Moreland City Council

Policy No. XXX

Moreland Urban Heat Island Effect Action Plan

2016/2017 – 2025/2026

For a cooler, greener, more liveable city

CONTENTS

1. TITLE

Moreland Urban Heat Island Effect Action Plan

2. EXECUTIVE SUMMARY

Reducing and responding to the Urban Heat Island (UHIE) – a phenomenon where the urban area is considerably warmer compared to surrounding rural areas – is a rapidly emerging priority for Moreland City Council. Moreland's highly urbanised environment experiences a high UHIE due to its many dense, dark and solid surfaces that absorb heat, as well as concentrated human activity. It will take a long period of time to affect real change. This Action Plan is Council's long term commitment to respond to the UHIE.

During heatwaves most parts of the City can be four to seven degrees warmer than surrounding rural areas. Detailed analysis of Moreland's UHIE vulnerability has found that there is an overall high UHIE across the municipality and a high number of extremely hot places; with very few cool places. The analysis highlighted that Moreland has a community that is vulnerable to this heat. During long periods of hot weather the UHIE increases heat stress in the community. Most affected are the elderly, the very young and those with pre-existing medical conditions.

Many parts of Council and external stakeholders have contributed to the development of this Action Plan. An analysis of the most vulnerable and high priority areas within the municipality has been undertaken to help determine where to target actions. A review of existing projects and upcoming capital works have identified opportunities to adjust the way we work to integrate a best practice approach. This approach will allow Council to implement many actions without the requirement for additional funding. Some actions identified are unfunded but funding and partnerships will be sought when opportunities arise.

Transforming Moreland into a green, cool, more livable city cannot be achieved by Council alone. It will require investment and commitment from residents, businesses, community groups and many others across the community. It will also require supportive State and Commonwealth policies and programs as well as partnerships with leaders at research institutions and in business. Council is committed to continuing to work with the Moreland community to improve local knowledge and capacity on how to act and respond. Working together we can make Moreland a more resilient and liveable city.

The vision for this action plan is as follows:

"Moreland in 2026 will be cooler and more liveable with improved protection from urban heat."

The Plan contains goals, strategies, targets and actions to start Moreland on the path to achieving this vision. Moreland is committed to:

- Responding to the Urban Heat Island Effect by setting and reviewing actions and targets to meet UHIE strategies through an integrated whole of Council approach.
- Reducing the impact of extreme heat events in Moreland by creating a cooler, greener more liveable city.
- Raising community awareness and encourage actions to create a cooler, greener and more liveable city.

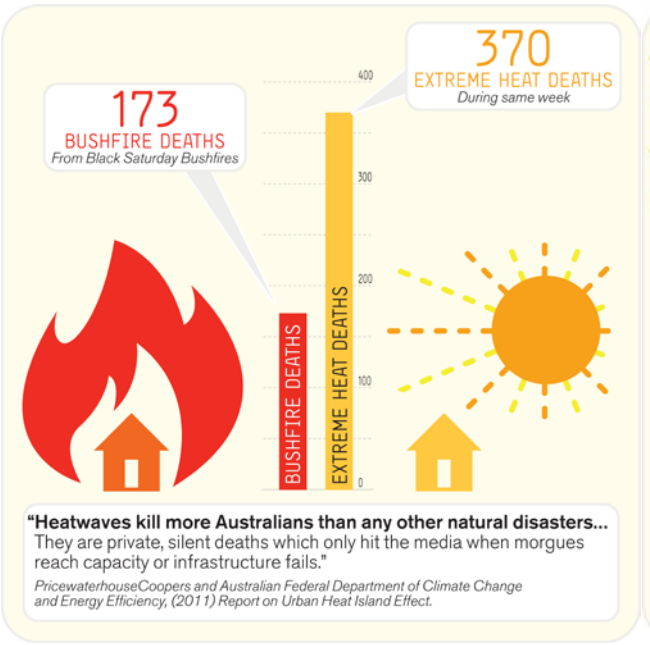
3. INTRODUCTION

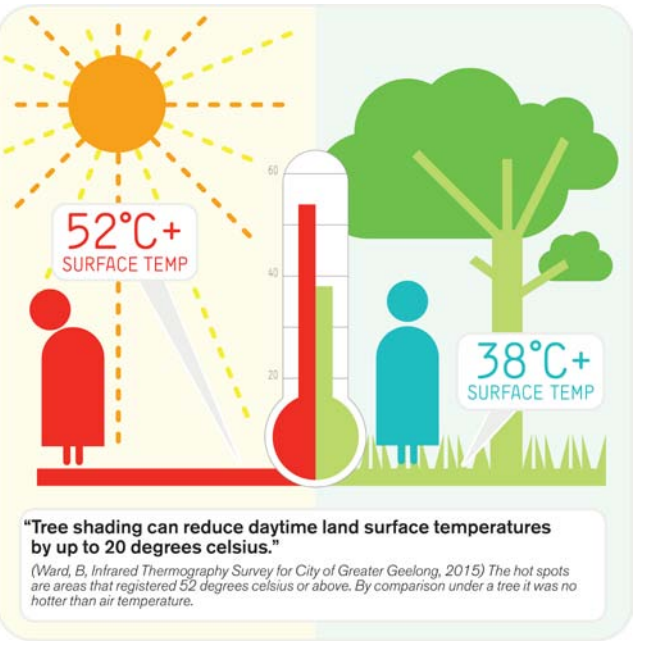
Climate Change is increasing the number of hot days and extreme heat events in Australia. The phenomenon known as the Urban Heat Island Effect (UHIE) means that hot days are hotter for longer in Moreland.

The UHIE is driven by a number of key factors:

- **A high percentage of solid surfaces e.g. asphalt and concrete** – these surfaces absorb, trap and re-radiate heat. They also prevent rainwater soaking in, reducing water available for plants, which in turn reduces evaporative cooling
- **Limited vegetation** - reduces shading and cooling through evaporation from plants through leaves
- **Urban development pressure** – creates denser urban environments that trap heat and removal of green areas reducing cooling
- **Construction materials which hold heat and have low reflectivity** – e.g. terracotta tiles, bricks, bitumen and concrete - these materials absorb, trap and re-radiate heat
- **Dense urban arrangements** – absorbs and traps heat
- **Heat production from the activities of people** – produced by vehicles, split system air conditioners etc
- **Air pollution** – that creates a local 'greenhouse' effect trapping heat.

Like cities around the world, UHIE is a key issue for Moreland because of its threat to liveability. Heat stress can lead to illness and mortality. Certain groups within the community such as the elderly, young, sick and socially disadvantaged are particularly vulnerable. A stark insight into the multiple risks of heat waves was revealed when more people died in Victoria from heat related illness during the 2009 heatwave than from the devastating bushfires during the same period.





Council assets are at risk too. For example, natural assets such as green space and trees are vulnerable due to reduced water and heat stress. Loss of these green spaces can further increase the UHIE. In addition, these assets are where the native animal population live. With no or limited irrigation in a water constrained future these assets and the animals that live in them, are at risk too.

Moreland can adapt to heat

A number of measures can be implemented to reduce the severity of the UHIE. These range from actions to reduce the UHIE (mitigation measures) such as implementing green infrastructure (trees and water sensitive urban design) and cool urban materials. Other responsive actions (adaptation measures) include community engagement, education programs and improving buildings so they are comfortable in summer.

Table 1 below summarises the key options for Moreland Council and Community to respond to heat (adapted from Coutts et al 2010).

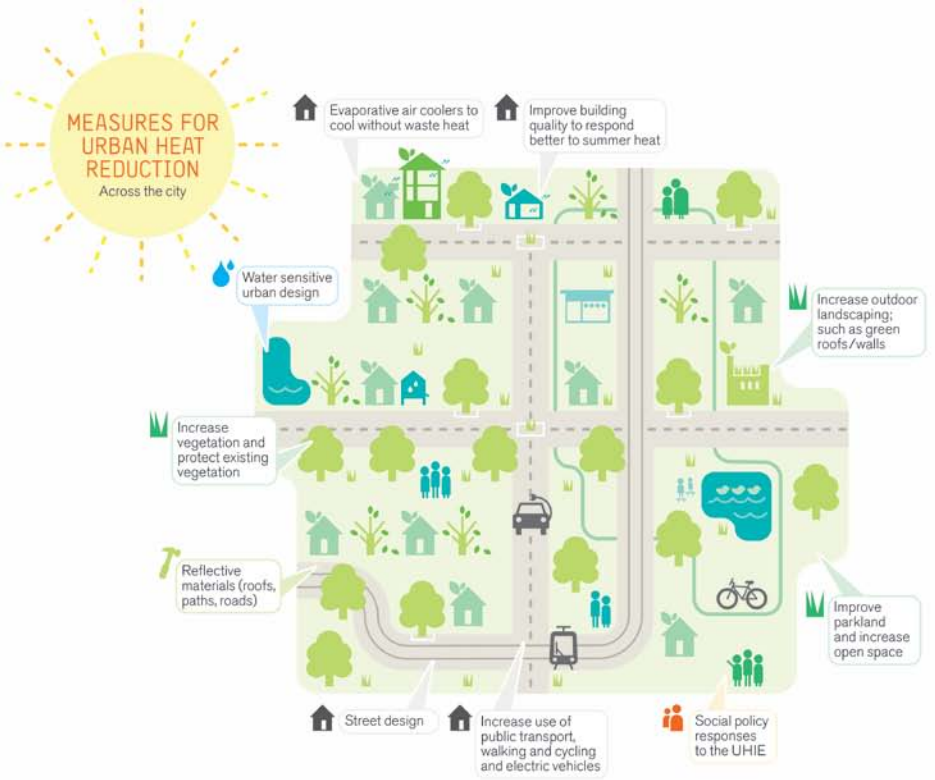


TABLE 1:
MEASURES FOR URBAN HEAT REDUCTION (MITIGATION) AND RESPONSES (ADAPTATION)
(adapted from Coutts et al 2010)

MEASURES	DESIRED EFFECT
VEGETATION	
Increase vegetation and protect existing vegetation	Plants and trees provide shading and cooling reducing heat absorbance.
Increase outdoor landscaping; such as green roofs/walls	External vegetation protects buildings from heating up from the sun's rays and cools due to evaporation from plants. Deciduous species provide summer shade and winter solar access.
Improve parkland and increase open space	Vegetated and irrigated open space provide cooling.
WATER	
Water sensitive urban design	Retaining water increases water available for irrigation and cooling from evaporation. Reduced hard surfaces allowing water to penetrate, increasing soil and tree health increasing cooling.
MATERIALS	
Reflective materials (roofs, paths, roads)	Reflecting the sun's rays reduces stored heat. This is most useful where vegetation cannot be increased.

