absence of a single integrated spatial framework that fuses them into a functioning green infrastructure system. That fusion is both technically achievable and economically urgent. Embedding it into the planning fabric now, while Melton's remaining growth precincts are still being designed, costs a fraction of what retrofitting equivalent infrastructure will cost once the urban fabric is set.

This report quantifies that gap. It identifies the structural deficiencies in Melton's current green infrastructure. It provides a six-layer GIS methodology for translating research findings into evidence-based spatial priorities. It sets out a four-tier connectivity framework for plannable, designable, fundable interventions. And it makes the case on economic, ecological and public health grounds that the best time to act is now.

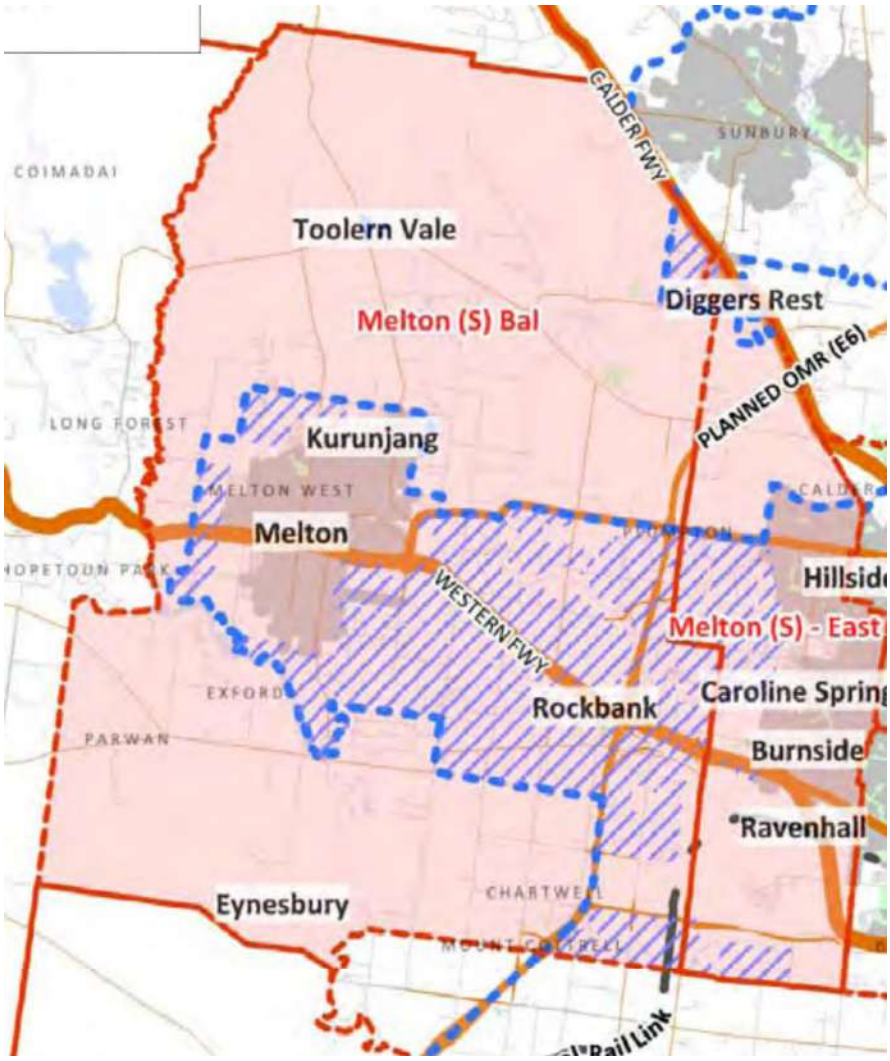

Figure 1: Two Green Wedges. One Growth Corridor (Source: City of Melton)

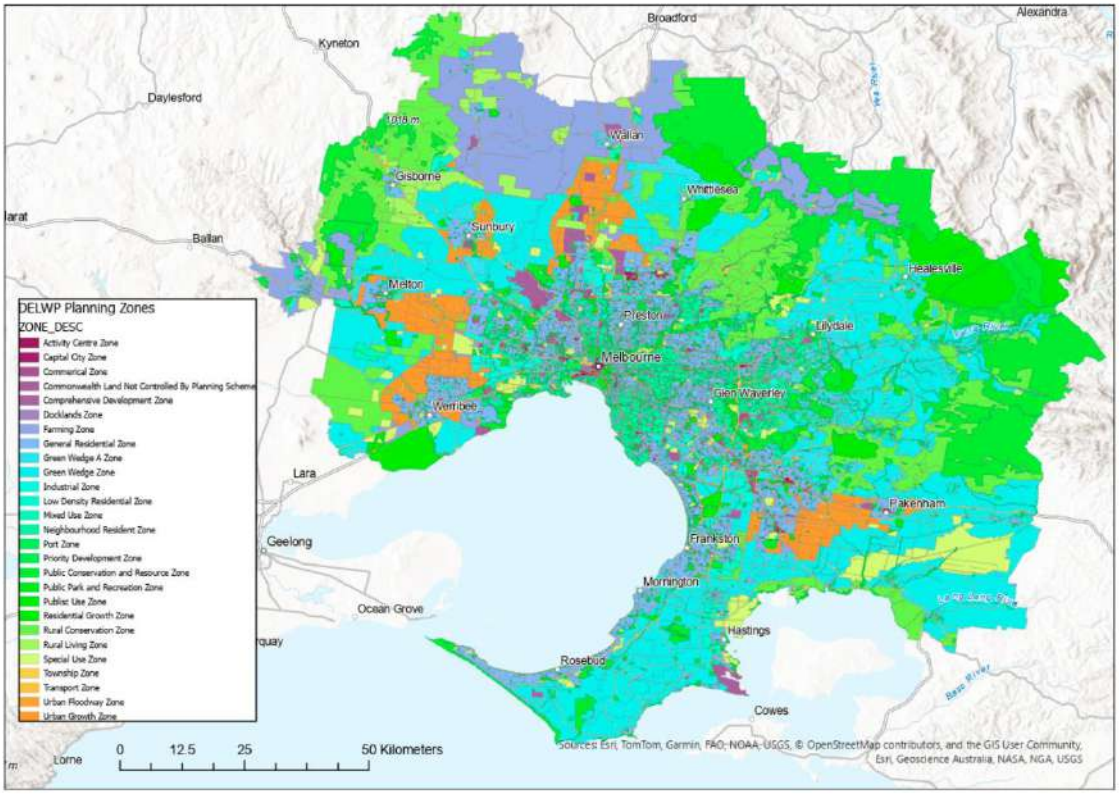

Figure 2: The Closing Window; Melbourne Planning Zones (Source: City of Melton)

The Core Finding

> *The cost of embedding green infrastructure into growth area development is estimated at between 15 and 20 per cent of the cost of retrofitting equivalent infrastructure after subdivision is complete. Acting in the current planning window is not only an ecological and quality-of-life benefit. It is the most financially responsible course of action available to the communities these councils serve.*

Summary of Principal Findings

- **Urban heat is accelerating, not stabilising.** Melton's western and north-western growth precincts already record among the highest urban heat island differentials in Metropolitan Melbourne, up to 6 to 8 degrees above the metropolitan mean on peak summer days. The growth area precincts currently under construction are being built to conditions that will worsen this differential substantially over the next two decades, absent deliberate design intervention.
- **The creek network is being managed as drainage infrastructure, not as ecological and cooling infrastructure.** All five waterways assessed, being Toolern Creek, Arnolds Creek (West and East), Little Blind Creek and Kororoit Creek, lack the riparian canopy, buffer width, fauna crossing infrastructure and inter-system connectivity needed to function as ecological corridors or meaningful urban cooling assets. Each is a drainage asset in ecological clothing.
- **Tree planting is producing landscaping outcomes, not resilience outcomes.** Melton's Urban Forest Strategy sets meaningful targets of approximately 10,000 trees per year but lacks the spatial intelligence to deploy those resources where they will have compounding ecological and cooling benefit. Without a GIS-based priority framework, tree planting follows convenience, maintenance logistics, or even distribution rather than ecological and thermal need.

