Beresfield Local Centre:

Urban Heat Measurements

Report

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

City of Newcastle

Index

Produced in 2021 by The University of Newcastle
University Dr, Callaghan NSW 2308

www.newcastle.edu.au

The University of Newcastle (text & images) 2021

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or any other information storage or retrieval system, without prior permission in writing from the author.

Thankyou to the Newcastle City Council Smart Cities fund for making this project possible and to all UoN Students and staff for your commitment and contributions.

Citation:
Ware, S., Livermore, M., UoN students: Roby, J., Cunningham, M., Olive, J., Rowlands, W., Dibley, C., Cranfield, J., Cheetham, H. (2021). Beresfield Local Centre: Urban Heat Measurements Report.

ISBN 978-0-7259-9995-7

1. Executive summary
2. Introduction
   - 2.1. The project
   - 2.2. UHIE
   - 2.3. Funding
3. Project background
   - 3.1. Literature review
   - 3.2. UHIE
   - 3.3. Smart trees report
   - 3.4. Location of Beresfield project.
4. Beresfield local centre design
   - 4.1. Community involvement
     - 4.1.1. Co design
     - 4.1.2. Placemaking
   - 4.2. Project progress
5. Data
   - 5.1. Methodology
     - 5.1.1. Acquire
     - 5.1.2. Input
     - 5.1.3. Analysis
   - 5.2. Data analysis
     - 5.2.1. Ambient temperatures
     - 5.2.2. Surface temperatures vs Ambient temperatures
     - 5.2.3. Specific materials
6. Results
7. Discussion
8. Conclusion
9. Bibliography
10. Appendix

1. Executive Summary

The future livability of urban areas will improve with consideration for appropriate human thermal comfort, as the effects of climate change begin to make themselves apparent in our day to day lives. In order to mitigate the effects of rising temperatures, our cities need to be retrofitted to their new environment.

This report provides a comparative data analysis over 2019, 2020 and 2021 of the Beresfield Local Centre as it is transformed through a NCC improvement plan. This project continues from an earlier collaboration in its data collection and examination of improving the thermal comfort of streetscapes and public amenities with regards to Urban Heat Island Effect. (UHIE). The Smart Trees report conducted by UoN, this report identifies and compares levels of Urban Heat Island Effect (UHIE) affected upgraded streetscape situated upon various points along Beresfield Avenue. In order to monitor UHIE throughout new developments temperature data was collected during peak temperature periods (Janurary/ Feburary) in 2019, 2020 and 2021. Methodology for data collection includes manual temperature monitoring. The temperature data recorded from on-site measurement developed into a series of data visualizations and spatialization to interpret and communicate the field conditions to a broad range of audiences. Interpretation of data comments upon the level of success in reducing ambient temperatures and material performance, including limitations of use, by contrasting against the human thermal comfort limits.

The research draws attention to ambient and surface temperatures for Beresfield Avenue at all data collection periods during 2020 is significantly cooler than in 2019. Therefore, as statistical analysis represents the average surface temperature excluding ambient temperature, the relationship provides a reasonable assumption that the design and material changes impacted the results.

Further investigations reveal that the individual sites that provided significant statical variance were study sites 1 and 6. Site 1 materials included wooden benches, brown brick edging, light-colored concrete, and white reflective curbs. Similarly, materials within site 6 include high immensity paint, painted pavement, permeable surfaces, softscape, and increased vegetation. The light-coloured concrete and reflective paint deflect radiant heat, increasing the heat transfer rate between the environment and solid materials, therefore, lowering surface temperature.

Ground cover planting and softscape increase the permeable surface of the landscape, increasing water absorption and retention, therefore, provide cooling through evapotranspiration. Moreover, the best performing material was natural rock, closely followed by colored reflective paint, which remained well below the thermal comfort level.

The Beresfield local centre improvement project involved placemaking and public consultation as well as considered design choices which corresponded to earlier recommendations in the 2019 Smart Trees Report.

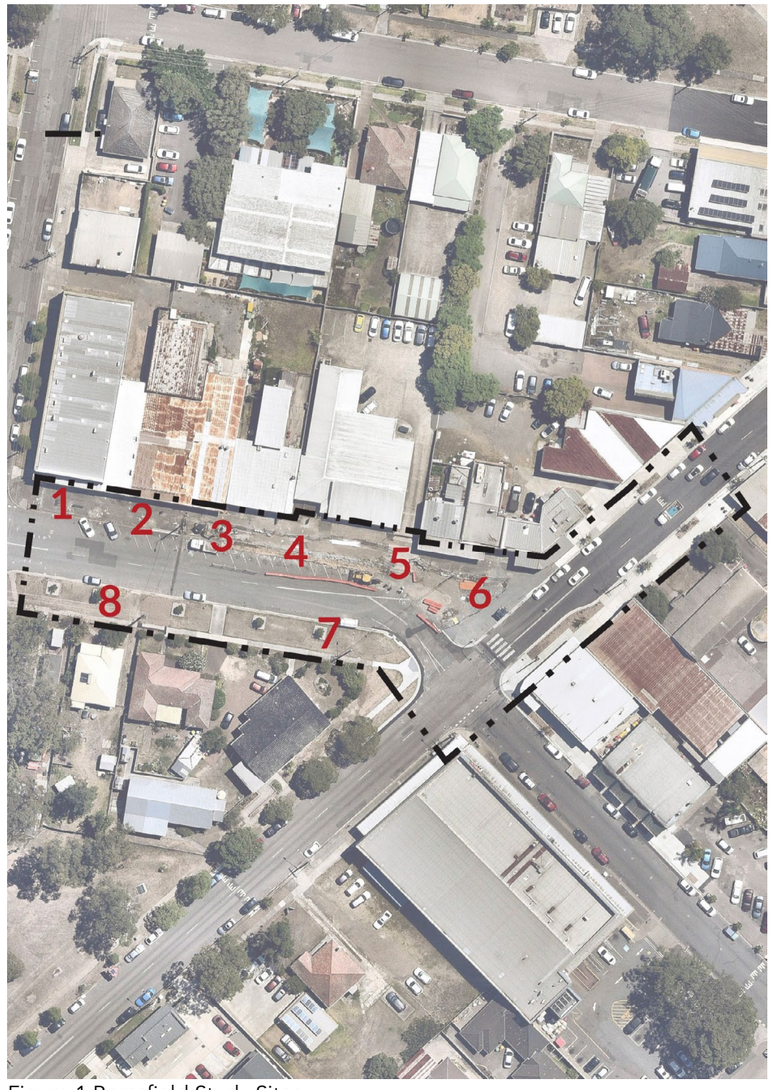


Figure 1 Beresfield Study Sites

2. Introduction

Urban Heat Island Effect is localized warming due to the increase in large amounts of hardscape (materials that absorb and hold heat) due to urban development. The sun's heat is absorbed, causing the surface and ambient temperatures to increase beyond the anticipated daily temperature. Climate change scientists also predict increases in our average temperatures upwards of 2-3 degrees over the next fifty years; urban centres are under increasing pressure to provide short, medium, and long-term resilience strategies for the urban heat island effect.

As Newcastle increases in population and built density, the negative impacts of UHIE are expected to become a significant issue facing both the CBD and suburban areas. This project engaged in two areas of the 2017-2021 NCC Smart City Strategy (Smart Governance and Smart Environments), aligning its goals with Newcastle's future ambitions as a world leader in Smart City structure and design.

This temperature data at the Beresfield sites was collected during the peak summer periods of 2019, 2020, and 2021. The research team then adapted data visualization and spatialization methods concerning a broad range of audiences within and outside of the council. The design for the Beresfield local centre adopted some of the material recommendations from the first study as a significant field test of the 'kit of parts' approach outlined in that research project.

The project makes available to the NCC a comprehensive analysis of the impact of the newly developed streetscape. It is envisioned that approaches to mitigating UHIE can be supported through similar projects modeled after the Beresfield pilot and that raising public awareness of UHIE and NCC efforts to combat increasing temperature in Newcastle's urban environment through the application of various mitigation strategies.
Within the Smart Trees report, researchers found that cooling the urban environment can be achieved through the implementation of:

- High-Quality Urban Design
- Better Performing Materials
- Increased and Diversified Urban Vegetation
- Reduction in Localized emissions from transport and energy uses

Project Funding

This project has been assisted by the NSW Government and supported by Local Government NSW. The city of Newcastle received Grant funding from Increasing Resilience to Climate Change from the Minister for Energy and the Environment for the design and construction of this project.

3. Project Background

This report is underpinned by review of the existing literature on the Urban Heat Island Effect. In particular, there was a thorough investigation into Australian examples of best practice, particularly focused on reports and strategies devised by Council, Local Government, State Government initiatives and methods. Some of the key findings and central texts that informed this research are briefly summarised in this chapter, however for the full documents/texts, please see APPENDIX 1 Literature Review.

Urban Heat Island Effect (UHIE)

Urban Heat Island Effect is localized warming as a result of urban development due to the increase in the large amounts of paved and dark-colored surfaces like roads, roofs, and car parks. The sun's heat is absorbed and retained, causing the surface and ambient temperatures to rise. Anthropogenic heat production, such as the heat produced through car engines and air conditioners, also contributes to Urban Heat Island Effect (UHIE). One key feature of UHIE is the difference in ambient and surface temperatures. On average, surface heat ranges from slightly above air temperature in the shade to between 1 to 20 degrees Celsius above air temperature in sunlight, depending on the intensity of sunlight and material properties (Rosenzweig and Solecki 2006; EPA 2008). This vast difference in what is recorded and distributed as the daily temperature versus the reality of the physical surface temperatures may lead to individuals unknowingly placing themselves in extreme heat conditions.

This increase in ambient and surface temperature poses a severe health risk to humans, animals and has crippling impacts on infrastructure. The combination of increasing amounts of paved/hardscape surfaces in urban areas compounding with climate change can lead to extreme heat events. In the 2016 'Minimizing the impacts of extreme heat: Guide for local government' NSW Office of Environment and Heritage and Adapt NSW defines extreme heat as the following:

"Extreme heat is defined as significantly hotter and/or more than average summertime temperature for a location, whereby human and animal health and the performance of infrastructure and the delivery of services may be adversely affected. This includes, but is not confined to heatwave conditions" (NSW Government, 2016)

Further, the guide indicates that 2070 NSW will experience on average 26 more 'hot' days than current. Based on this prediction, and with the knowledge that as extreme heat event occurrences rise in frequency and intensity, so do the associated risks, it is estimated that annual net temperature-related deaths will increase by 1250 deaths by 2070, and 8628 deaths in 2100, nationally. This figure alone is cause for great alarm; currently, extreme heat kills more Australians than any other natural disaster. (Coates, 2014)

Pinpointing the aspects of urban design that directly cause increased temperature is the natural first step when seeking to mitigate this issue. Drawing on previous investigations into UHIE, precisely 'Moreland City Council's UHIE action plan' For a cooler, greener, more livable city,' several driving factors for UHIE that serves as a springboard for Newcastle's analysis of current urban conditions include:

1. Hardscape
   Solid surfaces, e.g., asphalt, concrete, paving - These surfaces absorb, trap, and re-radiate heat. They also prevent rainwater soaking in, reducing water available for plants, reducing evaporative cooling.
2. Lack of green
   Limited vegetation reduces shading and cooling through evaporation from plants through their leaves, reduces the ability for humans and animals to inhabit public space.
3. Developer driven design
   Urban development pressure - creates denser environments that trap heat, vehicle-focused areas that do not cater for pedestrians, and removal of green areas reducing cooling.
4. Materiality
   Construction materials that hold heat and have low reflectivity - e.g., terracotta tiles, bricks, bitumen, and concrete - these materials absorb, trap, and re-radiate heat.
5. Poorly planned density
   Dense urban arrangements - absorbs and traps heat with little consideration of breezeways and green pockets.
6. Infrastructure
   Heat production from activities of people - produced by vehicles, split air conditioners, construction. Etc.
7. Pollution
   Air pollution - that creates a local 'greenhouse' effect, trapping heat. (Moreland City Council 2016)

The areas that can be improved through the mitigation of UHIE can be broken down into the following categories, which will be further discussed in the following section: Dangers and Impacts. These factors are:
Social/Health: reduction in heat-related illness and fatality, increases in outdoor activity, improvement in mental wellbeing, and human thermal comfort.
Economic: reduced energy costs due to reduced use of artificial cooling, increased property values, and increased retail spending in commercial areas.
Environmental: cleaner, healthier waterways, reductions in air pollution and dust, more water retention in the landscape in water constrained climate, healthy flora and fauna.

To prevent rising levels of the Urban Heat Island Effect UoN and NCC have collaborated to produce the Smart Trees Report. The report provides resilient strategies to combat the Urban Heat Island Effect by cooling the urban environment through quality urban design, high preforming materials, increased and diversified urban vegetation, reduction in localized emissions from transport and energy uses.

3. Project Background

Smart Trees: Resilience Strategies to Combat Urban Heat Island Effect, Newcastle NSW. University of Newcastle, 2019

Earlier research identified levels of Urban Heat Island Effect (UHIE) experienced across five (5) identified sites in Newcastle's public realm. The temperature data was collected during peak temperature periods in January 2019. The report documents a methodology for using temperature monitoring, which may be conducted manually (Figure 4) or by utilizing the NCC Smart Pole network. The temperature data recorded from on-site and field-based measurement was developed into a series of data visualizations and data spatialization to interpret and communicate the field conditions with a broad range of audiences, see Figure 3. The research team also identified a broad review of mitigation strategies to mitigate UHIE and arranged them into a kit of parts to be utilized in consultation with internal and stakeholders. The visualization techniques and mitigation kit of parts were tested with the Newcastle City Council through three intensive co-design workshops. This report provides information with which the Beresfield community center design was developed, and it further identifies economic, social, and environmental issues that arise from UHIE.

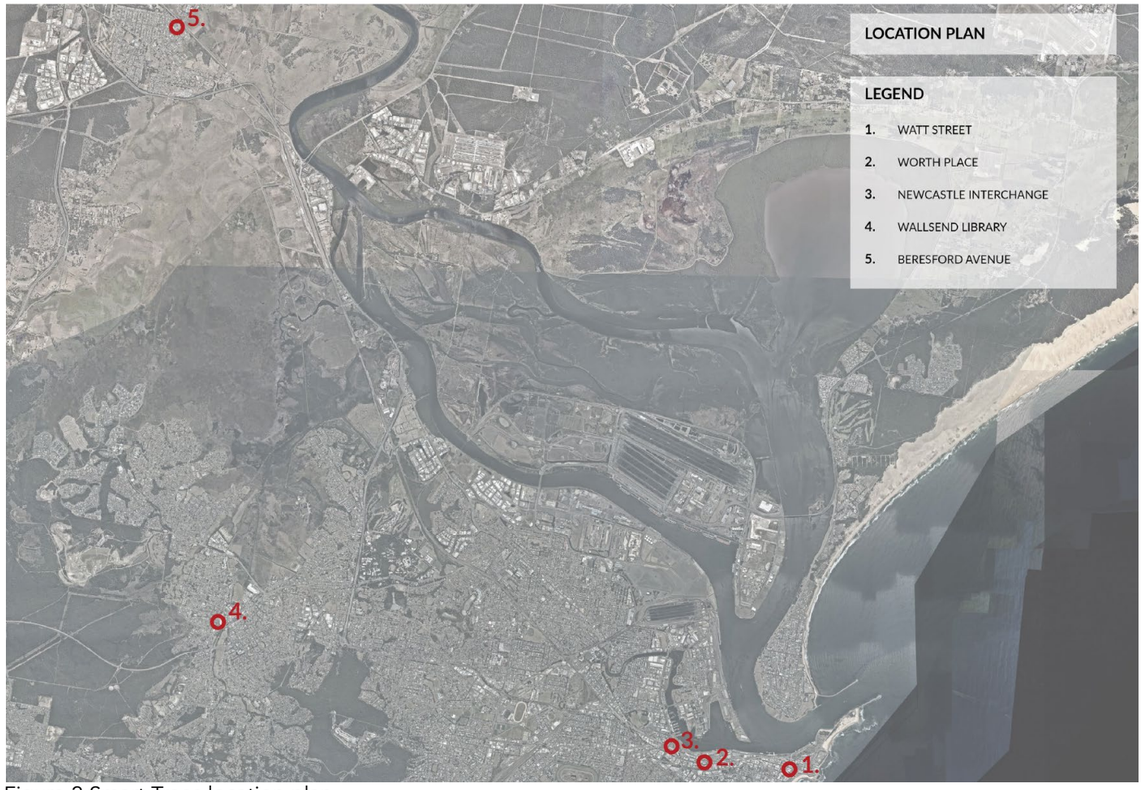


Figure 2 Smart Trees location plan

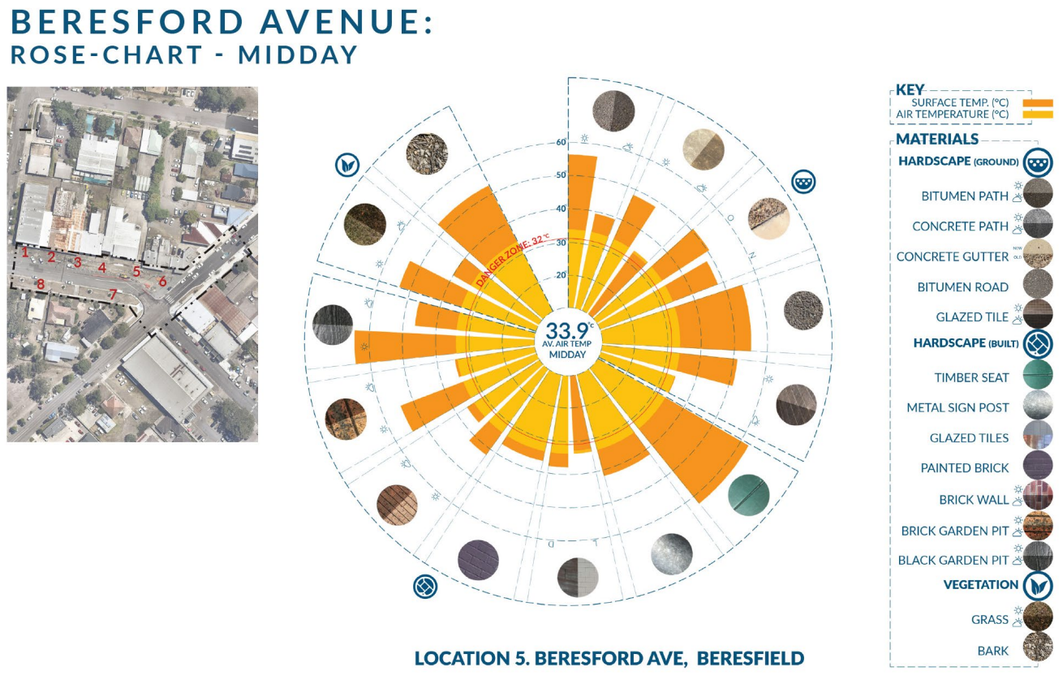


Figure 3 Smart Trees suggested material visualisations

3. Project Background

Site X																		
Date	Temperature Readings (°C)																	
Date 1	Data Logger no.1		Data Logger no. 2		Data Logger no. 3		Data Logger no. 4		Data Logger no. 5		Data Logger no. 6		Data Logger no. 7		Data Logger no.8		Data Logger no. 9	
Time	Surface (Grass)	Air	Surface (Grass)	Air	Surface (Grass)	Air	Surface (Concrete)	Air	Surface (Asphalt)	Air	Surface (Asphalt)	Air	Surface (Asphalt)	Air	Surface (Asphalt)	Air	Surface (Asphalt)	Air
Time 1	20.2	20.9	20.4	20.9	20.1	20.9	19.0	20.9	19.2	20.9	20.2	20.9	20.7	20.9	20.3	20.9	20.7	20.9
Time 2	34.6	26.5	34.1	26.5	31.9	26.5	27.3	26.5	28.4	26.5	29.0	26.5	34.2	26.5	35.8	26.5	33.2	26.5
Time 3	32.1	26.5	32.1	26.5	31.6	26.5	24.6	26.5	26.1	26.5	28.0	26.5	31.3	26.5	31.9	26.5	31.3	26.5
Time 4	25.6	23.2	25.4	23.2	24.9	23.2	23.6	23.2	23.3	23.2	24.5	23.2	25.2	23.2	25.3	23.2	24.5	23.2
Date 2	Data Logger no.1		Data Logger no. 2		Data Logger no. 3		Data Logger no. 4		Data Logger no. 5		Data Logger no. 6		Data Logger no. 7		Data Logger no.8		Data Logger no. 9	
Time	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air
Time 1																		
Time 2																		
Time 3																		
Time 4																		
Date 3	Data Logger no.1		Data Logger no. 2		Data Logger no. 3		Data Logger no. 4		Data Logger no. 5		Data Logger no. 6		Data Logger no. 7		Data Logger no.8		Data Logger no. 9	
Time	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air
Time 1																		
Time 2																		
Time 3																		
Time 4																		
Date 4	Data Logger no.1		Data Logger no. 2		Data Logger no. 3		Data Logger no. 4		Data Logger no. 5		Data Logger no. 6		Data Logger no. 7		Data Logger no.8		Data Logger no. 9	
Time	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air
Time 1																		
Time 2																		
Time 3																		
Time 4																		

Surface (Location 1)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-07	1	28, 21	20.2	34.6	32.1	25.6
Jan-08	2	28, 21	0.0	0.0	0.0	0.0
etc.	etc.	30, 22	0.0	0.0	0.0	0.0
Average Temp. (°C)			6.7	11.5	10.7	8.5

Ambient (All of Site X Locations)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-07	1	28, 21	20.9	26.5	26.5	23.2
Jan-08	2	28, 21	0.0	0.0	0.0	0.0
etc.	etc.	30, 22	0.0	0.0	0.0	0.0
Average Temp. (°C)			7.0	8.8	8.8	7.7

Figure 4 Smart Trees data collection templates

3. Project Background

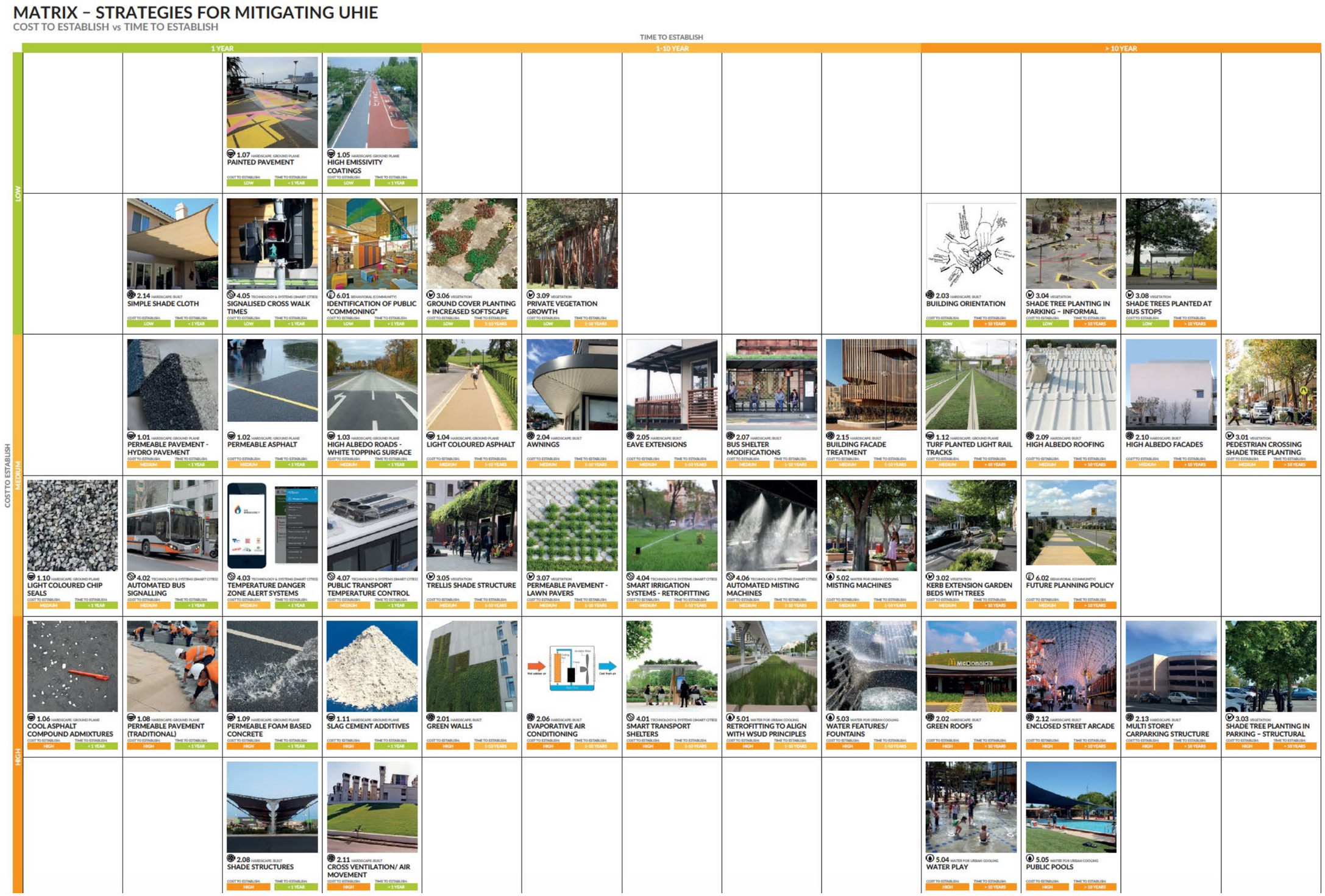


Figure 5 Smart Trees Matrix - kit of parts organised to reflect their cost vs the time taken to come into full effect.

3. Project Background

Moreland Urban Heat Island Effect Plan: For a Cooler, Greener, More Livable City. Moreland City Council, 2016

This long-term action plan was created to mitigate UHIE in the Moreland City LGA. Written for a citizen and stakeholder audience, it defines UHIE and provides explanations to potential methods of reducing the effects. This document pinpoints the triggers for UHIE, listing key factors, and compliments this with a list of feasible measures that will reduce the effects. They identify the following:

- Vegetation:
  Increase vegetation and protect existing
  Increased outdoor landscaping, Green walls, and roofs Improve parkland and open space (irrigated spaces)
- Water:
  Water Sensitive Urban Design Materials:
  Use of reflective materials
- Urbanization
  Street Design - orientation, width Evaporative air coolers
  Public Transport
  Improve building quality to reduce the need for artificial cooling
- Social
  Social UHIE policy and education. (Moreland City Council 2016, p6).

This report provides the base level information with which the Smart Trees Matrix was developed. Additionally, it recognizes economic, social, and environmental concerns that develop from UHIE, which significantly informs the gravity of the situation in Newcastle. It further identifies a series of targets/goals that Moreland City Council has committed to achieving, such as "Increase vegetation in Moreland's most vulnerable areas by 35% by 2020; Stormwater harvesting infrastructure supplying 30ML/a of treated water for open space irrigation by 2020" (Moreland City Council 2016, p)

Where Should All the Trees Go? State buy State -Victoria. University of Western Australia, 2017

This report acts as a state-specific analytical overview on canopy loss, communities vulnerable to heat-related stresses, and potential canopy tree planting. Through graphic representations, it outlines percentages of canopy cover vs. hard surfaces in Victoria, identifying areas of greatest vulnerability, and states that these areas have the potential to be prioritized for revegetation or urban cooling strategies.

Temperature Thresholds Associated and Increased Mortality in Ten Major Population Centers in Rural Victoria, Australia Monash Climate School of Geography and Environmental Science, 2006
The research examines whether similar mortality temperature thresholds that apply to urban centers are applicable in rural settings—providing a clear and concise view of the relationship between increased and sustained temperatures and mortality. Identifying 32 degrees as the mean temperature that should be used as a base heat alert for this region greatly informed the assessment of what should be considered a 'danger zone' for Newcastle. This report found that days with temperatures above this threshold (9-am-9am, 32 degrees) are associated with a median mortality increase of 18%.

Cooling the Commons: Pilot Research Report. Mapping Urban Resilience in Riverland Sydney (MURRS) - Western Sydney University - Institute for Culture and Society, 2018
This study reviewed factors that produce urban heating in Sydney's rapidly developing urban fringe and the key socio-environmental issues. These include the health effects of extreme heat and research highlighting the dearth of information about how residents navigate and traverse public spaces and interact with the physical environment. The concept of 'cool commons' was employed to identify those spaces that offer cooler temperatures than surrounding areas and that are used by and accessible to the vulnerable members of the community. The working hypothesis focused on identifying these 'commons' and emphasizing funding going to support and encourage this communing, rather than spreading focus broadly across entire suburbs. (MURRS, 2018. p3) Ideas around 'cool commons' are particularly relevant to the Wallsend Library site, which acts as a refuge for the community in extreme weather events. Once space has been identified as such, the MURRS report highlights the need to consider public transport infrastructure that allows users to access these 'commons' safely.

3. Project Background

This report analyzes and interpret the data collection of temperature readings that reflect the upgraded streetscape of Beresford Avenue, Beresfield, 2322, in response to the Urban Heat Island Effect. Beresfield is located approximately 20km NW from Newcastle. The report follows on from Smart Trees: Resilience Strategies to Combat Urban Heat Island Effect in Newcastle, NSW. In the initial study the research team developed a kit of parts that provided strategies to combat UHIE supported by an extensive review of current literature. In this follow up report the team collected data across three successive years during the implementation and completion of design works, some of which adopted the kit of parts recommendations from the Smart Trees Report.

The project site has been split into eight testing locations, as seen through figure 8.

Figure 6 Location of Beresfield <Source https://www.nearmap.com/au/en>

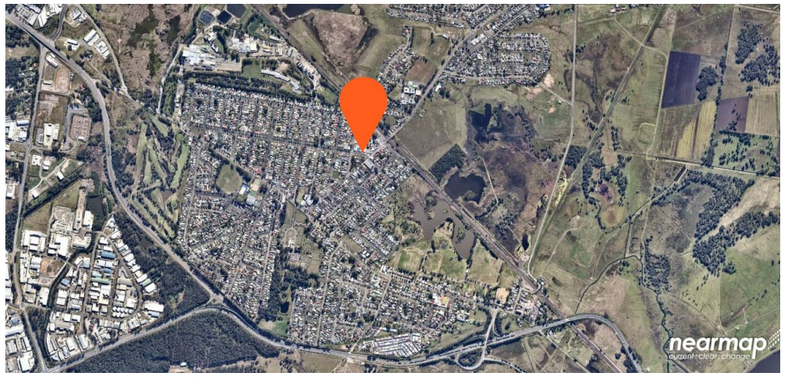


Figure 7 Location of Beresford Avenue <Source https://www.nearmap.com/au/en>

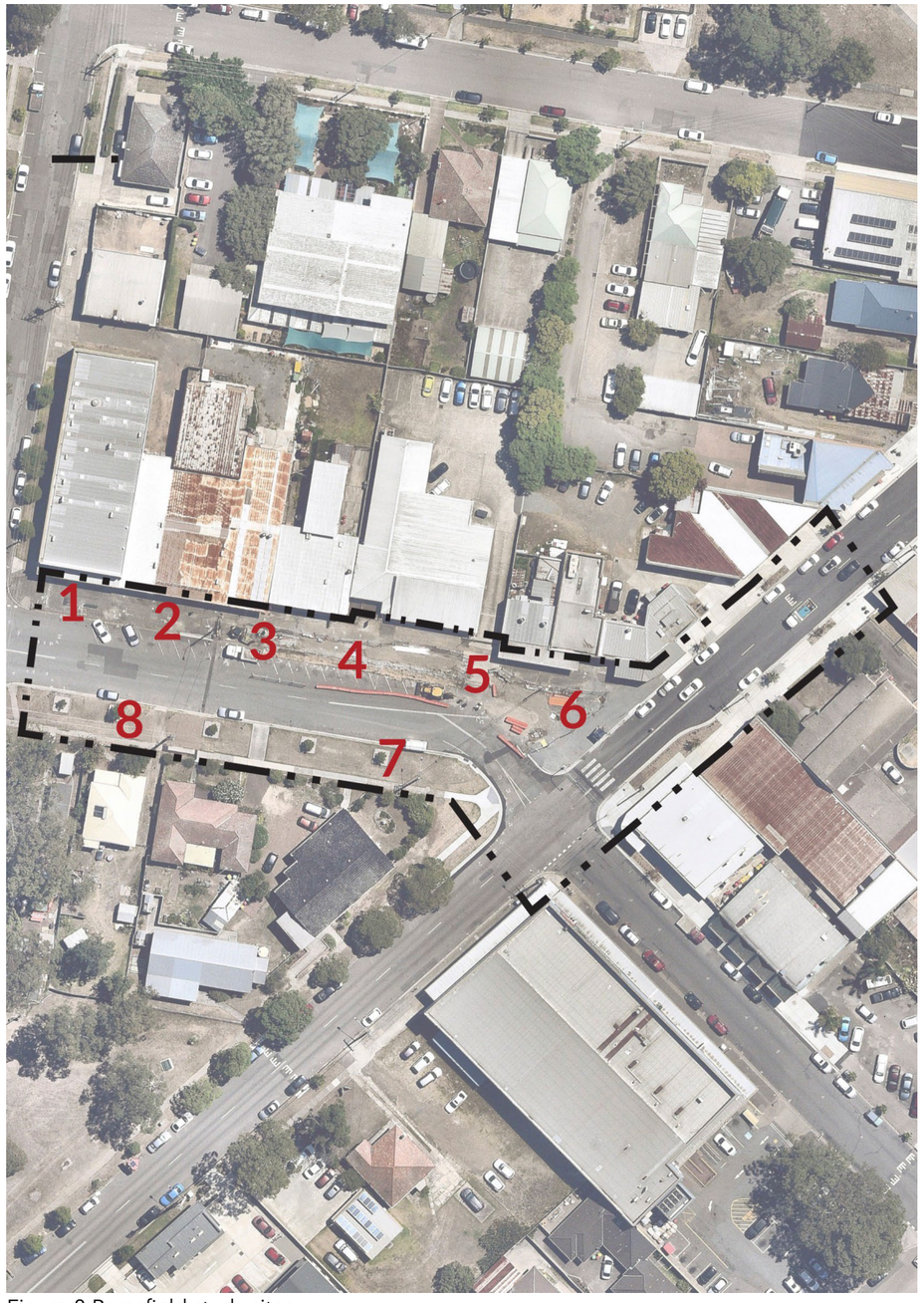


Figure 8 Beresfield study sites

4. Beresfield Local Centre Design

NCC Senior Project Planner Sarah Horan engaged in community consultation throughout the site analysis and design phases of this pilot project. She and the landscape architectural consultants Terrace examined the need for a safer environment, placemaking, accessible seating, and a space for the shelter alongside of selecting materials which should lower surface and ambient temperatures as per the recommendations of the Smart Tree Report.

Co- Design

Community engagement and voice empowerment were at the forefront of design. The principle of co-design is to engage the community through design consultation. Within the design stage, a co-design and feedback workshop was held for members of the Beresfield community to have their say on the proposed community space.

In 2019 NCC engaged artists Up&Up to hold workshops with local schools to develop creative themes for the space. This was followed up with a community place-warming session on-site to gather ideas from the community. This collaborative approach builds on research undertaken by the University on urban heat island effect.

In developing the project, NCC worked with local businesses and residents to develop a public domain plan for the infrastructure works for the centre and placemaking consultation with the community for the area on the corner of Beresford and Lawson Avenues.

After site analysis, evaluation, and community consultation, the corner of Beresford and Lawson Avenues was a significant safety concern. The proposed design expanded public space for the community on the corner of Beresford and Lawson Avenues. The proposed plan is anticipated to mitigate motor vehicle crashes and improve pedestrian and cyclist accessibility, amenity, and safety.

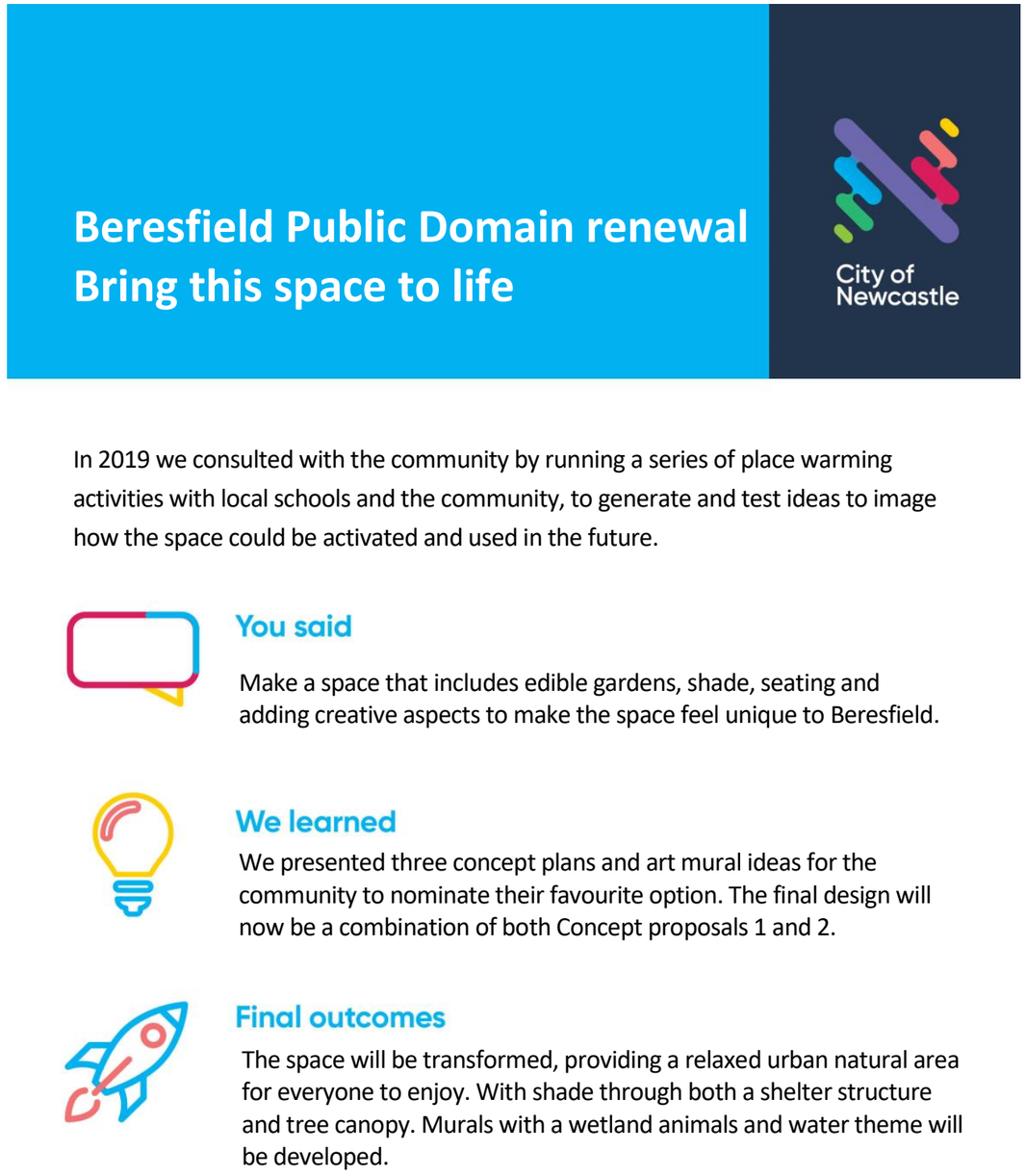


Figure 9 Beresfield Local Centre final outcomes summary <Source: https://newcastle.nsw.gov.au/have-your-say/projects/beresfield-bring-this-space-to-life>

4. Beresfield Local Centre Design

Placemaking Activities

As part of the infrastructure renewal, a new public space for the community was created on the corner of Beresford and Lawson Avenues. This prominent space has the potential to be a focal point for the community.

The community had the opportunity to view and vote on three concept ideas for landscaping and art from 25 November to 9 December 2019. The community preferences were for Concept Proposal 1 (Corner-garden with Green and Golden Bell frog mural) and Concept Proposal 2 (Underwater with Blue Billed Duck mural). The final design combines these design options and includes a community mural at Beresfield facilitated by Up&Up, shelter (*Disclaimer the shelter was introduced after the 2021 temperature recordings, therefore its impact will not be present within data analysis and results*) and tree canopy. The University research team providing paint specifications to ensure a non-slip surface while trialling lowering surface temperatures.