MEASURES	DESIRED EFFECT
URBANISATION	
Street design	Streets orientation and width that allow breeses, space for street trees and buildings that balance protection from summer heat but allow winter sun.
Evaporative air coolers to cool without waste heat	Reduced waste heat outside buildings created by reverse cycle air conditioning.
Increase use of public transport, walking and cycling and electric vehicles	Less waste heat from private vehicle exhaust, resulting from increased sustainable transport use.
Improve building quality to respond better to summer heat	Improved occupant comfort in summer heat without artificial cooling. This reduces waste heat outside buildings created by reverse cycling air conditioning.
SOCIAL	
Social policy responses to the UHIE	Community encouraged to respond to the UHIE through education and capacity building campaigns.

Benefits of taking action

This Action Plan focuses on changing the physical environment to address the UHIE, which has significant and wide-ranging benefits. Table 2 below outlines numerous social, economic and environmental benefits that are realised when UHIE solutions are implemented across the municipality.

Table 2: Benefits of taking action

Adapted from Aecom for City of Melbourne, (2012), Economic Assessment of the Urban Heat Island Effect).

Economic Benefits
• Reduction in energy costs from reduced use of artificial cooling • Increase in property values • Possible avoidance in costs from damage to infrastructure and vehicle breakdowns • Reduction in public health costs • Positive branding for the City • Increased retail spending in commercial areas • Increased worker productivity • Reduction in energy costs from a reduction in and private fossil fuel powered transport
Social Benefits
• Reduction in heat related illness and fatalities • Provision of a sense of place and creation of local identity • Improved sense of community • The encouragement of outdoor activity • Reconnecting children with nature • Reduction in human exposure to sun • Improvement in mental wellbeing • Buildings that are more comfortable in summer in a warming climate • Heat resilient housing for the socially vulnerable
Environmental Benefits
• Provision of shade for cooling • Cleaner, healthier waterways • Reduction in air pollution and dust • Increase in carbon storage through tree planting • More resilient urban ecosystems which provide healthier, cooler habitat for animals • Improved neighbourhood character from increased tree coverage in public and private spaces • More water retained in the landscape in a water constrained climate • Improvement in open space through increased irrigated vegetation and canopy cover • Reduction in noise pollution from air conditioning

4. COUNCIL'S APPROACH

Moreland already has many existing policies and programs that contribute to addressing the UHIE. A key focus in the Action Plan is working within existing projects to achieve UHIE outcomes. Responsibility for developing and delivering actions to address UHIE sits with the whole of Council. However, the scale of action required to genuinely respond to this challenge cannot be achieved through Council actions alone. It will require significant collaboration from the community and will require partnerships and funding from external sources.

Working together we can make Moreland a more resilient and liveable city.

Guiding principles for UHIE decision making

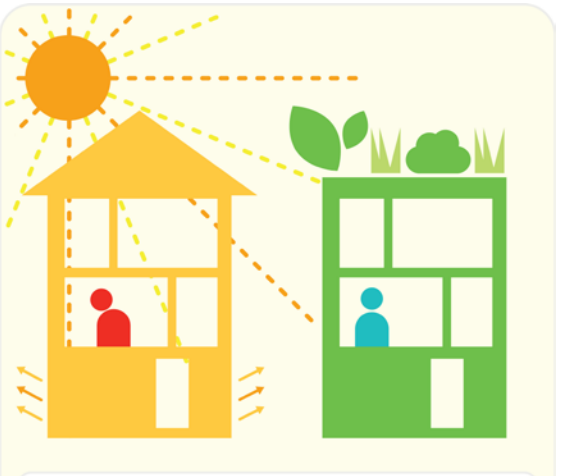
Council's key guiding principles for decision making when developing and implementing actions to reduce and respond to the UHIE include:

Leveraging existing action: Moreland is already implementing a number of actions that contribute to mitigating and responding to the UHIE:

- A street tree planting program, which plants 5,000 new trees across the municipality each year
- Water sensitive urban design projects in public spaces
- Improving irrigation of open space
- Working to encourage a shift away from fossil fuel powered vehicles
- Building resilient Council buildings in line with the Moreland Sustainable Buildings Policy
- Building community capacity to respond to heat waves through engagement and education
- Improving the resilience of buildings and houses within the community through providing advice and support for energy efficiency actions and planning policies for new developments.
- We are committed to commence the development of an urban forest strategy late 2016 that will integrate the findings of the UHIE Action Plan and the Street Tree Planting Plan as well as build upon the strong foundations of the Moreland Street Landscape Policy.

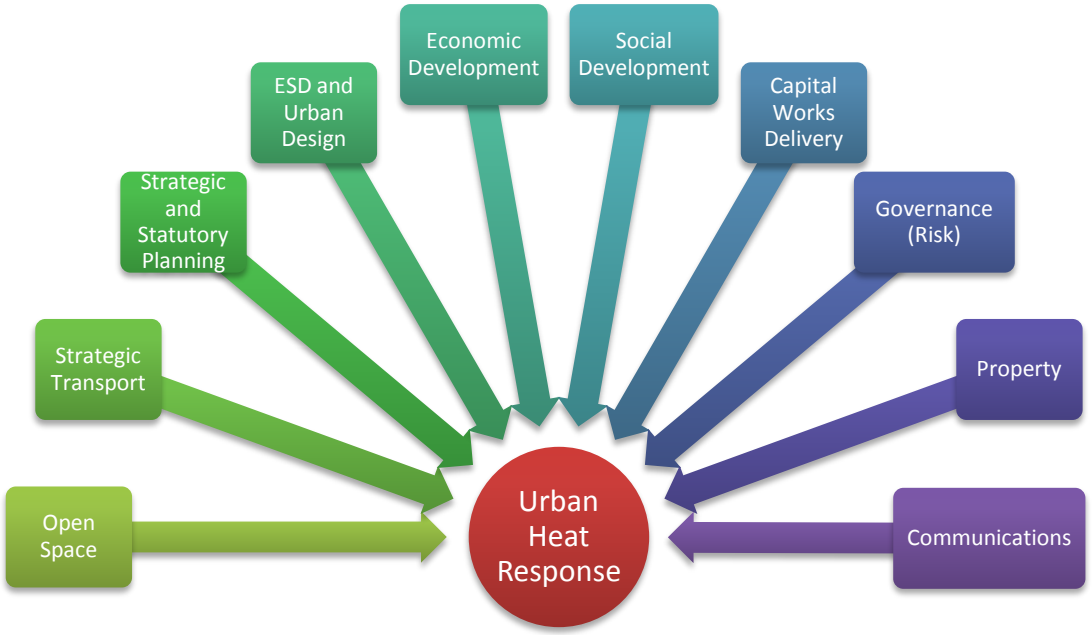
An integrated approach: Development of this Action Plan has been overseen by a cross Council working group to facilitate an integrated approach which includes:

- Existing strategies and programs have been incorporated into the Action Plan to highlight the many initiatives that Council is already undertaking to assist with UHIE mitigation and to leverage other existing projects to achieve UHIE outcomes
- Establishing an active cross-functional working group, which is critical to successful implementation
- Each of the actions has been assigned a lead Unit(s) and supporting Unit(s) to ensure clarity around roles and responsibilities.



New York has mandated that 75% of new and retrofitted roof tops increase the amount of heat they reflect rather than absorb.
NYC CoolRoofs, 2016

Figure 1 below outlines Council areas involved in implementing UHIE actions. Council areas involved in implementation of the urban heat responses.



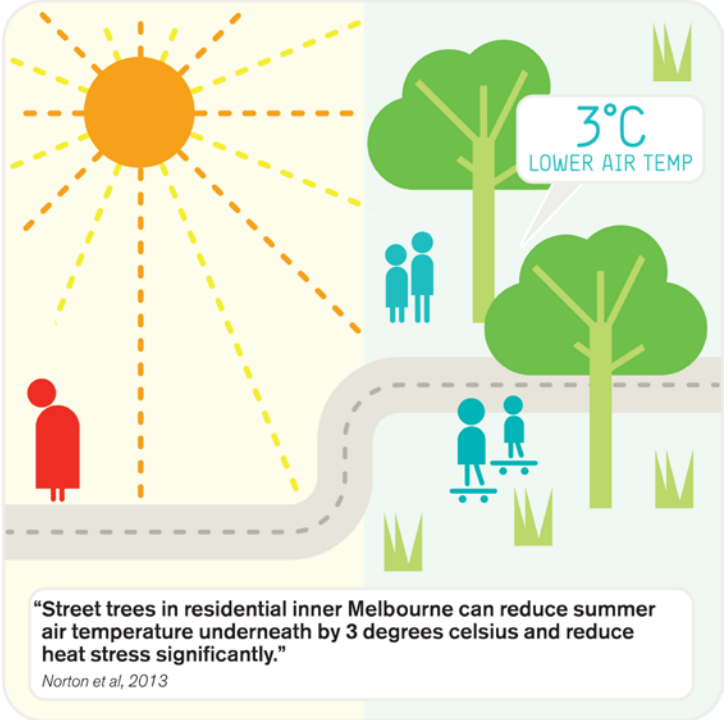
Focus on priority areas: Council will focus on delivering or supporting action in its vulnerable areas. Projects that are driven by other priorities can integrate measures to reduce the UHIE. Through this approach measures can be implemented municipality wide as opportunities arise.

Priority areas have been identified using mapping to find the intersection of the following vulnerability indicators:

- Hotspots (locations with surface temperatures of 52 degrees or above on extreme heat days)
- Social vulnerability (young children aged 0-4, older persons living alone, socio-economically disadvantaged groups, those who aren't fluent in English, those in social housing, census and Socio-Economic Indexes for Areas (SEIFA) data
- High human activity (principal pedestrian network, commercial and retail areas, neighbourhood activity centres, bike paths, schools, kindergartens and childcare facilities
- Future zoning and population growth changes.

Review and renew: Significant ongoing research into the causes, effects and solutions of the UHIE is happening both internationally and within Australia. This will remain a dynamic space and Council will regularly review and renew its approach to ensure the most efficient and effective best practice measures are being pursued.