- **The growth area window is real, measurable, and closing.** Current development trajectories suggest Melton's designated growth areas could approach full buildout by approximately 2050. The decisions made in the next five to ten years, covering creek corridor buffers, open space links, canopy standards and fauna crossing infrastructure, will determine the ecological and thermal character of Melton's urban environment for the fifty years that follow.
- **Council's negotiating power is highest right now.** The council's capacity to secure better green infrastructure outcomes in Precinct Structure Plan negotiations is directly proportional to the quality of the spatial evidence and design frameworks it brings to those negotiations. The research program has built that evidence base. The question is whether it is mobilised in time.

Summary of Research Recommendations

Four intervention types are recommended, sequenced by urgency:

1. **Creek Corridor Design Framework** Design-led analysis and guidelines for all five waterways, specifying corridor widths, canopy targets, fauna crossing locations, WSUD integration, and inter-corridor linking strategy.
2. **Urban Forest Priority Map** GIS multi-layer analysis producing a spatially prioritised planting framework tied to heat vulnerability, ecological sensitivity, growth area staging, and creek corridor buffers.
3. **Urban Heat Island Mitigation Strategy** Design standards for embedding cooling infrastructure into remaining growth area subdivisions, with modelled cooling benefit scenarios for 2035 and 2050, aligned with state planning instruments.
4. **Habitat Connectivity Network Plan** A four-tier network framework linking the creek corridors with green links, habitat nodes, and stepping stones across the council area, structured for use in PSP negotiations and development contribution frameworks.

2. Research Context and Methodology

2.1 The Metropolitan Melbourne Green Infrastructure Research Program

Since 2022, Meso Space has been conducting a systematic assessment of green infrastructure performance across Metropolitan Melbourne's outer growth councils. The program examines how rapidly urbanising local government areas are managing, or in some cases failing to manage, the integration of ecological networks, urban forest programs, waterway management and urban heat island mitigation within their respective growth trajectories.

The research draws on publicly available spatial datasets including DELWP vegetation mapping, Bureau of Meteorology thermal imaging, Melbourne Water catchment data, and council urban forest and open space strategies, supplemented by Meso Space's own field assessment and GIS analysis. To date, the program has examined conditions across thirteen outer metropolitan councils, spanning the northern, western, and south-eastern growth corridors.

The City of Melton was identified early as a priority case study for several compounding reasons: the scale and pace of its growth, the ecological significance of the green wedge system on its boundaries, the presence of multiple waterways with underrealised corridor potential, and the severity of its urban heat island conditions relative to comparable councils.

> **RESEARCH OBSERVATION** *Melton's combination of rapid population growth, ecologically significant boundary land, an existing but structurally underperforming creek network, and measurably accelerating urban heat conditions makes it one of the highest-priority intervention opportunities identified across the metropolitan program. The conditions for transformative action are present. The key question is whether that action occurs before or after the growth area window closes.*

2.2 Three Assessment Domains: Heat, Connectivity, and Canopy

This assessment focuses on three interrelated domains:

- **Urban heat vulnerability and the urban heat island effect (UHIE):** The current thermal performance of Melton's urban areas, the trajectory of heat exposure in growth precincts, and the design interventions capable of moderating that trajectory.
- **Habitat connectivity and ecological corridor function:** The capacity of Melton's existing landscape features, particularly its creek network, to support fauna movement, biodiversity resilience, and species persistence across a fragmented and developing landscape.
- **Tree canopy and urban forest:** The current state of Melton's canopy cover, the effectiveness of its Urban Forest Strategy in directing investment, and the spatial intelligence needed to convert a planting target into a compounding ecological and cooling asset.

2.3 The Six-Layer GIS Methodology: One Composite Priority Map

All spatial findings in this report are grounded in a composite GIS overlay analysis applied across the full north to south Melton transect, from the northern green wedge to the southern. Six data layers are assembled and weighted to produce a single ranked priority map that tells planners precisely where corridors should run, where canopy is most urgently needed, and where ecological intervention will compound across heat, habitat, and amenity outcomes simultaneously.

Layer 01: Urban Heat Island: Landsat-derived land surface temperature raster. Identifies the hottest streets and precincts across the council area, where cooling

intervention is most urgent and where tree canopy and riparian planting will deliver the highest return on investment.

Layer 02: Vegetation and Canopy: LiDAR-derived and aerial-classified canopy mapping, combined with DELWP native vegetation data identifying remnant grassland and woodland patches. Establishes the baseline north–south canopy gap and the extent of ecological fragmentation.

Layer 03: Hydrology and WSUD: Waterway corridors, stormwater drainage networks, and WSUD infrastructure locations. Maps where blue-green infrastructure can do double duty, managing water while simultaneously functioning as habitat movement channels and cool air drainage routes.

Layer 04: Ecological Sensitivity: Ecological Vegetation Class (EVC) communities, threatened species records, and remnant grassland condition data. Prevents inappropriate canopy intensification in native grassland zones and ensures species-appropriate planting across the corridor network.

Layer 05: Movement, Structure Plans and PSPs: Subdivision design layouts, road hierarchy, open-space reserve locations, and precinct structure plan boundaries. Identifies corridor opportunities within the planning system, specifically the places where land reservation is still possible before development approvals are issued.

Layer 06: Urban Density, Growth and Vulnerability: Forecast urban density by suburb and precinct, mapped against population vulnerability indicators. Reveals where heat exposure and per-capita canopy demand will be greatest as each new suburb reaches full occupancy.

The six layers, combined and weighted, produce four specific outputs:

What the Composite Model Delivers

- **Ranked north to south corridor routes:** Scored by heat urgency, canopy gap, ecological sensitivity, WSUD alignment, and open space availability.
- **Species-appropriate zone map:** Separates canopy intensification zones from native grassland protection zones.
- **Precinct canopy targets:** Quantified per growth suburb, tied to PSP stage gates and open-space contribution triggers.
- **Cooling performance scenarios:** Modelled PET and urban heat island reduction at canopy maturity, providing the evidence base needed for capital works funding submissions.

2.4 Planning Gaps Confirmed by Council's Own Documents

The following four structural gaps are confirmed by Melton City Council's own 2024 Planning Scheme Review and 2025 to 2029 Council Plan. They are included here not as criticism but as evidence that this research program's independent findings align with the council's own acknowledged deficiencies, and that the evidence base for action exists on both sides of the table.

- **No Habitat Corridor Framework:** No operative spatial framework identifies north–south ecological corridor routes through the growth areas. PSPs have been approved without any requirement to demonstrate that development layouts are compatible with fauna movement between the northern and southern green wedges.
- **Urban Forest Policy Not Yet Operative:** The 2024 Planning Scheme Review explicitly recommends Council prepare and implement a suitable Street Tree and Urban Forest Policy, confirming that no operative policy instrument yet exists to enforce canopy standards in new development.

- **No Heat-Priority Spatial Map:** Council's Climate Adaptation Plan calls for prioritised planting in high-heat areas, but there is no publicly available spatial map identifying which precincts and street corridors are hottest and should be acted on first.
- **Canopy, Water, and Biodiversity Programs Not Spatially Integrated:** The Climate Adaptation Plan, Integrated Water Management Plan, and Environment Plan are directionally aligned but have not been fused into a single spatial delivery standard.