Figure 10 Beresfield Local Centre wall mural

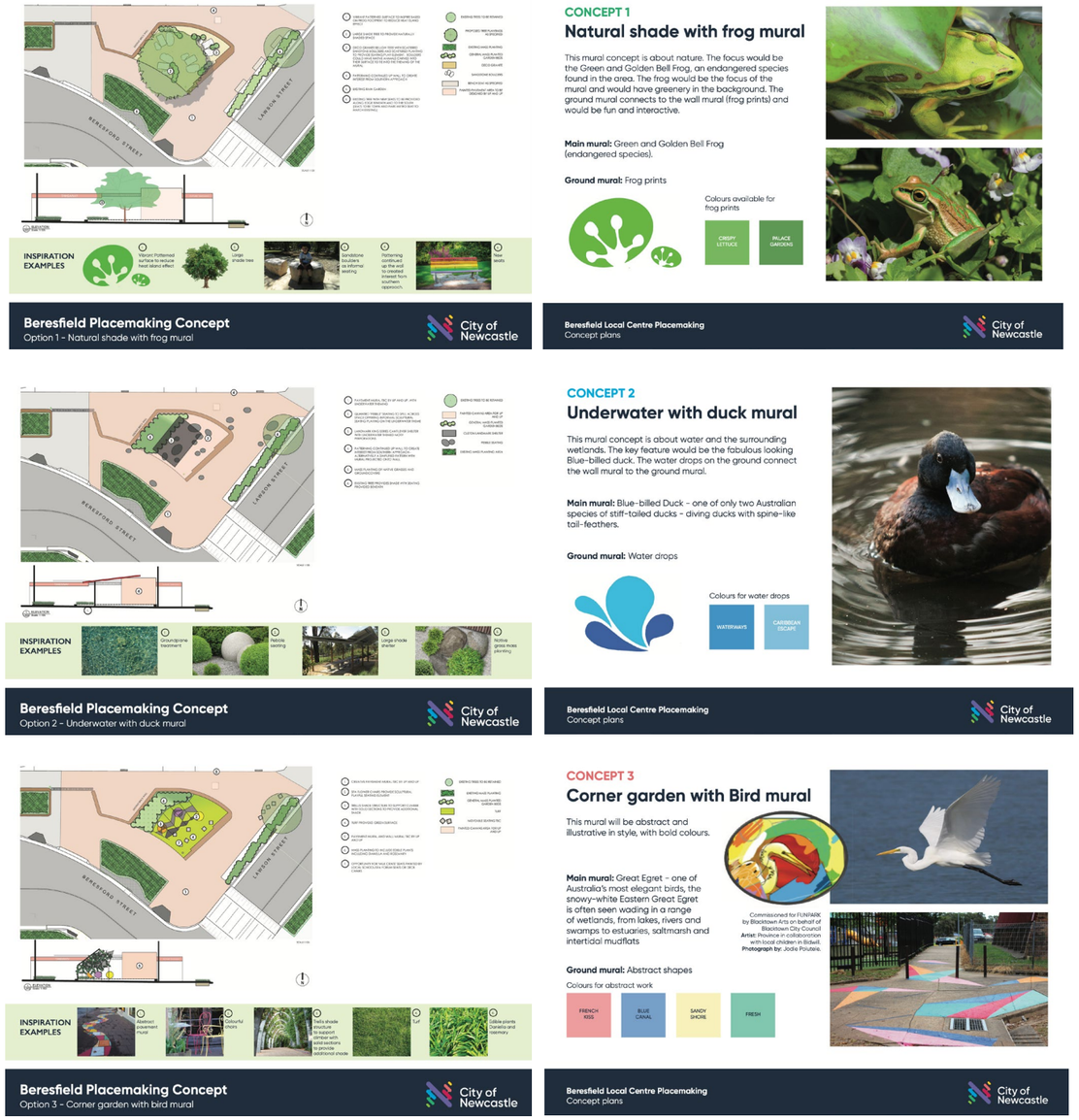


Figure 11 Beresfield placemaking concepts <Source: https://newcastle.nsw.gov.au/have-your-say/projects/beresfield-bring-this-space-to-life>

4. Beresfield Local Centre Design

Proposed design

As a design workshop, the revised design aimed to improve safety, drainage, and the look and feel of the area to make Beresfield's local Centre a more inviting place to visit and shop. Beresfield Local Centre was one of the first center's to be renewed in 2018/19 as part of Our Local Center's program. The designs upgrade delivered significant improvements to the drainage, stormwater system, roads, pathways.

Figure 12 Beresfield proposed design site plan
<Source: https://newcastle.nsw.gov.au/beresfield>

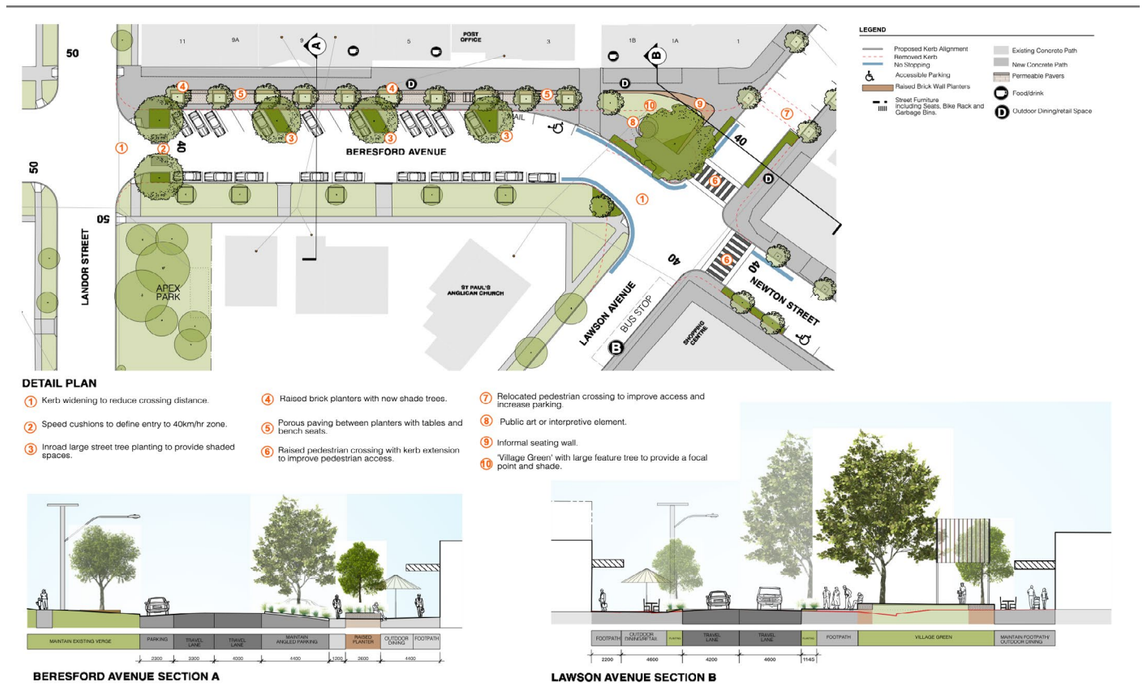


Figure 13 Beresfield proposed design <Source: https://newcastle.nsw.gov.au/beresfield>

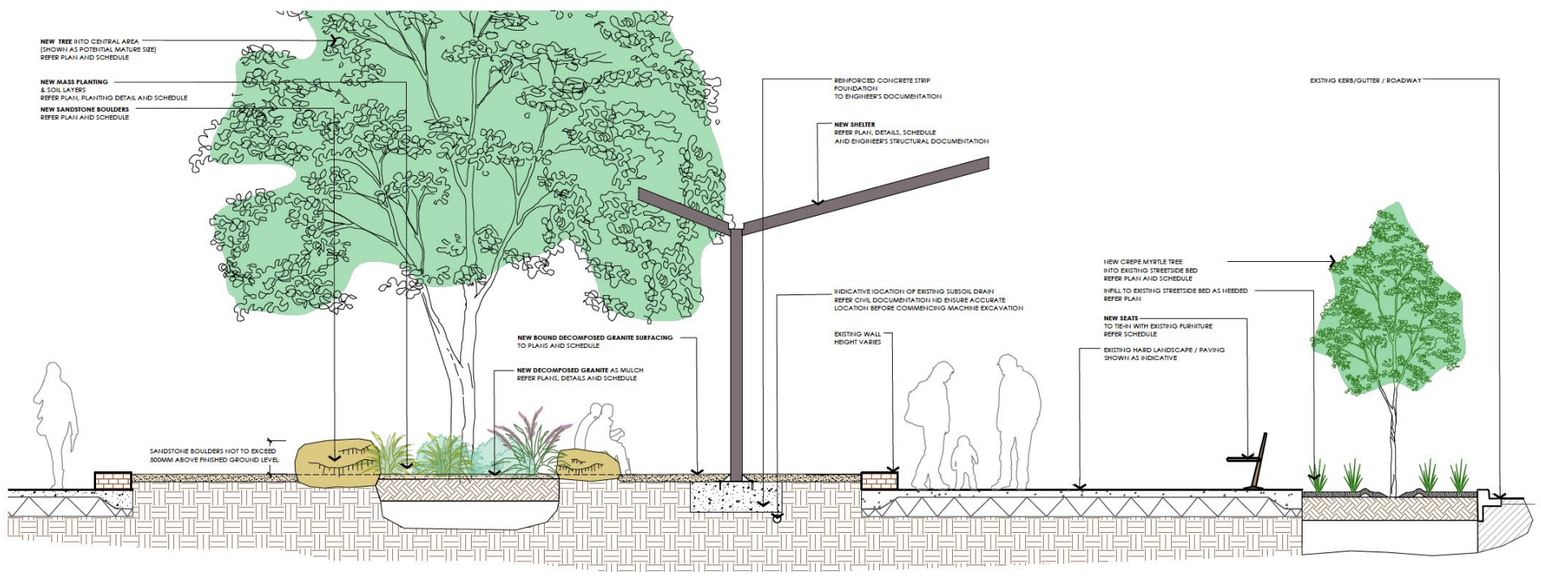


Figure 14 Beresfield proposed design section <Source: https://newcastle.nsw.gov.au/beresfield>

4. Beresfield Local Centre Design

From 2019 to 2021, the Beresfield community center progressed to a renewed public space for the community. The space exhibited:
A 40km/h zone and associated traffic calming devices to reduce speed and increase safety.

- Road and pedestrian lighting upgrade, including lighting to the railway station.
- Drainage renewal and rain garden to improve the quality of water run-off
- New street trees.
- New street furniture, including seats, bike racks, and bins.
- New curb, gutter, and footpath.
- Renewed road pavement.
- Retention of on street parking.
- Free WiFi.

A new community gathering space on the corner of Beresford and Lawson Avenues including a new placemaking mural, shade shelter, seating and landscaping.

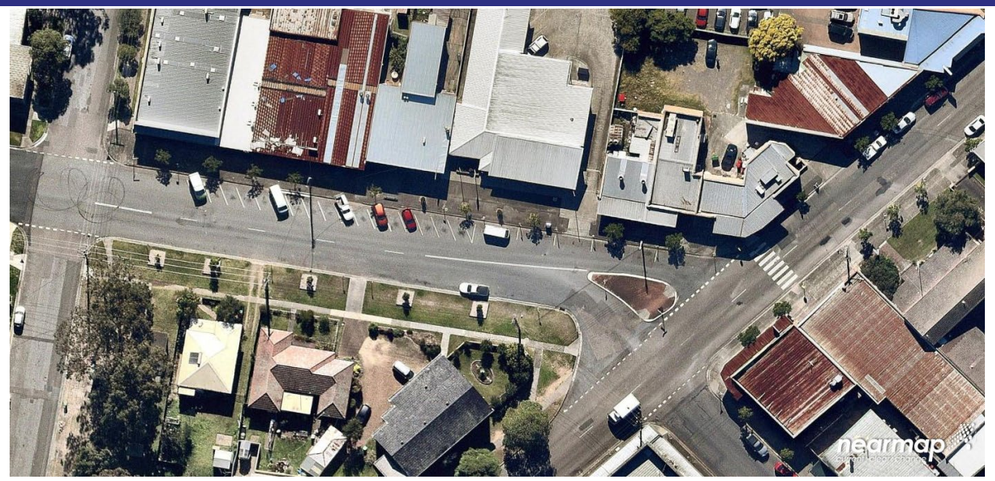


Figure 15 Beresfield 2019. <Source https://www.nearmap.com/au/en>

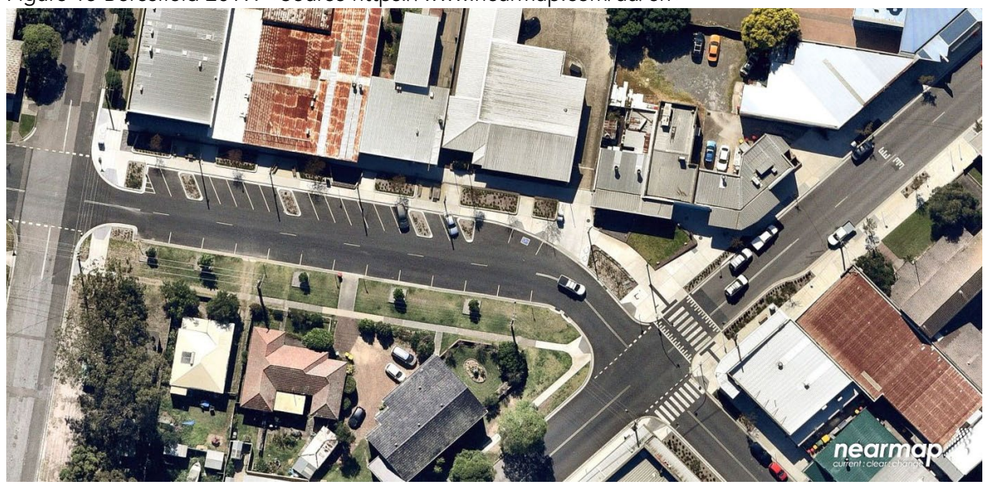


Figure 16 Beresfield 2020. <Source https://www.nearmap.com/au/en>

Figure 17 Beresfield 2021. <Source https://www.nearmap.com/au/en>

4. Beresfield Local Centre Design

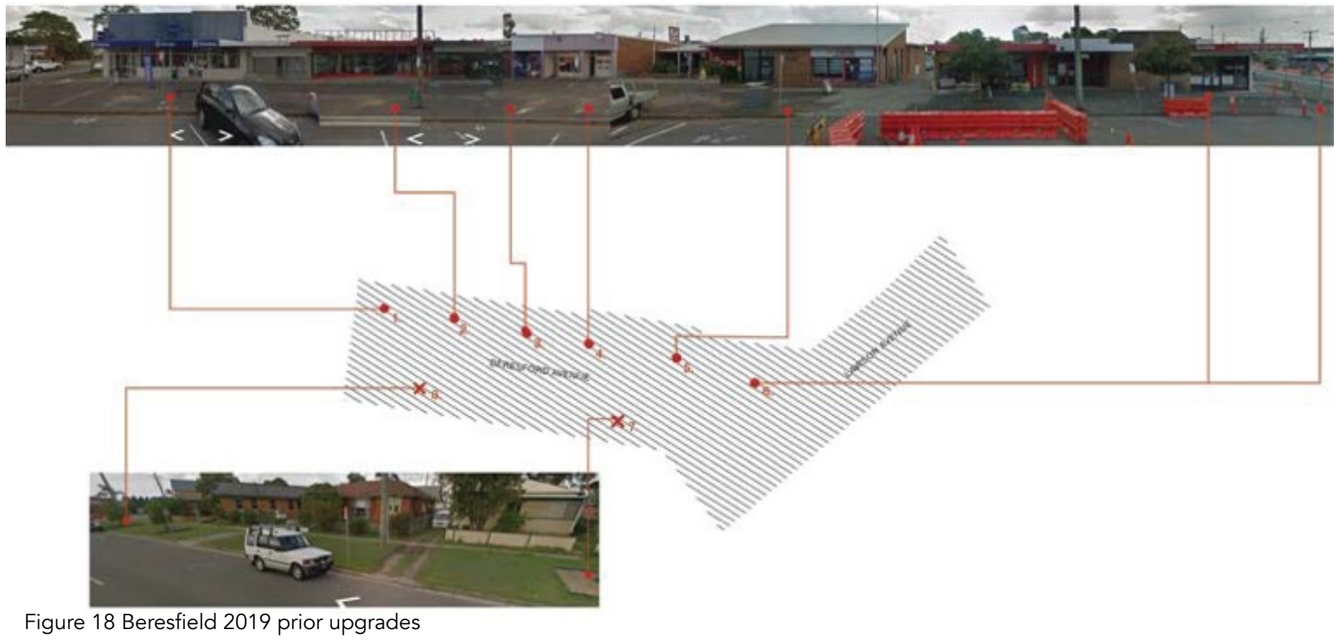


Figure 18 Beresfield 2019 prior upgrades

Figure 19 Beresfield 2021 after upgrades

4. Beresfield Local Centre Design

Hardscape: Ground Plane

Light Coloured Concrete Paving

- Reduces energy in the form of heat from being absorbed into pavement and transferring back into the atmosphere
- Achieves atmospheric cooling while also acting to stabilise damaged road surfaces.

High emissivity coatings

- Emissivity is a measure of the efficiency in which a surface releases thermal energy.
- High emissivity coatings are products that increase the rate of heat transfer between the environment and solid materials.
- Results from studios showed that the application of developed coating materials could reduce the surface temperature of asphalt pavement up to 5C (Guntor, Faldhil Md Din, Ponraj, Iwao, 2014 & Wan, Hein, Ping, Aloysius, 2021)

Figure 20 Light Coloured Concrete Paving

Figure 21 High emissivity coatings

Painted pavement

- Painting pavements with lighter/high albedo colours can increase the reflectivity of the surface and deflect radiant heat from being absorbed into the pavement.
- Can be applied to existing roads, car park, playground, and sporting facility pavement.
- Has the potential to increase glare in an area, so needs to be applied where topically suitable.

Permeable surfaces

- Improved storm water management and retention by allowing for the infiltration of rainwater.
- The retention of the storm water in the landscape better services localised vegetation for the uptake for transpiration.

Figure 22 Painted pavement

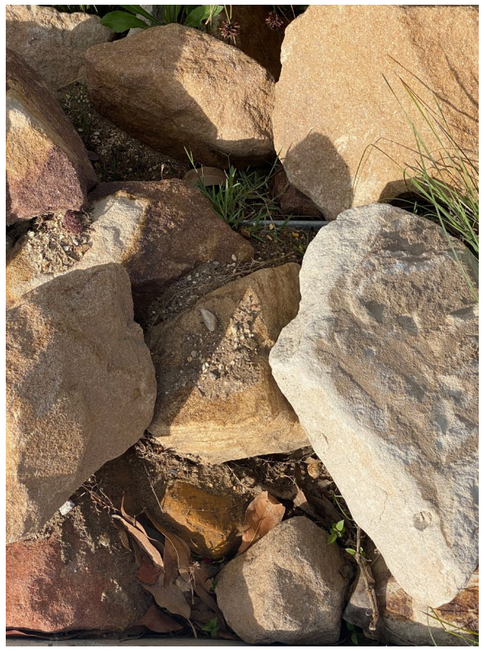


Figure 23 Permeable surfaces

4. Beresfield Local Centre Design

Hardscape: Built

Shelter

- The shelter was introduced after the 2021 temperature recordings; there fore its impact will not be present within data analysis and results. See Figure 24.

Vegetation

Ground cover planting and increased softscape

- Increases permeable surface of the landscape, increasing water absorption and retention.
- Ground cover plants absorb and hold less heat than hard-scape and have added evapotransprative cooling benefits.

Curb extension garden beds

- Combines Urban Cooling effects through provision of shade, evapotransprative cooling, retention and slowing of storm and ground water.
- Additional pedestrian safety benefits, as trees and planting provide a physical barrier between traffic and footpaths.
- Can be installed with Water Sensitive Urban Design integration
- Additional traffic calming benefits
- Shades both pedestrians and parked cars.

Figure 25 Ground cover planting and increased softscape

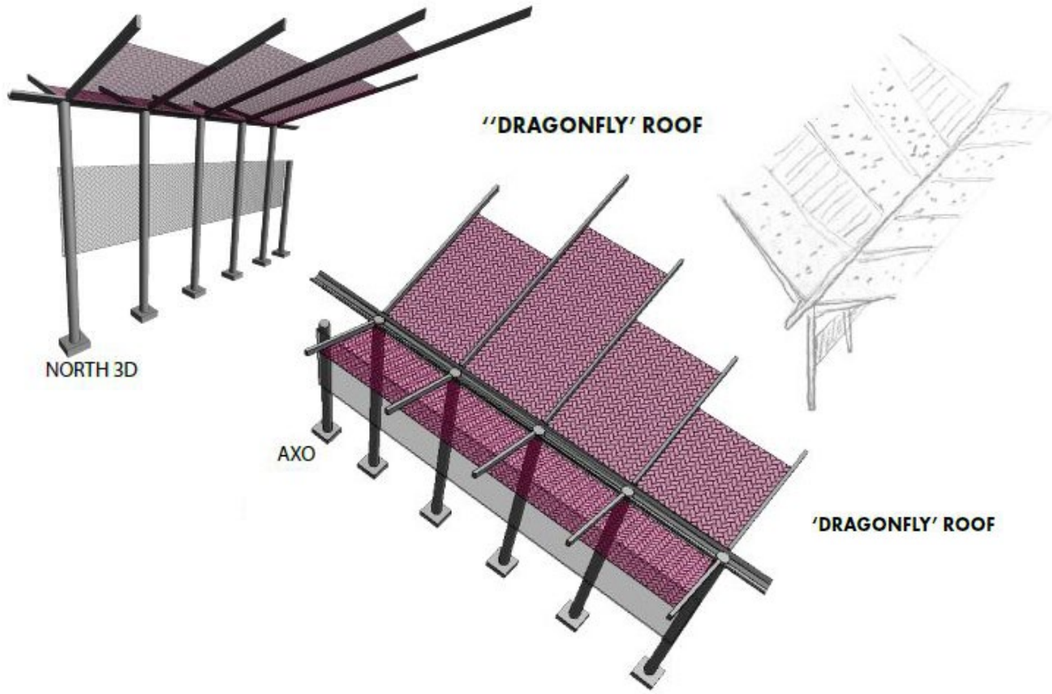


Figure 24 shelter "Dragonfly" roof illustrations

Figure 26 Curb extension garden beds

Figure 27 shelter "Dragonfly" roof

5. Data

The report provides an analysis of of the newly developed streetscape regarding NCC efforts to combat increasing temperature in Newcastle's urban environment through the application of various mitigation strategies. In order to assess the success of the Beresfield project lowering levels of the UHIE series of temperature data was collected during peak temperature periods in January 2019, 2020, and 2021.

Methodology

The following section aims to outline the methodology pertinent to data handling in the UHIE Study. The data handling process entailed a series of stages including:

1. Data Acquisition
2. Data Input
3. Data Analysis

Data acquisition

The data recorded included surface temperature readings and ambient temperature readings. Surface readings were taken using a non-contact thermometer tool. The image depicts the model of the non-contact tool used in this study.

In the application, the non-contact tool functions by holding a trigger and pointing the tool at the location of choice. A laser aids the user in visualizing where the tool is pointing. The resultant temperature measurement is depicted on the liquid crystal display (LCD) screen on the rear of the tool to 0.1oC accuracy. See figure 28.

The wireless thermometer kit is a battery-powered continuous running pair of devices. As such, measured temperatures can be readily viewed on the display component of the kit to 0.1oC accuracy. The kit is considered most accurate when the two components are separated by a minimum distance of 1.5 m and are allowed at least 30 min to equilibrate at a new location. A control temperature was taken from the Maitland Bureau of meteorology site at Maitland Airport to ensure consistent accuracy within tools. See figure 29.

Surface and ambient temperatures were acquired in the peak periods with the use of the tools outlined above. Readings were also taken across similar time periods of the day, including; 8 am, 12 pm, 5 pm, and 10 pm to ensure comparable data over the three year period of 2019-2021.

Figure 28 Wireless thermometer

Maitland, New South Wales
July 2021 Daily Weather Observations

Observations from Maitland Airport.

		Temps		Rain	Evap	Sun	Max wind gust			9 am						3 pm					
Date	Day	Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Th	7.8	15.0	0.4			WNW	20	19:54	12.2	100	8		Calm	1025.3	14.7	85	8	WNW	7	1021.4
2	Fr	10.5	20.2	2.6			W	28	11:43	12.6	100	3	WNW	7	1019.3	19.7	60	1	WNW	15	1016.6
3	Sa	5.8	20.0	0.2			W	22	06:12	9.5	96		NW	13	1019.6	19.5	44		W	11	1016.1
4	Su	2.9	15.7	0			WNW	26	10:16	9.0	85		WNW	17	1023.8	15.5	43		W	13	1019.4
5	Mo	3.6	15.9	0			WNW	37	09:46	7.8	76		WNW	20	1021.7	15.5	44		WNW	15	1018.6
6	Tu	3.1	16.1	0			WNW	33	10:21	6.5	82		WNW	19	1022.6	15.6	39	5	WNW	7	1019.7
7	We	1.0	17.5	0			WNW	24	09:18	7.5	85		WNW	17	1025.7	16.3	54	4	ESE	9	1022.9
8	Th	0.7	16.3	0			WNW	15	09:43	5.5	100	7	ESE	9	1024.3	15.8	57	8		Calm	1020.2
9	Fr	5.4	13.4	1.6			NW	28	22:55	9.9	99	8	WNW	7	1014.9	11.4	98	8	WNW	11	1011.4
10	Sa	9.0	15.6	2.6			SW	41	10:03	13.4	70	8	WSW	17	1016.5	13.9	74	7	SW	20	1017.6
11	Su	8.5	18.1	1.0			SSW	26	12:23	11.7	87	4	W	9	1025.9	17.5	57	1	SSE	15	1023.5
12	Mo	3.2	19.0	0.2			W	31	22:47	6.2	100	8	WNW	7	1024.8	17.4	61		N	4	1020.1
13	Tu	4.9	19.8	0.2			NW	35	14:40	10.6	86		NW	9	1019.9	18.5	43		WNW	19	1016.4
14	We	2.4	15.0	0.4			NW	17	12:19	8.0	100	8	NW	7	1016.0	13.8	74	8	NNE	9	1011.9
15	Th	5.8	19.0	0.2			NW	19	21:07	14.3	99	8		Calm	1008.0	18.6	83	1	NNE	7	1003.1
16	Fr	5.4	19.3	2.0			WNW	65	13:19	15.8	73		NW	22	998.9	18.2	47	1	WNW	30	995.5
17	Sa	11.6	14.7	0			WNW	70	13:14	12.4	67	8	WNW	26	1000.8	13.1	57		WNW	31	1000.6
18	Su	9.8	18.3	0.2			WNW	48	10:26	13.2	63		WNW	28	1012.8	17.3	47	1	NW	24	1012.6
19	Mo	2.5	15.1	0			NW	48	13:14	8.8	78		WNW	13	1019.0	14.1	43		NW	28	1015.1
20	Tu	8.1	15.1	0			WNW	61	13:53	11.7	63		WNW	30	1013.0	13.1	54	8	WNW	30	1008.1
21	We	8.8	16.1	0			SW	50	09:46	11.0	59	6	WNW	17	1013.6	15.5	38	6	SSW	19	1014.6
22	Th	1.5	17.0	0			WNW	31	09:51	7.0	74		WNW	19	1019.9	16.4	42		N	6	1014.5
23	Fr	5.2		0						11.4	78	8		Calm	1010.7						

Figure 28 Bureau of Meteorology website data

5. Data

Data Input

Readings taken during this study were recorded using Apple iPad. The devices employed did not possess the ability to send data; hence readings from the units were viewed and separately uploaded results into an online Excel file. The structure used provided ease in viewing and ease in handling of the data. An example of the Excel template is presented below.

Site X																		
Date	Temperature Readings (°C)																	
Date 1	Data Logger no.1		Data Logger no. 2		Data Logger no. 3		Data Logger no. 4		Data Logger no. 5		Data Logger no. 6		Data Logger no. 7		Data Logger no.8		Data Logger no. 9	
Time	Surface (Grass)	Air	Surface (Grass)	Air	Surface (Grass)	Air	Surface (Concrete)	Air	Surface (Asphalt)	Air	Surface (Asphalt)	Air	Surface (Asphalt)	Air	Surface (Asphalt)	Air	Surface (Asphalt)	Air
Time 1	20.2	20.9	20.4	20.9	20.1	20.9	19.0	20.9	19.2	20.9	20.2	20.9	20.7	20.9	20.3	20.9	20.7	20.9
Time 2	34.6	26.5	34.1	26.5	31.9	26.5	27.3	26.5	28.4	26.5	29.0	26.5	34.2	26.5	35.8	26.5	33.2	26.5
Time 3	32.1	26.5	32.1	26.5	31.6	26.5	24.6	26.5	26.1	26.5	28.0	26.5	31.3	26.5	31.9	26.5	31.3	26.5
Time 4	25.6	23.2	25.4	23.2	24.9	23.2	23.6	23.2	23.3	23.2	24.5	23.2	25.2	23.2	25.3	23.2	24.5	23.2
Date 2	Data Logger no.1		Data Logger no. 2		Data Logger no. 3		Data Logger no. 4		Data Logger no. 5		Data Logger no. 6		Data Logger no. 7		Data Logger no.8		Data Logger no. 9	
Time	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air
Time 1																		
Time 2																		
Time 3																		
Time 4																		
Date 3	Data Logger no.1		Data Logger no. 2		Data Logger no. 3		Data Logger no. 4		Data Logger no. 5		Data Logger no. 6		Data Logger no. 7		Data Logger no.8		Data Logger no. 9	
Time	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air
Time 1																		
Time 2																		
Time 3																		
Time 4																		
Date 4	Data Logger no.1		Data Logger no. 2		Data Logger no. 3		Data Logger no. 4		Data Logger no. 5		Data Logger no. 6		Data Logger no. 7		Data Logger no.8		Data Logger no. 9	
Time	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air	Surface	Air
Time 1																		
Time 2																		
Time 3																		
Time 4																		

(Rainy day)

(Sunny, 28/21)

(Sunny, 30/22)

(Cloudy, 27/21)

Figure 29 Data input excel template

5. Data

Data Analysis

Data obtained within this study was input into an Excel template designed to convey data from day to day. The structure used provided ease in viewing and ease in handling of the data. An example of the Excel template is presented on the following page.

This template illustrates the data layout used by the UON research team. Surface and ambient temperature readings recorded daily and between days can be readily viewed through this arrangement. Using this, average 8 am, 12 pm, 5 pm, and 10 pm temperatures were established at each data collection point. The process involved preparing a separate form of summary table that contained data recorded throughout the project.

The following tables were developed for both temperature measurements to separate the dataset of each site into ambient and surface temperatures.

Ambient (All of Site X Locations)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-07	1	28, 21	20.9	26.5	26.5	23.2
Jan-08	2	28, 21	0.0	0.0	0.0	0.0
etc.	etc.	30, 22	0.0	0.0	0.0	0.0
Average Temp. (°C)			7.0	8.8	8.8	7.7

Figure 30 Data analysis ambient temperature excel template

Surface (Location 1)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-07	1	28, 21	20.2	34.6	32.1	25.6
Jan-08	2	28, 21	0.0	0.0	0.0	0.0
etc.	etc.	30, 22	0.0	0.0	0.0	0.0
Average Temp. (°C)			6.7	11.5	10.7	8.5

Figure 31 Data analysis surface temperature excel template

This report aims to see the variances between the temperature of 2019, 2020, and 2021; comparative data analysis is essential. Comparative data analysis requires multiple sites to be displayed on a single data set. The use of bar graphs was applied to identify differences among sites and materials.

Ambient temperature readings were contrasted with the BOM control readings to ensure accuracy within variant measurements. The analysis first applied the Two-Sample t-Test. This test measures whether the population means of the two groups are equal or not and assumes a null hypothesis (Ho) that the means of both groups are equal ($\mu1 = \mu2$). The alternative hypothesis for our analysis is that the means of both groups are not equal ($\mu1 \neq \mu2$). This test's two-sided probability value (p-value) is the probability that the null hypothesis is true. Therefore, a low p-value (i.e., a value less than the chosen significance level of 0.05) indicates the chance of the null hypothesis being correct is small. Thus, the null hypothesis can be rejected, and we can conclude that there is a statistically significant difference in mean temperature.

Date	Maitland Airport Daily Max Control Temperature (°C)	Ambient Temperature: Site 1			
		Time/Ambient Temp. (°C)			
		8:00:00 AM	12:00:00 PM	17:00:00 PM	22:00:00 PM
8/1/19	34.4	25.8	31	33.5	27.1
10/1/19	29.3	22.8	28	28.1	23.8
11/1/19	32.7	25	33	34.1	
14/1/19	33.3	28	33	34.3	27.7
15/1/19	39.8	25.8	38.8	39	28.9
17/1/19	40.3	24.6	37	40.8	29.2
20/1/19	28.2	26.2	30	29.6	26.4
21/1/19	29.3	27	38.3	37.2	
22/1/19	36.9	27	38.3	37.2	
24/1/19	32.1	26.4	31	32.2	25.5
29/1/19	38.1	27.1	36	34.6	28.1
30/1/19	37.9	27.1	35	33.9	
31/1/19	36.4	27.4	35.2	37.4	26
10/2/20	30.5	21.0	27.0	24.0	21.0
11/2/20	32.2	21.0	29.0	30.0	23.0
12/2/20	29	21.0	25.2	24.7	23.4
13/2/20	27.4	22.4	23.8	25.3	22.9
14/2/20	28.8	22.0	27.0	27.0	22.0
17/2/20	26	21.0	22.0	25.0	22.0
18/2/20	34	21.0	30.0	35.0	28.0
19/2/20	30.5	22.0	28.6	28.1	21.2
20/2/20	26.9	19.2	23.6	22.6	21.6
21/2/20	26.8	21.0	24.0	26.0	21.0
24/2/20	26.4	20.0	26.0	25.0	22.0
25/2/20	30.2	22.0	28.0	32.0	24.0
26/2/20	32.5	23.8	30.1	25.0	23.9
27/2/20	26.3	20.0	23.0	26.0	21.0
28/2/20	27.8	20.6	27.6	23.9	21.1
15/1/21	30.6		29.0	28	23
18/1/21	31.9	20	30	28	24
19/1/21	27.6	22	23	22	20
20/1/21	23.5	19	22	22	20
21/1/21	28.6	18	27	27	21
22/1/21	35.2	21	32	32	28
25/1/21	36.9	21.0	33.0	33.0	28.0
26/1/21	38	22	37	38	
27/1/21	26.2	26.0	23.0	33	20.0
28/1/21	21.7		21	20	19
29/1/21	24.2	21.0	22.0	22.0	22.0
1/2/21	29.9	24.0	27.0	28.0	23.0
2/2/21	25.5	19	22	23	20

Figure 32 Data analysis ambient temperature contrasted against BOM

5. Data

Surface temperature readings were assessed regarding the ambient temperature of the time to achieve relative temperature differences. See Figure 33.

Date	Maitland Airport Daily Max Control Temperature (°C)	Surface Temp - Control Temp: Site 1				Surface Temp - Control Temp: Site 2			
		Time/Temp. (°C)				Time/Temp. (°C)			
		8:00:00 AM	12:00:00 PM	17:00:00 PM	22:00:00 PM	8:00:00 AM	12:00:00 PM	17:00:00 PM	22:00:00 PM
8/1/19	34.40	-6.10	14.20	13.90	-3.70	-7.74	11.21	13.51	-3.89
10/1/19	29.30	-3.69	7.91	9.98	-2.98	-3.26	5.80	7.31	-2.89
11/1/19	32.70	-6.40	15.97	14.51		-6.10	13.60	14.24	
14/1/19	33.30	0.26	15.48	9.36	-5.73	-1.14	11.93	8.27	-5.80
15/1/19	39.80	-10.21	13.51	14.19	-9.83	-10.00	10.60	13.56	-9.83
17/1/19	40.30	-11.10	16.22	2.61	-13.10	-10.46	10.03	2.63	-12.61
20/1/19	28.20	1.06	12.73	2.08	-2.04	0.93	11.16	1.91	-1.57
21/1/19	29.30	-0.04	15.09	10.08		1.39	10.99	7.61	
22/1/19	36.90	-7.60	7.50	2.50		-6.20	3.40	0.00	
24/1/19	32.10	-4.60	6.50	10.40	-3.90	-4.60	4.50	9.70	-2.80
29/1/19	38.10	-7.80	12.90	-3.80	-5.80	-8.00	10.80	-3.10	-4.60
30/1/19	37.90	-6.50	13.20	-5.40		-5.90	11.30	-5.50	
31/1/19	36.40	-6.30	7.20	4.80	-12.30	-6.60	6.10	4.90	-14.20
	Average Temperature:	-5.31	12.18	6.55	-6.60	-5.21	9.34	5.77	-6.47
	Standard Deviation:	3.68	3.45	6.37	3.89	3.62	3.09	6.10	4.34

Figure 33 Data analysis surface temperature contrasted against BOM

Relative surface temperature difference data are represented through box plot graphs. Please see figure 34.

The first quartile represents the lower 25% of the data, the line in the centre (often called Q2) is the median value of the distribution, Q3 is the third quartile. It represents 75% of the data between this and the minimum value. The centre bar is called the Interquartile range (IQR) and is the difference between Q3 and Q1, representing the middle 50% of the data. Minimum and maximum values of the distributions are referred to as whiskers and are 1.5 times the distance from the IQR. Values that extend beyond the max and min are represented by dots and referred to as outliers. These outliers are part of the distributions but lie beyond this 1.5 IQR distance.

By assessing the relationships of specific site surface temperature and ambient temperature, variants will comment on the success of materials present at the specific site. To further comment on the performance of materials, bar charts will be utilized, presenting each material's average temperature and contrasted against the Human thermal comfort limit.

For the complete and comprehensive data set across all sites, please see APPENDIX 2: Data Set.

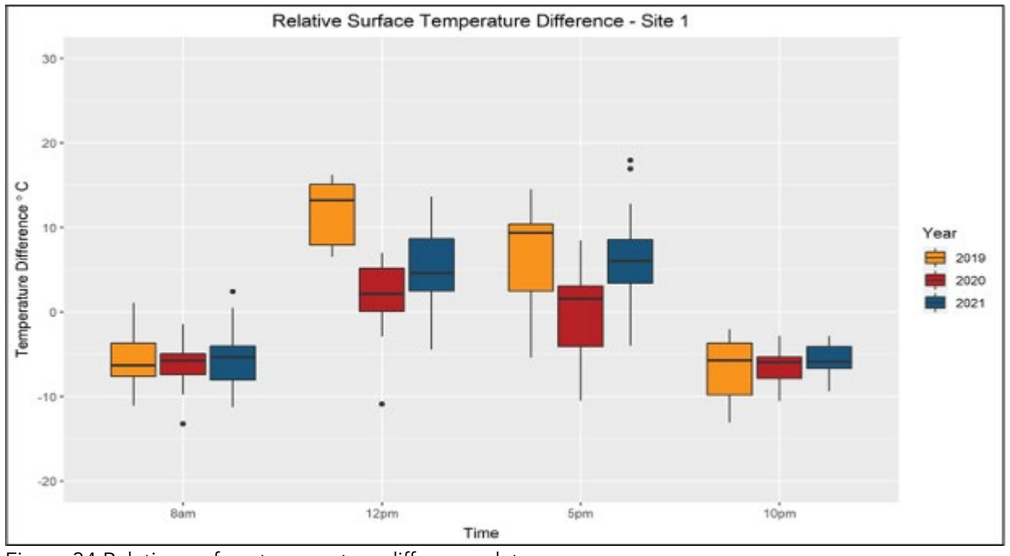


Figure 34 Relative surface temperature difference data

6. Results

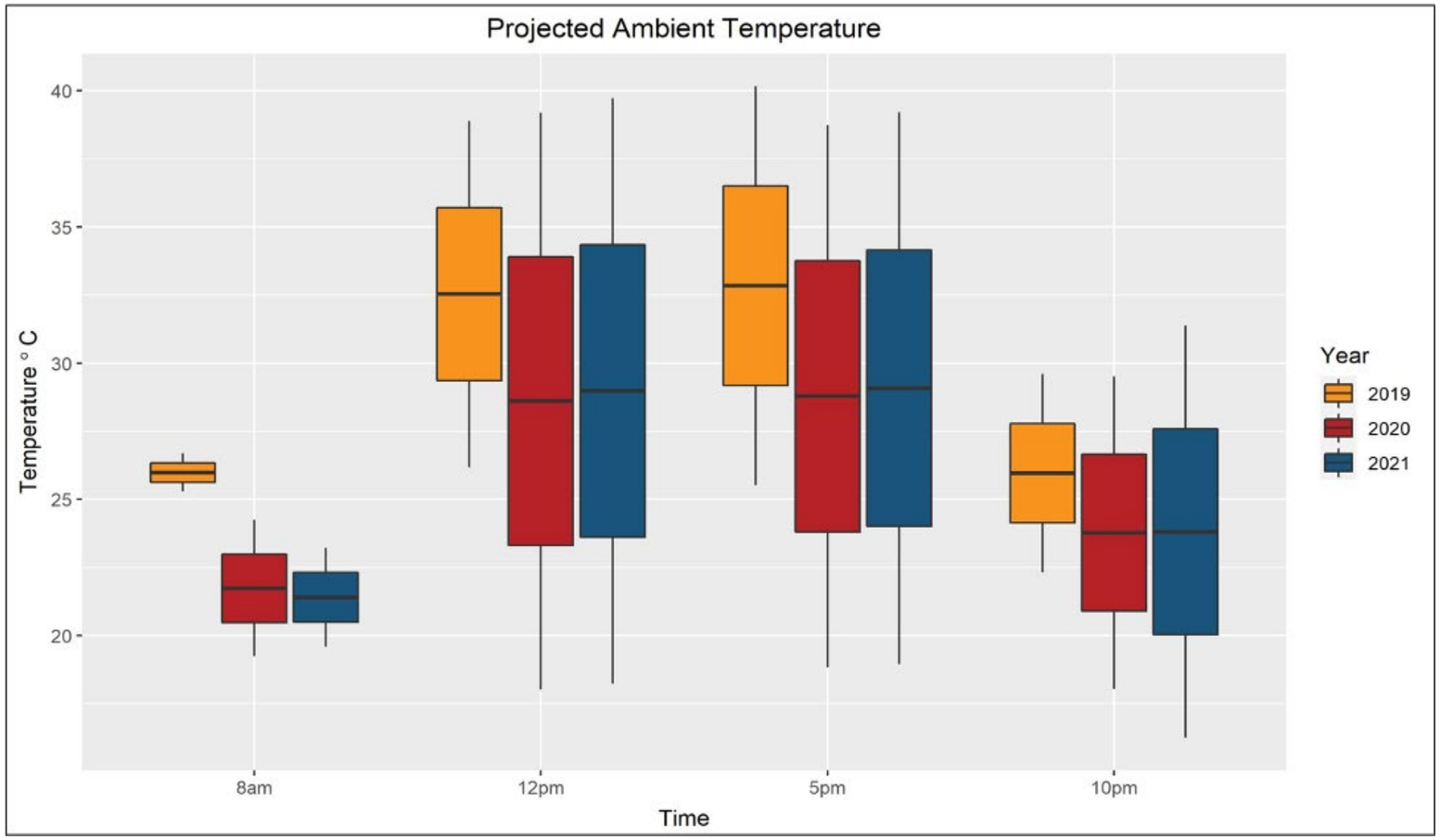


Figure 35 Data analysis Ambient temperature

Data analysis must consider controlled yearly temperatures to observe the temperature variants within the project without external factors. Regression equations were used to produce a temperature distribution for 2019, 2020, 2021 for the range of observed (control) temperature at Maitland Airport (20 – 43 degrees)*. The two-sample t-test is used to test whether the temperature means of two years are significantly different. This test assumes a null hypothesis (Ho) that the population means are equal. The alternative hypothesis (H1) is that the means are not equal. Using a 95 % confidence interval, the two-sided p-value of this test is the probability value that the null hypothesis is true. A high p-value (greater than the chosen significance level 0.05) means there is no statistical evidence to reject the null hypothesis. A small p-value suggests there is evidence to reject the null.