Engage and partner: External engagement will be critical to the success of affecting genuine change within the community. Given the scale of activity that is required, Council will seek to partner with other public agencies, key community stakeholders and all levels of Government to drive real change. This will include agencies such as Melbourne Water, VicRoads, Moreland Energy Foundation Ltd (MEFL), developers and private land owners/managers. Council will also partner with research institutions to ensure current best practice solutions are being implemented in this evolving area.



Action at all levels: Council will play a vital role in responding to the urban heat island effect. Council has the opportunity to implement localised green infrastructure and work with local industry and community on solutions. However, a truly effective response to this enormous challenge will require strong action from a broad range of stakeholders supporting and/or taking action both in the public and private realms to protect what is already in place and to implement new mitigation and adaptation measures.

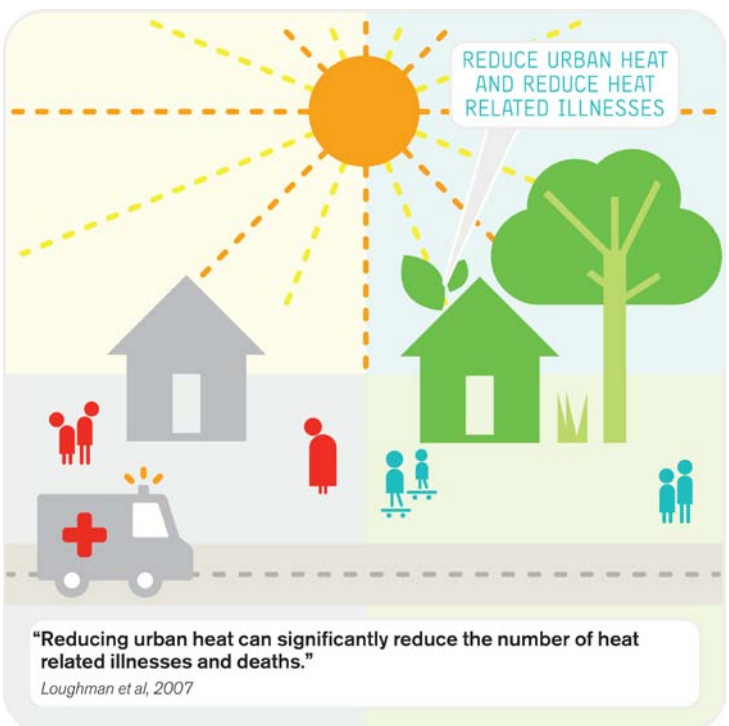


Table 3 below provides a summary of how everyone can play their part.

Table 3: Stakeholders and roles in responding to the UHIE

Stakeholder	Role
Federal Government	• Demonstrate leadership by setting national goals for climate mitigation and adaptation • Incentivise the uptake of electric vehicles • Fund research and development including research into the business case for green infrastructure • Support funding for public transport and green infrastructure • Incorporate UHI mitigation solutions into the National Urban Design Protocol and the planning framework for the Department of Cities and Built Environment
State Government	• Demonstrate leadership by setting clear progressive positions on climate mitigation and adaptation including green infrastructure, sustainable transport, climate resilient buildings and communities • Support infrastructure development that incorporates active and public transport and water sensitive urban design • Coordinate, support and fund green infrastructure • Undertake action to support vulnerable communities such as those in social housing and schools
Research Institutions	• Research and development into process and practical innovation for mitigating the urban heat island effect • Partnering with organisations such as local government to develop and apply evidence based solutions are embedded appropriately
Melbourne Water and Yarra Valley Water, VicRoads, Yarra Trams, Creek Management Committee's	• Develop partnerships to undertake green infrastructure actions • Lead actions on assets under their management • Advocacy for funding to support action
Moreland City Council	• Implement localised green infrastructure • Improve resilience and performance of Council assets • Integration of green infrastructure and resilient buildings into local policies • Support community and local industry to take action • Collaborate regionally • Advocacy and reporting to build the case for future action
Moreland Community households and businesses	• Install localised green infrastructure • Improved resilience in business and residential buildings • Develop greater social resilience to heatwaves • Install heat sensitive domestic water management
Northern Alliance for Greenhouse Action Moreland Energy Foundation Ltd.	• Promote and drive regional plans and actions • Advocacy • Partner with Council to seek external funding for solution delivery • Support community and industry to take action • Community engagement and education
Council Alliance for Sustainable Built Environments	• Promote and drive regional sustainable building tools, policies, standards and actions • Advocacy • Partner with Council to seek external funding for solution delivery

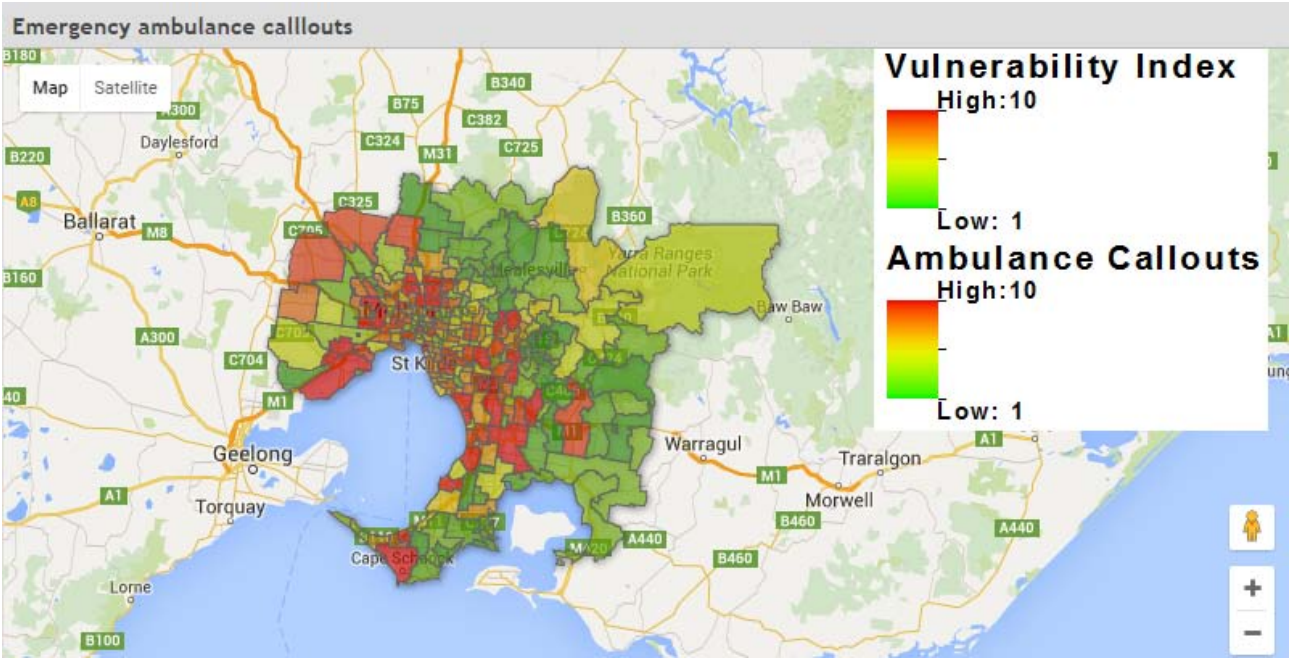
5. CONTEXT

Moreland's heat vulnerability and hot spots

In 2014 Monash University researchers produced an UHIE vulnerability map for Melbourne (refer to Figure 2 below). Glenroy and Coburg are in the list of Melbourne suburbs (including Sunshine, St Albans, Preston, Reservoir, Clayton and Dandenong) most at risk due to a combination of extreme heat and social vulnerability. Risk factors in the study included lack of tree cover, housing types and age, health and socio-economic status of the population.

Figure 2: Mapping Heat Vulnerability 2014 - viewed 5 January 2016

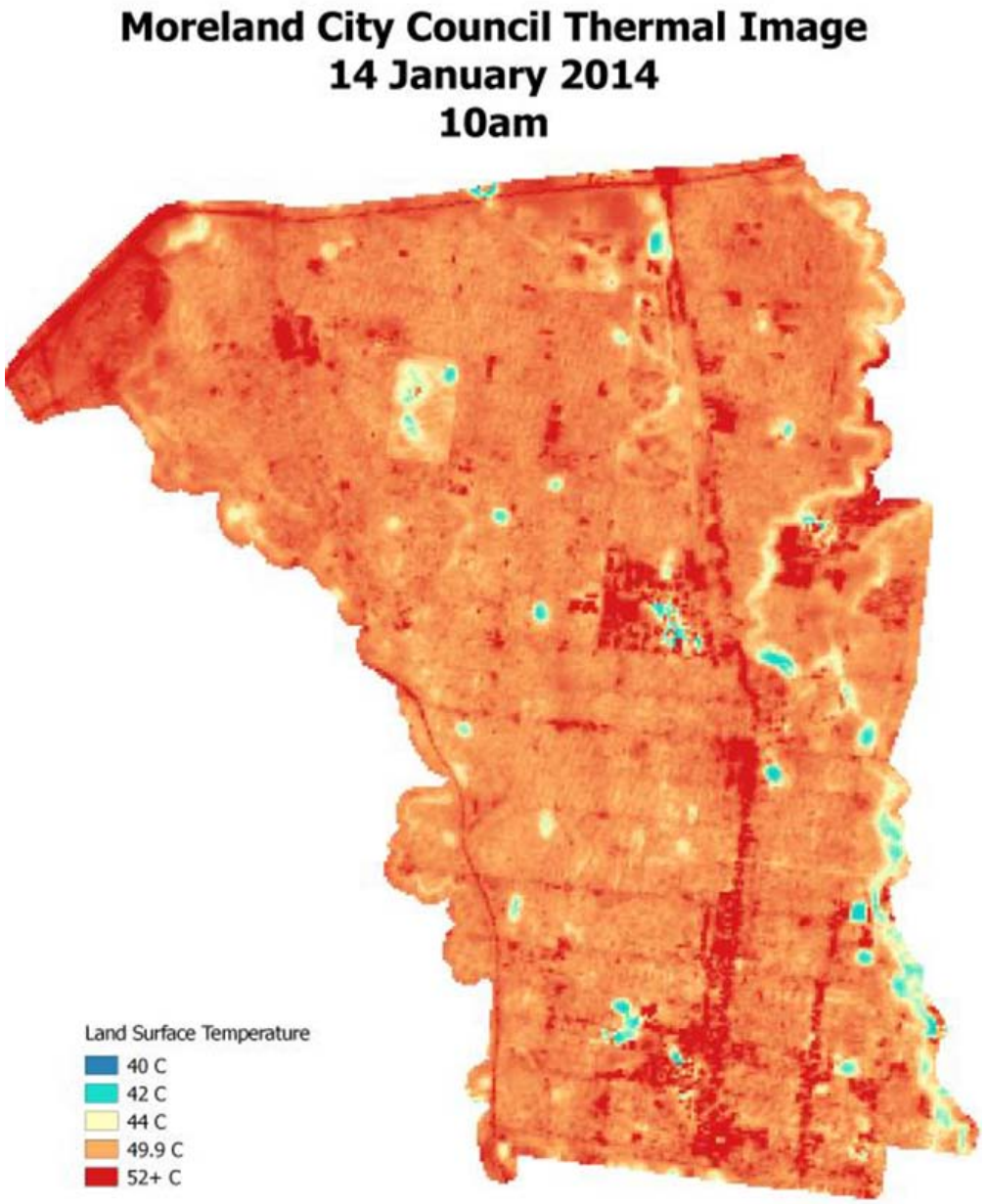
Source: http://www.mappingvulnerabilityindex.com/home/melbournevi