> **RESEARCH NOTE** *The alignment between these independently identified gaps and the council's own published acknowledgements is significant. The evidence base for action is not contested but shared. What is needed is the spatial framework that converts that shared evidence into a coordinated investment program.*

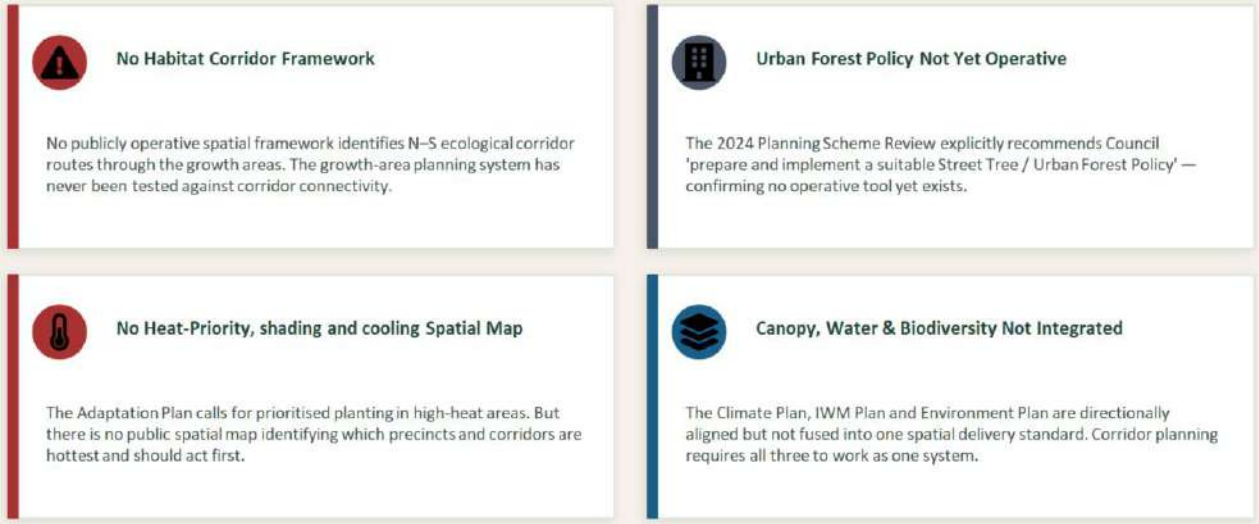

Figure 3: What Melton's Own Documents Reveal, Four Planning Gaps

3. Urban Heat Vulnerability

3.1 The Thermal Reality of Outer Metropolitan Growth

Melton ranks as the second worst urban heat island in Metropolitan Melbourne, with its western and north-western growth precincts driving that ranking. Bureau of Meteorology thermal data and independent satellite-derived land surface temperature analysis indicate that during peak summer events, on days above 38 degrees Celsius, significant portions of Melton's established and developing suburbs experience land surface temperatures 6–8°C above the metropolitan mean, and up to 12–15°C above the temperatures recorded in Melbourne's inner-urban tree-canopied neighbourhoods.

> **KEY FINDING** *On a 40 degree day in central Melbourne, a tree-canopied street in Fitzroy might record a land surface temperature of 38 degrees. On the same day, an unshaded residential street in a new Melton subdivision can record between 55 and 58 degrees. This is not a marginal difference. It is a public health differential, with direct consequences for cardiovascular stress, respiratory illness, outdoor activity and the wellbeing of children, elderly residents and households without air conditioning.*

3.2 The Growth Area Thermal Trajectory

Melton's established suburbs already have a heat problem. The more urgent concern is that the growth area precincts currently under construction are being built to conditions that will entrench and amplify that problem across an additional 15,000 to 20,000 lots over the next two decades.

Current growth area subdivisions are being approved and built with:

- Street tree canopy that takes between 15 and 20 years to reach meaningful shade provision
- No enforceable minimum canopy ratio at lot scale
- Waterway corridors built out to within metres of the drainage reserve boundary
- WSUD requirements that are being met on water quality grounds but not being leveraged for the ecological and cooling outcomes those same systems could deliver with minimal additional investment

The cumulative effect, compounding across the remaining growth area, is the progressive creation of a heat-exposed residential landscape from which there is no easy or affordable exit.

The thermal trajectory is not fixed. It is a design choice, made now in the planning and approval process, or not made at all.

3.3 What Reduces Urban Heat and Where to Intervene

- **Street tree canopy, the single most effective intervention at precinct scale** Mature street trees reduce ambient air temperature by 2–4°C and surface temperatures by up to 20°C beneath the canopy. Achieving this requires a minimum of two trees per lot frontage at the time of subdivision, species selection for canopy spread and fast establishment, and council-maintained verge tree programs in the critical first decade after development.
- **Creek and waterway riparian planting, the network multiplier** Well-vegetated waterway corridors function as cool air reservoirs, drawing cooler air through the urban fabric during evening land breezes. The cooling effect extends between 100 and 300 metres from the corridor edge when canopy is continuous and at sufficient width. For Melton's creek network, this means minimum 20-metre vegetated buffers on each bank.

- **Water-sensitive urban design, the foundation** WSUD features including bioretention swales, permeable paving and retarding basin landscaping reduce pavement heat storage and maintain the soil moisture that enables tree establishment and persistence through Melton's hot, dry summers.
- **Canopy on private land, the scale factor** Between 40–60% of Melton's urban area is private residential land. Establishing minimum canopy ratio requirements for new residential development is a planning mechanism several metropolitan councils have already begun to implement.

> **RECOMMENDATION 2.1** *Prepare a Melton Urban Heat Island Mitigation Strategy: baseline thermal mapping across current and future growth precincts; spatial modelling of the cooling benefit of proposed interventions under 2035 and 2050 climate scenarios; and design standards for integration into PSP negotiations and development overlay conditions. Combined street tree canopy and WSUD implementation has the potential to reduce ambient air temperature by 2 to 4 degrees and land surface temperatures by up to 20 degrees in the most exposed precincts.*

4. The Creek Network: Assessment and Potential

4.1 Five Waterways Managed for Drainage Rather Than Ecology

Melton is relatively well-endowed with waterways. Toolern Creek, Arnolds Creek (West and East branches), Little Blind Creek, and Kororoit Creek collectively traverse the council area from north to south and east to west, crossing most of the major growth precincts. In principle, they provide a connected network of blue and green corridors linking the northern and southern green wedges, two of the highest-biodiversity landscapes in the metropolitan region.

In practice, each waterway has been managed primarily as stormwater drainage infrastructure. Their ecological function, their role in supporting fauna movement and their capacity to deliver urban cooling have been secondary considerations at best in both the development assessment process and the maintenance regimes applied to them.

A creek managed for drainage delivers drainage. A creek designed as an ecological and cooling corridor, with defined buffer widths, multi-storey indigenous planting, fauna crossing infrastructure and connection to adjacent systems, delivers drainage and habitat movement and urban cooling and landscape amenity and recreational value. The difference is not cost. The difference is design intent, articulated at the planning and approval stage.

4.2 Individual Waterway Assessment

Waterway	Role in Network	Current Status and Gaps	Connectivity Rating
Toolern Creek	Primary N–S spine; bisects growth area and town centre	Fragmented, lacking continuous riparian canopy. Road crossings are unmanaged for fauna. Thermal buffer is absent in new subdivisions. WSUD and retention capacity are underutilised.	Low–Moderate
Arnolds Creek (West Branch)	Traverses fastest-developing precincts	Poor. Channelised in sections, with minimal indigenous planting, insufficient corridor width and high heat exposure on adjacent lots.	Low
Arnolds Creek (East Branch)	Potential link between northern green wedge and central suburbs	Poor. Interrupted by multiple infrastructure crossings, with a degraded riparian zone and no formal connection to the West Branch.	Low
Little Blind Creek	Southern sub-corridor; ecologically sensitive upper catchment	Poor. Disconnected from the broader network with sparse canopy cover and stormwater impacts reducing ecological function.	Low
Kororoit Creek	Southern boundary corridor; traverses biodiversity-sensitive land	Moderate. Has existing biodiversity value but corridor width is inadequate, canopy continuity is absent and there is no fauna crossing	Low–Moderate

Waterway	Role in Network	Current Status and Gaps	Connectivity Rating
		infrastructure at key road intersections.	

4.3 The Interconnection Problem: A Missing Network

The individual performance deficits of each waterway are compounded by a systemic problem: the five creek systems are not functionally connected to one another.

Without deliberate designed green links between creek systems running along secondary drainage lines, road reserves, open space chains and council land, fauna moving along one corridor has no pathway into another. A species that can travel the full length of Toolern Creek but cannot cross to Kororoit Creek remains functionally isolated from the southern green wedge.

The corridor map illustrates this precisely. The existing and partially functional creek corridors, shown as blue directional arrows, each operate in isolation. The proposed inter-corridor links, shown as green dashed routes, do not yet exist as designed green infrastructure. The question mark at the centre of the map represents the critical gap: the point where functional connectivity between north and south either exists or does not. Currently, it does not.

A fauna movement network requires nodes, links, and crossings, not just linear corridors. The design of that network must happen before the gaps between corridors are built out with private lots and roads.