*Maitland temperatures collected by the BoM are the closest to the Berefield Local Centre site and thus have been utilised for ambient temperature accuracy.

Two sample t-Test assuming equal variance				
	8am	**12pm**	**5pm**	**10pm**
2019 vs 2020	**0.0000**	**0.0148**	**0.0120**	**0.0135**
2019 vs 2021	**0.0000**	**0.0281**	**0.0207**	**0.0462**
2020 vs 2021	0.3966	0.8452	0.8680	0.9778

Figure 36 Two sample T-test

6. Results

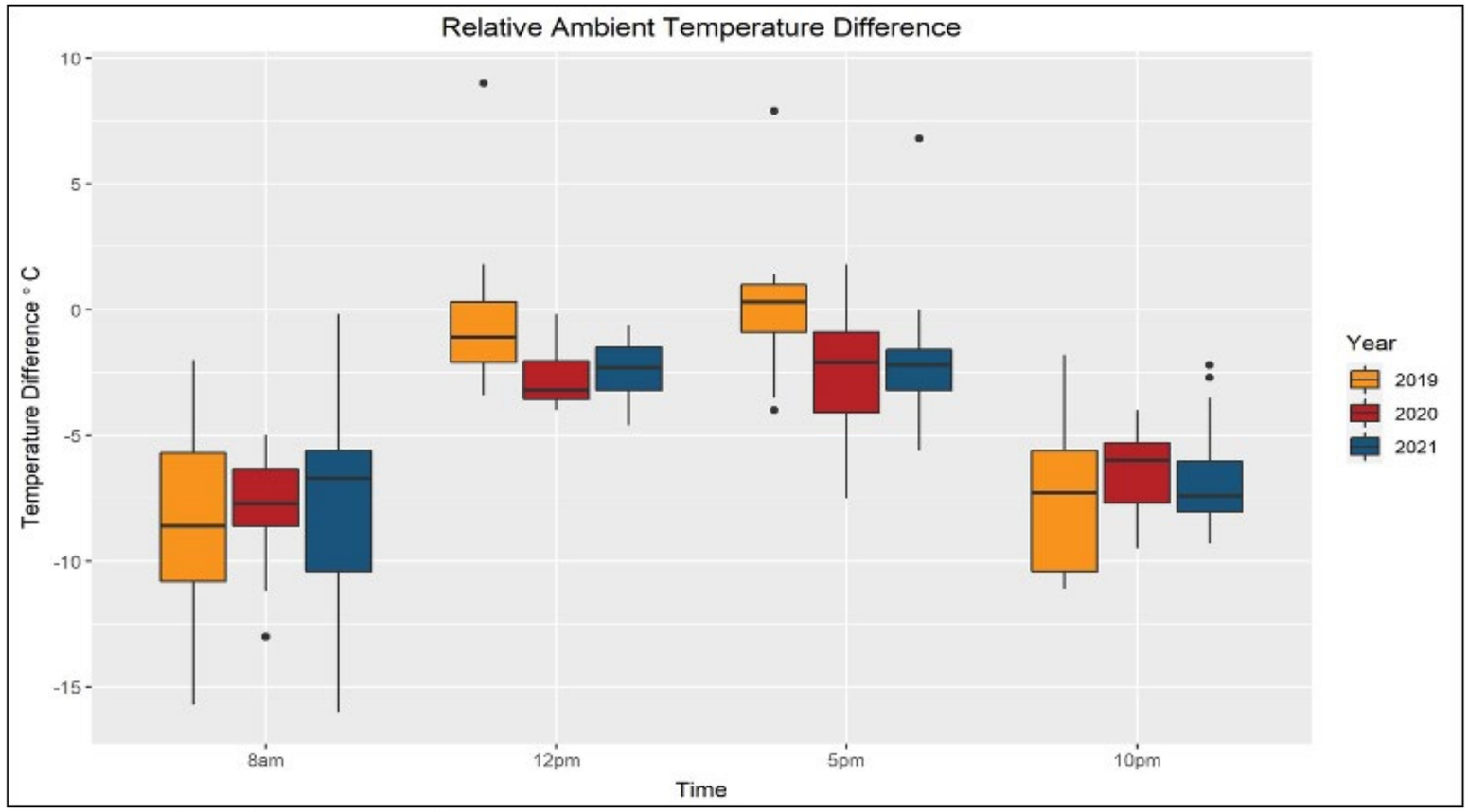


Figure 37 Data analysis Ambient temperature difference

The relative difference in Ambient temperature from the Control temperature is calculated to identify the relative difference in ambient temperature for each year. A more significant relative difference indicates a cooler temperature for that period. A two-sample t-Test was also used for this. The null hypothesis (Ho) of this test is that the difference between the control temperature and the target temperature for one year is equal to the difference between the control and target temp of another year. Again, a low p-value gives strong evidence to reject this null hypothesis.

The second statistical test used identifies the significant difference between the regression slope of each year. The null hypothesis of this test assumes the slope of two years is the same, and the alternative hypothesis is that the two slopes are not equal.

Two-Sample t-Test assuming Equal Variance

	8am	12pm	5pm	10pm
2019 vs 2020	0.6685	**0.0136**	**0.0167**	0.2466
2019 vs 2021	0.9315	**0.0125**	**0.0149**	0.3032
2020 vs 2021	0.7457	0.3970	0.7532	0.7776

Figure 38 Two sample T-test

Two-Sample t-Test assuming Equal Variance

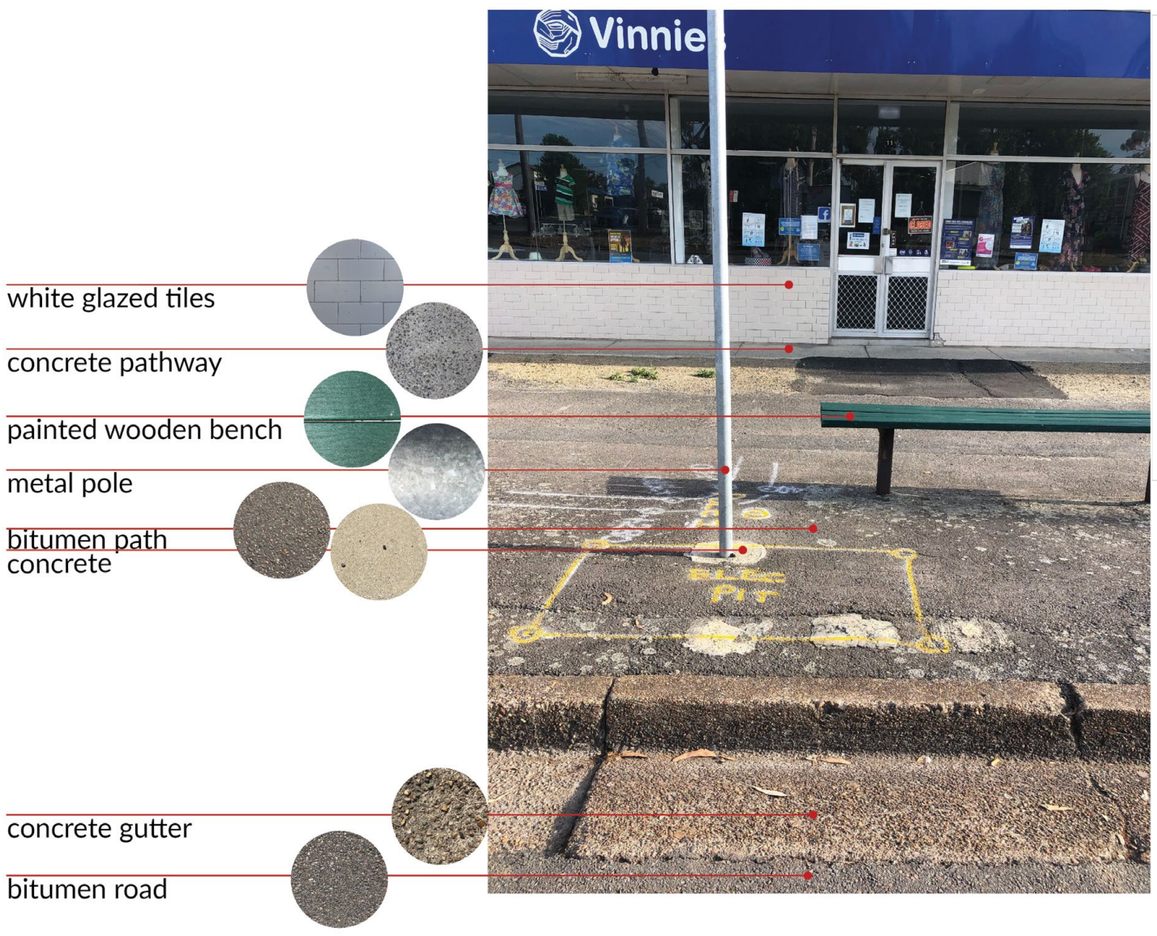
	8am	12pm	5pm	10pm
2019 vs 2020	0.2597	**0.0373**	0.2788	0.2220
2019 vs 2021	0.3957	**0.0063**	0.0875	**0.0014**
2020 vs 2021	0.6480	0.9140	0.9352	0.2630

Figure 39 Two sample T-test

6. Results

Site 1

Site 1 is frontage to the St. Vincent's store. In 2019 the site was used as a bus stop with a single-seat and uneven asphalt pavement. The upgraded design included the replacement of the asphalt pavement to coloured concrete; plain concrete guttering was modified with reflective paint; singular green painted bench to multiple stained timber seating options and table; kerbside extension gardening; and a brick vegetation containment which doubles seating from the storefront.



Beresfield | Location One

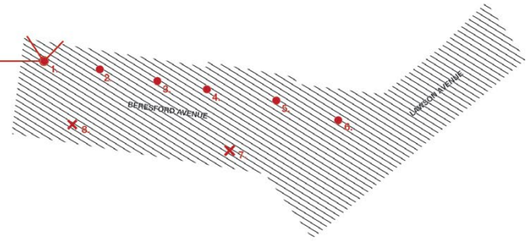


Figure 40 Site 1 Material changes

6. Results

Site 1

Relative surface temperature difference

Figure 41 represents the average surface temperature in relevance to the control temperature. The analysis offers data on the average surface temperature without the impact of the ambient temperature. The temperature distribution provides evidence of 2019 having a greater positive relation to the controlled temperature. Therefore 2020 and 2021 exhibiting cooler relative surface temperatures.

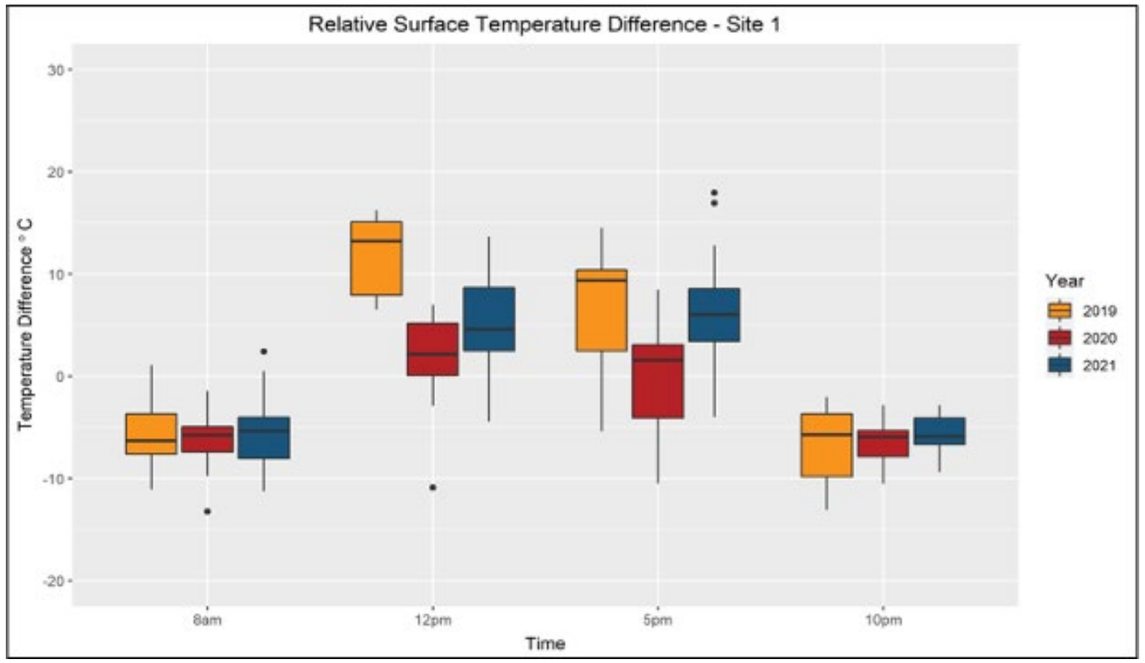


Figure 41 Site 1 Relative surface temperature difference

Material performance

As previously discussed, 2019 saw the hottest surface temperatures; this is reiterated within the individual material graphs on the preceding pages. The painted wooden bench produced the highest average temperature at 12 pm at 64 degrees. The bench was replaced with naturally finished wood that significantly lowered temperature results by 20°C. The best performing material in 2020 at 12pm is the edge brown brick, measuring a 25°C average. Additionally, the surface constantly remains below the thermal comfort limit.
Other significant replacements are:

- The bitumen and concrete pathway to light-coloured concrete. Although the replaced concrete exceeds the thermal comfort limit, it is less excessive than the previous bitumen pathways by averaging 15°C cooler.
- The white reflective curb performs on average 13°C cooler than the traditional concrete gutter at all timepoints.

6. Results

Site 1

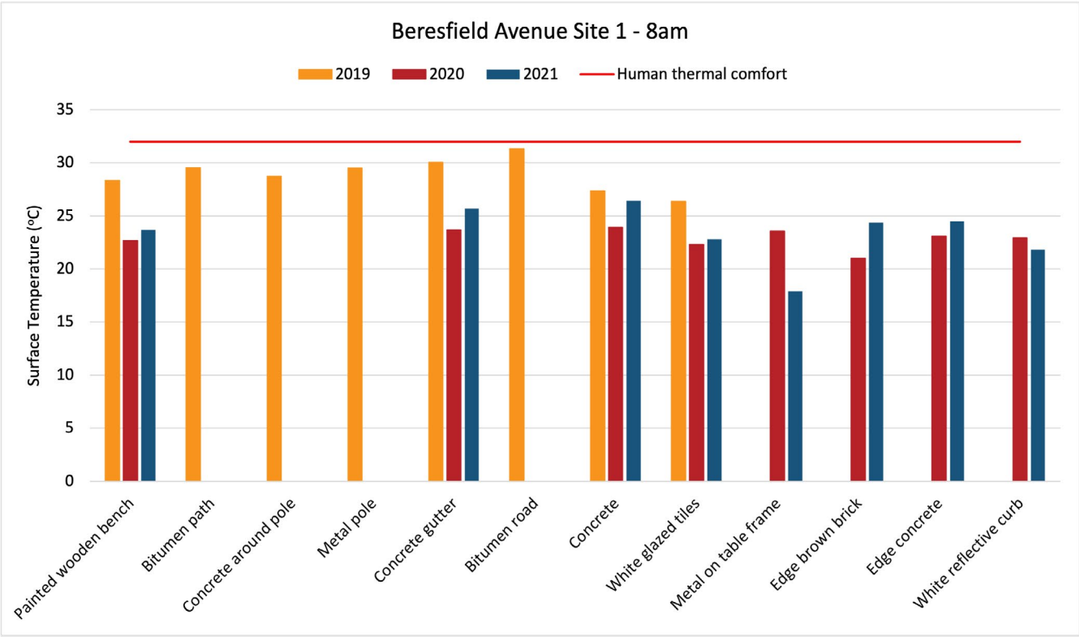


Figure 42 Individual material performance Site 1 8am

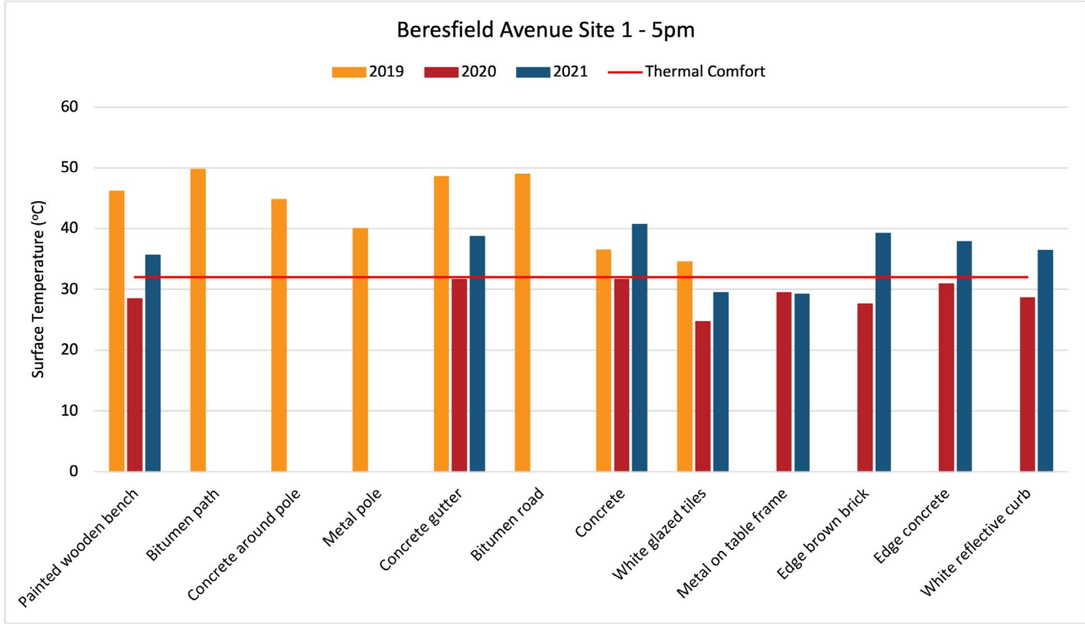


Figure 44 Individual material performance Site 1 5pm

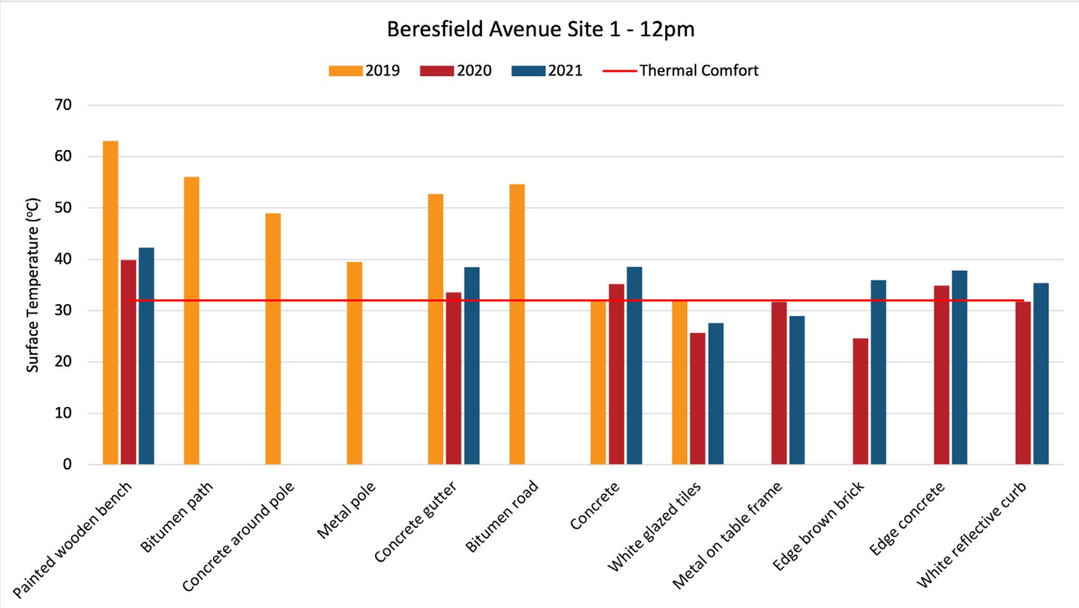


Figure 43 Individual material performance Site 1 12pm

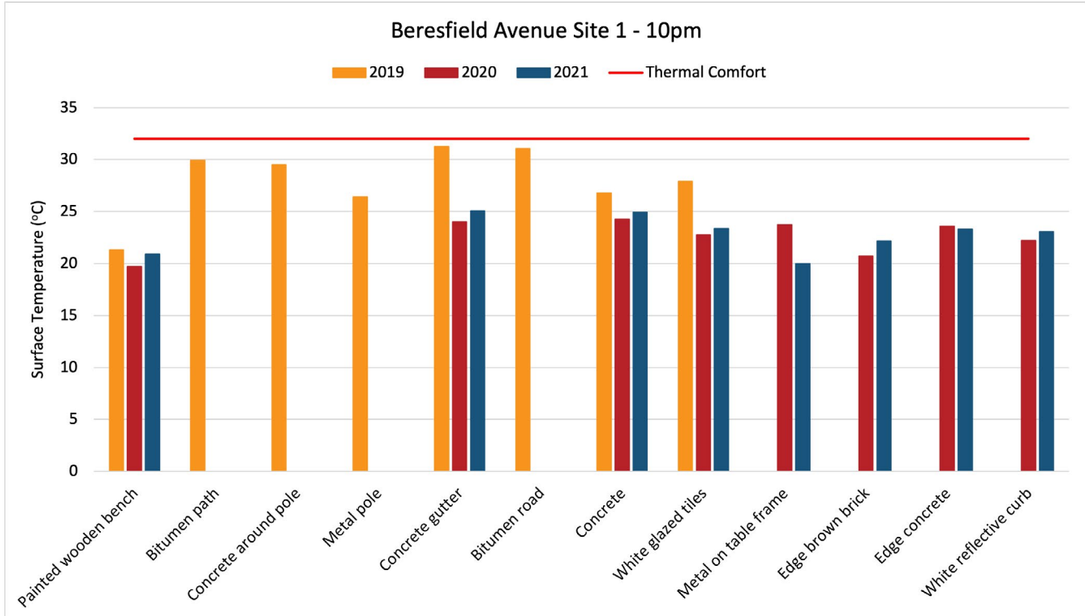


Figure 45 Individual material performance Site 1 10pm

6. Results

Site 2

Site 2 design revisions included the activation of public space through the addition of seating and extension curbside gardening. The replacement of the bitumen path to coloured concrete provides a greater aesthetic appearance to the street.

Figure 46 Site 2 Material changes

6. Results

Site 2

Relative surface temperature difference

As seen within Figure 47 relative temperatures within 2020 display significant statistical difference. However, this lowering of temperature is not continued within 2021. The temperature distribution exhibits little difference between 2019 and 2021 within their relation to the controlled temperature.

Material performances

As expected from Figure 47, individual material graphs on the next page provide evidence that the 2020 materials remained the majority under the thermal comfort timepoint. In contrast, all 2019 materials averaged above the thermal comfort limit at the 5 pm timepoint—the finished project results between the two years. Similar to site 1, the bitumen pathway remains the hottest material, and the white reflective curb performed significantly better than the concrete gutter. Within 2020 the best performing material is the metal on the seat averaging 22 °C at the 12pm timepoint as seen in Figure 49. The material remains entirely under the thermal comfort limit.

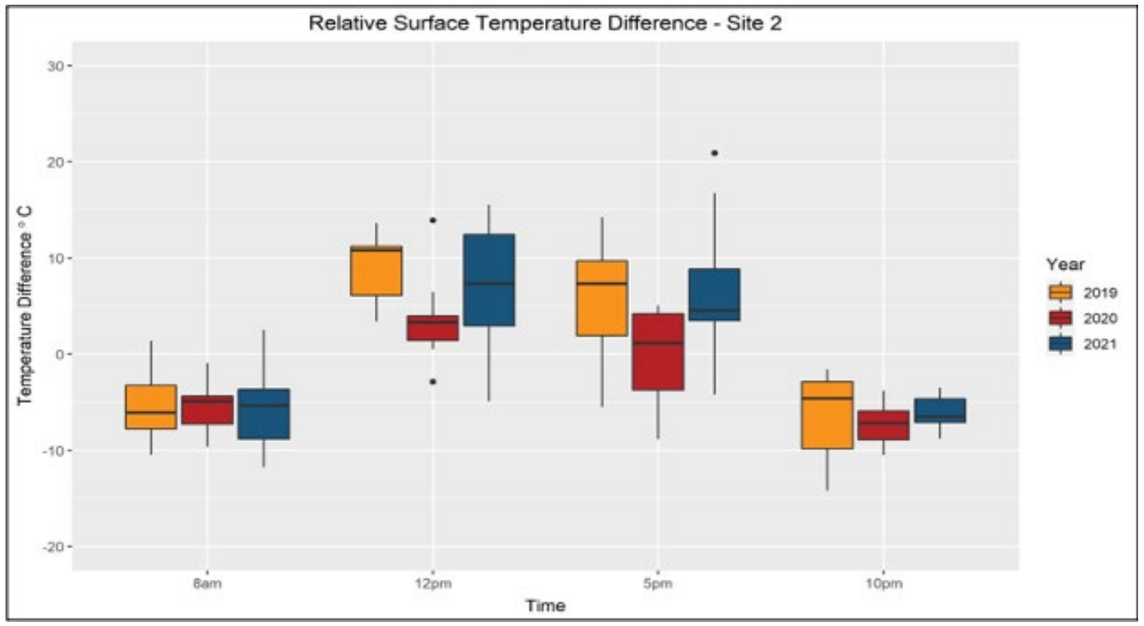


Figure 47 Site 2 Relative surface temperature difference

6. Results

Site 2

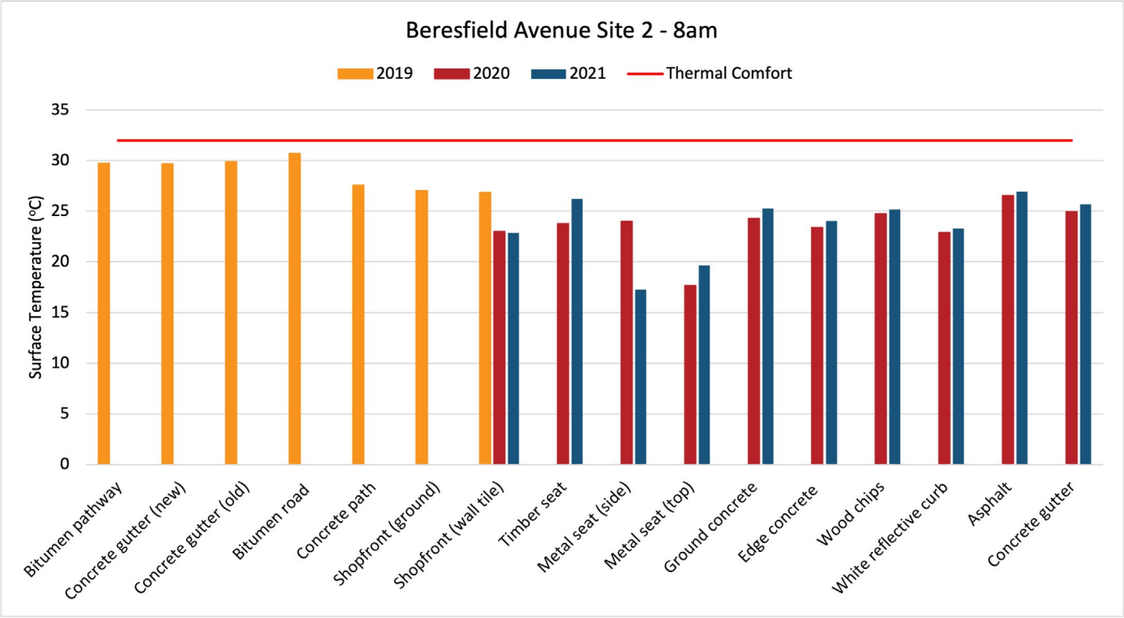


Figure 48 Individual material performance Site 2 8am

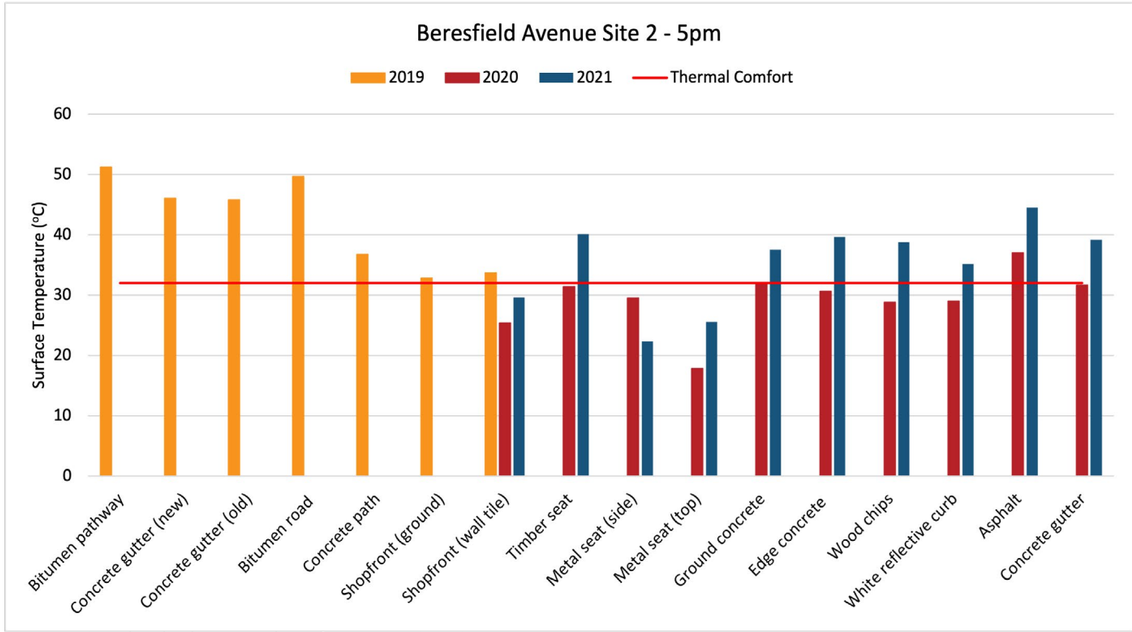


Figure 50 Individual material performance Site 2 5pm

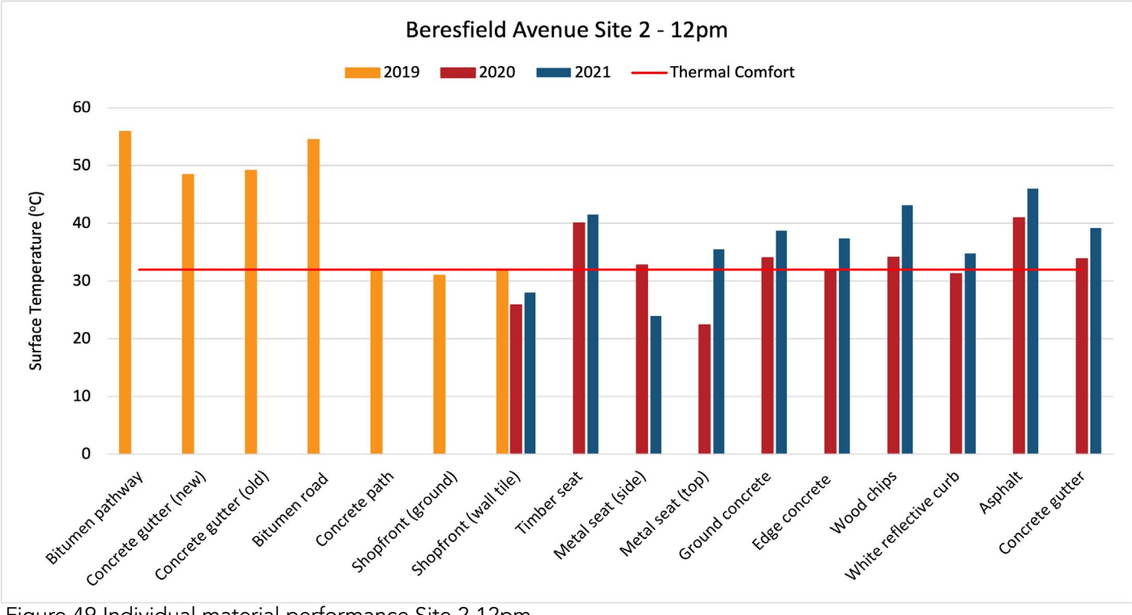


Figure 49 Individual material performance Site 2 12pm

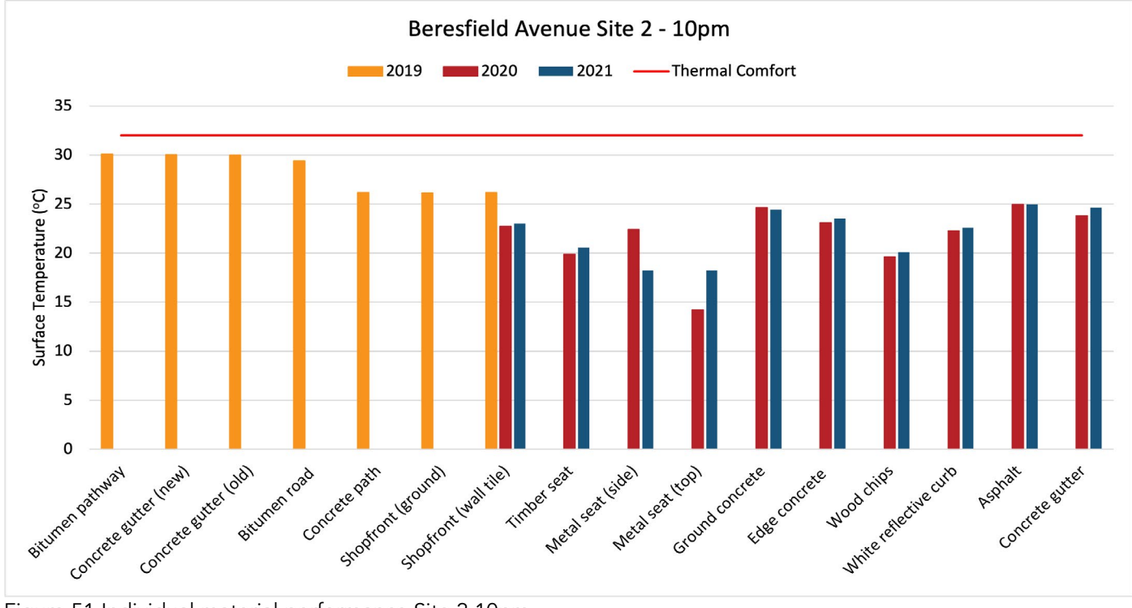


Figure 51 Individual material performance Site 2 10pm

6. Results

Site 3

The streetscape of site 3 transformed considerably. The replacement of the uneven bitumen pathway resulted in levelled light-coloured concrete pathways, a brick paver seating area edged by vegetation and concrete curbing.

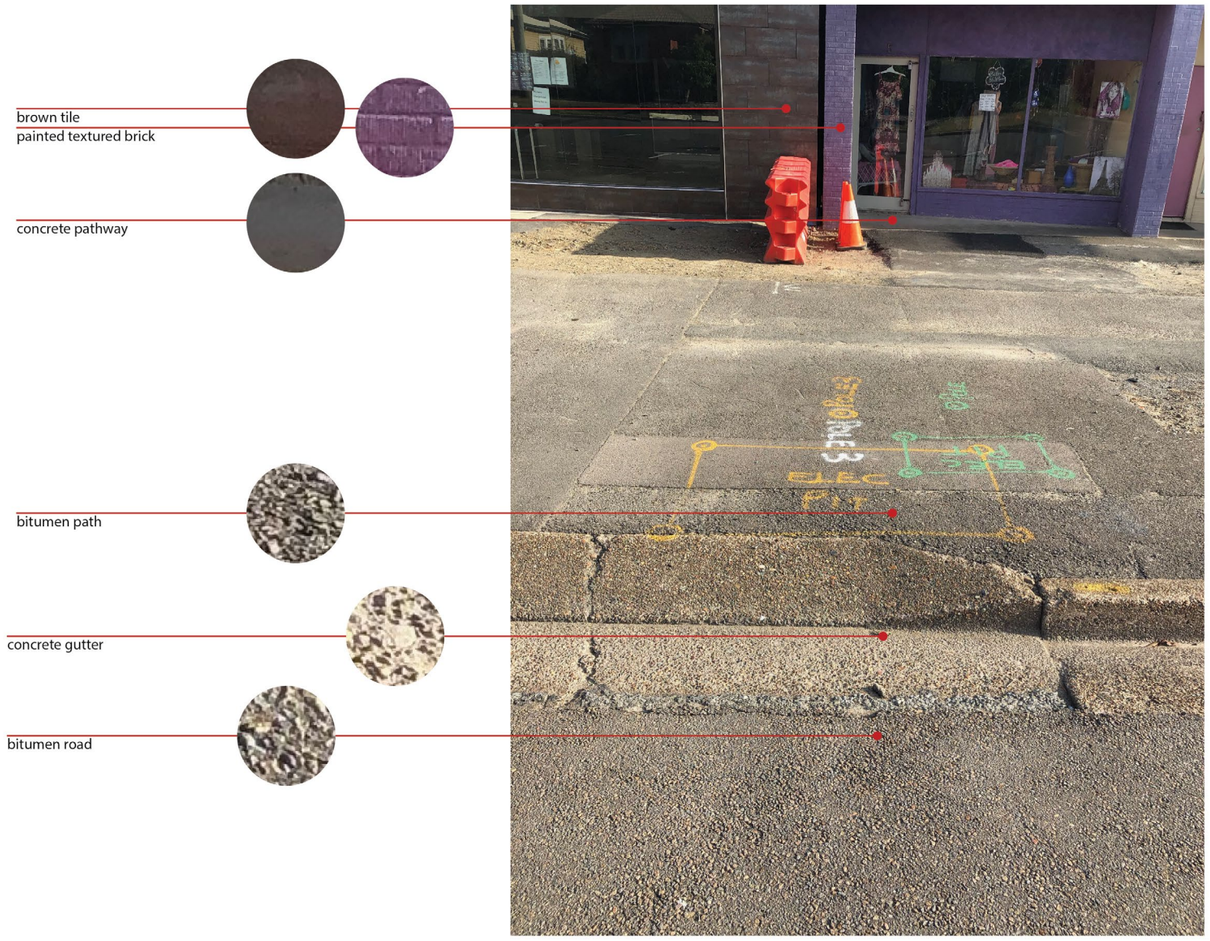


Figure 52 Site 3 Material changes

6. Results

Site 3

Relative surface temperature difference

The relative temperature distribution observes lessened relative differences within 2020 and 2021. As per previous sites, the same trends occur with 2020 exhibiting the best performance, then 2020 and 2019 the worst.