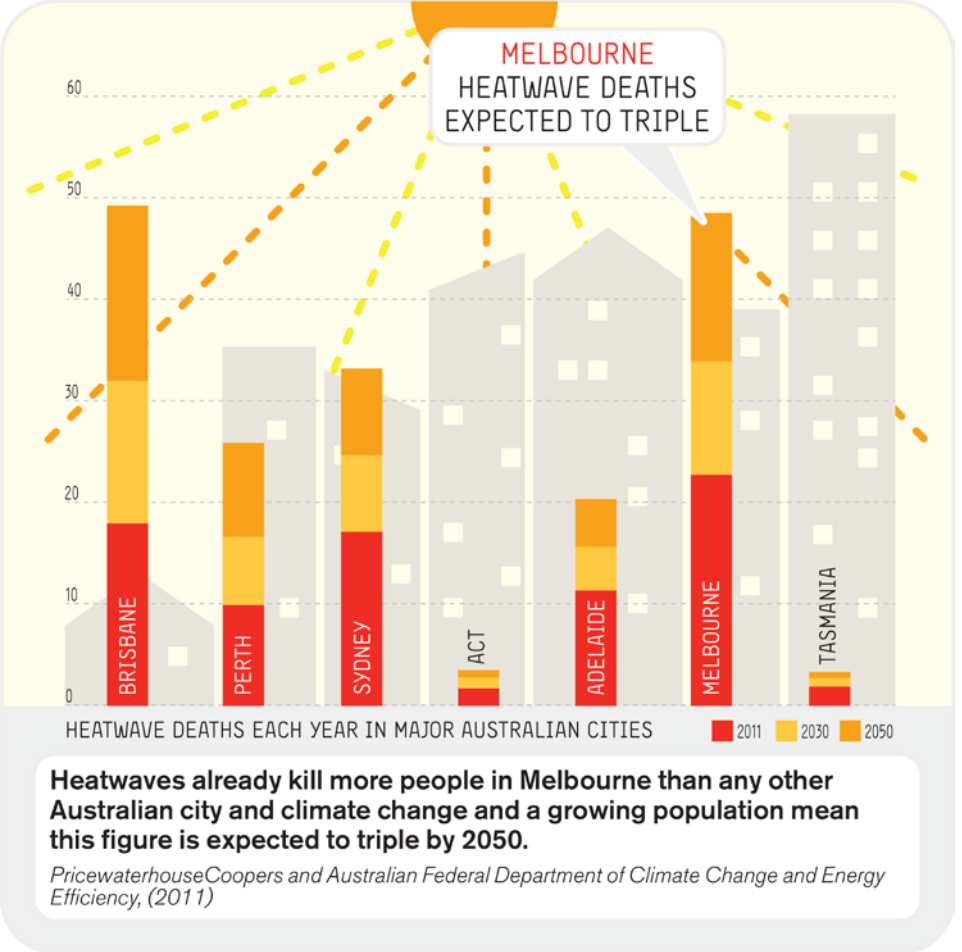


In addition to the 2014 UHIE vulnerability map for Melbourne, further mapping work was undertaken for Moreland in 2015. This work included development of satellite thermal imaging and social vulnerability maps to help understand the Moreland context, determine priority areas and focus action. A more detailed background report is available which includes a report summarising this work titled "Urban Heat Island Priority Locations Moreland City Council, October 2015".

The research demonstrates that in summer Moreland has very few cool places and a significant number of extremely hot places (hot spots). Moreland's hotspots are indicated in Figure 2 on the following page with dark red shading. Hot spots are those areas of concentrated heat retention, which are emitting the highest Land Surface Temperature (LST) values. The hot spots are areas that registered 52 degrees Celsius or above. Specific hotspots include: City Link, the Ring Road, Sydney Road, industrial and commercial areas, business activity centres and recent residential subdivisions in Gowanbrae and Coburg Hill. By comparison irrigated vegetated areas such as City Oval in Bridges Reserve) were measuring 38 degrees Celsius which was the same as the ambient air temperature.

Figure 3: Moreland Satellite Thermal Imaging





The satellite thermal image shown in Figure 3 on the previous page was taken on 14 January 2014 at 10:30am. By the time the image was taken, the sun's heat had already been penetrating the hard surfaces for around four hours. With the effects of summer well underway very little moisture was left in the landscape; there was no wind and very little moisture to cool. The ambient temperature was already around 35 degrees Celsius. The maximum temperature that day was 42 degrees and was the first day of a prolonged heatwave where Melbourne experienced five days over 40 degrees. The preceding days had not been unusually warm. Under these conditions the surface temperature rose quickly to above 50 degrees to touch in the hottest areas.

It is important to note factors that increase heat. During the mid-morning, brown grassed areas appeared hotter than some asphalt or concrete surfaces but would have cooled very quickly after sunset. Also worth noting is that residences directly south of industrial areas were hotter than other surrounding areas. Hot north winds are typical of extreme heat days in Melbourne. When they blow over the hotter industrial areas the winds carry excess heat into downwind residential areas. This demonstrates how the UHIE and heatwaves can impact Moreland and how quickly surface temperatures can heat up during summer.

Moreland's Priority Areas

Five priority areas have been identified and mapped in the study of Moreland's urban heat island vulnerabilities and priorities. These areas are shown in Figure 4 on page 16. The five priority areas are:

Priority Area 1: The North Social vulnerability - Priority Area 1 includes the suburbs of Gowanbrae, Glenroy, Hadfield and Fawkner, including properties close to the Western Ring Road. Locations for public housing are also shown.

Priority Area 2: Activity Centres - Priority Area 2 includes the three largest Activity Centres in the municipality i.e. Coburg, Brunswick and Glenroy Activity Centres.

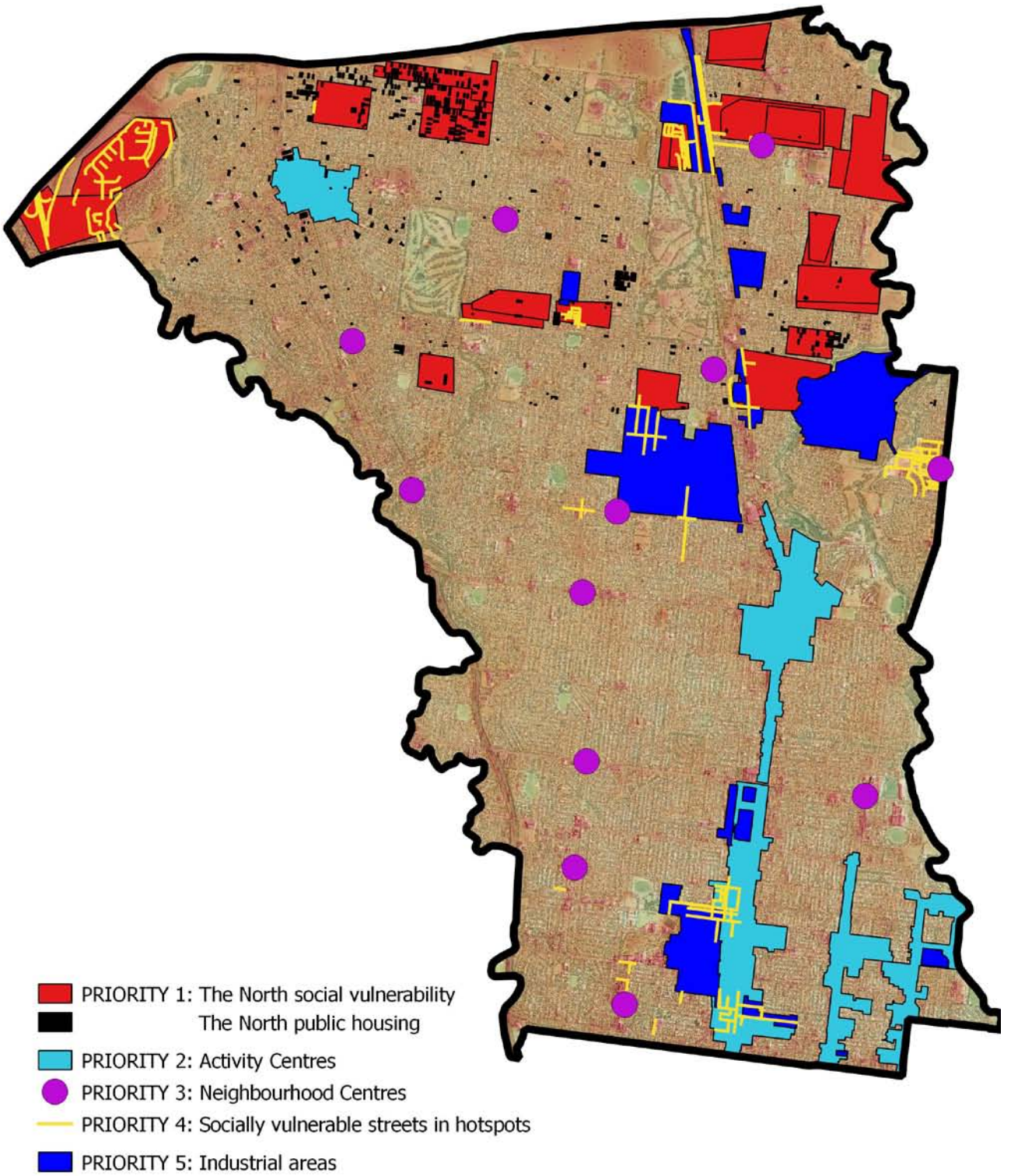
Priority Area 3: Neighbourhood Centres - Priority Area 3 includes Neighbourhood / suburban shopping strips in hotspots.