The inter-corridor connections that are required pass through:

- WSUD bioretention channels functioning as habitat movement routes
- Urban forest street corridors along primary movement routes
- Species health and movement managed across designed crossings
- Tree canopy at minimum 8 to 12 metre spread on primary routes
- Pedestrian and recreational connections that double as ecological stepping stones

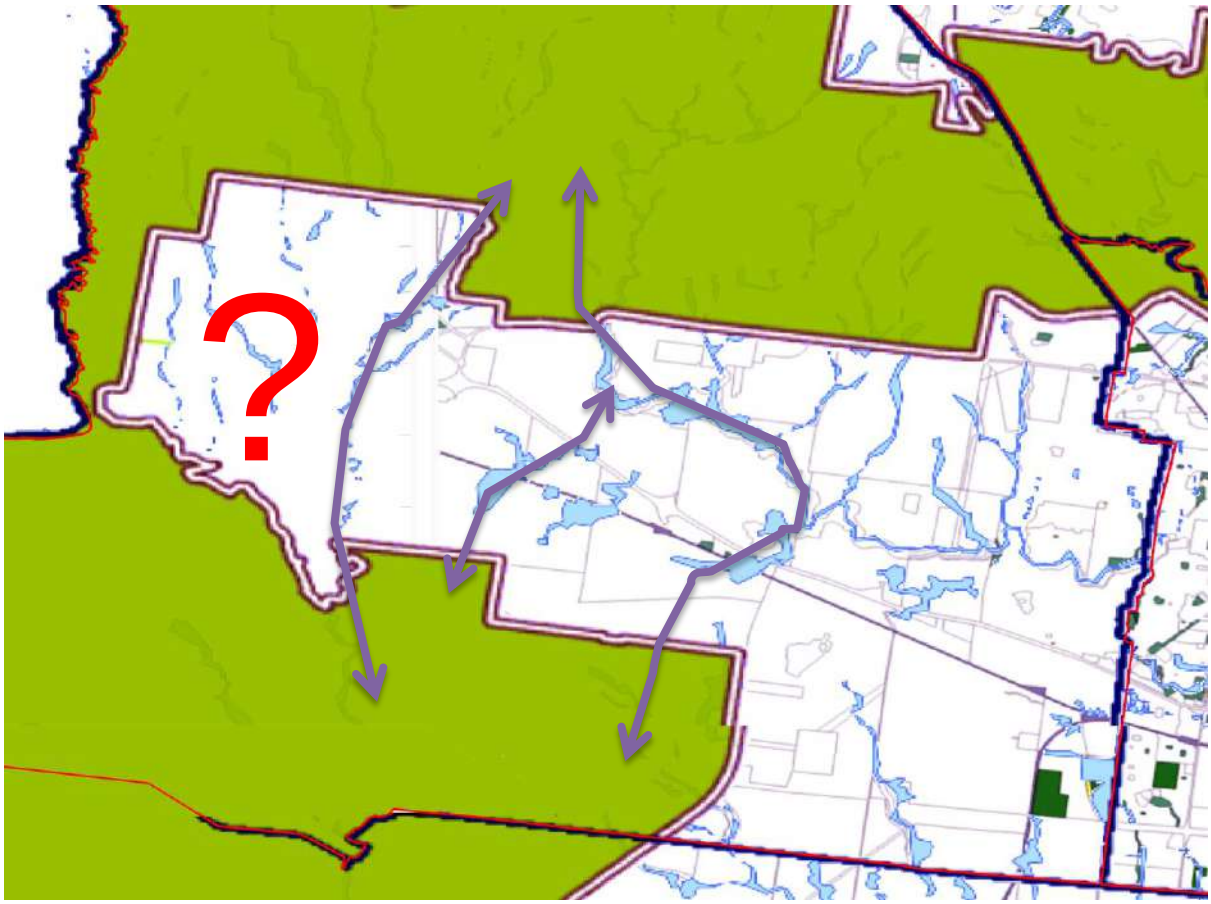

Figure 4: One Closing Window; Melton Habitat Corridor Map with Potentialities (Source: Meso Space)

4.4 A Four-Tier Connectivity Framework for Melton

Meso Space's metropolitan research program has developed a four-tier connectivity framework applicable to outer growth council contexts:

- **Tier 1: Primary Corridors:** The five creek systems, designed and managed as continuous ecological corridors with minimum 20-metre riparian buffers, multi-storey indigenous planting, and fauna crossing infrastructure at all major road intersections. These are the non-negotiables and form the structural backbone of the entire network.
- **Tier 2: Secondary Links:** Designed vegetated connections between creek systems, running along secondary drainage lines, road reserves, linear open space, and large-lot residential areas. Minimum 10-metre vegetated width. These act as the connective tissue that turns five isolated corridors into one functioning network.
- **Tier 3: Habitat Nodes:** Significant areas of remnant or restored indigenous vegetation such as bushland reserves, school grounds, community open spaces and wetland systems that function as refuges, source populations and stepping-stone habitats within the broader network.
- **Tier 4: Stepping Stones:** Smaller green spaces such as pocket parks, street tree corridors, bioretention systems and private gardens with indigenous planting that reduce the functional isolation between nodes and corridors for mobile species, and contribute to the distributed cooling and permeability of the urban fabric.

> **KEY FINDING** *The four-tier framework is not an aspirational map. It is a planning and design tool. Each tier translates directly into a land reservation specification, an open space design standard, a development contribution requirement, and a maintenance program. Applied to*

> *Melton's remaining growth areas now, it produces a spatial plan that development must accommodate rather than a wish list to be added on afterward.*

4.5 What Designed Corridors Require in Practice

- **Defined minimum buffer widths:** Each waterway requires a defined minimum vegetated buffer on each bank, measured from the top of bank rather than the centre of the channel. Research-based minimum standards range from 20 metres for secondary waterways to between 40 and 60 metres for primary corridors.
- **Multi-storey indigenous riparian planting:** Effective corridor planting requires three vegetation layers: canopy trees (e.g. Eucalyptus camaldulensis, Acacia melanoxylon, Casuarina cunninghamiana); shrub understorey (e.g. Acacia, Leptospermum, Olearia); and groundcover and sedge layer (e.g. Lomandra, Carex, Juncus, Poa). Canopy continuity is the critical element, as gaps greater than 50 metres represent functional barriers for many arboreal and semi-arboreal species.
- **Fauna crossing infrastructure at road intersections:** Every road that crosses a creek system is, without mitigation, a potential barrier to or mortality trap for ground-dwelling and semi-arboreal fauna. Box culverts or arch underpasses of sufficient dimension, at least 600 mm in height, are required at all arterial and major collector road crossings. Priority locations include: Toolern Creek at Leakes Road, Westwood Drive, and Paynes Road; Kororoit Creek at Robinsons Road; and Arnolds Creek at Taylors Road and Hume Drive.
- **WSUD integration within the corridor:** Water-sensitive urban design features placed within or immediately adjacent to the creek corridor serve a dual function: they improve water quality entering the creek system, and they maintain the soil moisture regime that enables riparian planting to establish and persist through Melton's hot, dry summers.
- **Inter-corridor linking vegetation:** Vegetated links between creek systems must be designed at the Precinct Structure Plan stage before development approvals are issued, so that the land required for them is reserved in the open space network rather than allocated to private lots.

> **RECOMMENDATION 3.1** *Prepare a Creek Corridor Design Framework for all five waterways, specifying buffer widths, indigenous planting palettes, fauna crossing locations, WSUD integration points, and inter-corridor linking routes. This framework should be calibrated to feed directly into outstanding PSP negotiations and the Open Space Plan Review. Continuous vegetated riparian corridors have the potential to reduce urban heat island intensity within 300 m of each waterway by a minimum of 5°C at canopy maturity, while simultaneously delivering habitat movement, water quality, and landscape amenity outcomes.*

5. Tree Canopy and Urban Forest Strategy

5.1 The Gap Between Target and Impact

Melton's canopy cover stands at 4.1 per cent, compared to a metropolitan average of 15.3 per cent and a commonly accepted minimum ecological threshold of between 20 and 25 per cent for meaningful urban heat mitigation and biodiversity support. Melton City Council has invested significantly in its Urban Forest Strategy and has established a meaningful annual planting target of approximately 10,000 trees. The research identifies a structural gap between the existence of those targets and the spatial intelligence needed to direct them to their highest-value locations.