Material performances

As site 3 exhibits similar materials as previous sites, the same results are to be expected. This has been justified through analysis, see Individual material performance on the next page. The material not previously analysed is the existing purple brick wall, painted white between 2019 and 2020. As a result of the modification, the brick wall experienced a significant temperature decrease of approximately 6°C.

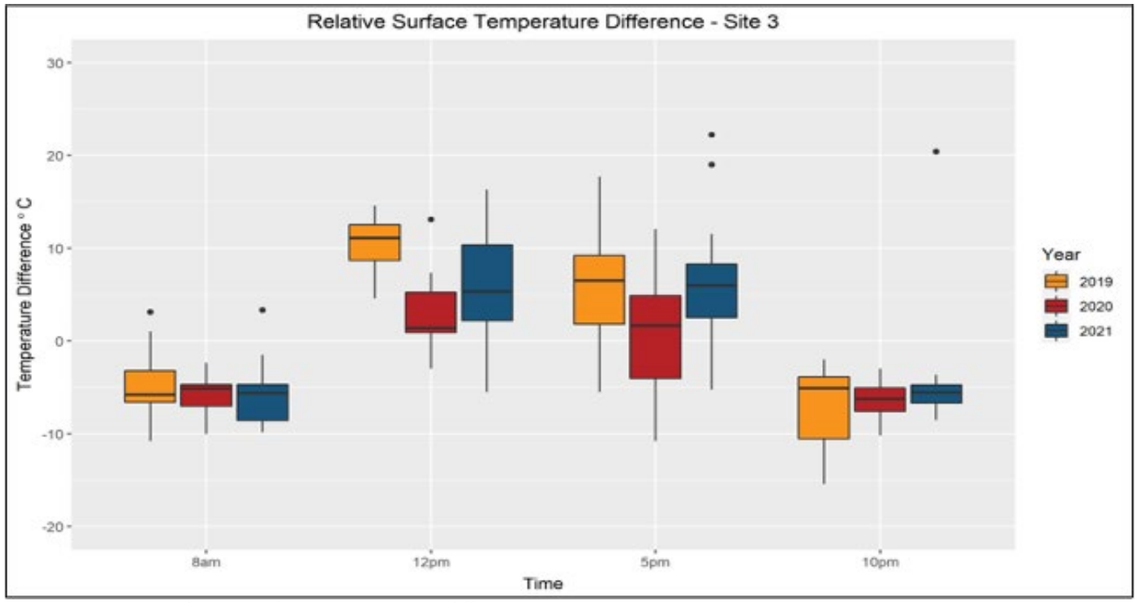


Figure 53 Site 3 Relative surface temperature difference

6. Results

Site 3

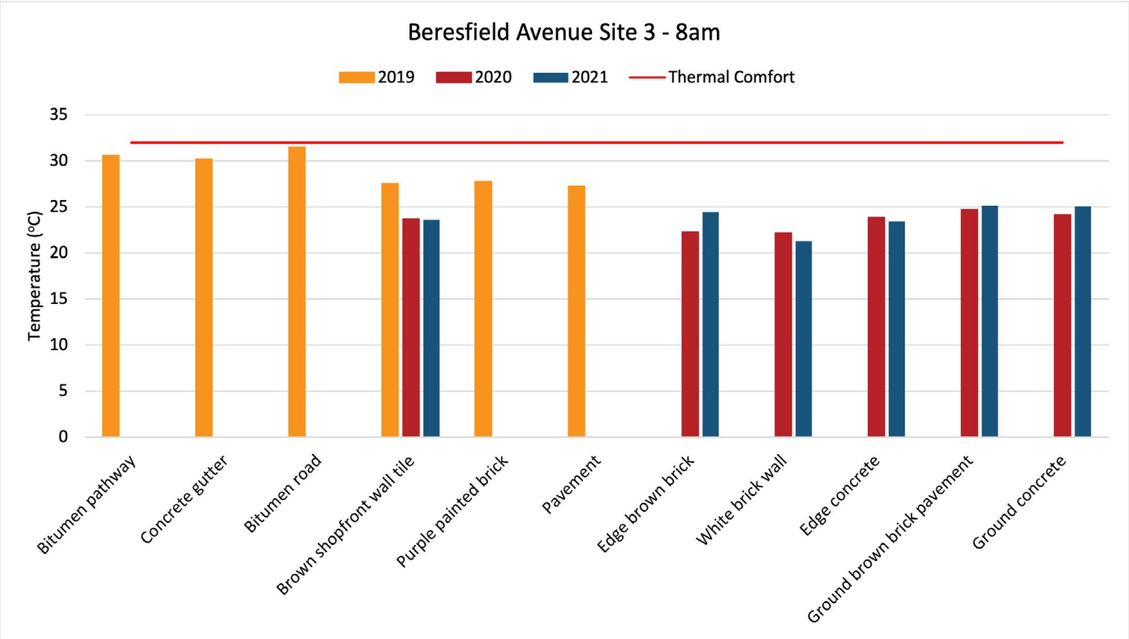


Figure 54 Individual material performance Site 3 8am

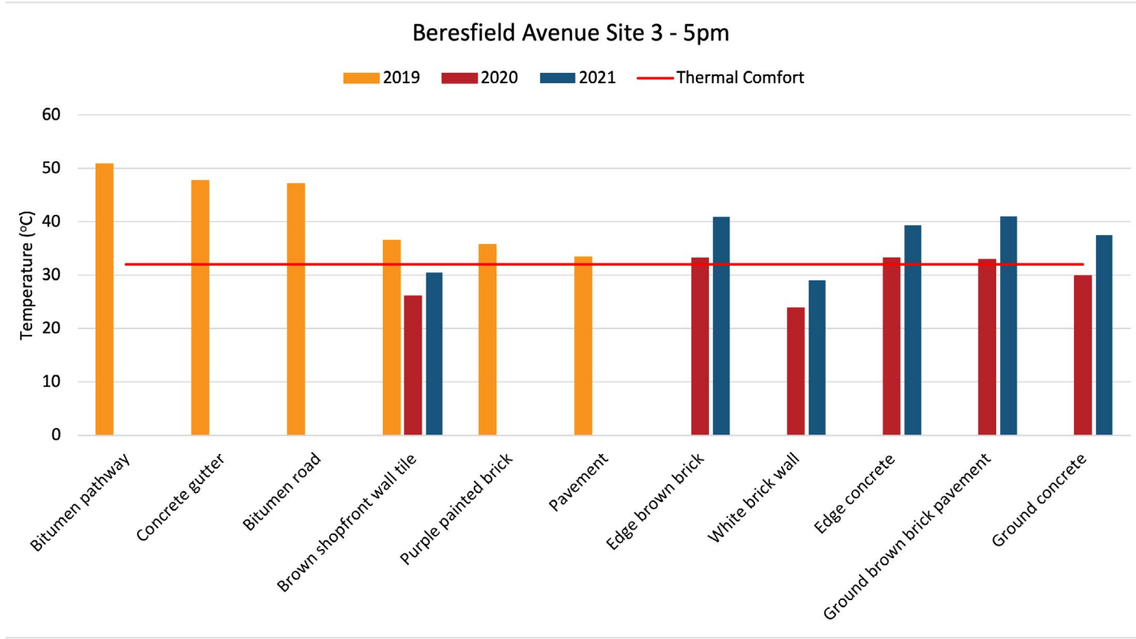


Figure 56 Individual material performance Site 3 5pm

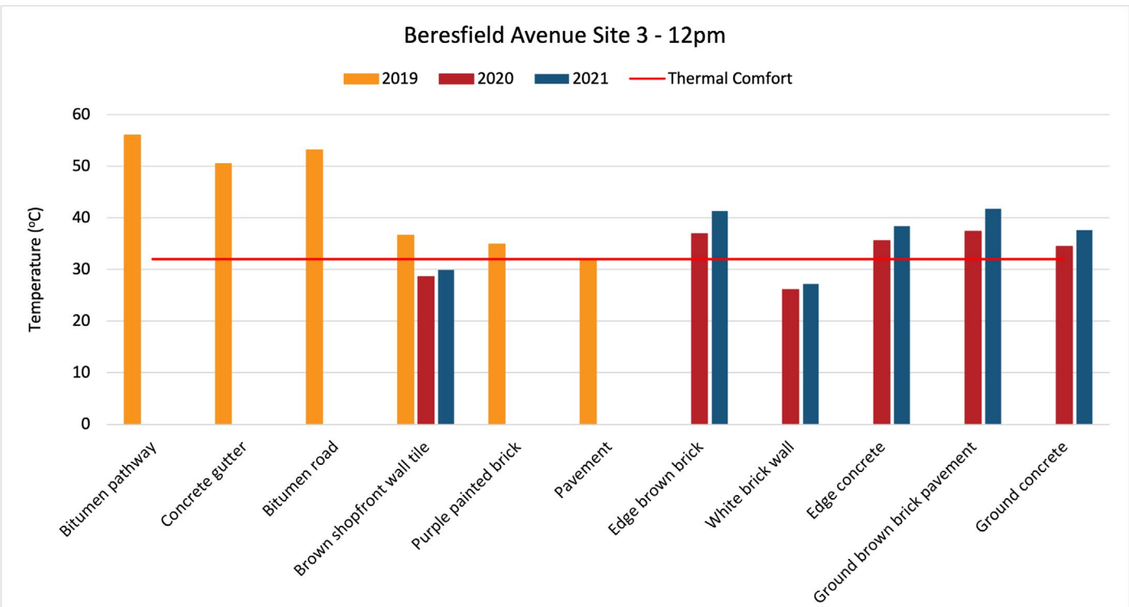


Figure 55 Individual material performance Site 3 12pm

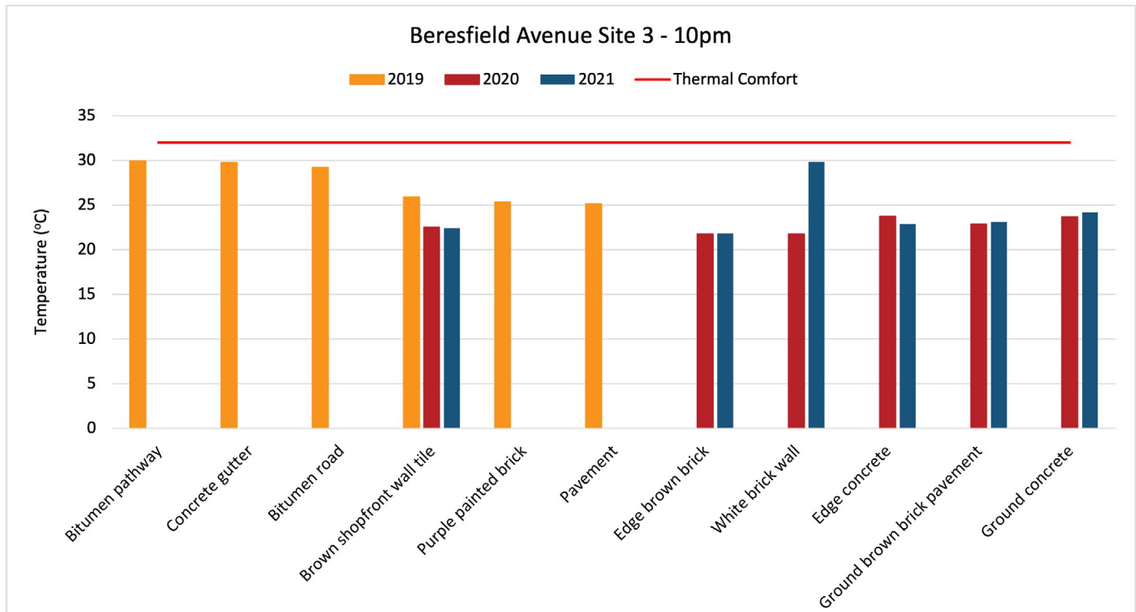


Figure 57 Individual material performance Site 3 10pm

6. Results

Site 4

The frequented public space site 4 fronts the Beresfield post office. The new streetscape continues the levelled light-coloured concrete pathway and includes multiple seating options with a picnic table setting and brown brick edge.

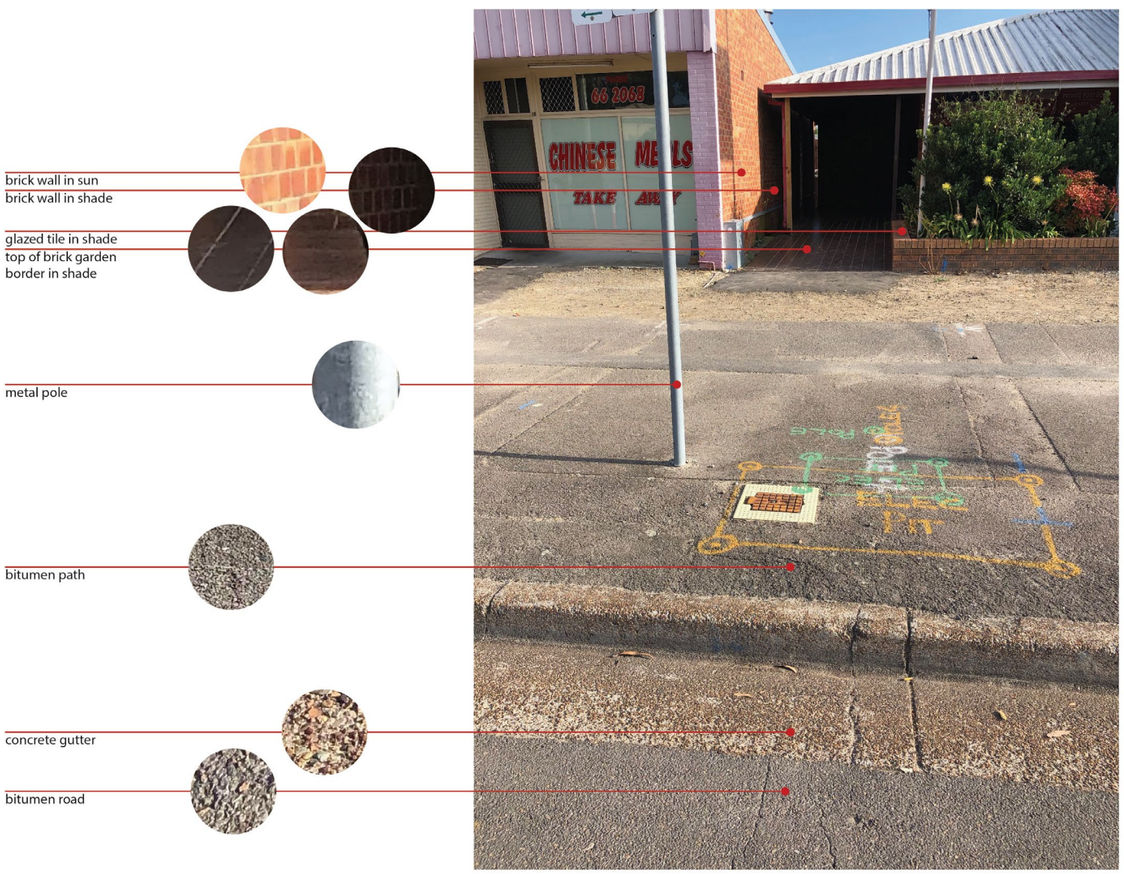


Figure 58 Site 4 Material changes

6. Results

Site 4

Relative surface temperature difference

As per the graph below, site 4 has the lowest temperature difference between 2020 and 2021. The 5pm temperature readings produced no significant difference across the last two years.

Material performances

As previously seen within the relative surface temperature difference graph, 2020 and 2021 remained closely similar, while 2019 considerably exceeds the thermal comfort limit between 12 pm and 5 pm. In Figure 61, the replacement materials provide significantly lower results, including concrete edge (-13°C) , white reflective curb (-16°C), brown brick edge (-15°C), and lightly coloured concrete (-18°C).

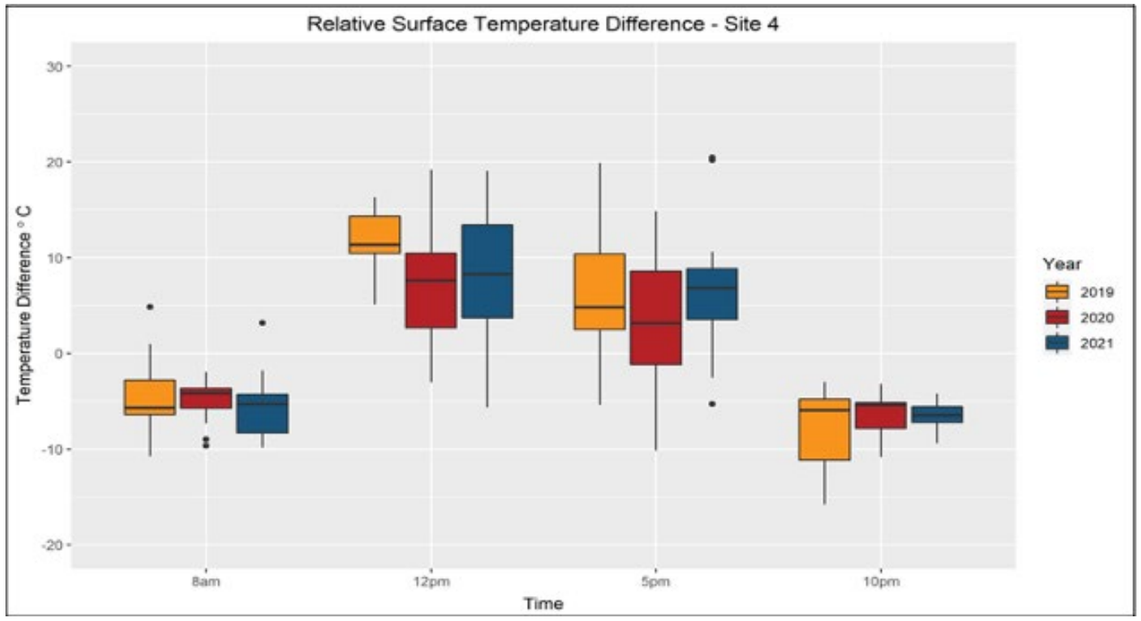


Figure 59 Site 4 Relative surface temperature difference

6. Results

Site 4

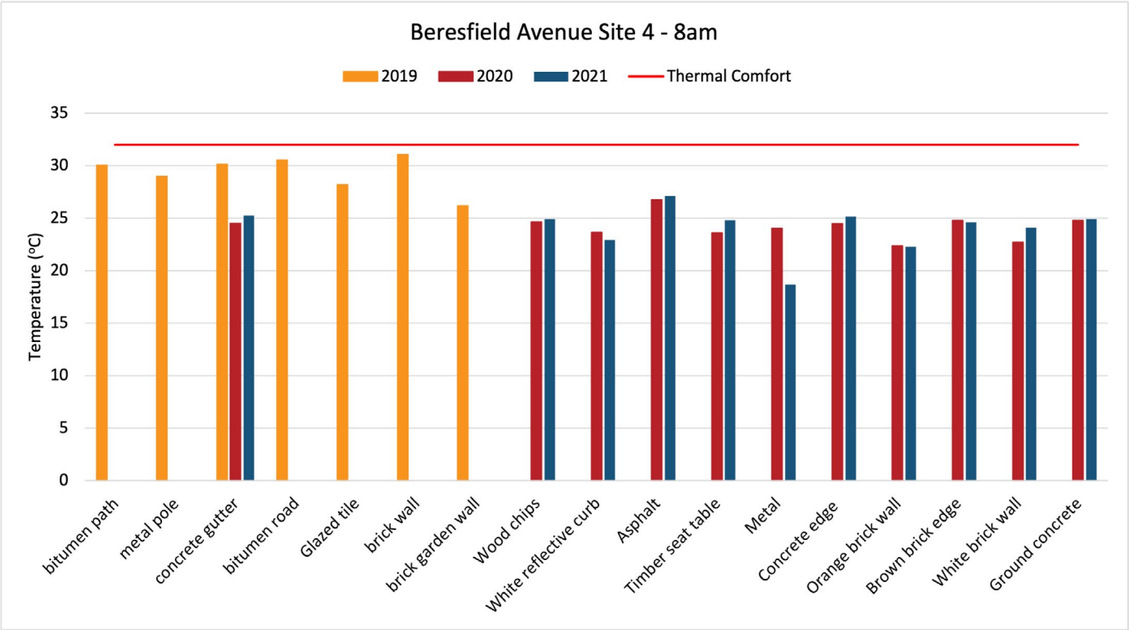


Figure 60 Individual material performance Site 4 8am

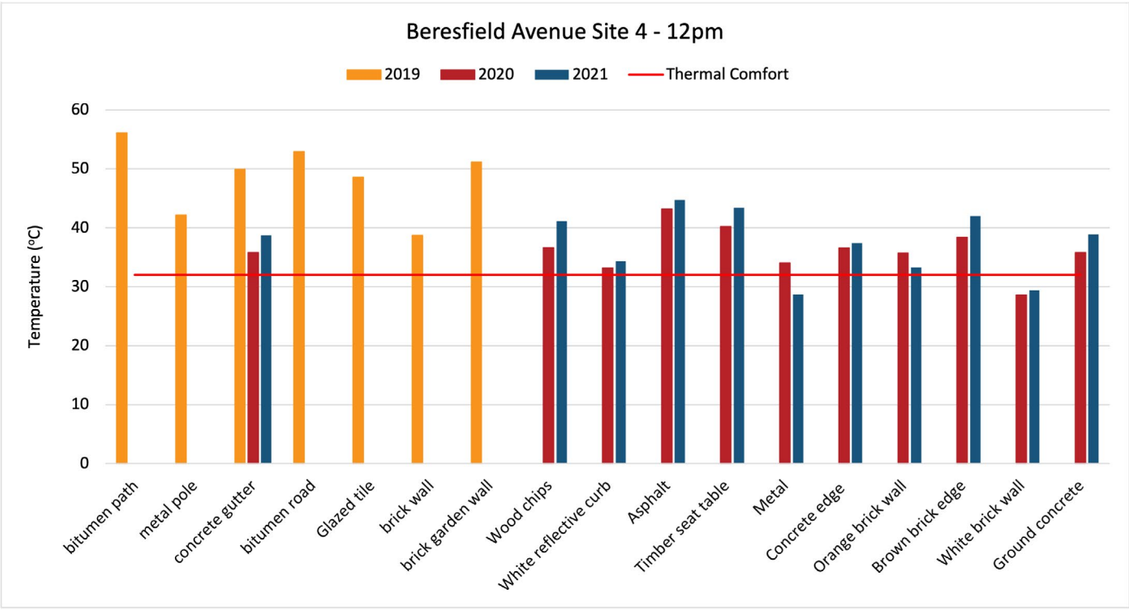


Figure 61 Individual material performance Site 4 12pm

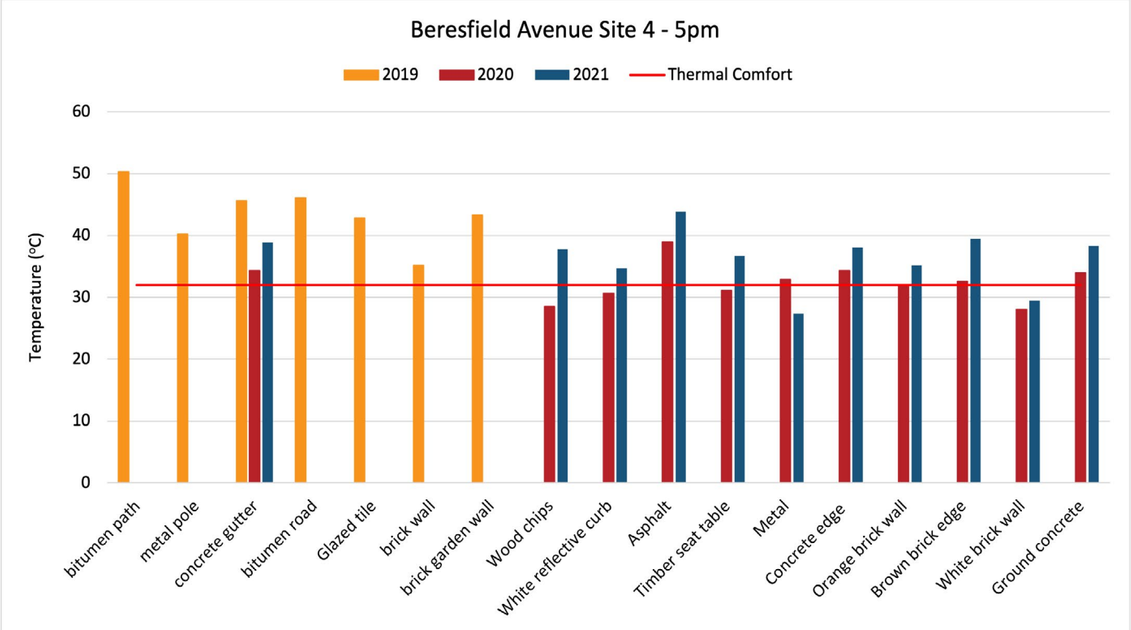


Figure 62 Individual material performance Site 4 5pm

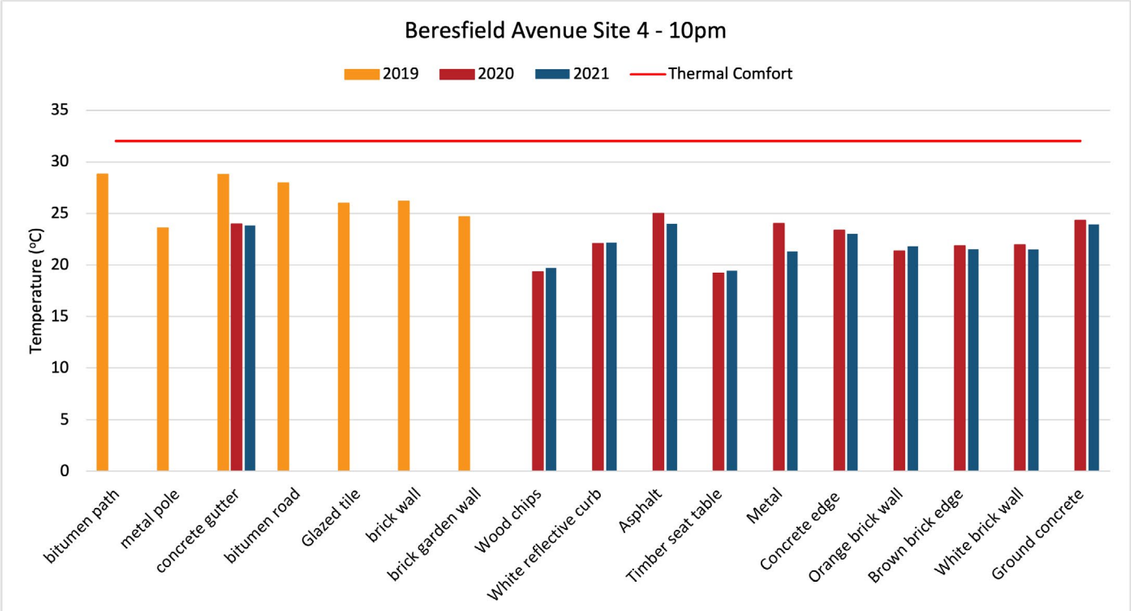


Figure 63 Individual material performance Site 4 10pm

6. Results

Site 5

Site 5 redesign included the consideration of the positive impact of a safer space by replacing uneven concrete and bitumen pavement with uniform light-coloured concrete. An additional bin has been placed within the site next to an elevated garden bed.

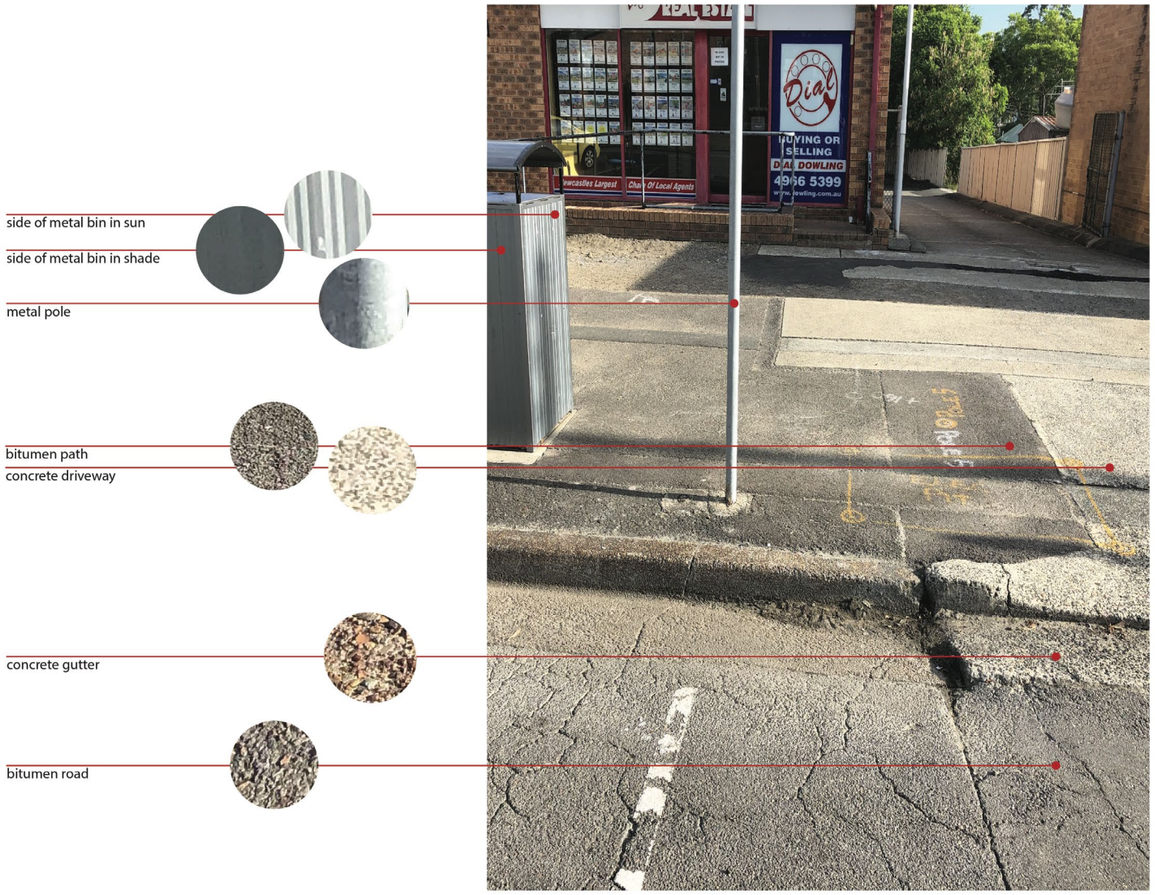


Figure 64 Site 5 Material changes

6. Results

Site 5

Relative surface temperature difference

As per Figure 65, the 2019 distribution has a major significant difference compared to 2020 and 2021 —12 pm providing evidence of the most significance at 64% and 53% cooler respectively. As trends continue throughout sites, 2020 has the least variance to the control temperature.

Material performance

All of the materials present within the upgrade have a significantly lowered surface temperature. Figure 67 provides evidence of both concrete and coloured concrete to have the best performance, briefly crossing the thermal comfort zone in 2020 during the peak hour of the day at 34°C and 33°C respectfully. The metal bin also experiences a decrease of 8°C surface temperature between 2019 and 2021.

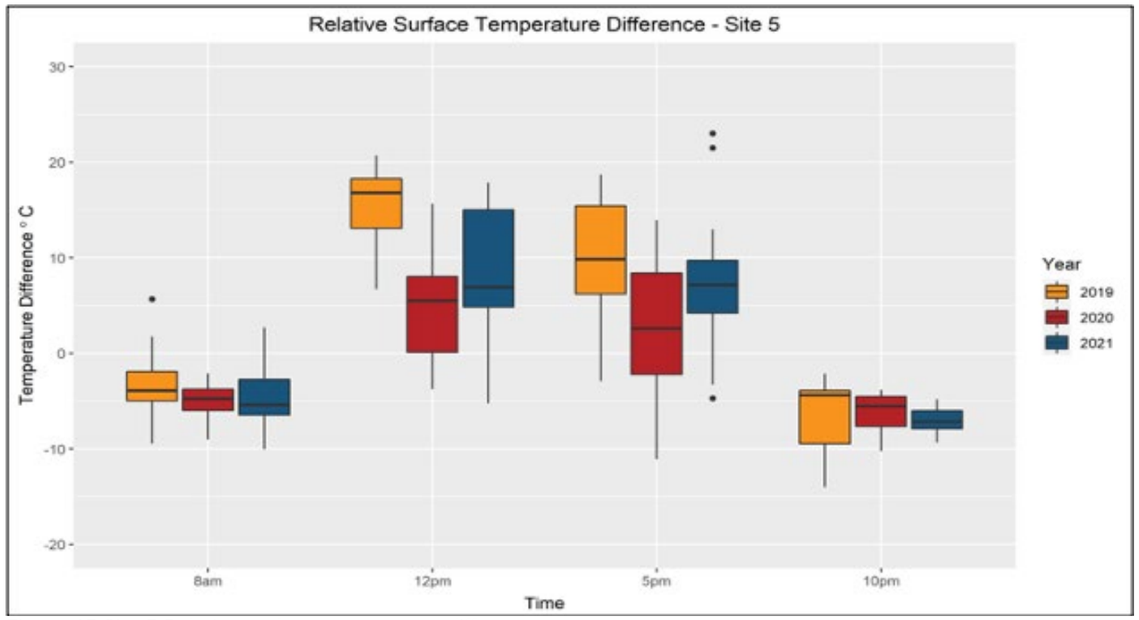


Figure 65 Site 5 Relative surface temperature difference

6. Results

Site 5

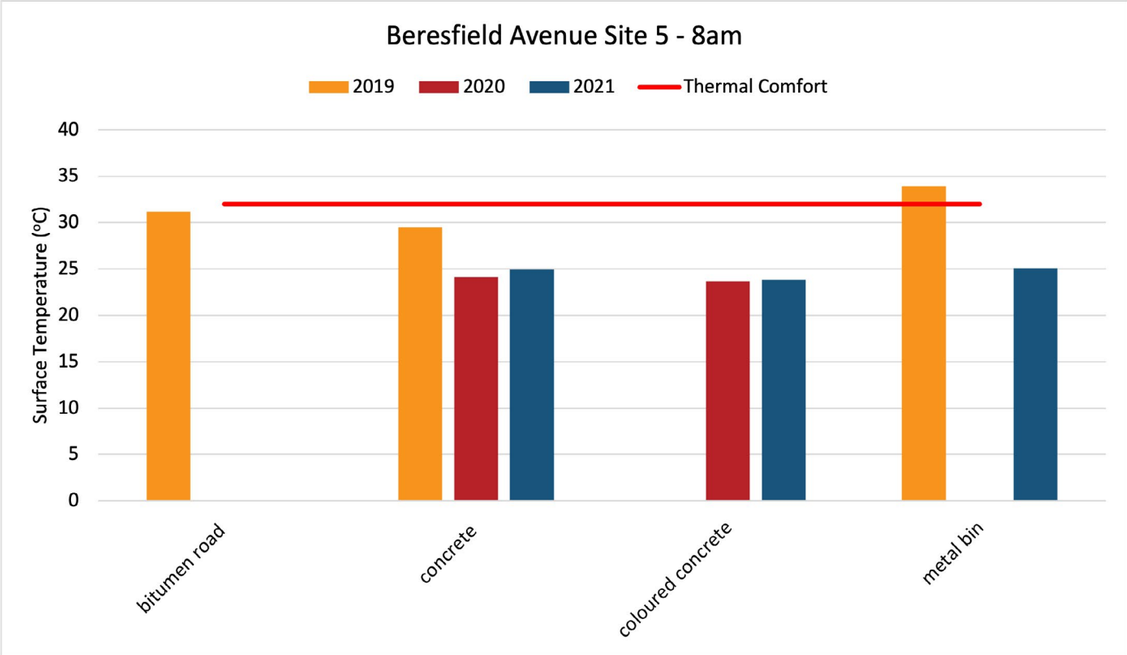


Figure 66 Individual material performance Site 5 8am

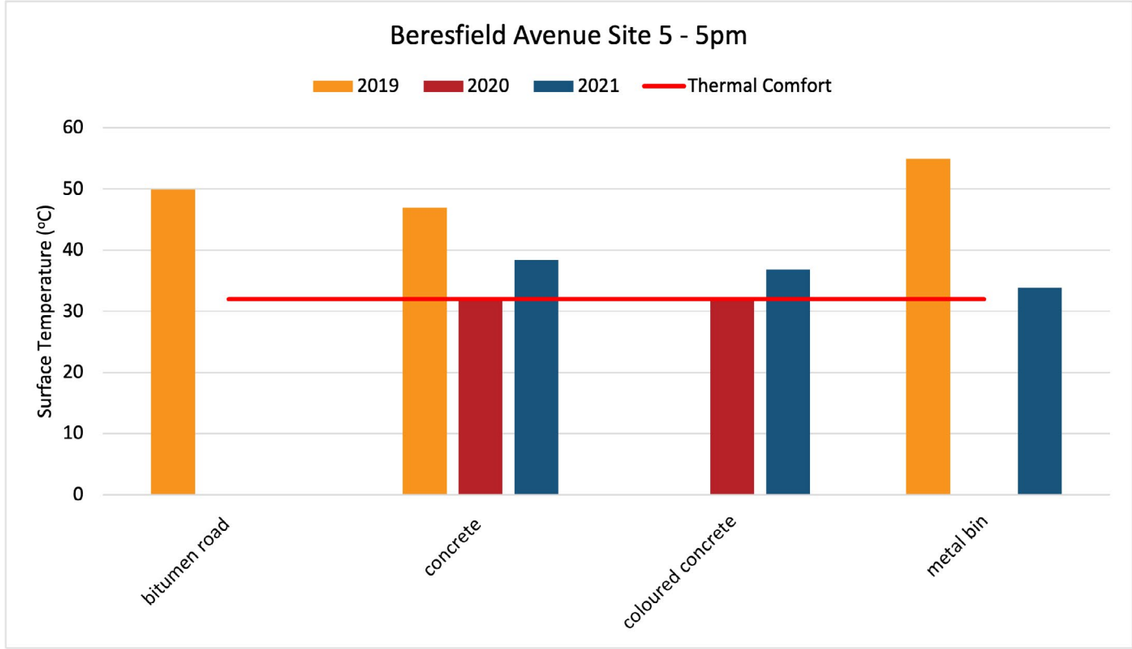


Figure 68 Individual material performance Site 5 5pm

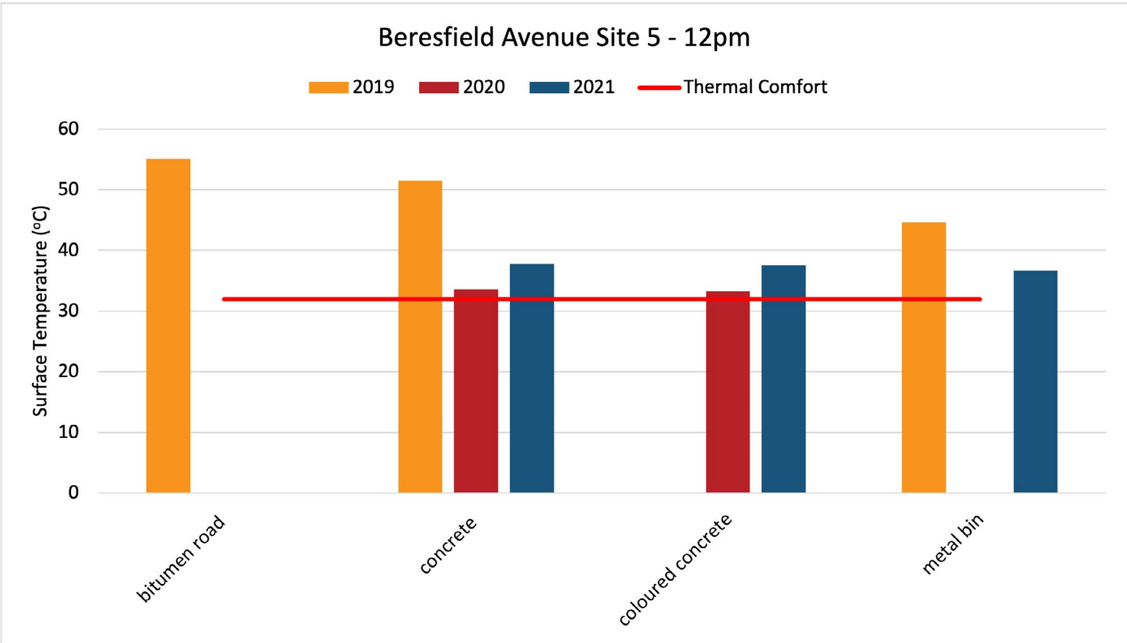


Figure 67 Individual material performance Site 5 12pm

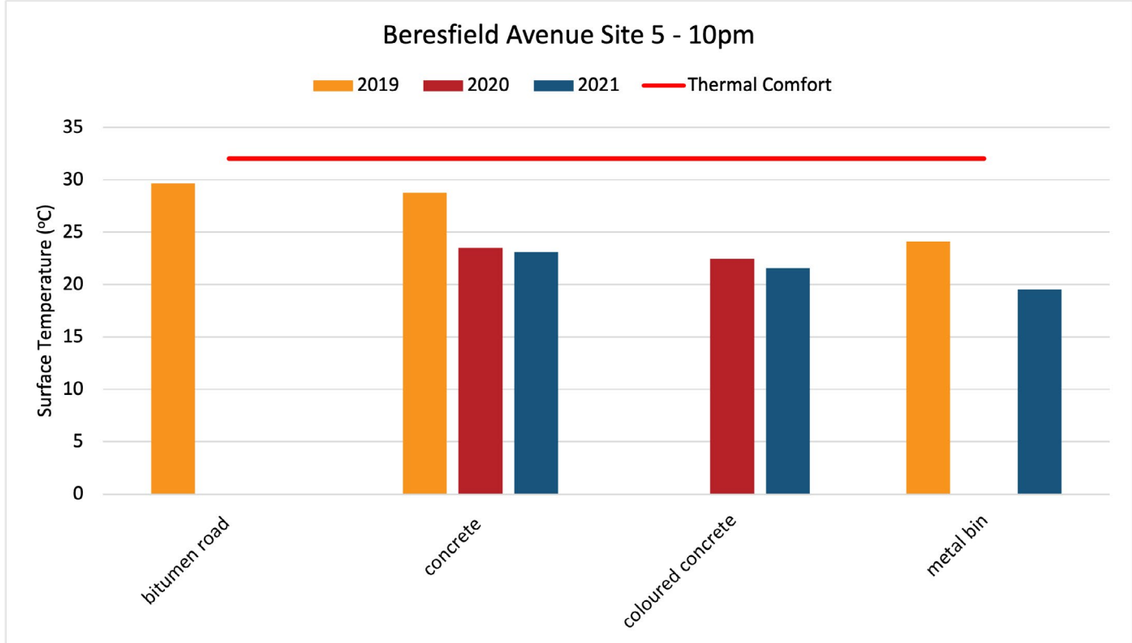


Figure 69 Individual material performance Site 5 10pm

6. Results

Site 6

The design extended public space on Beresford and Lawson Avenues in site 6. The ample public space provides multiple sitting spaces, a rain garden, a wall and ground mural, and a butterfly shelter (the shelter was not installed at the 2021 temperature data collection; hence its impact will not be evident within the project results).