Priority Area 4: Socially vulnerable (SV) streets in hotspots - Streets where people are less able to protect themselves from extreme heat events. Socially vulnerable areas have been identified based on their diversity and density of vulnerability. Young children, older persons living alone, those who aren't fluent in English, public housing tenants and the socio-economically disadvantaged are considered socially vulnerable. Schools, childcare centres and kindergartens have also been included as potential areas of vulnerability.

Priority Area 5: Major industrial areas - Priority 5 Area includes the major employment and industrial areas in Brunswick, North Coburg and Newlands.

The priority areas cover large geographical areas and a range of built form types within the municipality in both public and private space. The above information underpins Council's approach in defining "vulnerable areas" which have been determined based on priority areas and hotspots. With appropriate interventions these areas can have significant heat reduction benefits. Measures to address the UHIE for these priority areas are detailed in Section 6. Addressing the priority areas requires a whole of Council and community response to achieve genuine long-term protection against the UHIE.

Figure 4: Mapping Heat Vulnerability / Moreland's priority areas for action



6. VISION, STRATEGIES, TARGETS AND KEY PERFORMANCE INDICATORS

Everyone plays a part

Everyone will play an important part in creating a cooler, greener, more liveable Moreland.

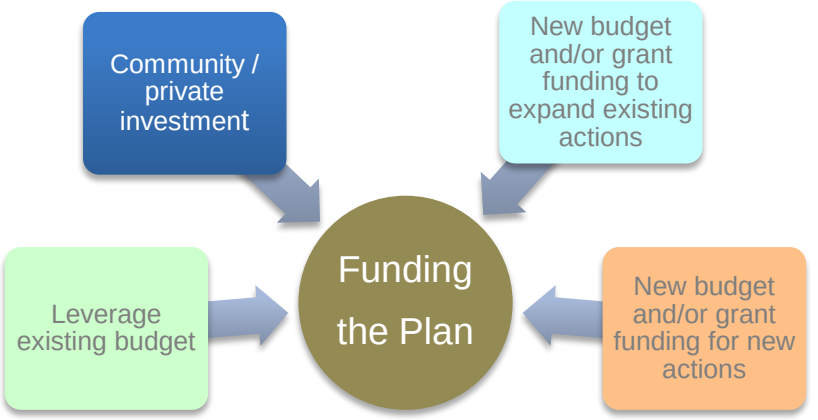
This UHIE Action Plan focuses on Council actions addressing infrastructure responses i.e. change in building materials, vegetation cover and water sensitive urban design (WSUD) to directly reduce the amount of heat absorbed into the landscape and to improve its cooling capacity.

This Action Plan also includes initiatives to engage with the community. By building awareness in the community the aim is to activate community-wide actions to reduce and respond to the UHIE. This combined with actions from all levels of government and partnering with key stakeholders can affect broad scale change across the municipality.

Funding action

As outlined earlier, this Plan has been designed to ensure that all opportunities to integrate action into Council's existing operations are leveraged as much as possible as well as direct new funding to deliver new actions. However, the scale of action required to genuinely respond to this challenge cannot be achieved through Council action alone; under a rate capping environment Council will be highly reliant upon external funding for project implementation. Section 7 outlines 37 key projects to be implemented over a 15 year period; 15 of these projects are already funded under existing project budgets or through staff time, however there are 22 unfunded projects that will rely on new and external funding in excess of $2.5 million over the first 10 years. Council will also require significant collaboration and various funding sources as shown in Figure 5 below.

Figure 5: Funding action approach



Vision

The vision for this Action Plan is:

Moreland in 2026 will be cooler and more liveable with improved protection from urban heat

Moreland is committed to the goals, strategies and targets designed to achieve this vision as detailed in Table 4 below. Detailed actions for each strategy are set out in the following pages under the Strategies and Actions section of this plan.

Table 4: Urban Heat Island Effect Action Plan – Goals, Strategies, Targets and Key Performance Indicators

Goal 1: Responding to the Urban Heat Island Effect by setting and reviewing actions and targets to meet UHIE strategies through an integrated whole of Council approach		
Strategy	**Targets**	**Key Performance Indicators (priority areas)**
Strategy 1: Integration of UHIE reduction and responses into existing operations, policies and programs	All relevant Council Policies and Strategies are to incorporate relevant urban heat island effect mitigation and adaptation solutions	• Relevant policies including UHIE reduction and response • Relevant actions implemented
Goal 2: Reducing the impact of extreme heat events in Moreland and creating a cooler, greener more liveable city		
Strategy 2: Strengthen and build green infrastructure	Increase vegetation cover in Moreland's most vulnerable areas by 35% by 2020 (from Zero Carbon Evolution –ZCE) Note: This target is subject to review and requires further study to factor in canopy cover and irrigated vegetation information since ZCE was endorsed (action item 2.2)	• Relevant actions implemented • Increased tree canopy cover • Irrigated vegetation
	Stormwater harvesting infrastructure supplying 30ML/a of treated water for open space irrigation by 2020 (from WaterMap 2020)	• An increase in stormwater harvested for irrigation
Strategy 3: Facilitate cool buildings	Council will engage with all relevant stakeholders and community to encourage cool buildings and cool roofs	• Relevant actions implemented from this Action Plan • More cool buildings • Cool roofs installed
Strategy 4: Create Cool Roads and paths	Moreland will research and investigate the trialling and installing of cool roads and paths infrastructure by 2020	• Cool roads and paths studies reviewed and reported • Cool roads and path infrastructure integrated
Goal 3: Raising community awareness and encourage actions to create a cooler, greener and more liveable city		
Strategy 5: Foster a heat aware community	Increased community action to reduce and respond to the urban heat island effect by the community	• Relevant actions implemented • Take up of programs and actions to facilitate reduction of the UHIE (e.g. Positive Charge, SDAPP, WaterSMART)

7. IMPLEMENTATION PLAN

Achieving a reduction in Urban Heat Island Effect by 2026 is an ambitious goal. The vision can only be achieved through collaborative effort, partnerships and commitment across the Moreland community and all levels of Government. The implementation plan has been prepared to focus on actions that Council can influence as well as actions that can have the biggest impact, such as:

- Changing surface types to reduce heat storage at night time; and
- Providing thermal comfort for the community.

We are most likely to see change over a ten year period, hence the Strategy has been drafted to take action from 2016/2017 to 2025/2026, with a built in review period midway in 2020/2021 to update the implementation plan (actions).

The full list of actions that follow includes further detail including the how, when and why for each. Each action will contribute towards Council ongoing leadership in responding to the Urban Heat Island Effect. The status of each action with regard to the adopted Strategic Resource Plan is indicated for reference. Funding for the actions are either within the adopted Strategic Resource Plan or they are subject to new funding, partnerships and/or external funding.

The following pages detail actions to be delivered for each Strategy Area.

Strategy 1: Integration of UHIE reduction and responses into existing operations, policies and programs

Target:

All relevant Council Policies and Strategies are to incorporate relevant urban heat island effect mitigation and adaptation solutions

Existing Council Strategies, Policies and Action Plans	
Brunswick Integrated Transport Strategy 2013	ESD Local Planning Policy (clause 22.08 of the Moreland Planning Scheme)
Greening opportunities for community (e.g. community planting days, community grants)	Moreland Food System Strategy (under development)
Moreland Integrated Transport Strategy 2010 - 2019	Moreland Municipal Public Health and Wellbeing Plan 2013 – 2017
Moreland Open Space Strategy (MOSS) 2012 - 2022	Moreland WaterMap 2020
Municipal Strategic Statement (MSS)	Street Tree Planting Plan (under development)
The Moreland Street Landscape Strategy 2012-2022 (specific objective to mitigation of UHIE, under review 2015/16)	Urban Forest Strategy (to be developed, planned commencement late 2016)
Zero Carbon Evolution 2014 - 2020	

Action Plan:

No.	Key Actions	Lead Unit(s)	Supporting Unit(s)/ Partners	Within Strategic Resource Plan	Budget	Delivery	Measures
1.1	Establish an urban heat island action plan (UHAP) Working Group The group will oversee the implementation of the Action Plan, monitoring and reporting	ESD	**Supporting Unit(s)** Open Space Design and Development, Urban Design, Strategic Planning, Strategic Transport, Social Development, Roads Unit, Engineering Services, Building Capital Works **Partner(s)** MEFL, NAGA, New external partners	Yes	Existing Base Funding (Staff time)	Ongoing	Group established and meeting quarterly

No.	Key Actions	Lead Unit(s)	Supporting Unit(s)/ Partners	Within Strategic Resource Plan	Budget	Delivery	Measures
1.2	Include urban heat island effect reduction in reviews of relevant Council plans, strategies, policies action plans and risk registers. Note: Relevant examples include: • Council Plan • Moreland Open Space Strategy, Open Space Maintenance Plan and Acquisition Criteria • Urban Forest Strategy (to be developed, planned commencement late 2016) • Brunswick Integrated Transport Strategy • Moreland Integrated Transport Strategy • Moreland Technical Notes • Asset Management and Building Maintenance Plans • Moreland Sustainable Buildings Policy • Heatwave Response Plan • Corporate Risk Register • Moreland Food System Strategy (under development) • Moreland Municipal Public Health and Wellbeing PlanStreetscape Guidelines for Activity Centres • Moreland Street Landscape Strategy • Moreland Right of Way Strategy	Urban Heat Action Plan (UHAP) Working Group	**Supporting Unit(s)** ESD	Yes	Existing Base Funding (staff time) and existing or new budgets allocated for reviews and updates	Ongoing	All relevant plans have UHIE Mitigation integrated