A target of 10,000 trees per year, deployed without a GIS-based priority framework, is effectively distributed across a large and ecologically varied landscape according to request, maintenance convenience, or even spread. The difference between targeted and untargeted planting, compounded at scale over a decade, is the difference between an urban forest program and an urban resilience program.

> **KEY FINDING** *The question for Melton's urban forest program is not how many trees are planted. It is where they are planted. Ten thousand trees planted in thermally vulnerable streets adjacent to creek corridors, in the hottest growth area precincts, along inter-corridor linking routes, and in the highest ecological-sensitivity zones, will produce a fundamentally different outcome than ten thousand trees distributed by request or even spread. The trees are the same. The spatial intelligence determines whether they become infrastructure or landscaping.*

5.2 What a Spatial Priority Framework Looks Like

A GIS-based urban forest priority framework, built from the six-layer composite model described in Section 2.3, layers multiple spatial datasets to identify where tree planting will achieve the greatest cumulative benefit across cooling, ecology, and amenity simultaneously. The layers include:

- Urban heat vulnerability: land surface temperature and heat island intensity data
- Creek corridor buffers: a buffer of between 200 and 500 metres from each waterway
- Ecological sensitivity and habitat connectivity: vegetation mapping and connectivity modelling
- Growth area staging: precinct development timelines
- Existing canopy health and cover: current tree canopy mapping

The output is a ranked priority map, a living spatial tool that informs annual works programs, development contribution negotiations, and open space plan review outcomes simultaneously.

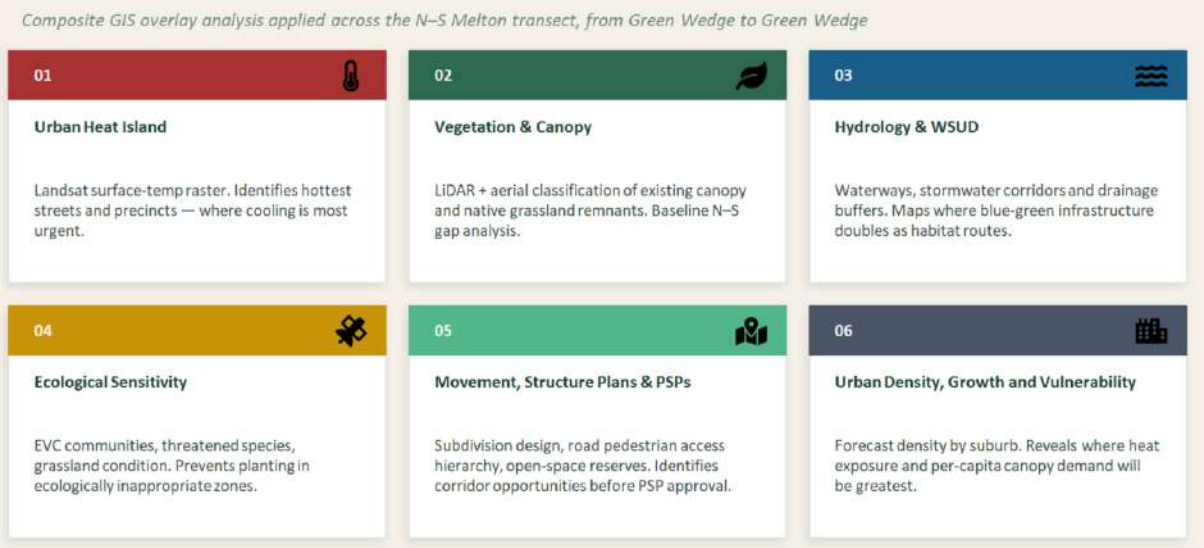

Figure 5: Six Mapping Layers; One Evidence Base

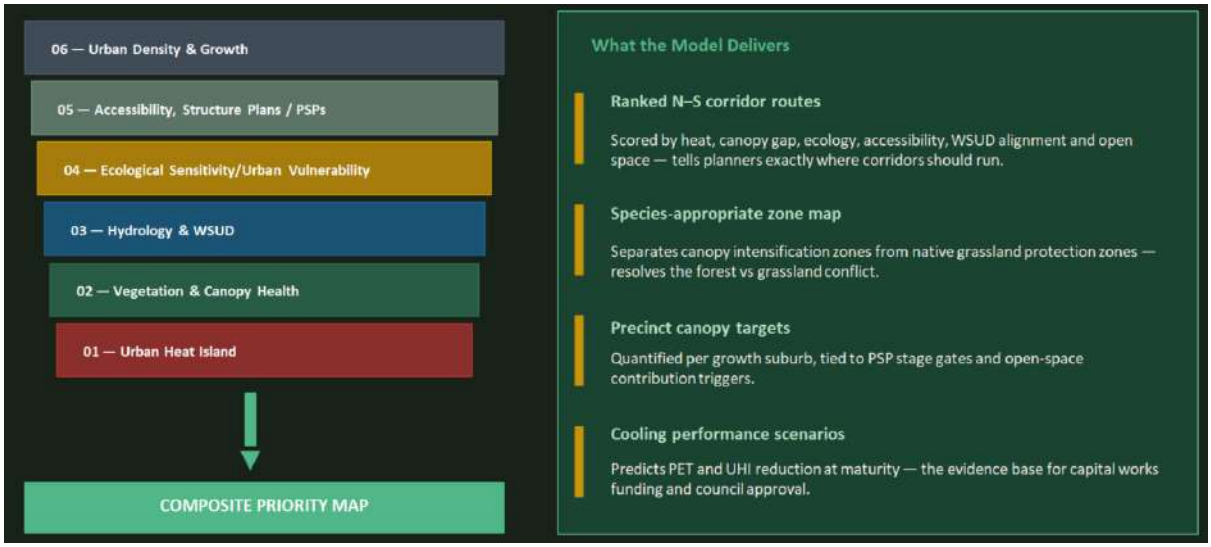

Figure 6: Six Layers Resulting in One Composite Priority Map

5.3 Species Selection and Canopy Establishment

Canopy establishment failure, where trees are planted but do not survive to maturity, is a consistent problem in outer metropolitan growth areas, driven by poor species matching to site conditions, inadequate maintenance in developer-funded programs, and the increasing thermal stress of summer extremes.

For Melton's context, species selection priorities should include: locally indigenous eucalypts and wattles in creek corridor and ecological connectivity zones; drought-tolerant canopy species with proven performance in Melbourne's western plains grassland and woodland contexts; faster-establishing species in the most thermally vulnerable streets; and locally provenant seed sources for all ecological plantings.

A critical distinction must be maintained. Canopy intensification zones such as residential streets, creek corridors and open space links are fundamentally different from native grassland protection zones. The composite model resolves this tension spatially, ensuring trees are planted where they compound value and protected grassland is not inadvertently shaded or invaded. This is the forest-versus-grassland conflict that has undermined previous

outer metropolitan planting programs, and the spatial model is specifically designed to resolve it.

> **RECOMMENDATION 4.1** *Prepare an Integrated Urban Forest Priority Map, being a GIS multi-layer analysis producing a ranked spatial priority framework for Melton's tree planting program, directly informing the Open Space Plan Review, annual works programming, and growth area development contribution negotiations.*

6. Habitat Connectivity and Biodiversity Resilience

6.1 Progressive Isolation Between Green Wedge Source Populations and Urban Habitat

Melton sits between two significant green wedge areas: the Werribee River corridor to the south-west and the Sunbury to Macedon ranges to the north. These areas contain vegetation communities, fauna populations, and biodiversity values of metropolitan and state significance. They are the source populations from which Melton's urban habitat, if well-designed, can draw.