Figure 70 Site 6 Material changes

6. Results

Site 6

Relative surface temperature difference

Results provided by Figure 71 indicate that 2021 has the least relative temperature difference. The relationship suggests that material changes evident within 2021 have made a significant impact in lowering surface temperatures.

Material performances

Concurring with previous trends, 2019 materials exceed the thermal comfort limit from 12 pm to 5 pm, see Figures 73 and 74. The brick wall experienced a significant change when painted. The coloured paint reduced the surface temperature considerably, keeping the temperature below the thermal comfort limit constantly. At the 12pm time point blue paint sees the lowest temperature (26.6°C), then red (27.7°C), green (27.9°C), and brown (29°C) being the highest. The introduction of decomposed granite (DG) instead of bitumen and concrete pathways saw temperature Max at 31°C. One degree below the thermal comfort limit. Material temperatures were impacted significantly when shaded, as seen by mulch decreasing 14°C at 12pm. Between 2020 and 2021, vegetation did not breach thermal comfort, maxing at 32°C.

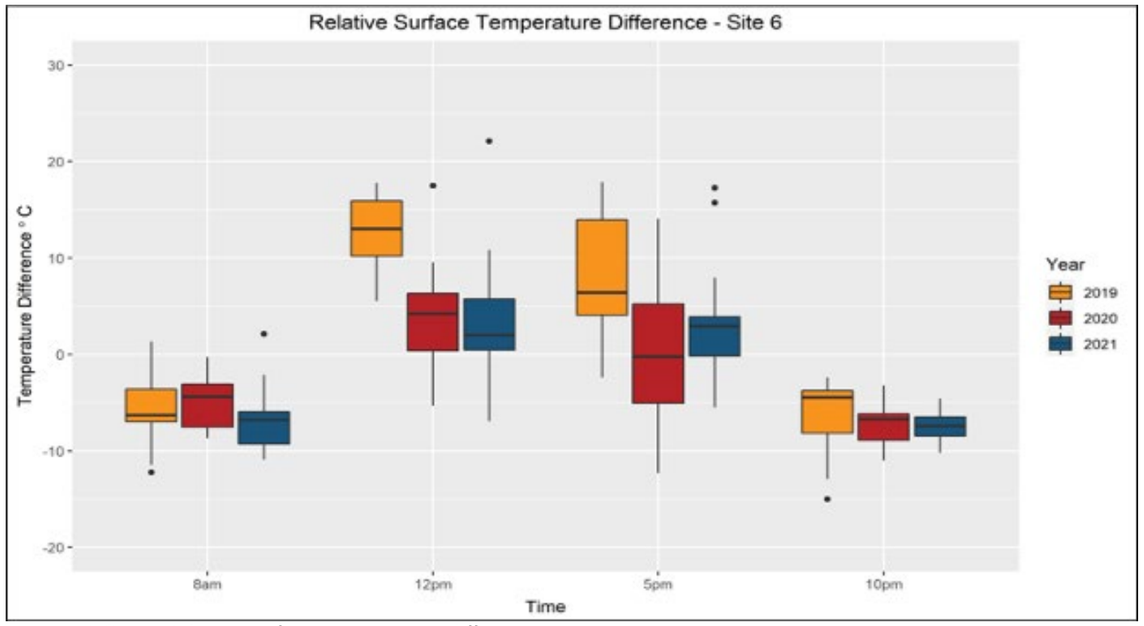


Figure 71 Site 6 Relative surface temperature difference

6. Results

Site 6

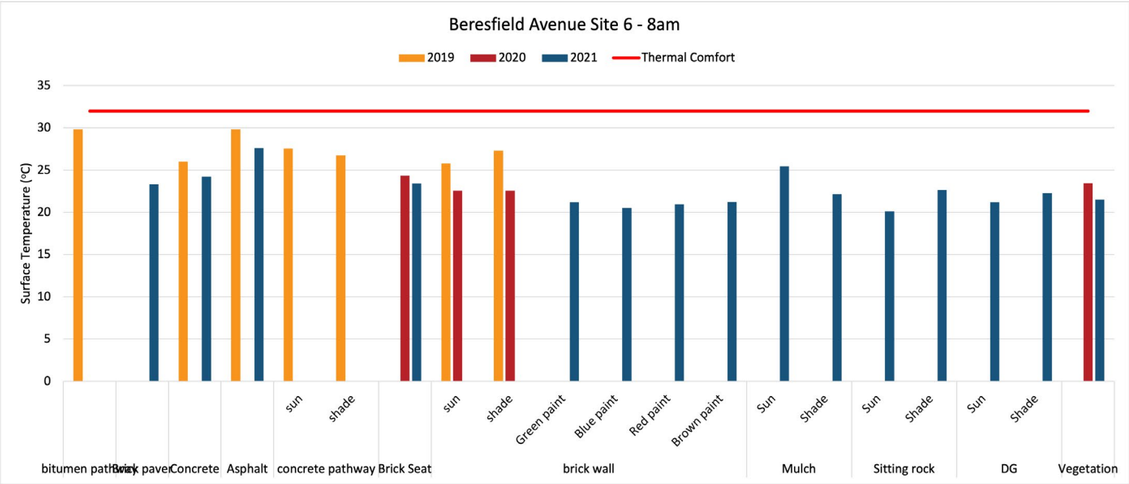


Figure 72 Individual material performance Site 6 8am

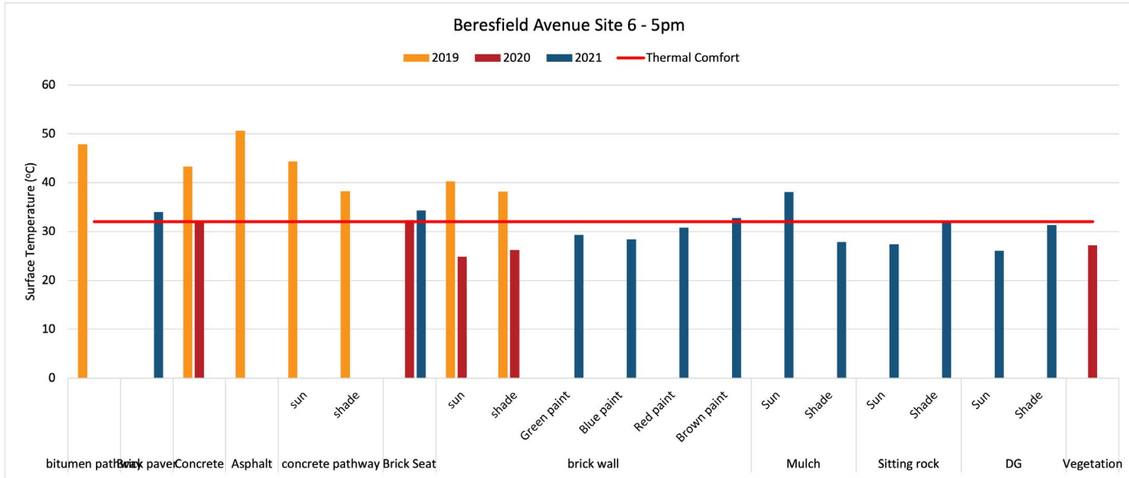


Figure 74 Individual material performance Site 6 5pm

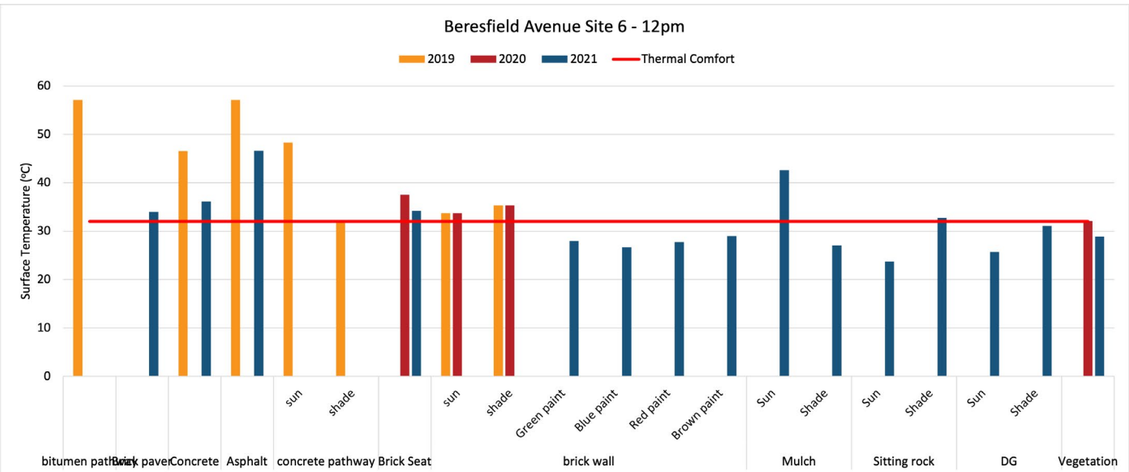


Figure 73 Individual material performance Site 6 12pm

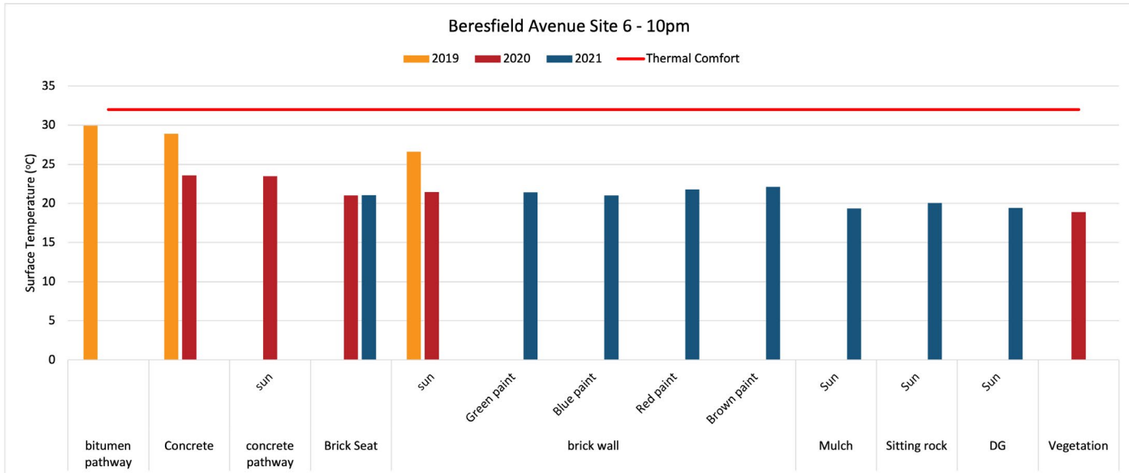


Figure 75 Individual material performance Site 6 10pm

6. Results

Site 7

Site 7 was not upgraded in the 2020/21 centre upgrade however, temperature data was collected in consideration of the growth of trees during this period. The trees plantings are bordered by a composite recycled material edge, filled with woodchip mulch, and planted with a Magnolia sp. The tree wells themselves are edged with the standard black rubber tree well.

Figure 76 Site 7 Material changes

6. Results

Site 7

Relative surface temperature difference

Site 7 has the least variance within temperature distribution. However, the graph continues the main trends of previous sites, with 2020 and 2021 presenting the smallest relative temperature difference.

Material performances

Materials within site 7 mostly remained similar within years. However, rubber and plastic edging in 2019 exhibited the highest temperatures. This may result from exterior temperatures as 2019 was a warmer year as previously seen within Figure 77 'projected ambient temperature' graph. There has not been significant tree growth to enhance the area for shade at this point in time.

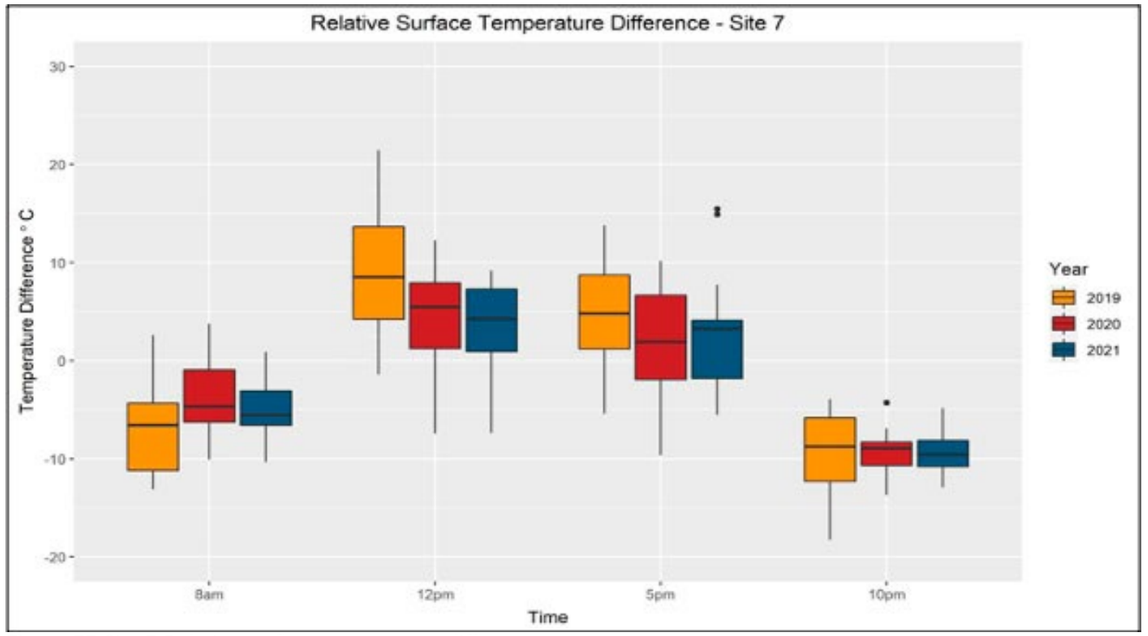


Figure 77 Site 7 Relative surface temperature difference

6. Results

Site 7

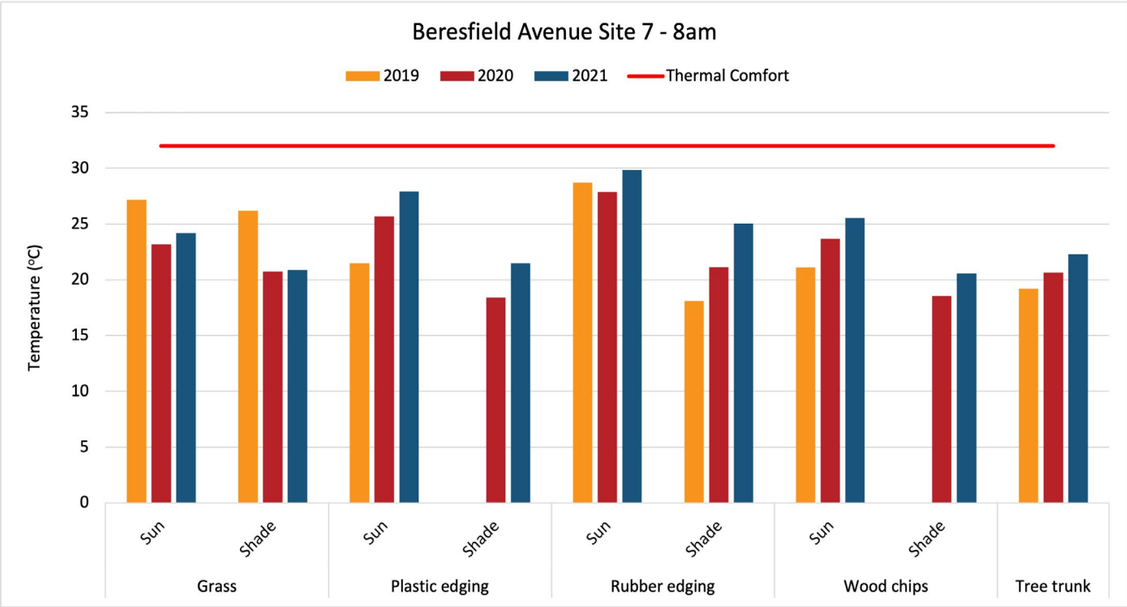


Figure 78 Individual material performance Site 7 8am

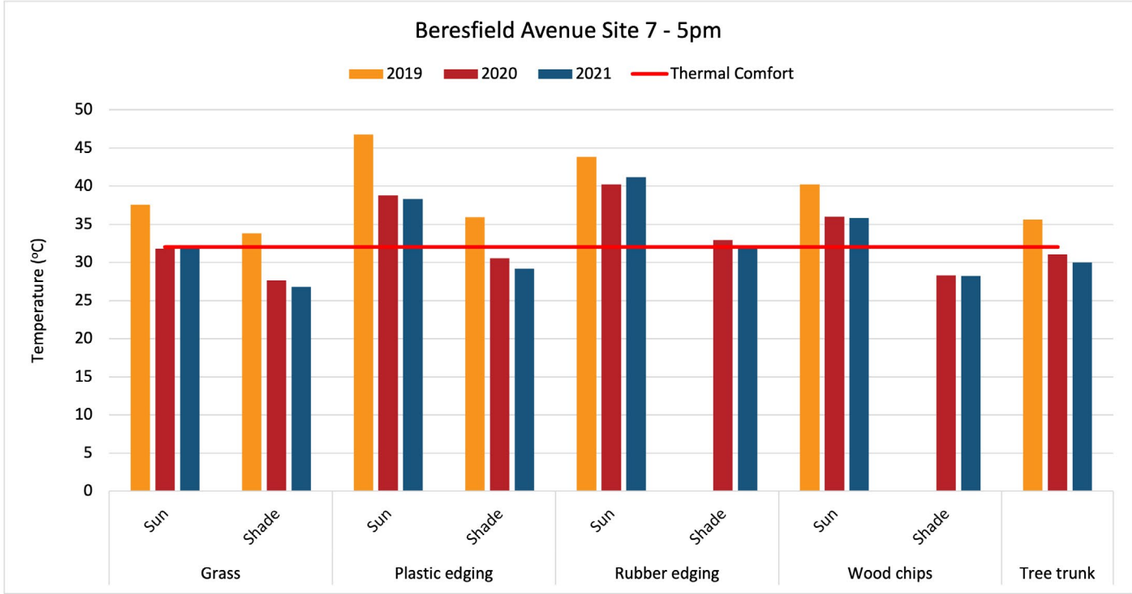


Figure 80 Individual material performance Site 7 5pm

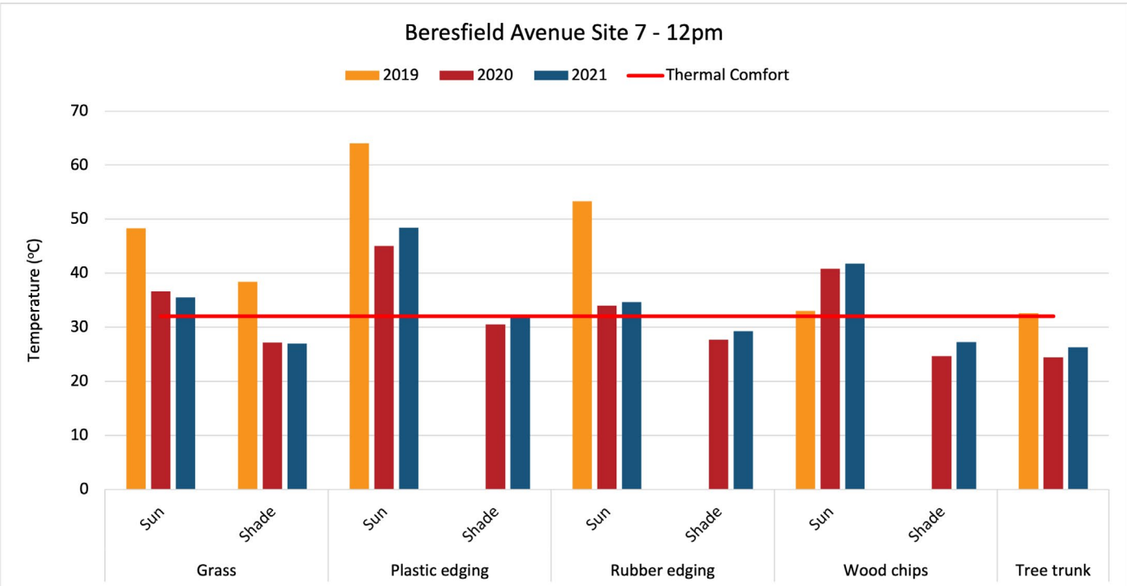


Figure 79 Individual material performance Site 7 12pm

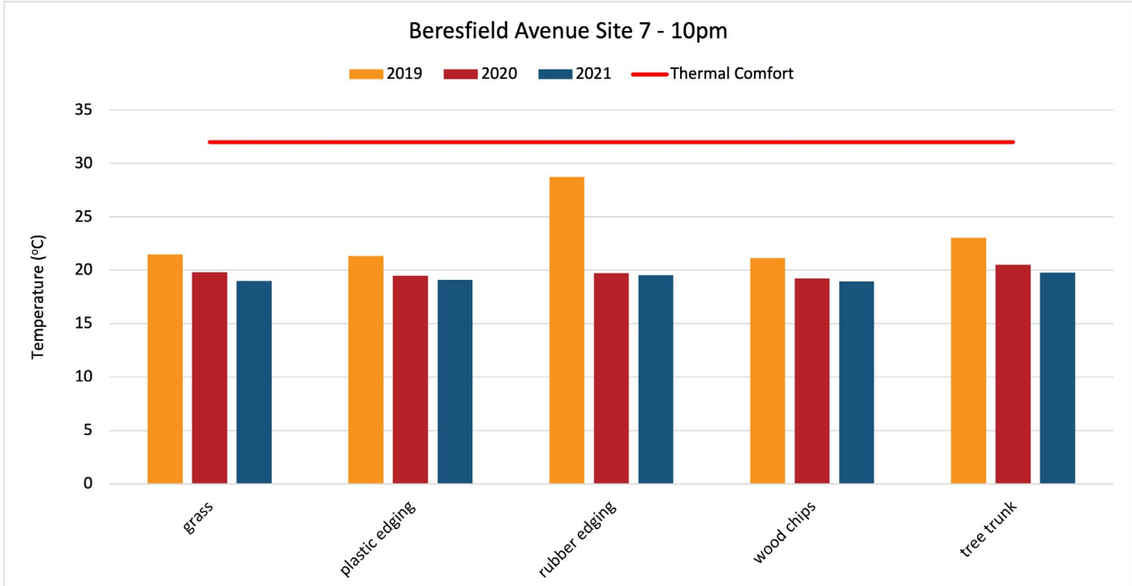


Figure 81 Individual material performance Site 7 10pm

6. Results

Site 8

Like Site 7, site 8 was neither impacted by the upgraded Beresfield local centre design although the trees have been significantly pruned.

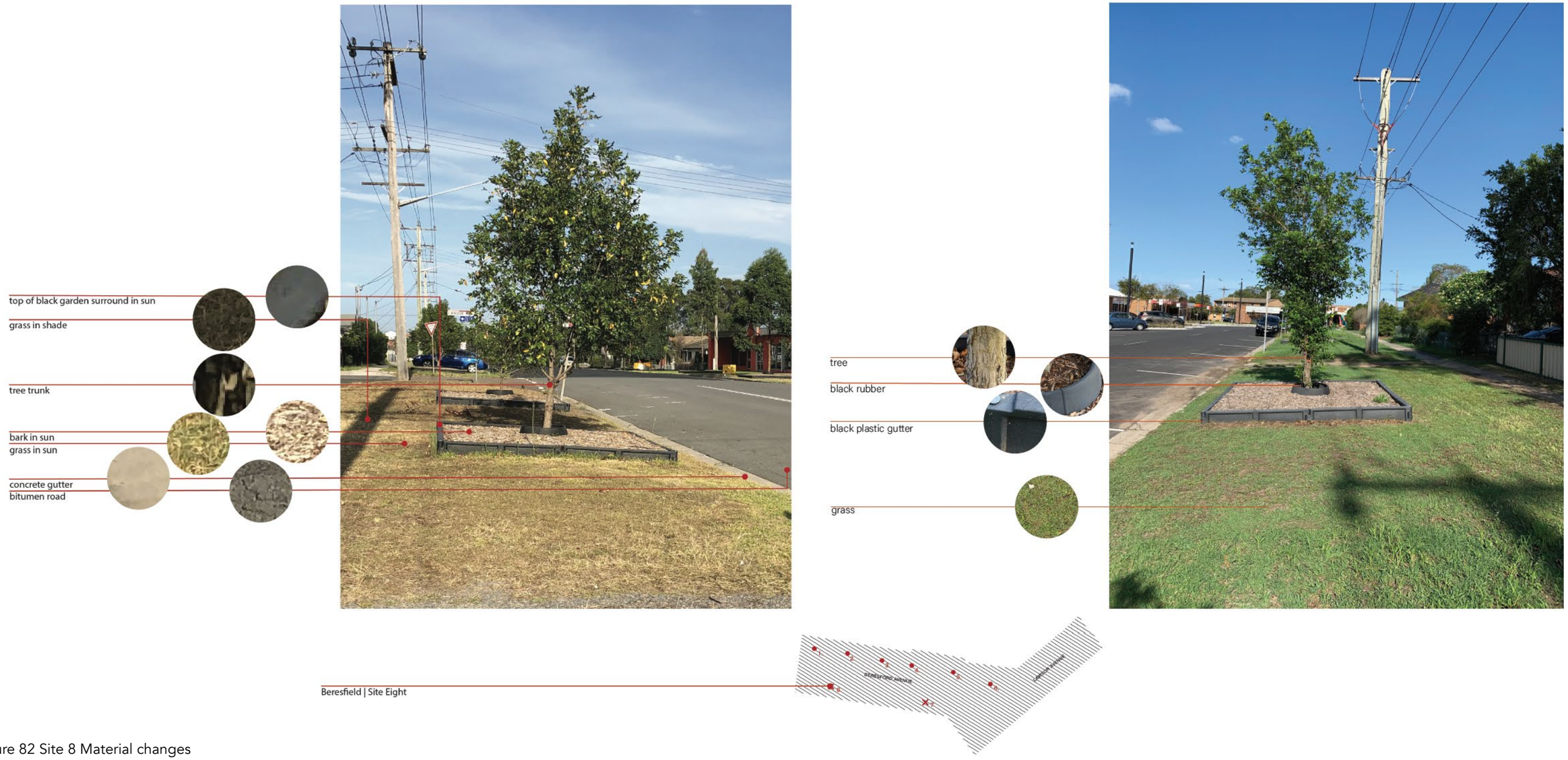


Figure 82 Site 8 Material changes

6. Results

Site 8

Relative surface temperature difference

Site 8, like Site 7, saw minor variance within temperature distribution and resumes the same trends of previous sites, with 2020 and 2021 presenting the least relative temperature difference.

Material performances

Material temperatures within site 8 have also remained similar within years. Comparable to site 7, rubber and plastic edging in 2019 also exhibits the highest temperature, recording the maximum 48°C and 44°C respectively, see Figure 85.

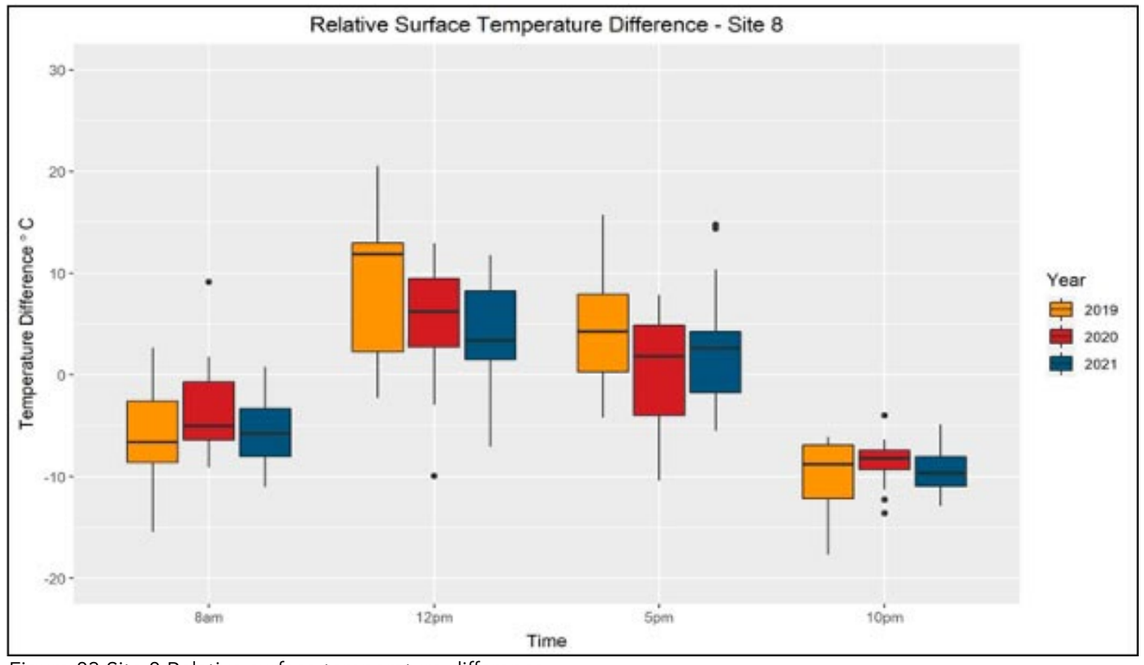


Figure 83 Site 8 Relative surface temperature difference

6. Results

Site 8

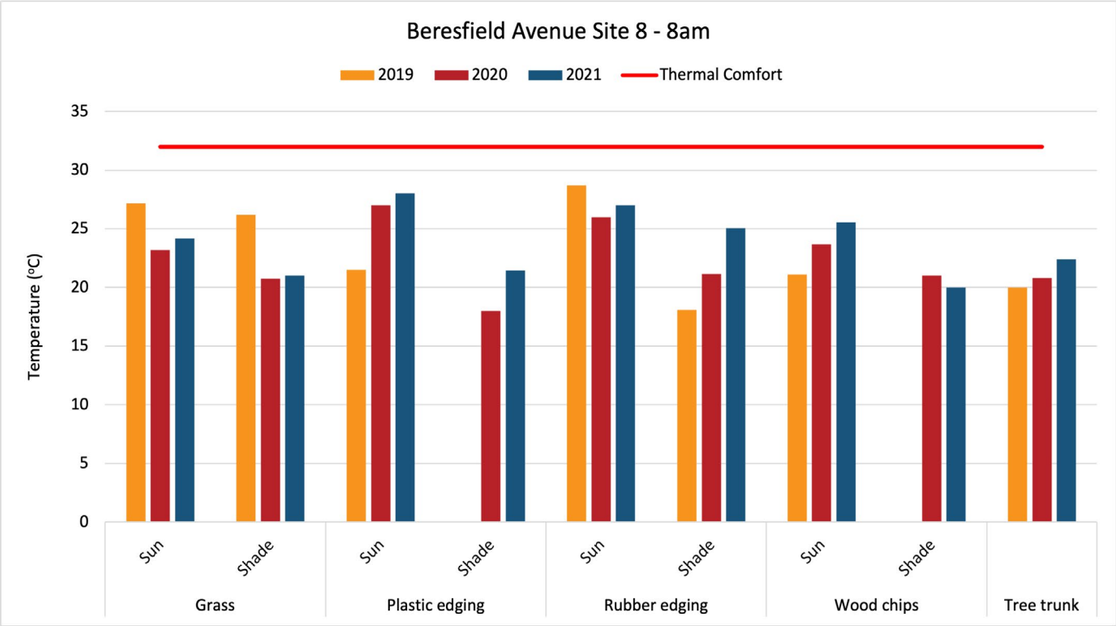


Figure 84 Individual material performance Site 8 8am

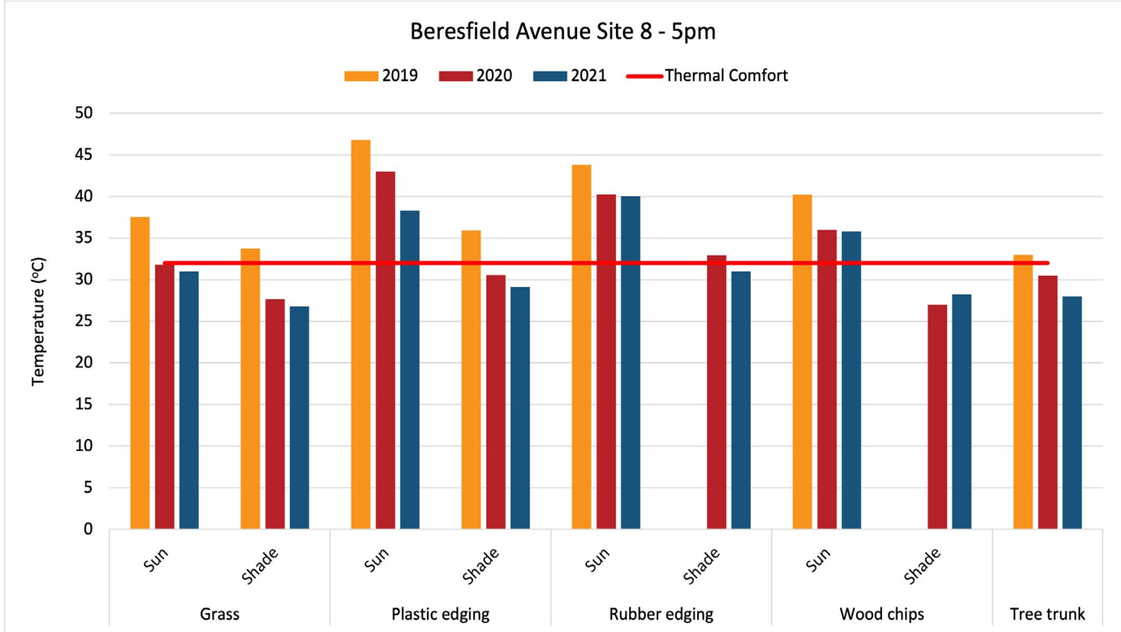


Figure 86 Individual material performance Site 8 5pm

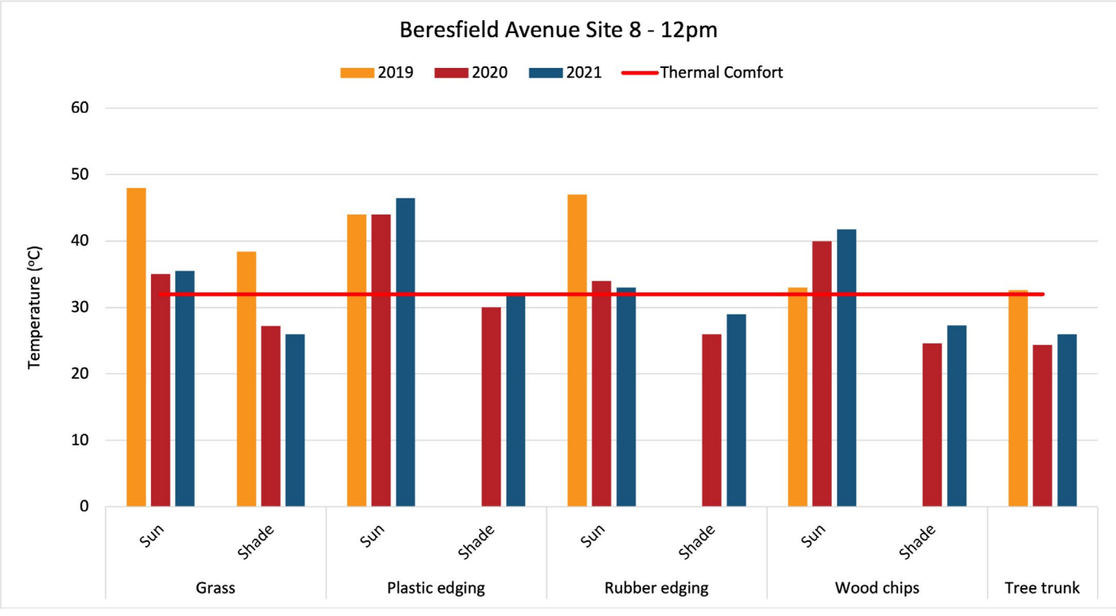


Figure 85 Individual material performance Site 8 12pm

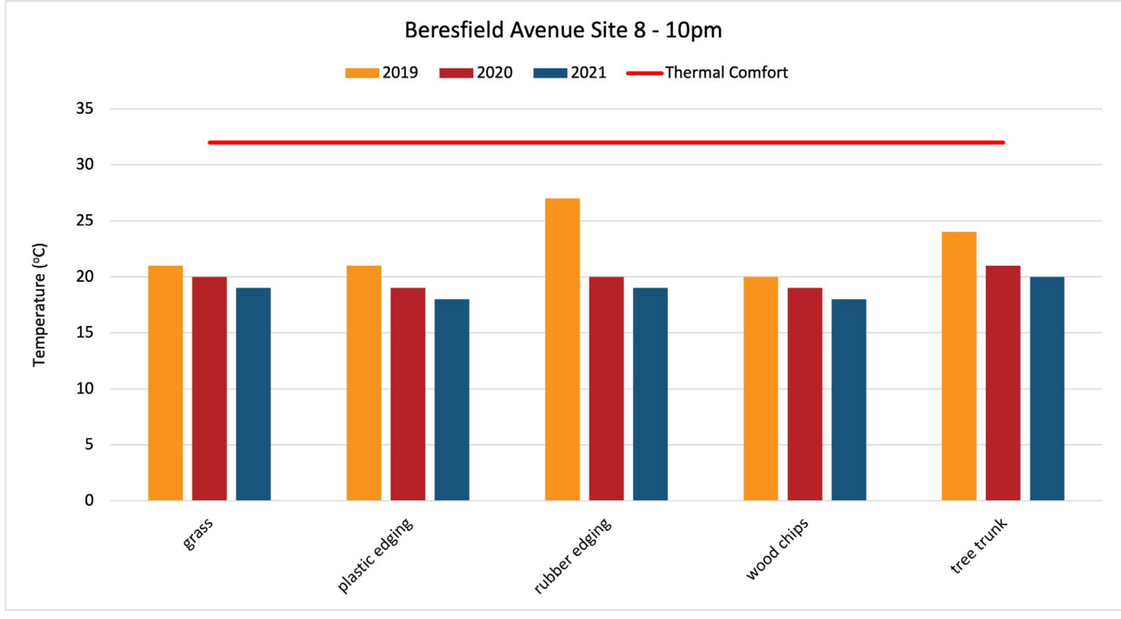


Figure 87 Individual material performance Site 8 10pm

7. Discussion

The results indicate that ambient temperature for Beresfield Avenue at all four times (8 am, 12 pm, 5 pm, 10 pm) during 2020 is significantly cooler than ambient temperature during 2019. 2021 ambient temp at all four times is also significantly cooler than 2019. However, ambient temperatures in 2020 and 2021 are not statistically different from one another. As statistical analysis represents the average surface temperature without the impact of the ambient temperature, it provides a fair assumption to be made that the design and material changes had an impact on the results.