No.	Key Actions	Lead Unit(s)	Supporting Unit(s)/ Partners	Within Strategic Resource Plan	Budget	Delivery	Measures
1.3	Incorporate street tree inventory and other green spaces hotspot and social vulnerability mapping into Dekho (Geographic Information System) and provide training for all relevant users to raise awareness	GIS Team	**Supporting Unit(s)** Open Space Design and Development Social Policy Unit	Yes	Existing Base Funding (staff time)	2016/17	Training complete with all users
1.4	Incorporate street tree inventory measures into Council's Asset Management System to enable monitoring of canopy, tree health and other relevant items to improve and cooling outcomes	Open Space Design and Development	**Supporting Unit(s)** Asset Management and Open Space Maintenance	Partial	Existing Base Funding (staff time) Existing Operating Funding (Assessment of trees under powerlines) New Operating Funds and/or grant funding required ($50,000 per annum - assessment of all other street trees and trees in public open space)	2018/19	Trees included in asset management system with measures on canopy and tree health Business case developed for new funding
1.5	Subject to an analysis of the pros and cons, prepare a new Landscape Policy and associated guidelines for inclusion in the	Strategy Unit	**Supporting Unit(s)** Open Space Design and Development, Urban Design, City	Yes	Existing Base Funding (staff time)	2016/17	Analysis complete Subject to findings of analysis, Landscape Policy and

No.	Key Actions	Lead Unit(s)	Supporting Unit(s)/ Partners	Within Strategic Resource Plan	Budget	Delivery	Measures
	Moreland Planning Scheme to increase vegetation cover on private land		Development				Guidelines drafted
1.6	Subject to outcomes of Action 1.5 analysis, undertake an amendment to the Moreland Planning Scheme to include the new Landscape Policy and associated guidelines in the LPPF	Strategy Unit	**Supporting Unit(s)** Open Space Design and Development Urban Design, City Development	No	New Operating Funds and/or Grant Funding required $50,000	2018/19	Amendment adopted by Council
1.7	Subject to an analysis of the pros and cons, prepare and implement a Local Law to protect significant trees on private land.	Local Laws	**Supporting Unit(s)** Open Space Design and Development, Strategic Planning	Yes	Existing Base Funding (Staff time)	2017/18	Analysis complete Subject to findings of analysis, Local Law adopted by Council and being implemented
1.8	Subject to the outcomes of the State Government Review of the new residential zones, undertake an amendment to Moreland Planning Scheme to increase the size of private open space required in the Neighbourhood Residential Zone (NRZ) and to potentially increase the % of permeable/irrigated surfaces, in association with any future amendment to the residential zones	Strategy Unit	**Supporting Unit(s)** ESD, City Development	No	New Operating Funds and/or Grant Funding required $100,000	2017/18 (subject to timing of State Governm ent review)	Amendment adopted by Council
1.9	Investigate the potential to encourage the use of electric vehicles through incentives in the Parking Management Policy i.e. parking charges in public car parks or residents parking permits	Strategic Transport	**Supporting Unit(s)** ESD **Partners(s)** VicRoads, NAGA, MEFL	Yes	Existing Base Funding (staff time)	2016/17	Investigation complete and inclusion in parking policy if determined appropriate

Strategy 2: Strengthen and build green infrastructure

Targets:

- **Increase vegetation cover in Moreland's most vulnerable areas by 35% by 2020 (from Zero Carbon Evolution).**
  Note: this target is subject to review and requires further study to factor in additional canopy cover and irrigated vegetation information since ZCE was endorsed (action item 2.2)
- **Stormwater harvesting infrastructure supplying 30ML/a of treated water for open space irrigation by 2020 (from WaterMap 2020)**
- **Council will engage with all relevant stakeholders to encourage cool buildings and cool roofs**
- **Moreland will research and investigate the trialling and installing of cool roads and paths infrastructure by 2020**

Existing Council Strategies, Policies and Action Plans	
ESD Local Planning Policy (clause 22.08 of the Moreland Planning Scheme)	Merri Creek Environs Strategy 2010
Moonee Ponds Creek Strategic Plan 2011	Moreland Open Space Strategy (MOSS) 2012 – 2022
Moreland Sustainable Buildings Policy 2015	Moreland WaterMap 2020
Street Tree Planting Plan (under development)	The Moreland Street Landscape Strategy 2012-2022 (specific objective to mitigation of UHIE, under review 2015/16)
Urban Forest Strategy (to be developed, planned commencement late 2016)	Zero Carbon Evolution 2014 - 2020

Action Plan:

No.	Key Actions	Lead Unit (s)	Supporting Unit(s)/Partner(s)	Within Strategic Resource Plan	Budget	Delivery	Measures
2.1	Establish baseline data for comparison: canopy cover (both public and private), vegetation cover, open space cover, irrigated open space cover	Open Space Design and Development	**Supporting Unit(s)** GIS, Open Space Maintenance	Yes	Existing Operating Funding (funded under the Street Tree Planting Plan)	2015/16	Delivery of exact baseline data

No.	Key Actions	Lead Unit (s)	Supporting Unit(s)/Partner(s)	Within Strategic Resource Plan	Budget	Delivery	Measures
2.2	Develop target(s) to increase irrigated vegetation and canopy cover considering parameters such as: baseline data (action 2.1) and costs e.g. establishing and maintaining vegetation, irrigation requirements and potential in accordance with the MOSS	Open Space Design and Development	**Supporting Unit(s)** Open Space Maintenance, ESD **Partner(s)** State Government, Universities, Water authorities	No	New Opex Funding/ Grant Funding required (TBC)	2017/18	Target established Business case developed
2.3	Increase street tree canopy cover across the Municipality, prioritising socially vulnerable streets in hot spots, including pedestrian and bicycle networks in hot spots and activity centres) through Street Tree Planting Plan	Open Space Design and Development, Open Space Maintenance – Arborist Urban Design (Activity Centres)	**Supporting Unit(s)** ESD, Strategic Transport, Engineering Services, Community Development and Social Policy	Yes	Existing Base Funding (current Tree Planting Budget 5,000 trees per annum) Additional resource requirements to increase tree canopy dependent on outcome of Street Tree Planting Plan	Ongoing	Canopy cover mapping across the municipality including priority UHIE hot spots
2.4	Collaborate with regional organisations such as Northern Alliance for Greenhouse Action (NAGA) in exploring regional approaches and grant funding opportunities to increasing green infrastructure and protect buildings from extreme heat	ESD	**Supporting Unit(s)** Open Space Design and Development, Urban Design,, Engineering Services **Partner(s)** NAGA, MEFL, Creek	Partial	Existing Base Funding (Staff time) New Grant Funding required	2016/17	Collaboration where opportunities arise

No.	Key Actions	Lead Unit (s)	Supporting Unit(s)/Partner(s)	Within Strategic Resource Plan	Budget	Delivery	Measures
			committees, Water Authorities		for opportunities (new metro-wide and regional projects)		
2.5	Incorporate WSUD or passive watering into Council road reconstruction and drainage upgrade projects where feasible, in alignment with Target 3 of Council's integrated water management strategy, WaterMap 2020	Engineering Services, Strategic Transport, Open Space Design and Development	**Supporting Unit(s)** ESD **Partner(s)** VicRoads	Yes	Existing Roads program Note: New funding required for maintaining additional WSUD assets. **Refer to Action 2.7 below**	Ongoing	Area of roads treated by raingardens and passive watering
2.6	Improve cooling capacity of Council owned/managed public open space with tree shade, large-scale WSUD and irrigation prioritising those in socially vulnerable hotspots and playgrounds. Explore opportunities for external funding to expand scope of, and number of, current planned projects to enhance impact	Open Space Design and Development, ESD	**Supporting Unit(s)** Open Space Maintenance (Parks, Sportsfields, Arborist)	Partial	Some Existing Capital Funding New Grant Funding required to expand	Ongoing	Measured increase in shade/cooling capacity public open space in vulnerable locations Number of WSUD projects
2.7	WSUD and stormwater harvesting infrastructure maintenance program – develop and implement ongoing maintenance program to ensure all WSUD and stormwater harvesting assets are maintained	Open Space Maintenance	**Supporting Unit(s)** ESD, Street Cleansing, Strategic Transport, Engineering Services, Sportsfields, Open Space	Partial	Some Existing Operating Funding for maintenance	Ongoing	% of raingardens being maintained quarterly under maintenance program Stormwater

No.	Key Actions	Lead Unit (s)	Supporting Unit(s)/Partner(s)	Within Strategic Resource Plan	Budget	Delivery	Measures
	in good operational condition		Maintenance – Parks Maintenance		of WSUDs New Operating Funding and/or Grant funding required for maintenance program. Approx $450 per annum per average sized raingarden for ecological maintenance (initially 120 raingardens). Excludes electrical and mechanical maintenance		Harvesting Assets maintained Business Case developed for additional maintenance
2.8	Undertake revegetation works along Merri, Westbreen, Edgars, Merlynston and Moonee Ponds creek corridors in line with the MOSS, the Merri Creek Evirons Strategy (2010) and Moonee Ponds Creek Strategic Plan (2011), creating cool spots for humans, flora and fauna through a green buffer zone and vegetated linkages	Open Space Design and Development	**Supporting Unit(s)** Open Space Maintenance – Parks Maintenance, Open Space Maintenance – Arborist **Partner(s)** Melbourne Water, Creek Management Committees, Friends Groups	No	New Capital Funding/ Grant Funding required $75,000 per annum for tree planting along priority waterways	Ongoing	Measured increase in vegetation along waterways Business Case developed for additional tree planting

No.	Key Actions	Lead Unit (s)	Supporting Unit(s)/Partner(s)	Within Strategic Resource Plan	Budget	Delivery	Measures
2.9	Maintain water security by providing irrigated public open space with alternate water source for irrigation through stormwater harvesting (SWH) infrastructure	ESD	**Supporting Unit(s)** Open Space Maintenance – Sportsfields, Open Space Maintenance – Parks Maintenance, Recreation, Engineering Services	Partial	Existing Capital Funding (WaterMAP 2020) New Grant Funding required for opportunities to expand	Ongoing	Measured volume of stormwater provided for irrigation and measured cooling capacity of irrigated open space
2.10	In line with the Moreland Open Space Strategy 2012-2022 develop a policy on the appropriate use of water on open space considering the environmental and social needs for keeping active/passive spaces green, and sustainable landscape values that sets out clear parameters.	Open Space (maintenance recreation reserves), ESD	**Partner(s)** Yarra Valley Water, Melbourne Water	No	New Operating Funds and/or Grant Funding required project management and $60,000 for consulting	2017/18 (subject to funding)	Development of water use policy for public open space for the city
2.11	Update Canopy Cover Mapping every five years	Open Space Design and Development	**Supporting Unit(s)** GIS	No	New Operating Funds and/or Grant Funding required $15,000 for mapping	15/16 and 20/21	Mapping updated Business Case developed 2016/17