> **KEY FINDING** *Ecological isolation does not require the complete removal of vegetation. It requires only that the gaps between habitat patches become too large for the species in question to cross. For many of Melton's locally significant species, including small woodland birds, reptiles and ground-dwelling mammals, the current gap sizes in the growth area landscape are already at or near the threshold of functional connectivity.*

6.2 The Cascade of Inaction

The consequences of failing to act in the current planning window follow a predictable and well-documented cascade:

5. **Species isolation** as habitat patches become too small and too distant for many species to cross between them
6. **Local extinction debt** where species populations persist for a time but are no longer functionally connected or reproductively viable, creating a time-delayed extinction wave
7. **Heat lock-in** where urban form is set with insufficient canopy and permeability and surface temperatures rise over decades as existing vegetation ages and dies without succession
8. **A 40-year retrofit horizon** being the point at which the council and community recognise the problem, find the political will to act and then wait four decades for remedial canopy planting to reach ecological maturity

Every year of delay in the current planning window advances the point at which this cascade becomes irreversible.

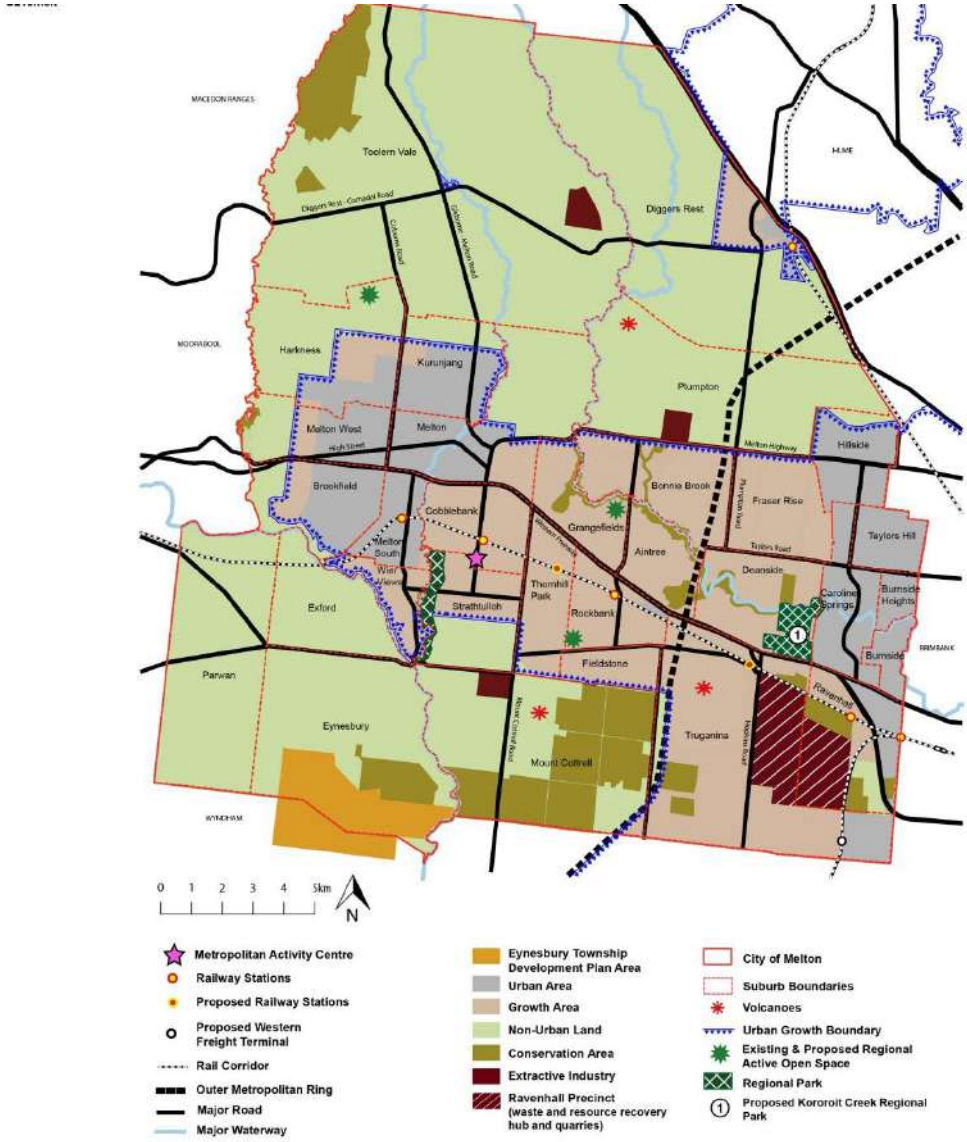

Figure 7: What Is Lost if Corridors Are Not Designed Now (Source: City of Melton)

6.3 Species and Communities of Concern

- Western (Basalt) Plains Grassland and Natural Temperate Grassland of the Victorian Volcanic Plain: A critically endangered ecological community under the EPBC Act.
- Grassy Eucalypt Woodland of the Victorian Volcanic Plain: Also listed as critically endangered, occurring in fragmented patches within the municipality.
- Reptiles and ground-dwelling mammals: Including species associated with grassland–woodland interface habitats, particularly vulnerable to fragmentation in outer metropolitan contexts.
- Woodland birds: Including Hooded Robin, Jacky Winter, Diamond Firetail and Brush Bronzewing, species that are highly sensitive to habitat fragmentation.

6.4 The Growth Area Timing Imperative

Acting before development is a planning, design and negotiation exercise. Acting after development is an acquisition, demolition, revegetation and long-term management exercise that typically costs five to ten times more per hectare of outcome, delivering a fraction of the

ecological benefit, and requiring political will that is very difficult to sustain across the decades needed for full ecological recovery.

Melton represents one of the last opportunities in metropolitan Melbourne's western growth corridor to embed ecological connectivity at the scale required for long-term biodiversity resilience. It still has precincts in PSP preparation where the location and design of open space, drainage reserves, and public land can be materially influenced by a well-evidenced council position.

> **RECOMMENDATION 5.1** *Prepare a Habitat Connectivity Network Plan applying the four-tier connectivity framework to Melton's spatial context, identifying priority connections in growth area precincts where land reservation remains possible, and providing the spatial evidence base for council engagement in PSP negotiations with the Department of Transport and Planning.*

7. Research Recommendations and Intervention Framework

7.1 Four Services, One Integrated System

The four services address distinct but interdependent planning gaps. Creek corridor design reinforces urban forest priority mapping, which reinforces heat island mitigation standards, which reinforces habitat connectivity planning. Each has been detailed in Sections 3 to 6 and the delivery specifications are summarised here.

Service	Deliverable	Key Outputs
1. Creek Corridor Design Framework	Design-led guidelines for all five waterways	Buffer widths, indigenous species palettes, fauna crossing specifications, WSUD integration, inter-corridor links and canopy targets
2. Integrated Urban Forest Priority Map	GIS multi-layer ranked planting framework	Annually updatable spatial priority map; precinct canopy targets tied to PSP stage gates
3. Urban Heat Island Mitigation Strategy	Design standards for remaining growth area subdivisions	Baseline thermal map; 2035 and 2050 cooling scenarios; street tree and lot canopy ratios; model planning controls for overlay conditions
4. Habitat Connectivity Network Plan	Four-tier habitat framework for the council area	Priority corridor routes; land reservation recommendations; evidence base for PSP and development contribution negotiations

7.2 Three Ways to Deliver Corridors in Every Growth Area Precinct

Plans and frameworks produce corridor outcomes only when three delivery mechanisms operate simultaneously in every growth area precinct. These are not alternatives. Each precinct needs all three.