The individual sites that performed the greatest are 1 and 6. Site 1 upgrades included wooden benches, brown brick edging, light-coloured concrete, and white reflective curbs. The addition of light-coloured concrete was selected to reduce heat energy from being absorbed into the pavement and transferring back into the atmosphere. While surfaces such as white reflective paint are high emissivity, coatings increase the heat transfer rate between the environment and solid materials. Materials within site 6 include high immensity paint, painted pavement, permeable surfaces, softscape, and increased vegetation.

Painting existing pavements with lighter/high albedo colours can increase the surface's reflectivity and deflect radiant heat from being absorbed into the pavement. Ground cover planting and increased softscape increases permeable surface of the landscape, increasing water absorption and retention. Ground cover plants absorb and hold less heat than hard-scape and have added evapotranspiration cooling benefits. Hence vegetation did not exceed the thermal comfort level. Within site 6, the best performing material was natural rock, closely followed by coloured reflective paint, which both remained well below the thermal comfort level.

Material temperatures were significantly reduced when shaded, as their average temperature levels were reduced by 5-30%. As per analysis, darker coloured materials had the highest thermal levels, including asphalt, rubber, plastic, and brown brick. They evidenced through relevant materials constantly over the thermal comfort limit at every site between 12 pm and 5 pm. Darker colours increase the absorption of heat energy into the pavement. Once again proven through the mural. Consequently, brown results in the hottest surface, followed by red, green, and blue.

Figure 88 Beresfield 2021 after upgrades

8. Conclusion

The Beresfield design upgrades, achieved its aimed impact of successfully lowering UHIE temperatures through better selection of the design materials palate, careful consideration about the amount of non-permeable and permeable surfaces, and an overall enhanced understanding of design with climate change and UHIE in mind. Through statical analysis, the average surface temperature was recorded without the impact of the ambient temperature. It provides a fair assumption to be made that the design and material changes had an impact on the results. Material changes were detailed by contrasting the human thermal comfort level. In many cases prior to the redesign the surfaces were too hot to touch and were impacting human thermal comfort substantially. As the vegetation grows and the trees begin to shade the spaces better, it is anticipated that alongside the new material palette, the temperatures at the local centre should continue to decrease. This initial report provides evidence to suggest the Beresfield Local Centre reduced levels of UHIE through design and streetscape. It is suggested that Council continue to monitor this site through the collection of surface temperatures and the use of the smart poles for another period of up to 5 years. This will provide compelling evidence of the thermal performance of the material palette as well as indicate future considerations for other local centre upgrades which need UHIE mitigation and climate resilient design solutions.

Figure 89 Golden Bell Frog and Blue Billed Duck Mural

9. Bibliography

City of Melbourne (2012) *Urban Forest Strategy*, 2012-2032

City of Sydney (2017) *City of Sydney - Environmental Action* 2016-2021

Research Group WSU (2016) *Mapping Urban Resilience in Riverland Sydney (MURRS)*

Moreland City Council (2016) *Moreland Urban Heat Island Effect Action Plan*

Newcastle City Council (2007) *Newcastle Urban Forest - Background Paper*

Newcastle City Council (2017) *Beresfield Public Domain Plan and Traffic Plan*

Newcastle City Council (2019) *Beresfield – Public Domain renewal Stage 2 – consultation Engagement Activity Report*

Newcastle City Council (2019) *Beresfield engagement summary outcomes statement*

University of Newcastle (2019) *Smart Trees: Resilience Strategies to Combat Urban Heat Island Effect*

University of Western Australia (2017) *Where Should all the Trees go?*

Urban Forest Consulting (2018) *Cool It - Addressing heat vulnerability in regional Victorian towns.*

Woolongong City Council (2015) U*rban Cooling Initiatives - preliminary Report*

202020 Vision - Urban Forest Strategy Melbourne, City of Melbourne (n.d) *How to Grow an Urban Forest - A ten step guide to help councils save money, time and share practical knowledge.*

202020 Vision (n.d) *Where are all the trees? An Analysis of the canopy cover in urban Australia.*

202020 *Vision (2015) 202020 Vision Plan*

10. Appendix

Appendix 1: Literature review

Smart Trees:
Resilience Strategies to Combat Urban Heat Island Effect,
Newcastle NSW, 2019
University of Newcastle

"As Newcastle increases in population and built density, the negative impacts of UHIE are expected to become a significant issue facing both the CBD and suburban areas. This project engaged in two areas of the 2017-2021 NCC Smart City Strategy (Smart Governance and Smart Environments), aligning its goals with that of Newcastle's future ambitions as a world leader in Smart City infrastructure and design."(University of Newcastle, 2019, P10)
This project identified levels of Urban Heat Island Effect (UHIE) experienced across five (5) identified sites in Newcastle's public realm. This report documents a methodology for using temperature monitoring. The temperature data recorded from on-site and field-based measurement was developed into a series of data visualisations and data spatialisations to interpret and communicate the field conditions with a broad range of audiences. The research team also identified a broad review of mitigation strategies to re-mediate UHIE and arranged them into a kit of parts to be utilised in consultation with internal and stakeholders. The visualisation techniques and mitigation kit of parts were tested with the Newcastle City Council through co-design workshops.

Minimizing the impacts of extreme heat.
A guide for local government, 2016
NSW Office of Environment and Heritage + Adapt NSW

The text provides a guide designed to describe ways NSW local governments can manage and minimize the impacts of extreme heat on the community, assets, and services. The guide seeks to clarify roles and responsibilities concerning extreme heat events and will examine ways in which local government can minimize the impacts of such events by adapting existing systems, procedures and activities.

"Extreme heat is defined as significantly hotter and/or more human than average summertime temperature for a location, whereby human and animal health, and the performance of infrastructure and the delivery of services may be adversely affected. This includes but is not confined to heatwave conditions."
(NSW Government, 2016, P 4)

"The NSW and ACT Climate Model (NARCLiM) shows, with high confidence, that NSW will experience more extreme heat in the future as a result of climate change. Hot days are expected to increase across the state by an average of 26 days per year by 2070… An overall increase in temperature means that current extreme heat events will become hotter, more frequent with increased duration and therefore more severe. Based on projections of increasing temperatures, it has been estimated that annual net temperature-related deaths (considering fewer deaths in warmer winters and more deaths in hotter summers) will increase by 1250 deaths in 2070, and 8628 deaths in 2100, nationally." (Bi et al. 2011)
(NSW Government, 2016, P 5)

- Cool roofs and walls.
Roofs that are partially or entirely vegetated (green roofs) or roofs that use reflective materials to reflect and emit solar energy (cool roofs) can decrease heat absorption, reducing ambient air temperature and minimizing heat impact.

- Cool pavements, streets, and car parks, using reflective and/or permeable materials for roads, car parks, and footpaths can reduce the amount of hard, paved, and dark-colored surfaces that cause UHI.

- Green open space.
Increasing the number of canopy trees to provide shade to grass areas, cycleways, parklands, and amenities can reduce the amount of heat absorbed and radiated by open spaces.(NSW Government, 2016, P 11)

- Communicating with local stakeholders.
Responding effectively to extreme heat requires individuals, families, and communities to understand and address extreme heat impacts as individuals and recognize and care for those most at risk in the community. There is less public awareness of extreme heat's effect on health than other extreme weather events.
(NSW Government, 2016, P 15)

10. Appendix

Urban Cooling Initiatives
Preliminary Report 2015
Wollongong City Council

The report provides meeting notes and recommendations for the development of an Urban Cooling Strategy.

"Cooling the urban environment can be achieved through a combination of quality urban design, the use of high-performing materials, increased and diversified urban vegetation, and a reduction in localized emissions from transport and energy use. These principles are closely aligned with the Community Objectives and Goals in the Wollongong 2022 Community Strategic Plan (CSP)."(Wollongong, 2015, P 3)

Cooling the Commons
Pilot Research Report October 2018
Mapping Urban Resilience in Riverland Sydney (MURRS) - Western Sydney University - Institute for Culture and Society

"The report provides initial insights into how residents living in Western Sydney keep cool during the hottest parts of the year and how they would like to see their living environments, at home and out and about, modified to improve wellbeing in a climate-changing world. The research responds to a lack of qualitative information about day-to-day living practices in outer suburban Sydney, the constraints people experience when trying to keep cool; and, people's aspirations for more comfortable living environments...The concept of the 'cool commons' was employed to identify those spaces that offer cooler temperatures than surrounding areas and are used by, and are accessible to, a community of commoners who, to some degree, care for, take responsibility for, and benefit from this coolness." (MUURS, 2018. P. 3)

"The findings show that shade, shelter and water commons are desired for a cool future city. Built and social interventions are needed to promote urban green space and encourage its use. However it is not a case of "build it, and they will come" or "regulate and they will behave." Normative social practice's that have grown up around current conditions, such as children playing indoors for large parts of the day, will be difficult to budge, and require action in relation to both the built and social environment on an ongoing basis." (MUURS, 2018. P. 4)

A Co-Design Approach:

There is the potential of taking a co-design approach to further research. Co-design, a standard of practice in design-led community consultation, would help us determine what sorts of common methods people are interested in investing their time and energy in and what they need to pursue. Co-design as a research mode gathers social data through workshops that elicit participants' creativity in ideation processes, developing prototypes for physical infrastructure and amenities or new social enterprises. This can involve 'fun exercise' such as creative mapping that allows for emotional layering on geographical places – how they are lived and experienced now, and how they might be lived and participated in the future. (MUURS, 2018. P. 34)

Where Should All The Trees Go? State by State – Victoria
University of Western Australia, 2017

A state-specific analytical overview on canopy loss, communities vulnerable to heat-related stresses, and potential canopy tree planting potential.

"The average canopy cover for urban Vic is 18.83%, down 2.06% from 20.89% in 2013... There has been an overall increase of 3%in hard surfaces, which is precisely the same rate of rising as NSW, but overall, VIC has around 5% fewer hard surfaces than NSW... In VIC, 44% of urban LGAs have undergone a significant loss of tree canopy, with only 8% having had a substantial increase in the shrubbery." (202020 Vision 2017, P2)

The report graphically represents LGA's at higher risk and highlights those LGA's as areas where urban cooling strategies, and tree planting, need to be prioritized.. The report defines trees as: "Anything that looks like a tree from above, distinguished from shrubs by the shadows cast." Shrubs are defined as: "Landscaped vegetation as well as bushland shrubs, crops and grapevines." The grass is defined as: "Cleared road sides, lawns, pastures, sites cleared for development and sporting grounds." Hard Surfaces are defined as: "Asphalt, buildings, car parks, footpaths, sandy beaches, train lines, rocky coastlines and water." (202020 Vision 2017, P4) The report defines Urban Heat Island Effect as: "An urban heat island is an area that heats up more than – and stays hotter than –its surrounding areas due to human impact of hard surfaces and development. Colours are used below to differentiate intensity of urban heat islands." (202020 Vision 2017, P5) The report cartographically represents a range of the hottest areas in Victoria, ranging from the hottest 16%, 8%, 2.5%

10. Appendix

Moreland Urban Heat Island Effect Action Plan
For a cooler, greener, more liveable city
2016/2017 – 2025/2026
Moreland City Council 2016

The long-term action plan was created to mitigate the effects of the Urban Heat Island Effect in the Moreland City LGA. The Action Plan is written to have a civilian audience; it defines Urban Heat Island Effect and provides explanations on potential methods of reducing the effects.

. "*Several critical factors drive the UHIE:*

- *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, reducing 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 remove green areas reducing cooling*
- *Construction materials that 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 air conditioners, etc.*
- *Air pollution – that creates a local 'greenhouse' effect, trapping heat."*

(Moreland City Council 2016, P. 5)

"*Tree shade can reduce daytime land surface temperatures by up to 20 degrees celcius*" (Ward B, Infrared Thermography Survey for City of Greater Geelong 2015).

"*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 City Council 2016, P. 5)

Measures highlighted as being feasible for Urban Heat reduction included:

1. Vegetation
   - 1.1 Increase Vegetation and protect existing vegetation.
   - 1.2 Increased outdoor landscaping (green roofs and walls
   - 1.3 Improve parkland and open space (irrigated spaces)
2. Water
   - 2.1 Water Sensitive Urban Design
   - 3. Materials
   - 3.1 Use of reflective materials
4. Urbanisation
   - 4.1 Street design – orientation, width
   - 4.2 Evaporative Air Coolers (instead of the reverse cycle)
   - 4.3 Public Transport, walking, cycling, and electric vehicle use
   - 4.4 Improve building quality to reduce the need for artificial cooling.
5. Social
   - 5.1 Social UHIE policy and education. (Moreland City Council 2016, P. 6)

The report highlights three areas that could benefit from enacting UHIE mitigation measures:

1. Economic; reduced energy costs from reduced use of artificial cooling, increased property values, and increased retail spending in commercial areas etc.
2. Social: Reduction in heat-related illness and fatality, increased outdoor activity, improved mental well-being, etc.
3. Environmental: Cleaner, healthier waterways, reductions in air pollution and dust, more water retention in the landscape in water-constrained climate. (Moreland City Council 2016, P. 7)

10. Appendix

Appendix 2: Data set

1.1.1 Site 1 & 2 2019 Temperature readings

	Data Logger no.1 - pole 1				Data Logger no. 2 - pole 2		
Tuesday, 8 January 2019	1	1.1	1.2	1.3	2.8	2.9	
Time	**Green bench**	**shaded bitumen path**	**Bitumen path**	**concrete around pole**	**shopfront wall tile**		**average @ data poles**
					ground	**wall**	
07:19:00 AM-07:40:00 AM	27.3	26.1	28.4	28	25.9	24.8	26.7
12:25:00 PM-12:38:00 PM	60.8	40	60.2	51.3	33.2	33.7	45.6
17:45:00 PM-17:57:00 PM	48.8	48	54.4	48.4	38.8	39.1	47.9
9:10:00 PM-09:20:00 PM	24		33.2	32	27.9	28.5	30.5
Thursday, 10 January 2019	**Data Logger no.1 - pole 1**				**Data Logger no. 2 - pole 2**		
Time	**Green bench**	**shaded bitumen path**	**Bitumen path**	**concrete around**	**shopfront wall tile**		**average @ data poles**
					ground	**wall**	
07:34:00 AM-07:46:00 AM	24.4		25.2	25.2	25.1	25.2	26.0
12:23:00 PM-12:41:00 PM	44.5		40.3	36.1	28.8	29.8	35.1
17:35:00	43.3	36.6	43.1	39.8	28.8	29.3	36.6
21:04:00	21.3		28.2	27.1	24.3	23.7	26.4
Friday, 11 January 2019	**Data Logger no.1 - pole 1**				**Data Logger no. 2 - pole 2**		
Time	**Green bench**	**shaded bitumen path**	**Bitumen path**	**concrete around**	**shopfront wall tile**		**average @ data poles**
					ground	**wall**	
07:40:00	25.5		26.7	26.4	25.1	25	26.6
12:40:00	70.6	37.3	61.1	51.4	31.2	31.9	46.3
17:30:00	52.6	36.4	62	51	32	33	46.9
21:00:00							
Monday, 14 January 2019	**Data Logger no.1 - pole 1**				**Data Logger no. 2 - pole 2**		
Time	**Green bench**	**shaded bitumen path**	**Bitumen path**	**concrete around**	**shopfront wall tile**		**average @ data poles**
					ground	**wall**	
07:48:00	36.7	30.8	35.9	33.7	28.6	29	32.2
12:40:00	72.5	38.6	59.8	51.4	30.3	31	45.2
17:37:00	47.2	39	49.7	44.7	31.6	32.5	41.6
21:23:00	20.4		28.9	29.2	25.4	25.7	27.5
Tuesday, 15 January 2019	**Data Logger no.1 - pole 1**				**Data Logger no. 2 - pole 2**		
Time	**Green bench**	**shaded bitumen path**	**Bitumen path**	**concrete around**	**shopfront wall tile**		**average @ data poles**
					ground	**wall**	
07:30:00	29.4	27.5	32.4	29.9	27.9	28	29.8
12:45:00	74.8	40.4	68.8	57	34.3	35.5	50.4
17:00:00	58	49.9	62.3	56.6	43	44.3	53.4
21:30:00	22.8		32.4	31.7	27.4	27.3	30.0
Thursday, 17 January 2019	**Data Logger no.1 - pole 1**				**Data Logger no. 2 - pole 2**		
Time	**Green bench**	**shaded bitumen path**	**Bitumen path**	**concrete around**	**shopfront wall tile**		**average @ data poles**
					ground	**wall**	
07:30:00	25.3		29.4	29.9	27.8	27.2	29.8
12:55:00	79.7	43.5	69.6	62.3	33.7	34.7	50.3
17:37:00	48.1	46.3	51.5	46.3	30.5	32.1	42.9
21:50:00	18.8		30	29.8	25.1	25	27.7

Monday, 21 January 2019	**Data Logger no.1 - pole 1**				**Data Logger no. 2 - pole 2**		
Time	**Green bench**	**shaded bitumen path**	**Bitumen path**	**concrete around**	**shopfront wall tile**		**average @ data poles**
					ground	**wall**	
07:50:00	30.3		29.9	28.9	27.4	27.2	29.1
12:55:00	51.3		46	42	31.3	32.4	39.4
17:30:00	30		32.5	31	26.4	27.1	30.1
21:00:00	20.1		26.6	26.9	25.7	25.6	26.6
Tuesday, 22 January 2019	**Data Logger no.1 - pole 1**				**Data Logger no. 2 - pole 2**		
Time	**Green bench**	**shaded bitumen path**	**Bitumen path**	**concrete around**	**shopfront wall tile**		**average @ data poles**
					ground	**wall**	
07:50:00	30.7	27.2	29.5	28.8	29.1	29.1	30.7
12:00:00	69.9	31.5	55.4	48.1	26.2	27.2	40.3
18:30:00	40.1	42.1	43.9	40.9	30.5	30.8	36.9
21:00:00							#DIV/0!
Thursday, 24 January 2019	**Data Logger no.1 - pole 1**				**Data Logger no. 2 - pole 2**		
Time	**Green bench**	**shaded bitumen path**	**Bitumen path**	**concrete around**	**shopfront wall tile**		**average @ data poles**
					ground	**wall**	
07:30:00	25.5		28.3	27.9	26.4	26	27.5
12:45:00	42.5		42.6	40.2	30.2	31.6	36.6
17:38:00	47		48.3	44.4	33.9	34.7	41.8
9:42:00pm	21.7		30.2	29.9	27.1	27.5	29.3
Tuesday, 29 January 2019	**Data Logger no.1 - pole 1**				**Data Logger no. 2 - pole 2**		
Time	**Green bench**	**shaded bitumen path**	**Bitumen path**	**concrete around**	**shopfront wall tile**		**average @ data poles**
					ground	**wall**	
07:30:00	28.5	28.4	30.2	30.4	28.3	27.9	30.1
12:30:00	68.4	39.7	65.5	54	33.8	34.2	48.9
18:30:00	30.1		38.8	36.4	28.7	29.9	35.0
21:30:00	24.6		34.6	34	31.2	31.5	33.5
Wednesday, 30 January 2019	**Data Logger no.1 - pole 1**				**Data Logger no. 2 - pole 2**		
Time	**Green bench**	**shaded bitumen path**	**Bitumen path**	**concrete around**	**shopfront wall tile**		**average @ data poles**
					ground	**wall**	
08:00:00	30.2	31.1	32	31.8	29	29.2	32.0
12:00:00	69.8	44.8	60.2	53.3	39.3	41	49.2
6:00:00pm	29.7		35.4	34.2	28.2	29.2	32.4
21:00:00							#DIV/0!
Thursday, 31 January 2019	**Data Logger no.1 - pole 1**				**Data Logger no. 2 - pole 2**		
Time	**Green bench**	**shaded bitumen path**	**Bitumen path**	**concrete around**	**shopfront wall tile**		**average @ data poles**
					ground	**wall**	
07:50:00	30.6	29.4	30.5	30.3	28.4	28.5	29.8
13:00:00	48.6		47.2	43.7	35.8	37.6	42.5
18:30:00	42.3	39.7	43.2	39.7	38.3	39.9	41.3
21:30:00	20.7		25.3	25.2	21.7	21.1	22.2

10. Appendix

1.1.2 Site 3 2019 Temperature readings

Data Logger no. 3 - pole 3									
3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.8	
bitumen pathway	concrete gutter	bitumen road	brown shopfront wall tile		purple painted brick		pavement		average @ data poles
			sun	shade	sun	shade	sun	shade	
26.8	27.3	28.3	26.1		26.7		26.9	24.1	26.6
59.9	52.3	56.1		37.7		37		32.2	45.9
56.3	53.9	52.4	44	41.9	40.8	39.9	39.9	34.3	44.8
32.7	31.9	31.6	27.9		27.7		26		29.6
Data Logger no. 3 - pole 3									
bitumen pathway	concrete gutter	bitumen road	brown tile on shop wall		purple painted brick on shop wa		pavement in front of purple shop		divided by no. of
			sun	shade	sun	shade	sun	shade	
27.4	27.2	28.5	24.8		24		24.6		26.1
43.6	40.4	42.6	33.5		31.8		31.2		37.2
43.8	41.3	41.9	27.2	28.3	31.5	28.9	29.5	28	33.4
28	28	27.9	22.9		22.5		23.3		25.4
Data Logger no. 3 - pole 3									
bitumen pathway	concrete gutter	bitumen road	brown tile on shop wall		purple painted brick on shop wa		pavement in front of purple shop		divided by no. of
			sun	shade	sun	shade	sun	shade	
28.2	28	28.4	25		24.7		25.5		26.6
60.4	51.4	54.7		33.6		34		31.4	44.3
58.7	51.2	53.9					37.9		50.4
Data Logger no. 3 - pole 3									
bitumen pathway	concrete gutter	bitumen road	brown tile on shop wall		purple painted brick on shop wa		pavement in front of purple shop		divided by no. of
			sun	shade	sun	shade	sun	shade	
36.4	35.7	37.6		30		32.3		27.6	33.3
58.4	52.3	56.6		33.6		33.4		32	44.4
52.1	47.7	48.5		35.5		33.9	31.4	30.2	39.9
29.5	29.8	28.8		25.6		25.3	24.2		27.2
Data Logger no. 3 - pole 3									
bitumen pathway	concrete gutter	bitumen road	brown tile on shop wall		purple painted brick on shop wa		pavement in front of purple shop		divided by no. of
			sun	shade	sun	shade	sun	shade	
31.7	30	32.9	29.3		30.6	29	29	26.7	29.9
69.2	62.3	65.3		44.6		41		35.5	53.0
64.9	61.5	58.6		47.7		46.6		40.7	53.3
32.4	32.3	31.5	27.1		26.4		25.9		29.3
Data Logger no. 3 - pole 3									
bitumen pathway	concrete gutter	bitumen road	brown tile on shop wall		purple painted brick on shop wa		pavement in front of purple shop		divided by no. of
			sun	shade	sun	shade	sun	shade	
31.6	31.3	31.6	28.1		27.2		27.3		29.5
66.3	59.6	63.6		41.8		38.7		32.6	50.4
53.9	50.1	48.7		36.1		34.7		29.2	42.1
29.2	29	27.6	25		24.3		23.8		26.5

Data Logger no. 3 - pole 3									
bitumen pathway	concrete gutter	bitumen road	brown tile on shop wall		purple painted brick on shop wa		pavement in front of purple shop		divided by no. of
			sun	shade	sun	shade	sun	shade	
30.8	30.4	31.8	27.6		27.1		27.7		29.2
48.1	44.9	45.5	38.6		35.6		34.5		41.2
33.1	32.1	32.5	27.7		27.9		28.3		30.3
27.5	27.4	27.2	25		24.4		25.7		26.2
Data Logger no. 3 - pole 3									
bitumen pathway	concrete gutter	bitumen road	brown tile on shop wall		purple painted brick on shop wa		pavement in front of purple shop		divided by no. of
			sun	shade	sun	shade	sun	shade	
34.2	32.5	34.9		30.9		31.7		30.3	32.4
57.3	51	53.2		33.4		30		26.1	41.8
46.3	43.5	42.2	36.7	30.3	35.4	32.2	30.3	27.9	38.1
									#DIV/0!
Data Logger no. 3 - pole 3									
bitumen pathway	concrete gutter	bitumen road	brown tile on shop wall		purple painted brick on shop wa		pavement in front of purple shop		divided by no. of
			sun	shade	sun	shade	sun	shade	
28.4	29.6	29.2		26		25.6		26.1	27.5
41.1	40	41.2		32.9		32.3		32.8	36.7
48.5	47.8	46.1		37		35.4		33.2	41.3
30.4	29.9	29.7	27.9			26.7		26.8	28.6
Data Logger no. 3 - pole 3									
bitumen pathway	concrete gutter	bitumen road	brown tile on shop wall		purple painted brick on shop wa		pavement in front of purple shop		divided by no. of
			sun	shade	sun	shade	sun	shade	
31.8	32.7	33.5		29	36.7	30.2	29.9	28.5	31.5
64	56	59.1		37.7		37.3		32.1	47.7
41.3	39.5	38.8	32	28.6	31.7	31.4	28.5	28.1	33.3
35.2	35.6	35	31.5		30.8		29.9		33.0
Data Logger no. 3 - pole 3									
bitumen pathway	concrete gutter	bitumen road	brown tile on shop wall		purple painted brick on shop wa		pavement in front of purple shop		divided by no. of
			sun	shade	sun	shade	sun	shade	
34	34.6	34.9		29.8		29.6		29.8	32.1
62.3	60.6	63.4		44		44.8		40	52.5
36.8	33.5	33		30.4		30.9		29.7	32.4
									#DIV/0!
Data Logger no. 3 - pole 3									
bitumen pathway	concrete gutter	bitumen road	brown tile on shop wall		purple painted brick on shop wa		pavement in front of purple shop		divided by no. of
			sun	shade	sun	shade	sun	shade	
31	30	31.1		29.4		28.7		28.5	29.8
50	47.4	48.2		43		42		40	45.1
44.2	43	44.9	43.7		45.6	40.2	42.3	39	42.9
20.8	22.4	22	20.8		19.3		20.7		21.0

10. Appendix

1.1.3 Site 4 2019 Temperature readings

Data Logger no. 4 - pole 4										
4	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	
bitumen path	metal pole	concrete gutter	bitumen road	tile		brick wall		brick garden wall		average @ data poles
				sun	shade	sun	shade	sun	shade	
25.5	21.4	26.7	27.2	25.8	22.3	25.3	23.7	22.7	21	24.2
60.3	44.7	54.1	56.9	55.5	32.5	48.5	33.2	50	33.6	45.4
55.4	47.7	50.4	51.8	46.4	39.4		40.5	47.5	40.3	45.5
32.3	25.9	29.5	29.9	28.3		28.8		28.3		28.5
Data Logger no. 4 - pole 4										
bitumen path	metal pole	concrete gutter	bitumen road	post office tile on ground		post office brick on wall		brick around garden		divided by no. of
				sun	shade	sun	shade	sun	shade	
27	24.9	27.3	27.6	26.3		24.8		24.1		26.0
43	34.9	39.6	42.3	36.4		33		35.6		37.8
41.1	34.7	37.4	38.2	36.4	27.4		26.7	33.3	27.5	33.6
27.4	22	27.8	27	25		23.2		22.8		25.0
Data Logger no. 4 - pole 4										
bitumen path	metal pole	concrete gutter	bitumen road	post office tile on ground		post office brick on wall		brick around garden		divided by no. of
				sun	shade	sun	shade	sun	shade	
27.9	25.7	28.2	28.4	25.5		25		24.4		26.4
60.1	41.3	53.4	58.6	51.3	38.1		33.1	57.7	32.6	47.4
58.8	42	53	54.9	51				55.9		52.6
Data Logger no. 4 - pole 4										
bitumen path	metal pole	concrete gutter	bitumen road	post office tile on ground		post office brick on wall		brick around garden		divided by no. of
				sun	shade	sun	shade	sun	shade	
34.4	32.9	33.4	34.3	29.6		37.4			28.8	33.0
58.7	37.4	49.8	55.3	46	29.5	39.6		48	29.5	43.8
51.7	39.8	48.3	49.7	42.9	35.8		35.9	46.8	34.6	42.8
28.3	23.2	28.6	27.4	25.2		25.5		25		26.2
Data Logger no. 4 - pole 4										
bitumen path	metal pole	concrete gutter	bitumen road	post office tile on ground		post office brick on wall		brick around garden		divided by no. of
				sun	shade	sun	shade	sun	shade	
31.4	35	31.1	31.6	30.2	27.5	39.8	28.2	26.7	25.7	30.7
69.2	51.6	61.3	63.3	60.7	34.7		44	66.9	35.2	54.1
63.7	51.5	57.6	57	55.6	48.6		47.1	51.7	47.3	53.3
31.6	25.4	31.7	30.1	27.7		28.3		25.6		28.6
Data Logger no. 4 - pole 4										
bitumen path	metal pole	concrete gutter	bitumen road	post office tile on ground		post office brick on wall		brick around garden		divided by no. of
				sun	shade	sun	shade	sun	shade	
31.2	28.7	31.2	31.4	28.1		29.8		26.3		29.5
67.3	45.5	58.8	60.2	61.1	33.3		36.9	67.6	34.1	51.6
54.1	42	49.1	48.9	43.5	35		36.2	44.8	32.5	42.9
27.2	21.1	27.2	26.5	24		25.3		23.6		25.0

Data Logger no. 4 - pole 4										
bitumen path	metal pole	concrete gutter	bitumen road	post office tile on ground		post office brick on wall		brick around garden		divided by no. of
				sun	shade	sun	shade	sun	shade	
30.2	28.6	30.4	31	29.1		27.7		27.2		29.2
47.2	38.4	43.2	45.3	40		36.7		40.4		41.6
32.7	27	31.5	31.6	27.8		27.4		28.5		29.5
26.6	23.4	27.3	26.2	25		25.3		22.7		25.2
Data Logger no. 4 - pole 4										
bitumen path	metal pole	concrete gutter	bitumen road	post office tile on ground		post office brick on wall		brick around garden		divided by no. of
				sun	shade	sun	shade	sun	shade	
34.5	37.4	34.3	34.6	32.5	31.5	42.2	35.2	30.9	28.3	34.1
58.3	51	50.1	54	49.9	26	42.7	29.8	58.4	29.5	45.0
46.1	37.4	37.4	36.6	40.4	31.7		32.6	37.5	31.7	36.8
										#DIV/0!
Data Logger no. 4 - pole 4										
bitumen path	metal pole	concrete gutter	bitumen road	post office tile on ground		post office brick on wall		brick around garden		divided by no. of
				sun	shade	sun	shade	sun	shade	
28.4	26.3	28.8	28.7	26.5	26.2	27.7	26.5		24.5	27.1
40.5	34.4	38.9	40.2		36.3		34.1		36.1	37.2
49.2	40.4	45.7	46.2	41.3	34		35.2	43.8	33.5	41.0
28.4	24.2	29.2	28.5	26.6		26.7				27.3
Data Logger no. 4 - pole 4										
bitumen path	metal pole	concrete gutter	bitumen road	post office tile on ground		post office brick on wall		brick around garden		divided by no. of
				sun	shade	sun	shade	sun	shade	
31.6	35.9	33.8	34.3	30.7	28.9	40.4	31.7	29.1	27.2	32.4
64.2	45.2	56.9	60.6	59.9	34.6	51.8	37	60.5	36.5	50.7
41.5	30.6	37.9	37.7	34.4	30.9		32.1	32.3	29.9	34.1
34.8	29.2	34.8	33.6	32		32.2		28.6		32.2
Data Logger no. 4 - pole 4										
bitumen path	metal pole	concrete gutter	bitumen road	post office tile on ground		post office brick on wall		brick around garden		divided by no. of
				sun	shade	sun	shade	sun	shade	
33.7	31.9	33.6	33.8	30.6		31.8	29.8	28.5		31.7
64.8	53.2	58.3	62.7	58.2	41.1	56.4	41	61.5	44.4	54.2
36.1		35.6	35.1		34		32.7		31.6	34.2
										#DIV/0!
Data Logger no. 4 - pole 4										
bitumen path	metal pole	concrete gutter	bitumen road	post office tile on ground		post office brick on wall		brick around garden		divided by no. of
				sun	shade	sun	shade	sun	shade	
30.4		31	30.9	29.3		31		27.1		30.0
48.7		47.2	49.7	45.3		44.8		48.6		47.4
44.9		43.1	44	41.8	39		41.1	44.3	39	42.2
21.2		22.3	22		19.6	20.3		18.4		20.6

10. Appendix

1.1.4 Site 5 2019 Temperature readings

Data Logger no. 5 - pole 5							
5.1	5.2	5.3	5.4	5.5	5.6	5.7	
bitumen path	concrete driveway	concrete gutter	bitumen road	metal pole	metal bin		average @ data poles
					sun	shade	
24	24.1	23.8	25.3	27.1	38.5	25.7	26.9
59	52.7	54.5	59.1		47.3	43.5	52.7
54.2	50.1	51.5		49.3	63.1	45.3	52.3
32.3	30.8	31.1	31.6	29.2	26.3		30.2
Data Logger no. 5 - pole 5							
bitumen path	concrete driveway	concrete gutter	bitumen road	metal pole	side of metal bin		divided by no. of
					sun	shade	
26.7	26.3	25.9	28.4		24.8		26.4
41.8	38.8	38.7	43.7	37	37.1		39.5
40.2	35.7	35.8	38.8	33.9	46.7	29.8	37.3
27	26.6	26.4	27.7	23.5	21.8		25.5
Data Logger no. 5 - pole 5							
bitumen path	concrete driveway	concrete gutter	bitumen road	metal pole	side of metal bin		divided by no. of
					sun	shade	
27.8	27.5	27.2	29	27.6	27.1		27.7
59.4	53.6	55	59.2	43.6	46.3	42.9	51.4
57	51.7	53.7	52.3	40.2	59	46	51.4
Data Logger no. 5 - pole 5							
bitumen path	concrete driveway	concrete gutter	bitumen road	metal pole	side of metal bin		divided by no. of
					sun	shade	
34.9	33.8	34.1	36.2	33.2	41.2	32	35.1
58.4	52	54.2	58.7	40.2	43.1	38	49.2
53.6	48.1	49.3	49.9	41.4	59.3	39.5	48.7
30.2	29	29.9	30	27	23.6		28.3

Data Logger no. 5 - pole 5							
bitumen path	concrete driveway	concrete gutter	bitumen road	metal pole	side of metal bin		divided by no. of
					sun	shade	
34.8	32.4	33.4	34.8	34.9	42.7	31.7	35.0
58.7	51	53.7	57	39.5	46.3	43.8	50.0
44.1	41.6	43.9	44.1	38	54.5	35.7	43.1
							#DIV/0!
Data Logger no. 5 - pole 5							
bitumen path	concrete driveway	concrete gutter	bitumen road	metal pole	side of metal bin		divided by no. of
					sun	shade	
28.2	28.7	29	29.6	27	29.2	25.9	28.2
41.8	39.1	40.6	41.9	34.6	37.1	36.6	38.8
49.6	45	46.3	47.3	39.4	54.5	38.3	45.8
29.4	29	29.9	29.8	26.7	24.1		28.2
Data Logger no. 5 - pole 5							
bitumen path	concrete driveway	concrete gutter	bitumen road	metal pole	side of metal bin		divided by no. of
					sun	shade	
32.9	33	32.4	34.4	34.4	43.2	34.3	34.9
62.3	57.8	58.5	63.7	51	53.1	47.6	56.3
43.1	40	40.5	40.3	31	37.3	32.4	37.8
35.4	34.8	35.5	34.9	31.9	29.8		33.7
Data Logger no. 5 - pole 5							
bitumen path	concrete driveway	concrete gutter	bitumen road	metal pole	side of metal bin		divided by no. of
					sun	shade	
33.5	33.4	34.6	33.9	32.8	33.4		33.6
60.8	55.4	56.1	60.8		–	—	58.3
35.6	36.6	35.1	36		31.5		35.0
							#DIV/0!