No.	Key Actions	Lead Unit (s)	Supporting Unit(s)/Partner(s)	Within Strategic Resource Plan	Budget	Delivery	Measures
2.12	Develop list of projects in UHIE priority locations informed by Street Tree Planting Plan to increase the cooling capacity of streets, car parking and activity centres Identified projects will require future funding bids or funding from external sources such as grant funding	Open Space Design and Development, Engineering Services, Urban Design	**Supporting Unit(s)** ESD, Strategic Transport, Open Space Maintenance (Arborists), Asset Management **Partner(s)** VicRoads	Partial	Some Existing Base Budget Funding (staff time for developing list of projects) New Capital or Grant Funding required $100,000 per annum for works from 2017/18	2016/17 – onwards	Projects identified (2016/17) Measured Increase in shade trees and WSUD in car parks in priority areas
2.13	Develop a tree species calculator and site selection matrix for maximising canopy cover	Open Space Design and Development	**Supporting Unit(s)** GIS; ESD; IT; Planning; Urban Design, Open Space Maintenance **Partner(s)** MAV	No	New Grant Funding required for development of software application and mobile interface with GIS)	2018/19	Calculator developed
2.14	Prepare budget bids to ensure that new vegetation, revegetation and WSUD projects are adequately maintained	Open Space Maintenance	**Supporting Unit(s)** ESD, Open Space Design and Development	No	New Base budget or Operating budget TBD	Ongoing	Budget Bid/Business Case(s)developed

Strategy 3: Facilitate cool buildings

Targets:

- **35% of the industrial hotspot roofs will have a cool roof[1] by 20301**
- **Council will engage with all relevant stakeholders and community to encourage cool buildings**

Existing Council Strategies, Policies and Action Plans	
Moreland Corporate Carbon Reduction Plan 2015 - 2020	Moreland Sustainable Buildings Policy 2015
Zero Carbon Evolution 2014 - 2020	

Action Plan:

No.	Key Actions	Lead Unit (s)	Supporting Unit(s)/Partner(s)	Within Strategic Resource Plan	Budget	Delivery	Measures
3.1	Improve UHIE mitigation performance (non artificial cooling, vertical gardens, cool roofs etc.) in new buildings and retrofits through the implementation of SDAPP and ESD Local Planning Policy (clause 22.08 of the Moreland Planning Scheme)	Statutory Planning, ESD	**Supporting Unit(s)** Strategic Planning, Strategic Transport, City Infrastructure **Partner(s)** City of Melbourne, CASBE	Yes	Existing Base Budget Funding (staff time) Existing Base / Operating Funding (CASBE memberships)	Ongoing	SDAPP program updated Implementation of ESD Local Planning Policy

[1] A cool roof is one that has been designed to reflect more sunlight and absorb less heat than a standard roof. Cool roofs can be made of a highly reflective type of paint, a sheet covering, or highly reflective tiles or shingles.

No.	Key Actions	Lead Unit (s)	Supporting Unit(s)/Partner(s)	Within Strategic Resource Plan	Budget	Delivery	Measures
3.2	Encourage improved thermal performance of housing in vulnerable areas, through current and future energy efficiency and renewable energy programs (e.g. Positive Charge) being delivered for Council through the Moreland Energy Foundation (MEFL)	MEFL	**Supporting Unit(s)** ESD, Social Development	Partial	Existing Base / Operating Funding (MEFL programs) New Operating Funds and/or Grant Funding required to increase implementation	Ongoing	Number of homes retrofitted to improve thermal performance Number of homes in targeted vulnerable areas
3.3	Trial methods for improving thermal performance of social housing in vulnerable areas	ESD, Social Development	**Supporting Unit(s)** MEFL, NAGA **Partner(s)** Department of Human Health and Services, Community Housing Providers	Yes	Existing Base / New Grant Funding secured $80,000		Number of homes retrofitted to improve thermal performance Number of homes in targeted vulnerable areas
3.4	Advocate to owner occupiers in Newlands, Brunswick and Coburg North industrial zones to encourage the uptake of cool roofs through existing key partners e.g. MEFL	MEFL, Economic Development	**Supporting Unit(s)** ESD, GIS Team **Partner(s)** Owner occupier industrial properties, State Government	Partial	Existing Base / Operating Funding (MEFL programs) New Grant Funding required	2017/18 - 20/21	Number of roofs upgraded

No.	Key Actions	Lead Unit (s)	Supporting Unit(s)/Partner(s)	Within Strategic Resource Plan	Budget	Delivery	Measures
3.5	Develop research partnerships to improve understanding of the Urban Heat Island Effect, e.g. determining maximum cooling loads for thermal comfort and cost/benefits, the effectiveness of solar PV as cool roofs	UHAP Working Group	**Partner(s)** CASBE, MEFL, NAGA, State Government, Universities	No	New Grant Funding required and partnerships required	Ongoing	Research findings

Strategy 4: Create Cool Roads and paths

Target:

Moreland will research and investigate the trialling and installing of cool roads and paths infrastructure by 2020.

Existing Council Strategies, Policies and Action Plans	
Brunswick Integrated Transport Strategy 2013	Moreland Cycle Strategy 2011 - 2021
Moreland Integrated Transport Strategy 2010 - 2019	Moreland Pedestrian Strategy 2010- 2019
Moreland Technical Notes	Street Tree Planting Plan (under development)
The Moreland Street Landscape Strategy 2012-2022 (specific objective to mitigation of UHIE, under review 2015/16)	

Action Plan:

No.	Key Actions	Lead Unit(s)	Supporting Unit(s)	Within Strategic Resource Plan	Budget	Delivery	Measures
4.1	Review the results from the Barrow Street passive street tree pilot project including impacts on parking, safety and maintenance and as appropriate integrate findings into the Moreland Technical Notes and future engineering projects	ESD	**Supporting Unit(s)** Urban Design, Open Space Design and Development, Open Space Maintenance (Arborists), Engineering Services **Partner(s)** Melbourne University, City of Monash, City of Melbourne	Yes	Existing Base Budget Funding (staff time)	2016/17 – 201718	Review complete Moreland Technical Notes updated (as relevant)
4.2	Review outcomes from existing cool road pilots such as City of Sydney project to determine whether it is a good option before trialling in Moreland	Engineering Services	**Supporting Unit(s)** ESD, Asset Management, Open Space Maintenance (Arborists), Roads Unit, Urban Design	No	New Operating Funds and/or Grant Funding required for staff time	2016/17 – 2017/18	Review complete

No.	Key Actions	Lead Unit(s)	Supporting Unit(s)	Within Strategic Resource Plan	Budget	Delivery	Measures
			Partner(s) Monash, RMIT and Melbourne Universities		New Grant Funding required for delivery of cool road pilots		
4.3	Develop Council Road Infrastructure Design Procedure to formalise roles and responsibilities and processes for integration of UHIE mitigation in delivery of road design and construction, e.g. integration of WSUD and passive watering of street trees Update Moreland Technical Notes as required	Engineering Services	**Supporting Unit(s)** Urban Design, Open Space Design and Development Open Space Maintenance (Arborists), Strategic Transport, ESD, Asset Management, Roads Unit **Partner(s)** Other Councils,, VicRoads	Yes	Existing Base Budget Funding (staff time)	2016/17 – 2017/18	Procedure adopted by Moreland Executive Group
4.4	Prioritise UHIE priority areas in implementation of 40km/hr speed limitations (signage and traffic calming) in accordance with the Moreland Integrated Transport Strategy. Integrate street trees, passive irrigation and canopy cover into traffic calming measures where possible.	Strategic Transport	**Supporting Unit(s)** Open Space Design and Development	Partial	Existing Capital Funding for 2016/19 (traffic management). Dependent on traffic management program (unfunded after 2019)	2017/18 - 20/25	40km limitation introduced Business Case developed
4.5	Optimise street car parking design to allow more space for passive	Urban Design	**Supporting Unit(s)** ESD, Engineering	No	New Operating	2017/18	Optimal Designs for typical street

No.	Key Actions	Lead Unit(s)	Supporting Unit(s)	Within Strategic Resource Plan	Budget	Delivery	Measures
	watering of trees and WSUD (e.g. rain gardens or stormwater capture) Investigate funding to implement pilots.		Services, Open Space (D&D), Strategic Transport		Funds and/or Grant Funding required $100,000 for standard car parking designs		typologies developed and being implemented
4.6	Develop a feasibility study with options for greening of Sydney Road	Urban Design	**Supporting Unit(s)** Engineering Services, Strategic Transport, Open Space D&D, Open Space Maintenance (Arborists), Street Cleansing, Asset Management. **Partner(s)** VicRoads, Yarra Trams	No	New Grant Funding required	16/17 – 17/18	Grant funding secured and feasibility complete
4.7	Implement streetscape masterplans for Activity Centres including opportunities for cooling and greening	Urban Design	**Supporting Unit(s)** Engineering Services, Strategic Transport, Open Space D&D, Open Space Maintenance (Arborists), Street Cleansing, Asset Management. **Partner(s)** VicRoads, Yarra Trams	Partial	Some Existing capital budget New Grant Funding required for cooling/greening	2016/17 – 2017/18	Grant funding secured and feasibility complete

Strategy 5: Foster a heat aware community

Target:

Increased community action to reduce and respond to the urban heat island effect by the community

Existing Council Strategies, Policies and Action Plans	
Brunswick Integrated Transport Strategy 2013	Moreland Cycle Strategy 2011 - 2021
Moreland Integrated Transport Strategy 2010 - 2019	Moreland Municipal Public Health and Wellbeing Plan
Moreland Pedestrian Strategy 2010- 2019	Zero Carbon Evolution 2014 - 2020

Action Plan:

No.	Key Actions	Lead Unit	Supporting Unit	Within Strategic Resource Plan	Budget	Delivery	Measures
5.1	Review existing community engagement programs to integrate and support action items under the UHIE Action Plan Engage the Moreland community on the UHIE through avenues such as factsheets (e.g. cool roofs and green infrastructure) and online resources, festivals and events with a focus on our most vulnerable communities Collaborate with existing community facing organisations (e.g., MEFL and CERES) to promote UHIE awareness and actions	UHAP Working Group	**Supporting Unit(s)** Economic Development, Communications **Partner(s)** State Government Departments, MEFL	Partial	Existing Base Budget Funding (staff time) New Base Funds and/or Grant Funding required $5 ,000 / year (fact sheets and materials)	Ongoing	Number of events held

5.2	Undertake research activity to better understand community values of street trees and streetscapes; Based upon findings, areas of community opposition (residential; commercial and industrial) to street trees to be targeted for education and community engagement activities	Open Space Design and Development	**Supporting Unit(s)** UHAP Working Group, Council Planning and Performance, Communications **Partner(s)** State Government Departments, Universities	Yes	New Grant Funding secured $320,000 (Australian Research Council) in partnership with University of Melbourne, City of Melbourne, and City of Ballarat	Ongoing	Funding received and research complete
5.3	Determine indicators for measuring community action to reduce and respond to the UHIE, e.g. through Household Survey	ESD	**Supporting Unit(s)** Council Planning and Performance, UHAP Working Group **Partner(s)** State Government Departments, MEFL	Yes	Existing Base Budget Funding (staff time)	2017/18	Indicators developed
5.4	Based on findings from Stage 1 Moreland WaterSmart Project evaluate Council's participation in stage 2.	ESD	**Partner(s)** MEFL, Melbourne Water, Neighbouring Councils	No	New Council Operating and external grant funding required	2015/16 - 2017/18	Evaluation of Stage 1 WaterSmart program

Key Advocacy Actions

The table below summarises the key advocacy actions for each strategy as relevant, these actions should be included in annual advocacy plan(s) as appropriate.