Streets as Corridors

- Species chosen for habitat value and ecological utility rather than aesthetics
- Between 8 and 12 metre canopy spread on primary movement routes, specified in subdivision permits
- Structural soil cells linking root zones continuously along street verges
- WSUD bioswales sustaining tree establishment through summer drought stress
- No-mow buffers at tree bases providing understorey habitat at ground level

Open Space as Stepping Stones

- Each public reserve linked by designed vegetation to adjacent waterway or parkland
- Native understorey planted to habitat grade with multi-storey indigenous communities rather than mown grass
- Constructed wetlands designed as habitat nodes with ecological function
- Connectivity confirmed against the four-tier network framework before subdivision approval is granted

- Minimum 10 to 30 metre riparian buffers on all drainage corridors within open space reserves

Planning Controls as Delivery

- Corridor overlays embedded directly in Precinct Structure Plans as spatial requirements, not aspirations
- Canopy targets written into open-space contribution requirements in a way that is quantified, measurable and enforceable
- Species schedules tied to ecological zone rather than generic lists, resolving the grassland and canopy conflict at the approval stage
- Post-construction monitoring against canopy survival targets, with remediation obligations
- Annual shade audit linked to the capital works programme, creating a feedback loop between outcome and investment

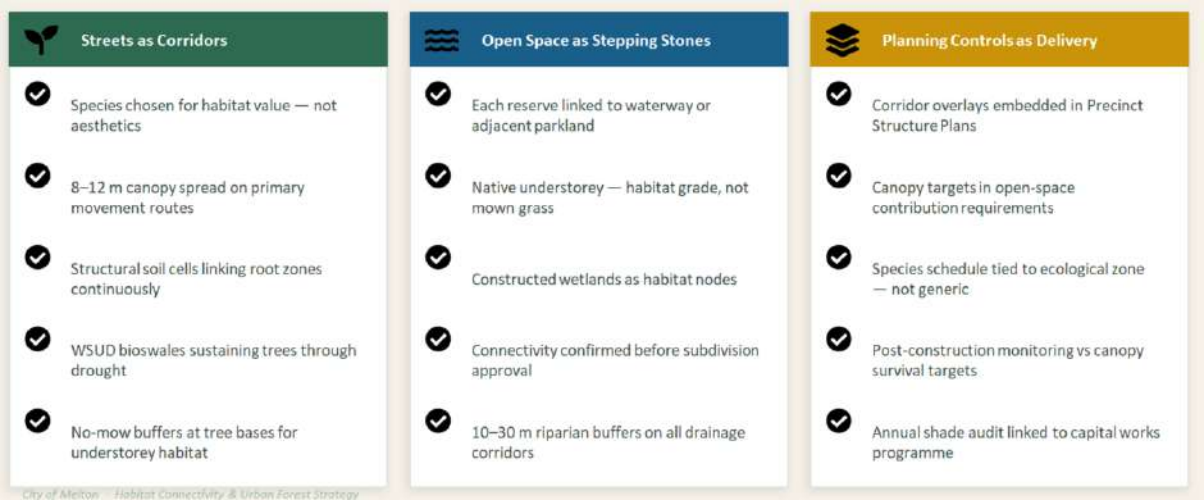

Figure 8: Streets as Corridors / Three Delivery Mechanisms

7.3 Priority Action Matrix

#	Action	Description	Timeframe
1	Toolern Creek Corridor Masterplan	Design-led corridor plan with canopy targets, fauna crossings, WSUD integration	Immediate
2	Arnolds Creek (West & East) Connectivity Design	Reunify branches, extend riparian planting, link to northern green wedge	Immediate
3	Urban Forest Priority GIS Map	Multi-layer heat / canopy / ecology map directing tree planting program spatially and annually	Short-term
4	Growth Area Tree Canopy Standards	Minimum canopy coverage ratios embedded into subdivision approvals	Short-term
5	Little Blind Creek Catchment Restoration	Canopy reinstatement, stormwater management, WSUD capacity and connection to Kororoit Creek	Medium-term
6	Kororoit Creek Fauna Crossing Infrastructure	Fauna underpasses at Leakes Rd and Westwood Dr; riparian canopy widening, WSUD integration	Medium-term

#	Action	Description	Timeframe
7	Inter-Corridor Green Links	Designed vegetated links joining creek systems across drainage divides	Medium-term
8	Integrated UHIE Monitoring Program	Baseline and ongoing thermal mapping tied to planting program outcomes	Ongoing

7.4 The Economic Case for Acting Now

The cost and feasibility of green infrastructure investment is inversely proportional to the degree of urban development. This is not only an ecological argument. It is a financial one that applies directly to ratepayer and community outcomes.

Acting now: cost is low and outcomes are compounding

- Reserve corridor land before subdivision is gazetted, at near-zero additional cost
- Embed connectivity into Precinct Structure Plans, which is a design and negotiation task rather than a land-acquisition task
- Specify ecological species in street and public realm schedules, which is a specification change rather than a capital works program
- Integrate WSUD as habitat movement channels within existing drainage reserve allowances
- Set canopy ratios in open space development contributions in a way that is enforceable at the permit stage

Retrofitting later: the cost is catastrophic

- Corridors permanently blocked by roads and private buildings that cannot be removed
- Land re-acquisition costs multiply 10–50× per hectare of corridor area
- Land re-acquisition costs multiply tenfold to fiftyfold per hectare of corridor area
- Ecological isolation drives local species decline and functional extinction in remaining patches
- Urban heat locked in by impervious surfaces across thousands of lots for decades
- Canopy in sealed suburbs takes 40+ years to reach ecological maturity even after replanting
- Community demand for shade already unmet for a generation before remediation begins

The research is unambiguous: the difference between acting in the current growth area planning window and acting after full build-out is not marginal. It is the difference between a 15 to 20 per cent investment now and a full-cost investment later that delivers only a fraction of the ecological and thermal benefit.

Figure 9: Plan It Now, or Pay to Retrofit Later

7.5 How Early Action Reduces Cost and Timeframe

A commission for the scope described, assembled from first principles with data acquisition from multiple agencies, a full GIS database build and field investigation across the council area, would typically require between 18 and 24 months and significant budget allocation.

Where a research program has already assembled foundational data assets relevant to the council context, that timeframe and cost can be substantially reduced. When metropolitan GIS datasets incorporating vegetation mapping, thermal data, waterway catchment information, growth area staging, fauna records and connectivity modelling are already available, the engagement shifts from data acquisition to design and analysis.

This means the work that matters most, covering the spatial intelligence, the design framework and the planning instrument, can begin much sooner. Councils that move early, while growth precincts are still in design, also avoid the compounding costs of deferral outlined in Section 7.4.

8. Critical Review: The Town Centre Revitalisation Blind Spot

8.1 A Well-Designed Plan with a Structural Gap

In 2024, the Victorian Government's Suburban Revitalisation Program produced a Melton Town Centre Revitalisation Plan centred on High Street, Melton. The plan represents a genuine and well-structured urban design investment that is directly relevant to the green infrastructure program because Toolern Creek, one of the five waterways identified as a primary ecological corridor, runs through the town centre precinct.

The plan's strengths are genuine:

- Clear urban design vision for a community-led, mixed-use town centre
- Strong streetscape and public realm quality emphasis
- Emphasis on walkability and active transport connections
- Structured implementation approach with responsibilities, timing, and funding assigned
- Mixed-use development recognised as a priority for economic activation
- Street tree canopy protection explicitly included in the Vision

The plan is structured across ten Revitalisation Moves, four Strategic Directions (land use, public realm, movement, and activation), six precinct plans with design guidelines, and a set of implementation actions.

8.2 The Habitat Blind Spot

The critical limitation for the purposes of this research program is this:

> *The Revitalisation Plan does not mention habitat, biodiversity, ecological corridors or green wedge connectivity at any point.*

Toolern Creek passes through the plan area as open space. It carries zero ecological corridor obligations in the plan. There are no species criteria, no green wedge linkage requirement and no biodiversity outcome specification, even though Melton ranks second for urban heat island intensity in Melbourne and Toolern Creek represents the primary north to south ecological corridor spine for the entire growth area.

This is not a failure of the plan's urban design intent. It is a structural gap in the policy framework within which the plan was prepared. The Victorian Suburban Revitalisation Program does not require ecological corridor assessment. The consequence is a town centre plan that designs the public realm well, but misses the opportunity to embed the creek's ecological function into the built form of the most visible and high-investment precinct in the municipality.

8.3 Further Structural Limitations

- **Rigid spatial framework** Six precincts with fixed outcomes limit adaptive response if economic conditions or development patterns shift, and ecological corridors do not follow precinct lines. A corridor-aware open space framework would require the ability to adjust precinct boundaries to accommodate optimal corridor widths.
- **Weak economic development underpinning** The plan's design-led focus on streetscapes and public realm is commendable, but contains limited strategy for employment clusters, investment attraction, or business development to drive the underlying demand that would justify the medium-density housing assumptions.

- **Housing density assumptions may be optimistic** Melton's housing market strongly favours detached residential. Medium-density assumptions embedded in the plan could delay or stall redevelopment timelines and do not include habitat or canopy design obligations regardless of development form.
- **No adaptive planning tools** The plan assumes a stable long-term development trajectory. Staged delivery mechanisms, temporary activation uses, and adaptable zoning provisions would add resilience against the market variability and extended timelines typical of outer metropolitan town centres.