Key Advocacy Items	Lead Unit	Supporting Unit(s)/ Partner(s)	Within Strategic Resource Plan	Budget	Delivery
Strategy 1: Advocate to VicRoads and Department of Transport for tools to reduce traffic along main thoroughfares e.g. through a congestion/emissions charge in association with improved public transport and mode shift, which are also being promoted by the Moreland Integrated Transport Strategy(MITS) and Brunswick Integrated Transport Strategy(BITS).	Strategic Transport	**Supporting Unit(s)** ESD **Partner(s)** VicRoads, Department of Transport	Yes	Existing Base Budget Funding (staff time)	2016/17
Strategy 2: Advocate to the Melbourne Planning Authority (MPA) to provide state level strategic support for UHIE mitigation measures into the Metropolitan Open Space Strategy and Boulevard Strategy.	Strategic Planning	**Supporting Unit(s)** ESD	Yes	Existing Base Budget Funding (staff time)	Ongoing
Strategy 2: Advocate to major landowners e.g. super market chains to encourage update of infrastructure responses to mitigate UHIE in buildings and carparks through key partners e.g. MEFL.	Economic Development , MEFL	**Supporting Unit(s)** ESD	Yes	Existing Base Budget Funding (staff time)	Ongoing
Strategy 2: Advocate to and partnership with key owners and managers of non Council green open space to enhance the cooling capacity in socially vulnerable hotspots	UHAP Working Group	**Supporting Unit(s)** Economic Development, MEFL, Social Development **Partner(s)** External stakeholders including: Department of Education, Housing and Human Services, MPA; community housing; VicTrack; VicRoads; Melbourne Water; other private large landholders, community organisations e.g. community gardens	Yes	Existing Base Budget Funding (staff time)	Ongoing

Key Advocacy Items	Lead Unit	Supporting Unit(s)/ Partner(s)	Within Strategic Resource Plan	Budget	Delivery
Strategy 2: Advocate to the Municipal Association of Victoria(MAV) to work with Distribution Network Service Providers (DNSP) to investigate potential for bundling or undergrounding of electric cabling with consideration given to limitations (e.g. underground services, tree root zones etc)	Open Space Design and Development	**Supporting Unit(s)** ESD **Partner(s)** MAV, City Power and Jemena	Yes	EXISTING Base Budget (staff time)	Ongoing
Strategy 2: Advocate to relevant State Government agencies and continue to work with partners to naturalise the Moonee Ponds creek through localised and upstream works.	Open Space Design and Development	**Supporting Unit(s)** ESD **Partner(s)** State Govt, Melbourne Water, Moonee Valley Council	Yes	Existing Base Budget Funding (staff time)	Ongoing
Strategy 3: Advocate relevant State Government agencies, developers, UDIA, Property Council to prioritise heat mitigation strategies in private property (e.g. through state-wide implementation of the Environmentally Sustainable Design Planning Policy)	ESD	**Supporting Unit(s)** Open Space (D&D), Economic Development, Statutory Planning **Partner(s)** State Govt, developers, Property Council, UDIA	Yes	Existing Base Budget Funding (staff time)	Ongoing
Strategy 4: Liaise with Department of Health and Human Services (DHHS) and community housing sector about infrastructure responses for UHIE mitigation including cooling strategies for social housing areas	ESD	Supporting Unit(s) Social Development (Community Development & Social Policy) Partner(s) DHHS and Community Housing Federation of Victoria	Yes	Existing Base Budget Funding (staff time)	Ongoing

Note: Community heat wave emergency initiatives are already in place through Social Development's Heatwave Plan and Emergency Management Plan and as such are not within the scope of this Action Plan.

8. MONITORING, EVALUATION AND REVIEW

The development of this Plan has been driven by Council's ESD Unit; who will be responsible for reporting on implementation via the Zero Carbon Evolution Project Board and annual Council reporting.

Responsibility for overall delivery lies across numerous areas of Council. Monitoring and evaluation will be undertaken through key mechanisms as outlined in table 5 below.

Importantly, this Plan represents the beginning of Moreland's journey in responding to this most critical issue. The Plan will be implemented over a 10 year period from 2016/2017 – 2025/2026. The actions Council takes between now and 2025/2026 will move Moreland towards a cooler, greener, more liveable city. Achieving this vision is not something Council can do alone. It will take effort and investment from the community and all levels of Government and partners.

Effective policy and implementation responses to Urban Heat Island Effect is a rapidly emerging and highly dynamic area; for this reason it is proposed to build in a more detailed review and update of the Implementation Plan in 2020/2021.

Table 5 – Monitoring and Evaluation

Mechanism	Description
Urban Heat Action Plan (UHAP) - Cross Functional Working Group	The cross-functional urban heat island action working group will be established to oversee the implementation of the plan. This group will fulfill a monitoring, evaluation and review function. They will meet quarterly and report on the progress of the Plan and any identified changes or updates that are considered necessary.
UHIE indicators and Measures	Each action has an associated measure, which will be monitored and reported to the Zero Carbon Evolution Project Board.
Project Board Council	The Zero Carbon Evolution Project Board will receive progress reports on this Action Plan. This Action Plan will be reported to Council annually via the Zero Carbon Evolution report.
Existing or new relevant Council Strategies, Policies and Action Plans	Responding to the Urban Heat Island Effect is a new and rapidly evolving area of action, research and expertise. As such, the Council report each year will include updates recommended by the UHAP working group to this Plan to ensure it is responsive and relevant without compromising the long-term strategic intent and goals. New Council Strategies, Policies and Action Plans will also incorporate UHIE mitigation and adaptation measures.
Mechanism	**Description**
2020/2021 Midway Review	Achieving a reduction in Urban Heat Island Effect by 2026 is an ambitious goal, particularly in the context of climate change. We are most likely to see change over a ten year period, hence the Strategy has been drafted to take action from 2016/17 to 2025/26, with a built in review period midway in 2020/21 to review and update the implementation plan (actions). The methodology for how we measure our success in moving towards a cooler, greener and more liveable city may include the following approaches:

Mechanism	Description
	• A review of delivery of actions in priority areas compared with elsewhere. Thermal imaging is unlikely to demonstrate much difference in heat retention in five years time and will not be undertaken. We would get better results with a night time flyover as this would indicate which areas are really problematic in storing heat. This unfortunately can only be done aerially at night at the moment which is expensive; and • A review of baseline data and surface type changes: canopy cover, irrigated vegetation, pervious versus impervious, asphalt, concrete, roof area, irrigated open space versus un-irrigated open space. The measures associated with the actions will assist us in tracking these indicators.

9. DEFINITIONS

Term	Definition
Urban Heat Island Effect	The effect where urban air and surface temperatures are higher than nearby rural areas due to more dark, dense and impervious surfaces that absorb and re-emit heat as well as concentration of human activities in cars etc. Many cities and suburbs have air temperatures that are 2 to 10°Fahrenheit (1 to 6°Celsius) warmer than the surrounding natural land cover.
Mitigation	Measures to reduce the drivers of the effect. In the case of the UHIE this could include reducing dark, dense impervious surfaces and planting shade trees.
Adaptation	Measures to reduce the impact of the effect such as improving the thermal performance of a house, which provides greater protection for the occupants from the effect particularly during heat waves.
Cool roof	A cool roof is one that has been designed to reflect more sunlight and absorb less heat than a standard roof. Cool roofs can be made of a highly reflective type of paint, a sheet covering, or highly reflective tiles or shingles. Photovoltaic panels and irrigated green roofs can also function as a cool roof.
Cool roads and paths	A cool road or path is one that has been designed to reflect more sunlight and absorb less heat than standard asphalt, is permeable to allow better absorption and evaporation of rainwater or integrates green infrastructure. Cool roods and paths can be made of light coloured asphalts, permeable paving, or incorporate water sensitive urban design to allow green infrastructure.
Green Infrastructure	Green infrastructure typically refers to an interconnected network of multifunctional green-spaces that are strategically planned and managed to provide a range of ecological, social, and economic benefits. Examples of green infrastructure include green roofs, permeable vegetated surfaces, green alleys and streets, urban forests, public parks, community gardens and urban wetlands. Research shows that green infrastructure can potentially improve residents' health and wellbeing, provide food, lower wind speeds, reduce stormwater run-off, modulate ambient temperatures, reduce energy use and sequester carbon, among other 'ecosystem service benefits', although the extent of these benefits remains somewhat contested. Green infrastructure thus holds the potential to cushion cities against many expected climate change impacts. (Matthews, Lo and Byrne, 2015)

10. ASSOCIATED DOCUMENTS

- Asset Management Plan
- Brunswick Integrated Transport Strategy
- Corporate Carbon Reduction Plan 2015 – 2020
- Environmentally Sustainable Design Policy
- Glenroy, Brunswick and Coburg Streetscape Masterplans
- Moreland Council Plan 2013 – 2017
- Moreland Integrated Transport Strategy
- Moreland Sustainable Buildings Policy
- Moreland Technical Notes
- Street Tree Planting Plan (Under development)
- The Moreland Open Space Strategy (MOSS)
- The Moreland Street Landscape Strategy
- The Moreland Water Map 2020
- The Zero Carbon Evolution

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