8.4 The Opportunity Missed, and Still Available

The Toolern Creek corridor within the town centre remains an opportunity. The land is publicly controlled. The creek is present. The revitalisation investment is real. What is missing is the ecological corridor specification that would require:

- Minimum 20 m riparian buffer on each bank, planted with multi-storey indigenous vegetation
- Fauna crossing infrastructure at the bridge crossings within the town centre
- No-mow riparian management replacing the mown-grass maintenance approach
- WSUD integration linking the town centre stormwater system to the creek's ecological function
- A corridor connectivity requirement embedded in the design guidelines for each creek-adjacent precinct

These requirements do not undermine the town centre vision. They make it more distinctive, more ecologically valuable and more resilient to the heat conditions that will increasingly affect the town centre's outdoor hospitality and public realm use over the next thirty years.

The research recommendation for the town centre context is to prepare a Toolern Creek Town Centre Corridor Masterplan as a companion document to the Revitalisation Plan, filling the ecological blank that the revitalisation program left.

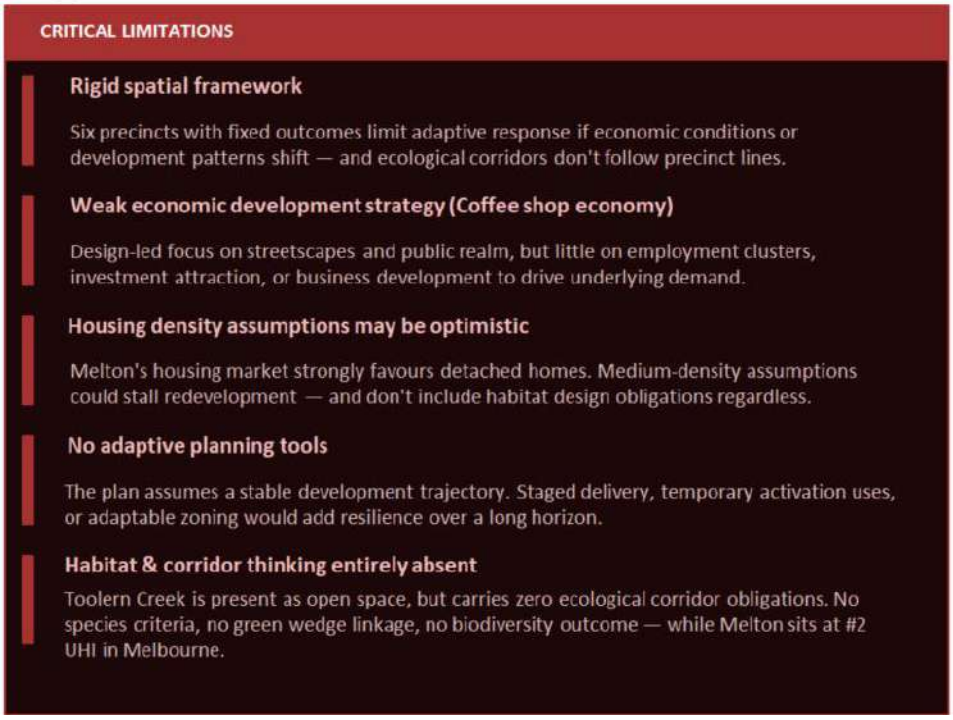

Figure 10: Town Centre Revitalisation, Plan Structure & Critical Review

9. Five Strategic Questions for Growth Area Councils

The following five questions are designed to help council officers and decision-makers assess where their own council sits relative to the structural gaps identified in this research, and to identify the most productive starting point for commissioning the work needed.

Q1: Does your council have a spatially explicit habitat connectivity framework for the full growth corridor from north to south?

If not, is the current PSP preparation process the right moment to create one, before the next stage gate locks in development layouts?

Q2: How is the Open Space Plan review being used to embed cooling, canopy and corridor requirements?

Are the outcomes of that review enforceable as each new suburb is built out, or are they aspirational guidelines that development can ignore at the permit stage?

Q3: Is the Urban Forest or Street Tree Policy now being developed?

Does it contain measurable, corridor-scale canopy targets tied to specific growth area precincts and timelines? Or is it a general policy without spatial content?

Q4: How are canopy targets, WSUD requirements and biodiversity protection being reconciled into one spatial delivery standard?

Are three strategy streams operating independently, each achieving its own internal targets but failing to compound into a functioning corridor system?

Q5: Has a multi-layer GIS overlay been commissioned across the full growth transect from north to south?

Incorporating heat, canopy, ecology, hydrology and structure plan data to map priority corridor routes before the next round of PSP approvals?

If the answer to most of these questions is "no" or "not yet," the council is in the same position as Melton's own planning documents acknowledge, with the policy intent in place but without the spatial intelligence to deliver it before the growth area window closes.

10. Conclusion: A Closing Window

Melton City Council has the institutional will, the stated strategic intent and, across its creek network, its green wedge boundaries and its partially developed growth areas, the physical raw material for a genuinely exceptional urban ecological outcome.

What it needs is the spatial intelligence and design framework to convert that raw material into a functioning green infrastructure system, and to do so before the growth area window closes.

The findings of this assessment are not presented as a criticism of council's existing investments. The Urban Forest Strategy, the creek management programs, the open space planning work, the town centre revitalisation, and the climate adaptation planning are all genuine commitments to the quality of Melton's built environment. The argument is that these investments are not yet connected to one another in a way that compounds their individual value. Connecting them through the spatial integration this report proposes is both technically feasible and economically urgent.

The councils across metropolitan Melbourne that invested in integrated spatial green infrastructure planning ahead of full build-out now have measurably better ecological connectivity, lower urban heat differentials, higher canopy cover, and stronger biodiversity outcomes than those that deferred. The difference is not funding. It is timing and spatial intelligence.

Melton has the waterways, the land, and the strategic intent. What remains is the spatial framework to connect them and the design will to act before the growth area window closes.

> **CLOSING STATEMENT** *What is designed into Melton's remaining growth precincts in the next decade cannot be undone for fifty years. The evidence base is assembled. The spatial framework exists. What remains is the political and institutional will to act before the PSP window closes, and to deliver to the communities who will occupy these suburbs a city that is thermally liveable, ecologically connected and financially well-planned.*

10.1 Three Immediate Actions for Growth Area Councils

9. **Immediate action, before the next PSP stage gate:** Commission a multi-layer GIS corridor analysis across the full north to south transect of the council area, identifying where creek corridor buffers, inter-corridor links and canopy targets must be embedded into outstanding PSP negotiations before subdivision layouts are fixed.
10. **Short term action within the current planning cycle:** Embed creek corridor targets, canopy coverage ratios and fauna crossing requirements into the Open Space Plan Review and the new Urban Forest Policy, giving these outcomes the force of policy instruments rather than aspirational guidelines.
11. **Long term action through annual monitoring and compounding investment:** Establish an integrated annual monitoring program linking canopy cover, corridor connectivity, cooling performance and biodiversity outcomes, creating the evidence base for continuous improvement and demonstrating return on green infrastructure investment to elected representatives and community.

List of Figures

About Meso Space

Meso Space is an Evidence-based Urban Design and Landscape Architecture practice, focused on systems thinking research and design, based in Carlton, Melbourne.

The Metropolitan Melbourne Green Infrastructure Research Program has been conducted since 2022 as an independent research initiative, examining green infrastructure performance across thirteen outer growth councils spanning Melbourne's northern, western, and south-eastern growth corridors.

The program draws on publicly available spatial datasets, independent field assessment, and Meso Space's proprietary GIS analysis to produce evidence-based findings and design frameworks applicable to outer metropolitan growth council contexts.

Meso Space works at the intersection of spatial research, design and policy, translating ecological and thermal data into plannable, designable and fundable outcomes.

MESO SPACE
DESIGN WITH EVIDENCE

Suite 99, 135 Cardigan St, Carlton VIC 3053

(03) 9111 9989 | info@mesospace.com.au | www.mesospace.com.au

Metropolitan Melbourne Green Infrastructure Research Program 2022–26

Research Lead: Hamed Tavakoli PhD, Principal Urban Designer & Landscape Architect