10. Appendix

1.1.5 Site 6 2019 Temperature readings

Data Logger no. 6 - round concrete thing								
6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	
concrete round thing	bitumen pathway	brick wall		concrete pathway		new concrete gutter	bitumen road	average @ data poles
		sun	shade	sun	shade			
22.3	25.5	21		23.7	21.4	18.8	22.4	22.2
56.1	62.3		35.5	48.3	32.2	50.2	61.3	49.4
54.9	52.8	46.8	44.1	45.4	40.3	46.5	55.9	48.3
30.3	31.2	28.9		30.7		29.9	32.7	30.6
Data Logger no. 6 - round concrete thing								
concrete round thing	bitumen pathway	ick wall under butcher special si		crete pathway under special		new concrete gutter	bitumen road	divided by no. of
		sun	shade	sun	shade			
24.9	27	24.2		24.8		24.2		25.0
37.9	39.1	31.8		31.4		34.1		34.9
37	36	31.2	29.2	32.1	28.5	32.7	40.2	33.4
24.7	25.3	22.8		24.4		24.7	27.2	24.9
Data Logger no. 6 - round concrete thing								
concrete round thing	bitumen pathway	ick wall under butcher special si		crete pathway under special		new concrete gutter	bitumen road	divided by no. of
		sun	shade	sun	shade			
26.3	27.3	24.5		26		25.3	28.2	26.3
56.4	58.3		35	50.1	32.3	48.8	59.5	48.6
55	54			47.9		47	48.9	50.6
Data Logger no. 6 - round concrete thing								
concrete round thing	bitumen pathway	ick wall under butcher special si		crete pathway under special		new concrete gutter	bitumen road	divided by no. of
		sun	shade	sun	shade			
30.4	34.4		27.7	31.3	30	29.1	35.1	31.1
52.9	52.2		33.3	45.8	30.8	46.3	56.1	45.3
51.6	48.8	41.7	38.4	49.9	38.8	44.4	53	45.8
28.9	29.6	27.3		30.6		27.8	31.4	29.3
Data Logger no. 6 - round concrete thing								
concrete round thing	bitumen pathway	ick wall under butcher special si		crete pathway under special		new concrete gutter	bitumen road	divided by no. of
		sun	shade	sun	shade			
29.2	32.6	31.6	27.5		27.2	27.4	31	29.5
65.6	69.9		40.9	58.5	35.7	55.9	68.7	56.5
61.6	61.4	48.9	45.7	59.5	54.7	54.1	62.9	56.1
30.9	32.1	29.3		33.4		30.9	33.1	31.6
Data Logger no. 6 - round concrete thing								
concrete round thing	bitumen pathway	ick wall under butcher special si		crete pathway under special		new concrete gutter	bitumen road	divided by no. of
		sun	shade	sun	shade			
27.7	30.2	26.7		30.2		27.9	30.4	28.9
60.4	57.7		34.7	52.4	29.8	53	64.5	50.4
54.8	50.1	42.5	37.6	48.6	38.8	46.2	55	46.7
26.9	27.5		24.9	28.6		26.8	29.5	27.4

Data Logger no. 6 - round concrete thing								
concrete round thing	bitumen pathway	ick wall under butcher special si		crete pathway under special		new concrete gutter	bitumen road	divided by no. of
		sun	shade	sun	shade			
27.5	28.7	26.6		27.3		26.9	30.2	27.9
42.3	44.2	35.7		37.2		41.4	46.5	41.2
30.4	30.7	28		28.3		29.3	32.4	29.9
24.8	25.5	24.6		26.1		24.7	26.1	25.3
Data Logger no. 6 - round concrete thing								
concrete round thing	bitumen pathway	ick wall under butcher special si		crete pathway under special		new concrete gutter	bitumen road	divided by no. of
		sun	shade	sun	shade			
31.4	33.9		28.4	30	29.4	28.6	32.8	30.6
56.1	51.4		35	48.6	30.7	48.6	59.3	47.1
44.7	44.3	36.2	34.9	41.3		40.4	46.9	41.2
								#DIV/0!
Data Logger no. 6 - round concrete thing								
concrete round thing	bitumen pathway	ick wall under butcher special si		crete pathway under special		new concrete gutter	bitumen road	divided by no. of
		sun	shade	sun	shade			
27.5	28.6		25.6	27.2	25.7	25.8	28.5	27.0
39.2	40.4		33		33.3	36.6	41	37.3
46.8	45.7	42.6	37.3	38.7	35.7	41.2	47.9	42.0
27.5	28.5	26.7		28.5		25.4	29.7	27.7
Data Logger no. 6 - round concrete thing								
concrete round thing	bitumen pathway	ick wall under butcher special si		crete pathway under special		new concrete gutter	bitumen road	divided by no. of
		sun	shade	sun	shade			
30.9	34	32.9	29.9		29.4	29.4	32.5	31.3
63.1	62.5		39.2	54.8	34.6	56.6	66.9	54.0
41.8	40.3	33.7	33.4	39.3		37.8	44.7	38.7
33.2	34.4	31.2		32.1		32.1	35.8	33.1
Data Logger no. 6 - round concrete thing								
concrete round thing	bitumen pathway	ick wall under butcher special si		crete pathway under special		new concrete gutter	bitumen road	divided by no. of
		sun	shade	sun	shade			
31.2	34.2		29.3	32	30.4	30.3	34.2	31.7
59.5	56		42	52.7	40	53.2	60.8	52.0
37.5	36.3	33.3	33.1	36.2	31.9	36	39.4	35.5
								#DIV/0!
Data Logger no. 6 - round concrete thing								
concrete round thing	bitumen pathway	ick wall under butcher special si		crete pathway under special		new concrete gutter	bitumen road	divided by no. of
		sun	shade	sun	shade			
28.5	31		27.5		29.3	28.6	31.3	29.4
48.2	49.6	42.6		42.7		46.6	51.4	46.9
43.6	42	42.3	39.5	41.1	41.6	41.6	45.6	42.2
21.1	20.9	20		22		21.6	22.7	21.4

10. Appendix

1.1.6 Site 7 2019 Temperature readings

Data Logger no. 7 - first tree pit								
7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	average @ data poles
grass in sun	grass in shade	sun	shade					
20.2	18	28.7	18.1	21.1	19.2	21.5	23.5	21.3
47		69.4		33	32.6	53.3	55.3	48.4
38.8	35.9	50.5		43.8	40.7	47.9	50	43.9
22.2		23		21.5	24.7	31	31.5	25.7
Data Logger no. 7 - first tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
24.2		24.3		23.7	23.6	26.7	27.2	25.0
32.2		42.3		32.2	30.4	36.9	38.8	35.5
30	26.5	38.5	29.4	31.9	27.5	36.8	39.3	32.5
20.8		20.5		20	20.6	26.5	26.5	22.5
Data Logger no. 7 - first tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
25.6		26.3		25.6	24	27.1	28.2	26.1
51.2		70		58.6	36.8	50.4	56.5	53.9
37.3		53.2		49.9	35.5	49.6	53.4	46.5
Data Logger no. 7 - first tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
32.1	31.8	36.4		32.5	30	33.5	36.4	33.2
39		60.2		51	32	47.9	52.7	47.1
39.1	31.5	49	33.9	42.9	38.1	46.1	48.2	41.1
20.5		21.5		21.8	23.2	30.1	29.9	24.5
Data Logger no. 7 - first tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
28	25	26.9		27.9	29.1	29.6	31.3	28.3
51.6		77.1		70.5	46	57.3	64.8	61.2
47.3	42.4	57.8	42.9	49.7	42.6	53.7	52	48.6
24.2		23.7		23.8	25.2	32.1	31.7	26.8
Data Logger no. 7 - first tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
27		27.4		27	25.6	30.1	30.8	28.0
59.6		73.8		62.7	42.3	55	60.7	59.0
39.6	32.2	48.3	35.7	41.5	36.9	47.4	50.2	41.5
19		18.1		17.7	22	27.7	27.7	22.0

Data Logger no. 7 - first tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
26.9		28.1		26	26.2	29.2	30	27.7
40.4		45.1		38.2	32.9	38.9	42.9	39.7
27		28		26.3	25.7	30.5	32	28.3
20.2		20.6		20.5	21.6	25.3	26	22.4
Data Logger no. 7 - first tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
34.4	29.9	33.8	28.3	35.6	31.6	29.8	31.9	31.9
65		74.6		70.2	37.7	45.9	56.6	58.3
	32.4		37.6	32.1	34.6	40.4	41.1	36.4
								#DIV/0!
Data Logger no. 7 - first tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
26			25.6	26.9	24.7	28.2	28.7	26.7
	38.4		42.8	40.8	33.3	38	38.6	38.7
41.2	35.5	49.1	36	44	38.9	41.9	45.4	41.5
23.4		21.9		22.6	23.8	28.4	28.1	24.7
Data Logger no. 7 - first tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
31.4	28.2	30.3		31.6	2.6	30.9	33	26.9
56.2		73		66.7	43.3	55.8	60.8	59.3
31.4		36.7		32.1	34.2	41.7	40.6	36.1
26.8		26		25.7	28.3	34.8	35.1	29.5
Data Logger no. 7 - first tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
32.7	30.4	30.9	29.9	32.1	27.9	32.5	34.2	31.3
54.8		64.2		54.8	42.1	51.7	56.1	54.0
32.1		34.1		32.1	31.8	37.2	38.2	34.3
								#DIV/0!
Data Logger no. 7 - first tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
28.9		28.2		27.8	26.1	29.5	30.6	28.5
49.7		53.8		48.6	42.4	46.5	48	48.2
	35.3		38.9	36.2	38.2	38.7	39.1	37.7
17.3		17.1		17.7	19.2	23.4	23.3	19.7

10. Appendix

1.1.7 Site 8 2019 Temperature readings

Data Logger no.8 - second last tree pit								
8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	average @ data poles
grass in sun	grass in shade	sun	shade					
18.6	16.8	17.7	16	19.1	19.6	20.6	23.3	19.0
58.1		71.2		33.6	30.5	49.4	57	50.0
38.9	33.2	47.1	37.5	38	31.5	35.9	47.2	38.7
22.4		22.8		21.3	25.1	31	31.1	25.6
Data Logger no.8 - second last tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
24.1		24.6		23.6	23.2	26.4	26.9	24.8
35.3		43.5		33.8	31.5	37.4	42.4	37.3
33.9	29.5	40.1	35.3	32.2	29.9	38.2	39	34.8
20.6		20.9		20.6	20.7	25.5	26.9	22.5
Data Logger no.8 - second last tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
24.7		25.5		24.7	24.1	26.2	28	25.5
54		70.5		60.4	40.2	52.3	60	56.2
39.2		51.2		50.8	38.5	51	59.8	48.4
Data Logger no.8 - second last tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
31.7	30.3	34.8		31.1	28.6	32.8	36.1	32.2
52.9		62.2		54	33.4	49.9	58.1	51.8
40.1	32.3	47.1	34.7	41.1	44.1	47.7	49.2	42.0
21.1		22		21.6	23.3	30.4	30.1	24.8
Data Logger no.8 - second last tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
28.2	25.3	28.5		28	29.7	29.6	32	28.8
74.1		79.6		73.1	43.9	60.8	68.4	66.7
49.8	40.5	48.1	41.7	43.5	40.4	53.9	56.1	46.8
24.3		24.3		24.6	25.9	33.7	33.1	27.7
Data Logger no.8 - second last tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
26.9		27.7		27.3	26.3	30.2	31.7	28.4
60.9		76.9		67.4	44.6	57.6	64.9	62.1
44.8	33.3	53.2	37.8	41.4	39.1	48.9	51.9	43.8
18.7		19.1		18.3	21.1	29.8	28.9	22.7

Data Logger no.8 - second last tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
25.9		26.9		24.7	25	28.6	30	26.9
40.3		44		35.3	33.6	40.2	44.4	39.6
26.3		27		26.3	25.8	30.2	31.3	27.8
19.2		20.3		20.2	21.4	25.5	26.1	22.1
Data Logger no.8 - second last tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
33.3	28.6	33.6		31.9	34.3	29.9	32.2	32.0
65.5		77.2		65.5	37	49.9		59.0
32.8		38.5	36.3	32.7	32.7	43.1	44.4	37.2
								#DIV/0!
Data Logger no.8 - second last tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
29.7	28.8	27.1		28.8	30.8	30.3	31.1	29.5
	38.4		42.6	39.2	34.2	38.5	41	39.0
44.3	34.4	49.8	38.7	46.8	39.5	44.5	46.8	43.1
22.6		22.7		22.2	24.7	29.8	29.4	25.2
Data Logger no.8 - second last tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
28.9	27.1	29.1		29.7	30	29.8	32.1	29.5
73.1	43.7	78	50.4	71.5	41.8	54.3	61.8	59.3
	31.6		34.6	31.2	32	40.1		33.9
26		25.1		25.4	28.3	33.8	33	28.6
Data Logger no.8 - second last tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
32.1	31.4	31	30	31.6	28.6	31.8	33.8	31.3
68.5		62.2		63.1	43	54	62.3	58.9
32.5		33.5		32.5	32.7	36.6	36.6	34.1
								#DIV/0!
Data Logger no.8 - second last tree pit								
hind tree pit -closest side to hous		black tree pit		bark in garden	tree trunk	in front of tree pit - gutter	bitumen road	divided by no. of
grass in sun	grass in shade	sun	shade					
28.3		27.8		27.8	25.7	28.8	30.2	28.1
48.6		49.4		44.3	40.8	42.7		45.2
	34.4		37.8	38.5	43.8	39.4	40.5	39.1
17.3		18.3		18.5	20.6	25		19.9

10. Appendix

1.2.1 Site 1 2020 Temperature readings

Data Logger no.1 - pole 1 - St Vincent de Paul											
Monday, 10 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am (0800-0820)	20.6	20.6	20.5	-	20.3	20.3	20.8	21.8	-	21.0	20.7
12pm (1200-1220)	38.9	31.4	25.6	27.3	-	31.6	30.8	30.1	31.0	-	30.8
5pm (1710-1720)	19.1	20.6	21.2	-	20.4	21.9	24.5	22.1	-	22.7	21.6
10pm (2150-2200)	17.8	20.9	21.3	19.1		19.3	21.1	19.5	20.7		20.0
Data Logger no.1 - pole 1											
Tuesday, 11 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am (0830-0850)	23.5	23.6	23.2	22.7	20.3	22.1	23.1	22.9	25.0	20.1	22.7
12pm (1150-1210)	50.0	33.2	25.3	21.1	-	33.6	36.9	33.8	40.8	-	34.3
5pm (1700-1720)	37.9	34.7	30.8	32.3	31.4	39.3	39.6	35.1	39.8	31.4	35.2
10pm (2220-2230)	21.5	25.4	23.5	21.0		26.1	27.0	24.5	26.9		24.5
Data Logger no.1 - pole 1											
Wednesday, 12 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am	24.2	24.7	23.2	-	22.0	23.2	24.2	23.1	-	24.1	23.6
12pm	37.3	36.0	29.9	-	29.2	36.6	36.6	34.6	-	36.5	34.6
5pm	22.2	24.8	20.0	-	24.4	27.3	27.7	24.4	-	27.8	24.8
10pm	22.4	26.9	25.7	23.7		25.5	27.1	24.9	27.3		25.4
Data Logger no.1 - pole 1											
Thursday, 13 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am	22.4	23.4	21.9	-	21.3	22.5	23.5	22.4	-	23.9	22.7
12pm	31.6	27.9	28.7	-	27.4	30.0	30.4	29.2	-	29.7	29.4
5pm	26.9	26.7	24.0	-	25.8	26.5	27.4	24.3	-	26.5	26.0
10pm	18.0	21.4	21.3	18.7		20.7	20.8	19.8	21.7		20.3
Data Logger no.1 - pole 1											
Friday, 14 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am (0820-0830)	20.6	21.7	21.6	-	21.1	21.7	22.7	21.0	-	22.8	21.7
12pm (1205-1220)	33.2	25.6	20.5	17.6	-	28.4	29.2	27.0	29.3	-	26.4
5pm (1705-1720)	30.7	29.0	25.4	28.2	27.5	34.5	33.8	30.3	35.7	28.6	30.4
10pm (2220-2230)	15.4	21.4	20.7	19.0		22.8	23.3	20.0	23.6		20.8

Data Logger no.1 - pole 1											
Monday, 17 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am (0750-0800)	19.3	21.9	20.6	-	20.0	20.4	21.8	20.8	-	21.3	20.8
12pm (1150-1205)	22.9	22.4	23.6	-	22.8	22.7	23.9	22.9	-	23.5	23.1
5pm (1725-1740)	33.4	30.2	27.2	29.9	26.3	27.4	28.5	27.4	29.4	26.0	28.6
10pm (2235-2245)	21.3	23.5	23.9	23.1		22.6	23.4	22.2	23.1		22.9
Data Logger no.1 - pole 1											
Tuesday, 18 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am (0850-0905)	29.1	24.6	23.8	-	21.4	24.6	26.0	23.7	24.4	22.8	20.8
12pm (1220-1240)	51.3	36.9	27.3	-	21.9	43.5	39.4	36.0	42.9	23.8	23.1
5pm (1715-1730)	42.6	38.9	32.3	34.4	33.5	41.7	41.9	38.0	39.1	29.3	37.2
10pm (2215-2225)	25.9	28.8	27.2	24.0		30.7	29.5	28.2	30.2		28.1
Data Logger no.1 - pole 1											
Wednesday, 19 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am	21.7	23.0	24.4	-	21.4	22.9	22.3	22.9	23.4	23.2	22.8
12pm	53.8	40.0	24.8	-	17.5	44.8	38.6	35.3	43.8	24.2	35.9
5pm	30.2	38.7	28.5	27.3	23.0	37.1	37.1	33.4	38.7	-	32.7
10pm	19.6	26.6	24.6	18.9		26.8	26.0	23.6	26.6		24.1
Data Logger no.1 - pole 1											
Thursday, 20 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am	22.7	20.6	19.6	-	15.3	21.8	23.0	22.1	25.6	19.6	21.1
12pm	38.5	33.1	25.1	-	23.9	35.0	32.7	30.8	-	33.6	31.6
5pm	18.6	20.5	15.2	-	16.0	24.7	26.1	21.8	-	26.5	21.2
10pm	21.7	25.9	23.3	21.4		24.6	25.8	23.9	26.0		24.1
Data Logger no.1 - pole 1											
Friday, 21 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am (0820-0830)	25.2	26.8	24.5	-	23.7	25.4	26.0	24.5	-	26.7	25.4
12pm (1220-1240)	26.0	26.6	24.5	-	26.4	28.0	28.2	25.7	-	27.6	26.6
5pm (1715-1730)	29.5	29.2	26.7	29.7	-	30.5	32.8	30.2	31.9	29.0	29.9
10pm (2150-2205)	17.2	21.1	20.2	20.0		22.2	23.2	20.7	23.2		21.0

Data Logger no.1 - pole 1											
Monday, 24 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am (0730-0740)	19.3	21.8	21.1	-	20.8	21.3	22.3	21.1	-	22.3	21.3
12pm (1220-1230)	35.1	31.4	27.1	-	31.5	31.4	33.0	29.9	-	32.0	31.4
5pm (1705-1720)	26.0	26.6	24.5	-	26.4	28.0	28.2	25.7	-	27.6	26.6
10pm (2225-2235)	19.1	22.5	21.2	21.2		22.0	22.5	20.8	22.9		21.5
Data Logger no.1 - pole 1											
Tuesday, 25 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am (0820-0835)	22.9	27.2	25.0	-	22.2	28.0	27.4	25.2	27.6	24.8	25.6
12pm (1220-1230)	48.0	37.9	28.8	-	26.1	47.0	39.9	36.9	44.4	25.6	37.2
5pm (1705-1720)	39.9	38.7	28.3	38.5		44.8	42.0	37.8	42.2	36.0	38.7
10pm (2225-2235)	20.0	24.6	24.3	23.0		26.6	26.3	24.0	26.6		24.4
Data Logger no.1 - pole 1											
Wednesday, 26 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am	27.8	26.1	23.3	-	24.6	26.9	27.6	28.6	-	27.5	26.6
12pm	47.2	31.0	24.9	-	24.6	41.7	37.4	37.6	39.8	24.2	34.3
5pm	20.1	24.2	17.1	-	22.3	22.1	22.7	23.4	-	24.2	22.0
10pm	22.2	25.0	24.1	21.0		24.7	23.'7	22.9	23.4		23.3
Data Logger no.1 - pole 1											
Thursday, 27 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am (0810-0820)	21.1	22.8	22.0	-	20.3	21.7	23.8	21.9	-	22.6	22.0
12pm (1230-1245)	34.2	29.9	24.6	-	26.8	26.8	31.3	28.5	-	31.0	29.1
5pm (1650-1710)	30.8	33.4	28.8	35.8	34.1	34.5	35.3	30.7	34.2	29.0	32.7
10pm (2205-2215)	18.1	21.5	20.2	20.2		21.0	21.5	19.8	21.9		20.5
Data Logger no.1 - pole 1											
Friday, 28 February 2020	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	**Timber seat of table**	**Metal on table frame**	**Cream tile on shop front**	**Edge brown brick**		**Edge concrete**	**Concrete gutter**	**White reflective curb**	**Ground concrete**		**average @ data poles**
				sun	**shade**				**sun**	**shade**	
8am	19.9	24.9	20.2	-	18.0	23.6	20.6	21.9	20.7	22.2	21.3
12pm	48.2	30.7	23.4	-	23.3	40.7	34.2	36.3	39.7	23.3	33.3
5pm	19.5	25.5	20.8	23.1	-	23.0	26.5	24.0	28.2	23.5	23.8
10pm	15.5	20.3	19.6	16.6		18.4	19.1	18.2	20.1		18.5

10. Appendix

1.2.2 Site 2 2020 Temperature readings

Data Logger no. 2 - pole 2 - Shop with brown tile wall													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
20.0	-	20.6	-	21.0	20.3	21.7	-	21.0	21.2	22.0	-	20.0	20.9
37.7	-	32.7	-	31.2	29.3	31.6	-	29.2	26.7	39.7	30.9	-	32.1
18.5	-	19.7	-	23.1	22.2	-	19.9	21.5	23.4	24.8	-	24.0	21.9
17.5	-	21.0	-	20.3	19.6	18.9		19.2	22.0	20.8	20.7		20.0
Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
24.2	-	24.6	10.2	26.3	24.8	25.3	-	24.1	24.2	28.7	25.2	24.2	23.8
47.5	-	37.6	11.9	38.0	30.0	-	25.7	33.1	23.9	53.1	40.1	-	34.1
41.7	31.8	36.8	11.7	41.7	40.4	37.6	28.8	37.1	30.1	49.9	42.7	-	35.9
22.5		26.1	17.0	29.7	26.0	22.6		25.2	23.8	28.4	27.7		24.9
Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
-	24.0	24.6	18.0	24.8	24.1	-	23.3	23.3	22.8	25.7	-	34.9	24.6
-	35.5	34.5	27.5	33.0	34.2	-	34.8	32.5	28.2	41.6	-	24.6	32.6
-	20.9	25.1	22.1	26.8	25.5	-	21.1	24.7	20.4	29.2	-	25.8	24.2
21.9		14.3	-	26.0	25.2	21.8		24.0	24.1	26.2	24.9		23.2
Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
-	21.9	23.8	20.0	23.4	22.9	-	21.9	22.6	22.6	24.6	-	21.2	22.5
-	30.5	27.3	22.9	28.1	29.1	-	29.1	28.5	26.5	35.1	-	28.7	28.6
-	27.3	26.7	18.2	28.0	27.8	-	26.6	26.4	25.8	32.7	-	28.1	26.8
17.7		20.7	6.0	22.1	20.9	18.8		19.8	22.3	21.9	20.6		19.1
Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
-	20.8	21.8	19.1	22.4	22.1	-	21.9	21.3	22.2	23.1	-	22.8	21.8
42.1	-	33.0	5.1	37.4	27.9	30.5	23.8	26.6	25.4	40.8	30.1	-	29.3
31.8	23.5	30.6	1.2	21.7	32.2	27.8	20.3	27.8	21.5	42.2	33.3	-	26.2
16.9		21.4	8.4	23.9	22.3	16.8		20.4	19.8	24.5	23.4		19.8

Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
-	20.4	21.5	18.8	21.6	21.0	-	20.7	20.8	20.6	21.8	-	22.2	20.9
-	22.1	22.9	22.2	23.7	22.9	-	23.2	22.8	23.6	23.9	-	24.0	23.1
36.9	27.4	30.3	13.8	29.4	28.4	32.2	27.8	27.9	29.2	33.8	29.3	27.8	28.8
21.9		22.5	12.1	23.9	23.3	22.1		22.6	24.1	23.8	23.3		22.0
Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
26.2	22.2	24.6	16.6	25.0	24.1	27.5	23.2	24.0	23.8	29.5	26.5	24.8	24.5
51.9	-	42.9	27.3	40.1	37.0	32.4	27.4	37.0	25.5	53.7	41.4	-	37.9
47.9	35.8	40.6	27.0	42.1	40.5	41.8	29.4	39.0	30.7	50.7	41.6	39.0	38.9
25.5		28.9	18.1	29.8	28.8	24.1		28.3	26.5	32.6	29.6		27.2
Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
25.3	23.1	24.4	8.4	23.8	23.4	23.6	23.0	24.0	25.3	27.4	24.2	-	23.0
46.9	-	32.3	28.1	37.6	34.9	37.7	17.4	35.1	23.5	29.5	38.2	31.1	32.7
38.9	33.6	36.1	30.7	36.9	35.5	31.4	28.7	34.7	29.3	39.8	37.3	-	34.4
18.4		24.1	10.9	26.0	23.4	18.5		23.0	24.5	24.1	24.0		21.7
Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
22.3	20.8	21.2	19.9	24.5	24.0	30.1	16.6	20.8	19.2	29.9	25.6	22.9	22.9
-	36.0	30.9	21.9	33.8	30.7	-	36.5	26.8	22.8	38.5	-	31.3	30.9
-	14.2	22.9	16.7	25.0	22.8	20.3	14.1	20.0	16.8	30.7	-	22.8	20.6
20.7		24.7	18.7	25.5	24.4	19.4		23.5	23.6	26.0	24.3		23.1
Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
-	25.0	27.3	24.8	26.4	25.4	-	25.4	24.6	25.2	28.9	-	26.0	25.9
-	27.6	28.5	19.1	29.7	28.7	-	27.8	27.1	25.4	32.9	-	28.7	27.6
33.3	29.6	31.6	12.1	36.1	33.5	33.2	28.9	32.0	28.4	41.2	34.9	-	31.2
18.2		22.3	16.2	23.4	21.7	17.5		20.6	20.6	24.9	23.0		20.8

Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
-	20.2	23.0	17.8	22.8	21.8	-	20.9	21.2	21.8	23.0	-	22.8	21.5
-	37.5	32.6	22.9	33.6	32.7	-	34.3	31.4	28.1	40.9	-	34.9	32.9
-	27.6	28.5	19.1	29.7	28.7	-	27.8	27.1	25.4	32.9	-	28.7	27.6
19.5		22.0	14.3	23.1	21.8	19.2		21.4	21.4	24.7	23.0		21.0
Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
25.6	23.2	27.3	8.8	27.2	26.0	29.2	23.7	24.6	25.5	31.2	27.3	26.8	25.1
58.4	-	41.9	21.5	49.6	48.3	59.5	33.5	42.0	29.8	55.0	45.5	-	44.1
38.9	31.2	36.2	21.9	42.8	39.8	33.8	32.0	37.2	29.2	40.0	39.7	-	35.2
21.1		26.0	10.1	28.1	25.3	20.5		24.1	23.7	25.2	26.4		23.1
Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
29.7	26.6	29.5	27.3	27.4	27.2	33.0	27.5	28.2	27.1	32.0	29.6	29.2	28.8
45.2	31.4	35.4	29.8	36.3	33.5	44.9	32.8	34.1	26.8	46.0	37.6	31.7	35.8
	21.1	23.6	24.2	27.1	23.7		15.7	23.1	23.1	29.9		24.9	23.6
22.3		21.8	23.9	24.6	23.2	20.6		22.8	24.2	25.5	24.6		23.4
Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
-	21.3	22.5	18.5	23.8	22.4	-	20.8	21.9	22.1	23.6	-	23.6	22.1
-	34.5	30.2	22.7	31.7	29.9	-	30.5	28.8	25.7	35.9	-	31.5	30.1
39.7	27.2	31.2	6.9	35.7	32.6	40.2	26.3	31.9	27.7	42.0	35.1	-	31.4
18.5		21.0	13.4	22.1	20.8	18.2		20.4	20.4	23.7	22.0		20.1
Data Logger no. 2 - pole 2													
2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground concrete	Edge concrete	Wood chips		White reflective curb	Red painted tile on shop front	Asphalt	Concrete gutter		average @ data poles
sun	shade	Side	Top			Sun	Shade				Sun	Shade	
29.7	22.6	23.2	19.5	24.0	21.2	25.7	19.4	21.0	21.4	27.0	22.9	22.4	23.1
46.7	31.5	29.0	30.2	26.9	27.2	32.5	32.1	34.3	25.7	47.1	40.3	32.8	33.6
31.7	20.3	23.7	23.7	30.3	26.4	23.0	19.7	25.3	20.4	35.8	26.9	25.2	25.6
16.0		19.6	15.6	21.1	19.7	15.4		18.8	20.0	21.9	19.6		18.8

10. Appendix

1.2.3 Site 3 2020 Temperature readings

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
20.4	19.5	21.2	-	19.8	-	21.0	20.7	-	20.4
31.8	26.7	27.4	32.9	-	34.7	-	30.1	-	30.6
20.2	19.5	19.9	-	21.6	-	21.3	-	20.0	20.4
19.5	20.4	20.9	19.4		20.5		21.1		20.3

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
24.2	25.0	26.1	25.4	24.2	26.2	24.3	25.8	24.3	25.1
35.1	25.6	26.5	40.7	-	39.3	28.8	36.6	30.5	32.9
40.4	31.0	31.6	43.7	-	37.9	33.7	30.7	26.7	34.5
23.1	23.8	23.9	27.9		23.9		27.2		25.0

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
22.0	21.6	22.4	-	21.8	-	31.7	-	23.7	23.9
33.8	27.2	30.2	-	34.4	-	22.0	-	33.7	30.2
25.1	19.3	21.5	-	26.1	-	25.7	-	24.7	23.7
22.1	22.7	23.5	24.4		22.5		25.1		23.4

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
21.5	21.6	22.4	-	21.9	-	22.2	-	23.0	22.1
30.1	25.3	27.6	-	30.4	-	30.6	-	28.7	28.8
29.4	24.4	25.5	-	29.6	-	29.2	-	26.9	27.5
19.0	21.0	21.8	20.5		20.3		21.7		20.7

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
21.9	20.7	23.0	-	22.1	-	22.1	-	21.5	21.9
41.7	26.0	27.9	37.2	-	35.6	26.4	33.7	23.1	31.5
34.8	21.1	22.3	33.7	-	25.6	21.9	32.5	19.2	26.4
20.1	19.1	20.3	22.6		19.9		22.4		20.7

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
21.6	21.3	22.1	-	21.1	-	21.8	-	21.9	21.6
22.8	22.1	23.2	-	22.9	-	23.5	-	23.6	23.0
33.1	27.9	30.6	30.8	29.7	31.4	29.3	32.6	29.3	30.5
22.0	23.4	24.2	22.7		23.0		22.8		23.0

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
22.8	23.0	25.8	24.3	22.8	25.8	22.7	25.4	22.8	23.9
45.6	27.6	29.4	40.0	-	40.7	33.6	40.0	24.6	35.2
43.5	32..3	33.2	45.7	44.4	41.8	37.2	34.9	29.7	38.8
26.3	26.1	26.5	30.8		27.6		29.2		27.8

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
24.0	24.7	25.5	23.5	-	22.6	21.5	22.6	21.5	23.2
37.5	25.0	27.4	43.6	32.6	50.4	27.2	46.2	37.4	36.4
36.2	29.3	31.2	41.3	38.5	40.6	26.0	41.0	35.1	35.5
19.8	21.6	23.2	24.9		24.0		24.5		23.0

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
19.1	18.8	21.5	31.2	18.0	25.7	18.1	25.5	21.4	22.1
26.6	21.5	24.7	-	27.6	-	29.5	-	28.5	26.4
22.0	15.6	18.3	-	22.2	-	23.5	-	19.6	20.2
20.7	21.0	21.6	23.5		23.4		23.8		22.3

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
23.8	23.1	24.4	-	24.9	-	24.1	-	26.3	24.4
29.0	24.8	26.8	-	29.0	-	30.3	-	28.6	28.1
38.7	27.6	29.8	-	36.0	37.4	25.2	35.2	32.7	32.8
20.9	19.8	20.9	22.2		23.0		23.7		21.8

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
21.1	21.7	22.1	-	21.3	-	21.7	-	22.6	21.8
37.5	28.1	31.7	-	35.1	-	36.5	-	33.6	33.8
29.0	24.8	26.8	-	29.0	-	30.3	-	28.6	28.1
21.7	20.8	21.9	22.6		22.0		22.7		22.0

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
23.9	24.9	26.1	26.6	24.4	26.5	23.4	26.6	24.7	25.2
55.9	32.5	34.7	50.5	-	55.0	41.8	46.6	29.4	43.3
53.4	31.4	32.9	50.2	39.8	55.4	41.1	45.6	30.7	42.3
28.3	22.7	23.8	27.6		26.4		22.2		25.2

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
26.0	25.1	27.4	29.2	26.8	30.3	26.6	29.0	26.8	27.5
46.6	27.1	31.1	40.7	33.2	49.1	34.2	39.1	24.4	36.2
24.3	16.2	19.0	-	23.3	-	24.4	-	23.0	21.7
23.7	25.1	25.3	24.3		25.0		25.6		24.8

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
21.6	21.4	22.4	-	21.6	-	22.6	-	23.1	22.1
34.5	25.3	28.0	-	31.1	-	34.8	-	31.8	30.9
40.4	27.4	29.2	37.0	29.2	38.4	30.1	30.1	27.0	32.1
20.7	19.8	20.9	21.6		21.0		21.7		21.0

Data Logger no. 3 - pole 3									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
20.2	20.6	22.6	23.2	21.2	27.0	21.2	24.9	21.2	22.5
45.5	26.4	32.5	38.1	30.7	48.8	34.0	35.9	21.6	34.8
27.8	19.1	19.6	28.4	25.3	31.7	24.3	22.4	26.3	25.0
18.2	18.5	19.5	20.9		21.0		21.6		20.0

10. Appendix

1.2.4 Site 4 2020 Temperature readings

Data Logger no. 4 - pole 4 - Post office													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
21.4	-	21.5	22.0	20.8	-	20.5	20.8	20.5	20.4	20.7	20.0	20.7	20.8
38.6	-	34.7	46.7	36.5	41.9	-	34.7	36.5	38.1	35.0	30.3	30.2	36.5
17.5	-	20.4	22.5	21.9	-	17.7	17.5	20.3	21.6	21.1	19.1	21.3	20.3
20.2		19.2	20.5	20.8	17.1		20.5	19.1	19.1	18.9	20.2	21.3	19.7
Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
27.6	-	25.6	30.5	27.9	25.2	-	25.8	25.2	25.2	27.6	25.8	27.5	26.7
26.7	-	36.1	47.5	38.6	45.3	-	36.9	41.5	44.8	36.6	31.3	39.7	39.8
36.9	32.1	40.4	47.2	44.8	40.6	33.3	42.6	44.2	39.2	41.5	34.4	45.2	41.2
22.3		25.6	30.7	28.7	22.4		27.7	27.2	25.1	24.1	24.8	28.8	26.5
Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
-	23.0	23.0	26.8	24.6	-	24.2	24.1	23.2	22.3	22.6	21.9	22.5	23.5
-	31.6	30.9	40.0	34.3	-	32.4	31.6	29.0	34.1	34.5	28.4	32.3	32.8
-	20.8	24.8	32.5	28.7	-	23.2	26.9	28.4	27.6	28.3	23.3	30.1	27.4
20.6		23.5	25.5	25.2	20.7		25.7	24.4	22.3	22.8	22.4	24.3	23.7
Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
-	22.6	22.3	24.3	22.8	-	21.9	23.3	22.7	21.6	22.3	21.5	23.4	22.6
-	29.4	28.3	32.6	30.8	-	29.0	27.0	29.5	29.4	30.5	24.7	28.1	29.0
-	30.0	28.5	35.3	30.8	-	28.5	29.4	29.6	30.3	29.7	25.7	28.2	29.6
18.4		20.2	22.1	20.8	17.3		22.0	20.5	19.7	19.9	20.6	22.2	20.5
Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
-	23.2	22.6	23.6	24.1	-	21.7	22.4	23.5	22.5	22.4	21.9	23.6	22.9
34.0	25.7	34.6	50.0	39.2	46.8	-	34.5	39.4	36.7	40.7	28.4	35.3	38.6
24.4	21.0	27.1	36.4	31.2	26.1	21.3	33.3	29.9	25.5	35.1	21.1	32.0	29.0
16.7		20.5	24.3	22.3	15.4		24.0	21.9	18.4	19.7	18.7	21.9	20.7

Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
-	21.9	22.2	22.6	23.0	-	21.0	22.8	22.3	21.9	22.4	21.5	23.0	22.2
-	23.0	22.8	23.7	24.0	-	22.4	22.7	22.9	22.0	23.1	22.7	23.4	23.0
31.8	29.0	29.8	34.5	31.9	32.2	29.2	32.8	32.1	33.6	31.1	29.8	31.8	31.5
21.9		22.7	24.1	23.6	21.2		23.8	22.7	22.9	21.5	23.1	23.2	22.8
Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
26.1	23.9	23.9	28.1	25.8	27.7	23.1	25.4	23.8	23.6	25.9	23.3	24.6	25.0
43.7	28.1	37.6	55.4	44.6	55.3	-	43.7	46.0	46.3	47.4	31.6	44.0	45.2
37.6	31.2	40.1	51.1	41.8	44.3	34.6	43.2	45.3	39.7	4.3	35.9	39.1	38.1
21.9		27.1	32.6	30.0	25.2		27.8	30.9	27.1	27.0	27.9	30.4	28.6
Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
22.9	21.7	23.9	25.7	24.3	-	22.7	22.6	22.6	22.1	22.4	22.9	24.3	23.2
48.5	-	39.0	55.0	42.3	52.0	-	40.8	47.7	41.4	43.0	30.3	48.9	44.0
35.7	28.4	37.7	46.9	40.1	40.9	33.7	43.0	39.7	39.4	39.9	34.7	41.6	39.8
17.0		21.5	24.5	23.5	16.9		25.9	24.5	20.1	21.4	22.8	25.8	22.7
Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
26.0	18.1	21.7	28.1	22.7	21.4	18.0	24.1	36.3	18.0	25.0	19.3	21.9	23.1
-	26.7	24.6	31.5	27.1	-	23.9	25.3	27.6	23.9	27.4	22.2	28.3	26.2
*DATA DID NOT SAVE WHEN ENTERED ON SITE		*DATA DID NOT SAVE WHEN ENTERED ON SITE			*DATA DID NOT SAVE WHEN ENTERED ON SITE				*DATA DID NOT SAVE WHEN ENTERED ON SITE				#DIV/0!
19.5		21.9	23.3	23.3	18.5		23.2	22.5	21.5	20.6	20.6	22.5	21.8
Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
-	25.0	24.4	26.9	24.3	-	24.5	25.5	24.5	23.4	24.8	23.5	26.6	24.9
-	27.5	26.8	31.2	29.1	-	26.1	27.8	28.8	27.9	30.3	26.0	27.3	28.1
-	3.5	31.8	44.2	37.2	29.7	27.2	31.1	36.1	32.4	39.3	29.7	36.3	34.1
16.8		20.5	24.4	23.5	16.9		22.4	21.6	20.1	21.6	19.7	24.4	21.6

Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
-	21.7	22.3	23.6	23.8	-	20.6	23.0	21.6	21.2	21.8	21.9	22.9	22.2
-	34.2	31.5	40.5	34.7	-	39.1	33.6	35.1	35.0	38.7	29.1	34.0	35.1
-	27.5	26.8	31.2	29.1	-	26.1	27.8	28.8	27.9	30.3	26.0	27.3	28.1
19.6		21.4	24.1	23.5	18.6		22.7	22.3	21.2	21.8	21.4	23.4	22.1
Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
29.9	24.8	26.7	31.0	28.4	28.9	24.0	26.6	26.3	25.1	29.3	26.3	28.9	27.4
52.0	33.7	43.6	56.9	49.3	55.6	-	46.9	53.2	46.7	57.5	36.0	48.3	49.4
47.1	34.5	41.2	58.2	47.4	45.8	35.8	43.0	48.8	40.5	53.2	35.7	46.0	45.1
20.1		24.2	26.9	26.9	22.6		26.1	25.8	22.9	24.2	23.8	28.0	25.2
Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
29.5	25.7	27.5	34.3	28.9	27.4	30.4	27.9	26.5	26.9	33.0	26.4	32.3	29.0
50.2	-	38.9	47.9	37.7	48.8	-	39.4	41.9	40.8	48.0	30.0	42.2	41.6
-	22.2	22.8	32.1	33.2	-	28.9	30.3	32.1	36.0	34.1	27.8	30.8	30.8
21.1		24.4	26.4	24.8	22.8		25.2	25.1	22.8	24.5	24.4	26.3	24.7
Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
-	21.1	22.4	24.3	24.0	-	20.8	22.6	21.8	21.2	21.9	21.2	23.3	22.2
31.4	30.1	29.5	37.6	32.6	-	36.0	31.5	31.6	29.8	35.9	26.8	33.9	32.5
38.2	31.1	33.6	39.1	36.7	-	30.9	36.0	39.4	30.9	40.3	30.8	37.1	35.5
18.6		20.4	23.1	22.5	17.6		21.7	21.3	20.2	20.8	20.4	22.4	21.1
Data Logger no. 4 - pole 4													
4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
27.9	23.3	24.9	29.3	22.7	25.7	20.0	23.6	26.3	20.0	29.5	23.3	26.1	24.8
52.5	-	39.2	51.0	36.3	48.5	-	34.7	38.2	39.2	46.8	31.5	41.2	40.7
25.8	21.3	23.7	34.3	26.4	21.0	17.1	24.3	26.0	21.2	28.0	18.9	28.2	24.5
15.2		18.2	22.6	20.0	14.8		21.3	20.6	16.8	19.3	18.9	20.0	19.3

10. Appendix

1.2.5 Site 5 & 6 2020 Temperature readings

Data Logger no. 5 - pole 5 - drive way			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
21.0	22.0	21.5	22.2	-	23.2	22.2	21.0	23.0	22.3
37.0	35.0	36.0	29.0	-	36.7	37.4	39.0	37.0	35.8
19.8	19.0	19.4	18.0	-	17.3	16.8	19.8	19.1	18.2
19.8	20.7	20.3	19.7		18.8	18.5	19.8	20.7	19.5
Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
25.8	25.8	25.8	22.9	-	25.4	25.8	25.8	25.8	25.1
42.1	40.2	41.2	25.7	-	37.7	36.4	42.1	40.2	36.4
44.9	42.8	43.9	31.8	30.9	38.6	35.0	44.9	42.8	37.3
28.6	28.0	28.3	22.5		22.7	21.4	28.6	28.0	24.6
Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
23.1	23.7	23.4	-	20.7	20.7	21.3	20.9	21.5	21.0
28.4	32.3	30.4	-	27.9	32.2	30.2	25.3	26.2	28.4
28.0	27.3	27.7	-	23.1	20.4	21.8	22.9	21.3	21.9
22.9	24.5	23.7	21.9		20.2	20.1	21.8	22.1	21.2
Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
22.3	23.0	22.7	-	20.8	20.7	20.5	21.2	21.4	20.9
28.2	26.1	27.2	-	23.6	22.0	21.6	21.5	22.0	22.1
27.9	25.9	26.9	-	24.5	23.2	21.4	21.5	22.2	22.6
21.3	21.4	21.4	20.7		19.5	18.8	22.5	21.8	20.7
Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
22.7	26.5	24.6	-	23.2	24.0	23.5	23.7	24.3	23.7
43.6	45.3	44.5	-	28.3	44.7	41.7	39.3	37.7	38.3
31.6	31.2	31.4	21.3	18.6	31.3	24.0	31.6	31.2	26.3
18.6	22.8	20.7	18.5		18.5	15.4	19.5	20.8	18.5

Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
23.7	24.1	23.9	-	22.3	22.6	23.0	22.5	23.9	22.9
23.1	24.0	23.6	-	22.8	23.2	22.9	23.1	23.7	23.1
31.7	31.8	31.8	30.7	29.8	31.5	32.2	31.7	32.1	31.3
21.9	22.4	22.2	23.2		22.6	21.9	23.2	23.1	22.8
Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
25.0	25.4	25.2	-	24.0	25.3	25.8	26.1	25.4	25.3
40.0	43.9	42.0	-	30.6	41.6	40.0	46.0	43.1	40.3
43.0	43.4	43.2	35.0	31.7	38.5	34.3	43.1	43.0	37.6
29.0	31.3	30.2	26.6		25.8	24.2	29.6	30.6	27.4
Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
21.7	21.6	21.7	-	21.7	21.8	21.5	24.4	22.7	22.4
35.2	38.2	36.7	-	25.8	40.5	35.5	29.3	40.4	34.3
37.7	38.5	38.1	23.4	28.5	34.9	29.2	30.0	35.5	30.3
22.1	23.6	22.9	20.5		17.2	16.2	24.7	23.4	20.4
Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
22.4	22.4	22.4	-	20.0	25.7	23.5	30.3	25.4	25.0
23.4	22.9	23.2	-	19.9	24.7	18.2	22.0	23.2	21.6
24.7	22.5	23.6	15.0	18.0	30.0	22.7	25.9	29.7	23.6
21.5	22.1	21.8	19.5		19.9	17.9	22.4	22.7	20.5
Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
23.9	24.2	24.1	-	22.7	23.9	22.4	25.7	24.0	23.7
28.5	27.5	28.0	-	27.9	30.3	24.3	29.2	29.4	28.2
32.0	34.2	33.1	-	31.6	38.1	29.2	32.7	36.1	33.5
20.5	22.0	21.3	20.4		21.0	15.6	20.9	23.0	20.2

Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
22.3	23.1	22.7	-	22.0	21.4	21.3	22.8	23.3	22.2
35.3	33.7	34.5	-	31.8	40.6	34.0	36.9	35.3	35.7
28.5	27.5	28.0	-	27.9	30.3	24.3	29.2	29.4	28.2
21.5	21.9	21.7	22.4		21.7	19.9	22.6	22.6	21.8
Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
27.4	28.7	28.1	-	28.0	29.7	30.9	29.0	31.9	29.9
43.2	43.4	43.3	-	34.1	57.8	46.3	51.7	48.6	47.7
43.7	44.6	44.2	-	33.9	53.1	40.3	48.8	45.2	44.3
25.3	26.3	25.8	22.8		26.0	19.4	26.6	26.6	24.3
Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
27.5	27.6	27.6	-	25.2	32.2	25.5	31.6	28.2	28.5
30.9	29.1	30.0	-	27.7	46.1	32.1	31.6	37.3	35.0
27.9	27.7	27.8	-	24.2	29.5	23.1	27.6	29.2	26.7
23.6	23.8	23.7	23.1		21.8	20.1	25.0	24.1	22.8
Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
22.0	22.9	22.5	-	21.1	21.9	20.6	22.7	23.2	21.9
32.4	33.4	32.9	-	27.3	37.4	30.4	34.2	33.9	32.6
38.4	36.3	37.4	31.3	28.1	38.4	33.2	41.0	36.6	34.8
20.5	20.9	20.7	21.4		20.7	18.9	21.3	21.6	20.8
Data Logger no. 5 - pole 5			Data Logger no. 6 - little patch of grass						
5.01	5.02		6.01	6.02	6.03	6.04	6.05	6.06	
Edge concrete	Ground concrete	average @ data poles	Takeaway brick wall		Edge brown brick	Grass	Edge concrete	Ground concrete	average @ data poles
			Sun	Shade					
23.8	21.4	22.6	-	21.8	26.7	24.2	32.3	26.8	26.4
28.4	28.2	28.3	-	26.1	47.3	30.3	31.7	35.1	34.1
24.3	25.2	24.8	17.4	16.6	30.3	20.8	23.8	26.1	22.5
19.4	20.9	20.2	18.6		19.1	15.2	23.2	22.4	19.7

10. Appendix

1.2.6 Site 7 2020 Temperature readings

Data Logger no. 7 - first tree pit - opposite patch of grass									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	20.4	-	21.6	-	21.4	-	20.6	18.0	20.4
32.0	-	49.6	-	36.1	-	35.4	-	26.7	36.0
-	22.7	-	20.6	-	19.8	-	20.0	21.1	20.8
20.8		17.9		18.6		18.1		18.4	18.8
Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
25.1	22.5	29.9	23.6	30.8	27.0	25.0	20.0	22.7	25.2
36.8	-	51.8	-	32.5	-	41.1	-	30.8	38.6
36.2	33.4	50.5	45.2	47.2	45.7	41.5	35.7	46.0	42.4
22.4		22.5		22.3		22.1		23.9	22.6
Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	21.6	-	22.6	-	24.4	-	25.5	21.2	23.1
-	30.8	-	41.3	-	36.3	-	36.4	29.4	34.8
-	23.3	-	31.2	-	28.1	-	28.0	23.9	26.9
21.3		19.9		20.7		20.6		21.5	20.8
Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	21.6	-	22.0	-	22.6	-	21.8	21.4	21.9
-	22.8	-	28.4	-	23.4	-	23.0	23.5	24.2
-	23.3	-	29.0	-	26.5	-	25.3	24.3	25.7
19.1		18.2		18.7		18.3		20.5	19.0
Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	24.7	-	24.4	-	23.8	-	24.8	23.8	24.3
41.3	-	57.8	37.4	-	37.6	45.9	31.9	35.1	41.0
23.5	17.1	43.7	23.5	49.5	27.0	32.9	21.1	36.5	30.5
18.5		18.4		16.9		17.2		18.8	18.0

Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	24.4	-	23.4	-	23.4	-	23.6	23.2	23.6
-	23.9	-	23.1	-	22.9	-	23.2	22.7	23.2
30.5	28.2	39.5	34.3	43.4	35.3	32.7	29.4	28.5	33.5
22.3		21.6		21.5		20.8		22.3	21.7
Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
27.1	25.5	28.9	26.6	28.7	28.6	25.8	24.4	24.2	26.6
41.8	32.0	61.9	37.7	-	34.1	51.3	32.3	32.8	40.5
31.5	28.4	47.6	37.6	50.1	47.6	45.1	35.6	34.7	39.8
24.3		25.7		26.3		25.0		26.1	25.5
Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
23.4	20.7	24.5	22.6	28.6	29.7	21.6	21.0	22.7	23.9
30.7	24.6	58.2	31.1	-	30.3	43.4	26.4	28.1	34.1
31.3	24.4	45.6	31.7	51.0	40.6	36.9	28.3	35.3	36.1
16.4		15.3		16.9		16.1		19.3	16.8
Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
25.3	20.3	42.4	24.4	50.7	32.0	32.2	23.6	24.7	30.6
-	18.6	-	22.1	-	20.1	-	18.9	17.6	19.5
23.6	20.7	32.1	24.7	40.4	30.8	27.6	23.3	25.5	27.6
17.6		17.8		17.9		18.2		18.2	17.9
Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	23.8	-	29.1	-	33.4	-	27.1	22.9	27.3
-	25.7	-	31.0	-	28.6	-	30.0	26.1	28.3
-	29.1	-	36.3	-	31.8	-	31.2	28.6	31.4
17.6		18.3		17.9		17.4		18.0	17.8

Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	22.4	-	21.1	-	21.9	-	21.7	21.6	21.7
-	32.7	-	46.7	-	38.2	-	42.0	32.0	38.3
-	25.7	-	31.0	-	28.6	-	30.0	26.1	28.3
18.9		19.4		19.4		19.8		19.9	19.5
Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
30.0	25.9	36.2	29.9	44.8	42.7	36.5	26.9	28.3	33.5
43.0	32.9	60.1	38.2	41.0	37.1	57.8	36.3	35.8	42.5
32.3	29.4	49.9	33.9	42.6	41.8	43.3	33.3	34.3	37.9
20.6		21.0		21.5		21.2		22.0	21.3
Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
25.4	22.1	34.5	24.1	37.4	30.7	32.7	24.8	25.2	28.5
32.1	25.0	46.9	28.8	-	30.6	45.2	30.4	28.9	33.5
-	21.1	-	26.7	-	28.2	-	25.2	21.3	24.5
19.9		20.2		20.9		19.2		20.9	20.2
Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	21.4	-	21.0	-	21.6	-	20.5	20.6	21.0
35.2	30.3	44.8	36.7	-	34.8	39.8	32.8	30.8	35.7
30.5	27.5	40.9	31.6	45.1	40.1	37.4	32.1	27.2	34.7
18.9		19.4		19.4		18.6		19.9	19.2
Data Logger no. 7 - first tree pit									
7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
26.3	23.0	32.6	23.9	37.4	29.3	32.8	23.4	26.9	28.4
33.0	24.7	43.1	26.9	-	31.1	45.6	30.1	27.6	32.8
15.3	12.9	22.5	29.3	32.1	24.0	24.7	20.3	24.3	22.8
18.4		16.6		17.2		15.7		18.4	17.3

10. Appendix

1.2.7 Site 8 2020 Temperature readings

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	21.5	-	23.5	-	21.4	-	21.5	19.1	21.4
37.6	-	49.0	-	41.6	-	36.1	-	25.6	38.0
-	21.1	-	20.7	-	19.5	-	18.9	20.3	20.1
21.1		18.9		18.5		18.6		19.1	19.2
Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
25.0	22.3	28.6	22.6	30.4	26.9	25.3	-	22.5	25.5
38.7	-	59.8	-	53.8	31.3	47.3	26.8	31.6	41.3
34.3	25.9	47.9	31.0	42.4	34.6	41.7	-	38.0	37.0
22.0		23.4		22.0		22.5		23.6	22.7
Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	22.4	-	23.5	-	24.3	-	23.3	21.4	23.0
-	30.6	-	40.4	-	34.3	-	36.6	27.7	33.9
-	23.1	-	26.9	-	26.4	-	25.7	24.7	25.4
21.3		20.4		20.5		20.6		21.2	20.8
Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	22.7	-	22.6	-	23.0	-	22.1	21.5	22.4
-	22.8	-	28.4	-	25.3	-	26.0	25.3	25.6
-	23.8	-	29.3	-	27.1	-	26.6	24.0	26.2
20.3		18.7		19.6		19.2		21.5	19.9
Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	24.4	-	25.2	-	25.6	-	25.7	24.1	25.0
41.9	32.4	57.4	36.2	56.5	40.1	46.5	29.9	34.2	41.7
28.0	16.8	46.9	21.8	41.3	32.0	35.2	17.8	28.2	29.8
19.5		22.3		18.5		18.6		20.4	19.9

Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	24.2	-	23.7	-	24.2	-	24.0	23.4	23.9
-	23.4	-	23.3	-	22.9	-	22.9	22.7	23.0
31.5	27.9	39.3	31.9	44.0	41.0	33.1	28.1	27.8	33.8
22.4		22.4		21.5		20.9		22.9	22.0
Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
27.3	25.0	28.4	26.5	34.6	28.3	26.8	25.0	24.5	27.4
44.5	28.4	60.0	32.3	49.4	33.3	52.7	29.4	32.0	40.2
35.4	29.8	49.7	35.2	49.4	44.1	42.8	31.9	32.9	39.0
24.9		27.3		26.0		25.3		27.0	26.1
Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
21.4	20.8	23.7	22.8	29.4	25.6	21.0	20.5	22.3	23.1
35.2	25.8	53.1	29.3	46.9	30.1	48.1	25.7	29.2	35.9
28.5	26.1	43.8	27.5	38.9	47.3	39.9	28.9	32.6	34.8
16.3		15.7		17.0		15.7		19.8	16.9
Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
35.6	25.7	49.2	28.6	52.5	41.2	37.8	26.0	27.9	36.1
-	13.4	-	21.2	-	16.3	-	17.9	16.0	17.0
19.3	18.6	28.0	21.2	28.6	24.4	23.8	19.6	19.8	22.6
17.3		17.6		18.0		17.9		18.4	17.8
Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	24.5	-	28.9	-	35.0	-	26.5	22.5	27.5
-	25.7	-	31.6	-	29.3	-	30.0	24.5	28.2
-	28.5	-	35.1	-	30.3	-	33.1	26.6	30.7
19.3		20.3		19.0		18.9		19.7	19.4

Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	22.5	-	21.2	-	22.2	-	21.7	21.9	21.9
-	32.8	-	47.8	-	38.4	-	44.5	29.9	38.7
-	25.7	-	31.6	-	29.3	-	30.0	24.5	28.2
19.9		20.4		19.8		19.9		20.3	20.1
Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
26.5	23.7	32.9	25.3	44.9	37.3	36.8	28.6	31.8	32.0
44.8	28.1	65.8	32.5	57.0	34.1	60.7	31.6	33.8	43.2
34.5	28.5	48.0	31.7	45.8	35.5	44.9	31.1	32.2	36.9
21.6		23.6		22.3		22.9		23.1	22.7
Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
24.3	22.1	32.8	24.1	32.8	30.7	27.1	22.5	20.7	26.3
35.4	26.5	51.5	30.3	45.6	31.8	50.6	29.4	28.3	36.6
-	22.1	-	24.6	-	27.5	-	23.7	20.1	23.6
20.2		19.7		20.9		19.2		21.2	20.2
Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	21.8	-	21.4	-	21.3	-	21.2	20.6	21.3
35.5	30.5	44.2	36.1	44.6	33.5	42.5	29.3	29.1	36.1
31.3	25.3	39.0	28.2	39.0	31.3	36.5	26.5	28.2	31.7
18.9		19.4		18.8		18.9		19.3	19.1
Data Logger no.8 - second last tree pit									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
27.0	23.7	35.8	24.9	37.2	35.6	30.7	24.2	25.7	29.4
35.3	25.1	50.8	27.2	44.6	31.1	47.8	29.0	27.1	35.3
17.5	12.6	29.7	15.1	32.6	26.0	28.9	19.0	22.8	22.7
19.1		18.7		17.9		17.5		20.3	18.7

10. Appendix

1.3.1 Site 1 2021 Temperature readings

Data Logger no.1 - pole 1 - St Vincent de Paul

Friday, 15th Jan 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	missed temp										
12pm (1220 - 1250pm)	50.2	40.2	27.4	38.8	29.2	46.2	45.3	40.5	46.8	28	39.3
5pm (1720-1745)	37.9	41.9	30.4	39.5	36	40.4	43.1	47.5	44	-	40.1
10pm (2210-2225)	20.6	8.5	26	22.7		26.9	26	24.3	27.5		22.8

Data Logger no.1 - pole 1 - St Vincent de Paul

Monday, 18th Jan 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am (0810-0825)	23.3	8.9	23.5	23.8	-	24.3	24.9	0	26	-	22.1
12pm (1220-1245)	56.1	44.9	30.1	51.9	31.1	48.8	45.5	45.5	47.4	29.8	43.1
5pm (1730-1750)	33.9	18.8	31	42.9	39.3	43.4	44.2	38.7	46.3	38.5	37.7
10pm (2150-2210)	23.1	5.5	27.4	27.3		29.7	30.5	26.3	29.8		25.0

Data Logger no.1 - pole 1 - St Vincent de Paul

Tuesday, 19th Jan 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	25.8	14.3	23.9	25.9	-	25.4	27.8	26.1	26.6	-	24.5
12pm (1220-1240)	20.7	22.2	23.5	-	22.5	22.8	25.6	24	-	24.2	23.2
5pm (1700-1715)	29.7	30.9	26.6	-	28.9	29.7	32.3	29.5	31.7	28.8	29.8
10pm (2200-2215)	19.2	23.2	21.4	20.5		21	24.1	20.8	23.7		21.7

Data Logger no.1 - pole 1 - St Vincent de Paul

Wednesday, 20th Jan 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am (0815-0830)	18.2	17.1	18.2	18.7	-	19.1	19.9	18.9	19.9	-	18.8
12pm (1220-1240)	28.8	18.4	23.5	27	-	26.7	28.3	25.1	28.6	-	25.8
5pm (1705-1730)	29.2	30.6	26.5	-	28.5	29.5	32	29.4	31.6	28.6	29.5
10pm (2210-2225)	17.8	17.5	20	18		19.3	21.8	19.5	21.1		19.4

Data Logger no.1 - pole 1 - St Vincent de Paul

Thursday, 21st Jan 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am (0820-0820)	19.2	21.4	20	22.4	21.4	24	24.3	19.7	25.3	21.9	22.0
12pm (1205-1225)	45.4	30	23.8	49.8	26.9	41.8	40.9	34.9	43.9	27.1	36.5
5pm (1700-1715)	40.1	42	31.5	47.1	40.3	44.7	45	44.9	45.2	33.3	41.4
10pm (2200-2215)	19.1	24.9	23	22.2		23.2	24.8	20.1	24.3		22.7

Data Logger no.1 - pole 1 - St Vincent de Paul

Friday, 22nd Jan 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am (0815-0840)	26.8	5.6	23	29.2	25.1	27.1	27.3	24.2	28.4	23.1	24.0
12pm (1220-1230)	57.2	19.2	31	58.9	36.4	48.8	50.5	45	51	31.7	43.0
5pm (1705-1730)	35.5	24.5	33.6	48.2	43	40.2	44.4	40.9	44.7	31	38.6
10pm (2155-2215)	29.1	30.1	29.6	29.5		30.3	31.2	31	32.7		30.4

Data Logger no.1 - pole 1 - St Vincent de Paul

Monday, 25th Jan 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	27.6	7.3	24.5	30.2	28.0	28.2	29.7	24.0	29.0	27.8	25.6
12pm	60.0	24.6	33.9	57.4	36.7	50.9	53.2	47.6	50.5	31.6	44.6
5pm	44.3	21.3	38.9	57.9	48.9	51.0	52.1	49.5	51.4	37.6	45.3
10pm	29.8	30.2	30.2	30.0		30.9	31.7	31.3	33.0		30.9

Data Logger no.1 - pole 1 - St Vincent de Paul

Tuesday, 26th Jan 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am (0800-0820)	23.3	27.2	25.7	28.4	27.9	29.4	29.7	24.7	31.4	27.6	27.5
12pm (1200-1220)	62.3	42.5	40.4	65.4	41.1	58.9	55.3	51.1	57.1	42.3	51.6
5pm (1710-1725)	56	54.4	45	61.1	55.1	61.9	58.3	58.4	59.5	49.8	56.0
10pm											#DIV/0!

Data Logger no.1 - pole 1 - St Vincent de Paul

Wednesday, 27th Jan 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	27.5	24.6	28.2	28.8		29.1	31.1	28.9	30.7		28.6
12pm	30.1	23.4	25.6	30.6		30.0	32.1	28.5	32.5		29.1
5pm (1705-1720)	44.3	21.3	38.9	57.9	48.9	51	30.7	49.5	51.4	37.6	43.2
10pm	17.3	17.6	20.7	18.3		19.5	22.2	19.7	21.4		19.6

Thursday, 28th Jan 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am											#DIV/0!
12pm (1210-1225)	22.5	21.2	21.2	-	21.9	21.8	23.9	22.3	-	23.7	22.3
5pm (1710-1725)	21.2	20.3	20.9	-	20.9	20.7	23.1	20.9	-	23.1	21.4
10pm (2205-2220)	17.5	17.6	18.3	17.1		17.6	18.5	17.9	18.3		17.9

Data Logger no.1 - pole 1 - St Vincent de Paul

Friday, 29th Jan 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	20.5	19.7	19.1	19.8		20.8	21.0	19.7	20.5		20.1
12pm	24.5	20.7	22.5	23.9		22.6	24.7	22.9	24.5		23.3
5pm	22.3	18.6	19.6	20.2		19.3	20.5	20.0	21.1		20.2
10pm	21.0	20.4	21.4	20.1		21.0	21.9	21.0	21.2		21.0

Data Logger no.1 - pole 1 - St Vincent de Paul

Monday, 1st Feb 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	30.0	19.2	26.4	26.8	26.0	29.0	29.3	27.4	29.6	27.7	27.1
12pm	43.1	34.1	29.4	30.5	27.7	38.0	38.3	37.4	37.7	28.6	34.5
5pm	33.2	11.4	29.5	41.9	33.5	35.4	39.8	35.8	41.1	32.6	33.4
10pm	21.5	11.6	23.9	23.1		23.5	26.2	24.4	26.5		22.6

Data Logger no.1 - pole 1 - St Vincent de Paul

Tuesday, 2nd Feb 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am (0815-0830)	15.3	16.7	18.2	-	16.2	16.3	18.1	16.7	-	17.8	16.9
12pm (1200-1220)	38.3	28.1	27.3	27.4	25.2	29.9	32.3	30.8	-	30.5	30.0
5pm (1700-1720)	35.4	37.5	28.9	31.7	27	37.1	38.7	33	39	29.7	33.8
10pm (2200-2215)	19.4	23.5	21.2	18.8		21.7	24.6	21.2	24.1		21.8

Data Logger no.1 - pole 1 - St Vincent de Paul

Wednesday, 3rd Feb 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	21.0	14.8	20.0	19.0		21.0	23.3	20.5	23.2		20.4
12pm	35.9	17.9	24.8	26.1		32.1	32.9	30.5	31.2		28.9
5pm	28.6	19.8	20.4	34.4	22.4	29.5	35.4	27.9	43.8	20.3	28.3
10pm	20.6	19.6	20.9	19.6		20.8	21.7	20.9	20.8		20.6

Data Logger no.1 - pole 1 - St Vincent de Paul

Thursday, 4th Feb 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	23.2	23.9	23.2	25.4	24.9	25.7	27.4	24.3	27.7	26.2	25.2
12pm	53.5	35.3	31.7	46.9	29.7	48.9	46.8	46.1	49.7	30.3	41.9
5pm	37.3	39.1	31.8	41.4	36.9	45.1	45.2	39.7	45.6	36.3	39.8
10pm	19.4	24.1	22.7	21.7		23.9	25.7	23.1	24.2		23.1

Data Logger no.1 - pole 1 - St Vincent de Paul

Friday, 5th Feb 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	32.1	9.7	27.0	32.2	25.3	29.9	30.6	28.0	36.7	32.0	28.4
12pm	51.5	29.2	33.0	38.9	32.7	47.8	49.2	44.5	52.0	32.5	41.1
5pm	34.7	7.5	26.6	37.2	32.0	32.9	36.9	33.3	39.0	25.9	30.6
10pm	21.1	6.8	25.1	25.5		24.1	27.6	25.3	27.8		22.9

Data Logger no.1 - pole 1 - St Vincent de Paul

Monday, 8th Feb 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	28.7	27.1	25.8	27.5	25.9	27.5	29.5	26.3	30.2	26.5	27.5
12pm	31.6	29.1	26.3	29.2		32.0	33.4	30.1	33.8	25.6	30.1
5pm	37.3	31.6	24.1	36.8	32.3	32.1	35.7	29.6	36.1	27.6	32.3
10pm	18.3	21.0	20.8	20.6		20.0	21.9	21.2	22.6		20.8

Data Logger no.1 - pole 1 - St Vincent de Paul

Tuesday, 9th Feb 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	20.9	22.5	21.4	-	20.4	20.8	23.2	21	23.6	22.1	21.8
12pm	42.7	32.7	29.8	-	31.6	36.6	39.1	35.8	37.9	30.1	35.1
5pm	35	36.1	29.5	39.7	32.8	41.8	42.3	35.9	42.7	32.3	36.8
10pm	16.5	21.7	20.1	18.7		20.1	22.4	19.8	21.2		20.1

Data Logger no.1 - pole 1 - St Vincent de Paul

Wednesday, 10th Feb 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	16.2	17.1	17.9	17.2		16.8	16.6	16.3	17.1		16.9
12pm	42.0	32.1	27.4		29.8	34.6	37.4	35.5	35.6	27.2	33.5
5pm	40.0	33.6	26.5	32.3	26.8	30.8	33.2	28.7	35.2	27.3	31.4
10pm	18.4	20.8	21.6	19.7		19.2	21.9	20.1	21.9		20.5

Data Logger no.1 - pole 1 - St Vincent de Paul

Thursday, 11th Feb 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	20	21.7	20.7	20.6	19.3	22.1	24	20.9	23.6	22.4	21.5
12pm	45	23.8	16.1	-	12.3	35.7	32.7	27.1	32.2	14.7	26.6
5pm	34.6	34.8	26.3	36.7	29.8	41.7	39.8	34.9	41.3	31	35.1
10pm	19.5	24.7	23.7	20.4		23.8	25.8	23.4	24.3		23.2

Data Logger no.1 - pole 1 - St Vincent de Paul

Friday, 12th Feb 21	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	
Time	Timber seat of table	Metal on table frame	Cream tile on shop front	Edge brown brick		Edge concrete	Concrete gutter	White reflective curb	Ground concrete		average @ data poles
				sun	shade				sun	shade	
8am	30.2	20.8	26.1	30.3	25.3	28.6	30.1	27.2	34.2	32.1	28.5
12pm	44.4	36.1	28.4		32.2	37.8	38.8	36.3	37.3	29.9	35.7
5pm	37.5	38.0	32.1	37.4		36.9	39.7	37.1	40.0	31.1	36.6
10pm	29.3	30.9	29.3	29.4		29.9	31.1	30.7	32.2		30.4

10. Appendix

1.3.2 Site 2 2021 Temperature readings

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
missed temp													
44.3	-	20	-	49	47.5	37.7	27.8	39.4	26.8	54.9	46.3	-	39.4
43.7	31.9	35.5	11.8	43.5	42.4	39.7	-	36.9	31.4	49.8	42.7	-	37.2
22		5.4		28.3	28	21.7		26.5	26.3	29.3	28.8		24.0

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
23.1	-	9.7	-	25.8	23.4	24	-	22.6	22.9	27	24.1	-	22.5
59.7	-	20.2	38.2	50.1	45.4	63.4	32.4	41	28.7	57.3	45.6	-	43.8
43.7	34.7	25.4	19.3	33.6	46.5	39.7	33.4	39	33.3	43.5	45.3	-	36.5
22.2		6.1		29.8	27.8	23		26	26.6	29.8	29.7		24.6

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
26.4	25.1	13.3	-	27.8	26.2	28.8	26.2	26.2	25.9	28.1	28.4	-	25.7
-	20	-	19.4	25.2	23.2	-	21.6	23	23.9	24.1	-	23.7	22.7
28.9	26.6	20.6	24.6	30.7	31.6	-	28.9	27.2	24.4	35.1	-	29.8	28.0
18.5		21.4		23.6	21.5	18.3		21.2	20.5	23	22.5		21.2

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
16.3	-	16.3	-	19.3	18.3	17.4	-	18.5	18.4	19	19.8	-	18.1
28	-	18.4	-	26.5	26.3	28.2	-	25	24.5	32	28.9	-	26.4
28.7	26.5	20.7	24.3	30.6	31.2		28.6	27	23.2	34.5	-	26.7	27.5
17.2		17.3		20.1	19	17		21.1	19.6	20.3	21		19.2

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
24.9	19	22.9	23.6	24.9	21.1	25.6	20.7	22.4	21.4	25.2	23.9	21.1	22.8
51.2	-	24.1	33.1	41.4	40.3	55.8	29.7	34.7	25	53.2	44.4	-	39.4
45.9	32.5	19.1	35	47.7	41.3	45.7	28.2	36	27.7	48.6	41.5	-	37.4
17.4		23.1		25	22.7	17.3		21.4	21.1	23.8	23.3		21.7

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
27.2	19.5	15.5	6.6	27	27.5	28.4	22.6	24.1	23.1	31.6	28.2	-	23.4
58.4	43.2	29.7	-	51.4	49.9	63.6	40.2	46.8	33.2	61	50.8	-	48.0
45.6	-	22.6	-	35.1	46.3	36.7	34.6	39.4	33.9	49.7	43.1	-	38.7
29.7		22		30.9	29.9	26.9		28	28	31.7	31.4		28.7

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
33.7	23.5	15.8	11.6	28.7	26.1	28.2	23.3	26.2	25.0	31.9	29.2		25.3
52.3	46.1	35.1	45.6	56.0	53.0	73.0	42.7	47.2	35.3	65.5	55.5		50.6
56.5	42.2	19.8	25.7	47.0	59.3	61.3	44.6	49.2	40.6	62.1	54.0	50.0	47.1
30.2		23.4		31.4	30.5	27.4		28.5	28.6	32.3	31.9		29.4

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
29.5	23.9	14.1	26.9	30.3	30.4	32.3	26.2	27.1	27	31.9	30.8	29.3	27.7
58.7	-	27.7	54.3	56.1	55.3	72.2	44.6	53	40.5	67.4	58.9	-	53.5
60.5	51.3	28.2	53.4	58.1	56.5	62.3	55.8	55.5	47	67.8	60.5	-	54.7
													#DIV/0!

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
28.7		23.9		28.3	28.8	28.2		29.2	27.5	32.4	31.4		28.7
28.4		19.6		30.9	29.6	32.4		28.6	25.4	34.1	31.9		29.0
56.5	42.2	19.8	25.7	47	59.3	61.3	44.6	49.2	40.6	62.1	54	50	47.1
17.3		17.5		20.2	19.2	17.2		20.0	19.7	20.4	21.1		19.2

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
													#DIV/0!
-	20.7	-	20.9	23.4	22	-	22.7	21.9	21.8	23.8	-	23.4	22.3
-	19.7	-	19.6	22.4	20.1	-	20.4	20.3	20.4	22.5	-	22.3	20.9
16.9		16.5		17.7	17.2	16.8		16.9	-	17.6	17.9		17.2

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
18.7		18.0		19.6	19.0	19.1		19.0	19.9	20.2	19.8		19.3
24.4	21.8	20.3	22.3	23.2	22.0	22.7		21.7	22.5	25.1	24.0	22.0	22.7
21.1		18.0		19.4	19.4	19.0		19.4	19.9	23.3	20.4		20.0
19.4		19.7		20.5	20.6	20.5		20.2	22.1	20.5	20.7		20.5

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
31.2	27.8	19.5	18.0	28.6	26.8	28.6	27.0	26.5	27.0	31.4	28.5		26.7
44.6	35.0	37.1	36.1	37.6	36.2	38.1	31.0	35.9	29.7	46.9	38.5		37.2
42.7	31.9	36.0	17.5	33.3	42.7	40.9	28.5	33.6	30.6	38.5	37.9		34.5
21.7		10.7		23.3	25.8	20.8		24.4	24.4	27.4	25.4		22.7

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
-	15.1	-	15.8	18.2	17.1	-	16.2	16.6	17.9	18.2	-	18.5	17.1
-	35.8	24.7	32.3	31.5	31	-	28.1	29.3		39	-	32.2	31.5
42.6	30.7	14.9	34.6	40.1	37.8	36.8	27.8	33.3		47.4	39.3	32.8	34.8
19.2		22.9		24.2	22.2	18.9		21.2	20.9	24.7	23.8		22.0

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
20.6		14.5	20.4	21.1	19.2	18.9		19.7	20.5	24.1	22.8		20.2
33.1	29.0	14.4	29.0	29.8	30.0	28.1		30.3	25.7	39.9	33.2		29.3
35.1	24.6	28.7		31.4	30.1	25.1	23.0	27.4	21.0	41.4	33.4		29.2
18.9		19.4		20.1	20.2	19.8		19.9	21.8	20.1	20.0		20.0

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
28.4	24.4	25	29.3	28.4	26.7	29.7	25.9	25.5	25.2	30.9	28.7	26.7	27.3
56.2	-	28.3	50.1	49.8	43.6	54.2	34.4	45.2	34.2	60	49.8	-	46.0
44.1	34.6	21.7	36.1	45.5	42.3	39.6	32.2	38.8	31.4	49.8	42.5	-	38.2
19.4	-	21.4		26.5	24.1	19.1		21.4	22	26	25.4		22.8

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
43.4	24.8	17.6	25.2	31.8	28.7	29.5	26.1	29.3	24.5	33.9	32.8		29.0
54.9	43.9	24.0	48.7	49.4	53.0	56.0	38.2	45.0	33.6	58.3	52.9	49.2	46.7
35.9	29.2	19.8	9.0	27.8	33.0	30.7	27.7	34.4	27.0	41.9	37.8		29.5
21.9		9.2		23.8	25.5	22.4		26.2	24.5	29.1	28.8		23.5

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
30.3	23.0	18.3	13.8	26.9	28.4	30.9	21.6	25.2	23.2	28.8	27.0		24.8
32.7	29.1	21.3	29.3	31.8	31.2	32.8		30.3	26.7	36.1	32.9	26.2	30.0
34.4	29.3	15.1	12.5	36.0	35.5	40.9	28.0	31.7	24.8	43.9	37.8		30.8
17.6		20.6		23.3	21.5	16.1		19.9	21.1	22.1	21.9		20.5

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
22.2	20.7	17.5	21.2	23.6	22	21.6	20.8	21.9	21.9	24.6	23.8	-	21.8
45.8	35.6	24.9	39.5	40.8	39.5	50.8	35.4	37.6	28.9	49.2	40.3	-	39.0
41.5	29.5	21	31.5	45.2	42.2	42.3	29.2	37.4	28.1	49.7	43.2	-	36.7
15.3	-	20.7		23.3	21.3	16.3		19.3	19.1	22.4	22.5		20.0

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
14.2		15.3		15.8	15.5	14.9		14.2	16.8	15.1	15.0		15.2
42.4	30.8	22.3	31.4	34.9	33.6	34.7	29.8	31.5	28.0	43.2	35.7		33.2
34.9	26.1	14.6	7.7	30.7	36.1	34.0	27.1	31.3	28.5	35.3	32.6	29.0	28.3
18.2		20.6		19.0	20.1	16.3		18.3	19.7	21.9	20.0		19.3

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
29	18.8	16	22.5	24.8	23	26.3	21.2	21.3	22.4	26	24.9	22.7	23.0
33.4	23.9	22.5	36.2	34.5	31.9	38.3	16.9	27	14.2	46.8	33.9	-	30.0
39.8	28.5	26	32.4	44.5	38.1	43.1	25	34.9	24.9	49.7	39.6	-	35.5
18.8	-	24.7		27	23.3	19.4		22.5	23.2	25.9	25.7		23.4

Data Logger no. 2 - pole 2 - Shop with brown tile wall

2.01	2.02	2.03	2.04	2.05	2.06	2.07	2.08	2.09	2.10	2.11	2.12	2.13	
Timber seat		Metal on seat		Ground	Edge concrete	Wood chips		White reflective	Red painted tile on	Asphalt	Concrete gutter		average @
sun	shade	Side	Top	concrete		Sun	Shade	curb	shop front		Sun	Shade	data poles
35.4	23.9	17.9	20.8	29.1	28.6	30.1	24.3	27.2	23.8	31.4	30.2		26.9
46.3	37.2	20.5	37.0	40.3	39.9	51.8	38.1	36.7	31.8	47.3	40.7	37.4	38.8
40.0	38.8	19.5	39.1	39.4	40.4	37.7		36.9	34.4	37.8	38.5		36.6
29.4		21.7		30.8	29.7	26.7		29.0	28.4	31.5	31.0		28.7

10. Appendix

1.3.2 Site 3 2021 Temperature readings

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
missed temp									
48.2	24.1	27.1	41	-	44.1	31.6	42.5	28.6	35.9
41.9	30	31.9	46.6	-	44.5	46.3	32.1	27.7	37.6
24.1	25.2	27.1	27.2		28.4		28.7		26.8

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
22.3	20.8	23.7	21.6	-	25.3	-	25.1	-	23.1
52.1	28.5	31.2	44.3	36.3	54.1	29	45.2	30.7	39.0
45.3	33	35	46.8	40.6	51	42	45.4	37.6	41.9
28.8	25.2	25.4	26.6		30.4		29.5		27.7

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
26.7	24.7	26.7	24.7	24.8	26.9	27.1	27	-	26.1
23.2	19.5	21.8	-	21.2	-	22.9	-	23.9	22.1
31	22.6	24.5	-	26.2	-	28.3	-	28.2	26.8
19.6	187	19.9	19.2		20.5		22		48.0

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
16.5	17.2	18.6	16.4	-	19.6	-	19.6	-	18.0
26.7	23.2	26.2	26.4	-	28.9	-	24.9	-	26.1
30	22.1	24.2	-	25.1	-	26.7	-	28	26.0
17.6	17.3	19.7	18.3		19.5		19.3		18.6

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
23.5	20	22.6	23.3	18.6	25.1	21.6	24.7	22.6	22.4
47.7	26.4	30.4	45.3	32	51.9	34.9	41.6	-	38.8
44.8	27.1	27.8	41.2	34.4	50.8	34.2	40.6	31.1	36.9
20.4	19.2	20.4	20.9		21.9		22.8		20.9

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
27.9	22.1	25.5	25.4	23.3	29.4	22.5	28	24.1	25.4
62	33.4	36.1	53.1	38.9	60.6	39.6	52.2	37.3	45.9
50	34.8	34.7	45.4	-	48.5	-	43.4	-	42.8
29.3	27.6	28.7	31		30.6		30.7		29.7

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
29.9	23.9	27.3	28.1	25.6	32.0	25.6	30.5	25.7	27.6
61.5	36.5	36.5	58.9	37.7	66.5	46.2	53.8	32.2	47.8
59.5	40.8	42.3	58.9	45.6	57.7	46.6	48.2	36.4	48.4
29.9	28.3	29.1	31.8		31.0		31.2		30.2

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
31.3	26.5	29.4	30.4	26.7	31.6	27.6	31.7	29.1	29.4
66.7	42.1	46	60.5	45.9	67.4	48.3	57.7	-	54.3
68.4	48	45.4	64	55.2	67.1	52.3	60.4	52.2	57.0
									#DIV/0!

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
30.3	27.4	28.6	29.1		30.9		30.8		29.5
27.7	23.7	27.3	27.9		33.3		30.4		28.4
59.5	40.8	42.3	58.9	45.6	57.7	46.6	48.2	36.4	48.4
17.9	17.4	19.9	18.0		19.3		20.1		18.8

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
26.6	24.5	26.9	25.5	25.3	27.0	26.7	27.0	25.6	26.1
37.4	29.1	32.4	39.7	31.5	38.8		37.6		35.2
34.4	30.5	33.0	42.2	36.5	41.5	34.7	33.7	29.9	35.2
22.7	22.4	23.2	23.1		23.9		25.1		23.4

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
16.7	16	17.4	-	17.1	-	16.7	-	17.9	17.0
29.7	26.1	28.2	29.1	25.2	-	29.4	-	28.7	28.1
38.4	27.2	28.5	36.1	27.7	33.3	27.2	36.3	26.4	31.2
18.3	19.5	20.5	19.9		18.7		22.7		19.9

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
18.9	18.8	20.6	20.4		20.4		21.5		20.1
32.6	24.5	28.7	32.2		33.9		31.7		30.6
32.1	20.7	23.3	24.2	23.7	32.1		31.5	20.2	26.0
19.8	19.9	20.0	19.8		20.3		20.2		20.0

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
26.6	23.6	25	25.4	22.9	26.5	24.9	29.2	27	25.7
55.4	33.5	35	50.8	37.8	55.5	-	50.1	32.9	43.9
46.8	30.8	31.8	42	35.8	44.7	41.1	43.9	33.8	39.0
21.5	21.3	22	23.4		23		25.4		22.8

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
29.0	24.9	27.2	30.6	25.0	32.4	24.7	30.4	25.8	27.8
57.1	33.8	34.3	51.8	41.6	52.4	41.9	48.6	32.5	43.8
39.6	27.9	28.6	35.6	31.4	39.3	33.8	37.3	32.6	34.0
24.2	24.3	24.7	25.9		26.0		28.1		25.5

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
30.2	20.4	23.2	24.9	21.3	24.3	20.7	24.5	21.8	23.5
28.2	26.1	29.2	29.2		30.5		28.6		28.6
38.8	26.1	29.4	36.8	29.9	40.6	31.6	37.3	26.2	33.0
19.5	19.5	20.4	24.8		21.7		23.5		21.6

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
21.5	20	22.3	21.3	20.5	22	21.6	23.5	22.7	21.7
44.9	30.8	32.7	38.9	33.6	43.3	34.9	40.9	32.5	36.9
43.7	27.3	28.6	40.9	31.7	44.6	30.5	41.4	30.6	35.5
18.4	17.5	19	18.3		18.9		21.4		18.9

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
15.2	14.2	16.7	15.9		15.9		15.4		15.6
37.9	25.1	30.2	34.7	25.7	33.4	31.2	31.3	24.9	30.5
35.9	27.8	29.9	38.7	28.1	31.3	28.2	33.4	28.2	31.3
17.4	18.7	19.6	18.9		18.3		19.7		18.8

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
23.4	19.8	22.4	20.8	18.7	23.8	20.9	23.6	21.7	21.7
39.6	13.7	16.4	38	21.7	40.7	29.1	36	12.6	27.5
44	24.2	25.2	40.1	29.7	42.1	33.1	39.3	29.2	34.1
21	21.8	22.9	22.7		22.8		25.1		22.7

Data Logger no. 3 - pole 3 - Brick pavement									
3.01	3.02	3.03	3.04	3.05	3.06	3.07	3.08	3.09	
Edge brown brick	White brick wall	Brown tile on shop front	Edge concrete		Ground brown brick pavement		Ground concrete		average @ data poles
			sun	shade	sun	shade	sun	shade	
29.1	22.5	25.8	26.7	23.2	28.5	22.1	27.1	22.8	25.3
45.8	31.3	35.3	41.3	39.8	44.7	38.2	40.2	32.6	38.8
37.7	34.3	37.4	38.8	37.2	40.3	39.1	38.2		37.9
29.1	27.8	28.6	31.1		30.4		30.2		29.5

10. Appendix

1.3.3 Site 4 2021 Temperature readings

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
missed temp													
29.5	24.2	36.2	54.2	45.4	51.8	-	40.4	44.1	30.7	38.5	28.6	42.9	41.3
39.8	-	33.2	50	40.2	35	28.1	40.1	39.5	37	38.6	29.7	40.5	37.4
21.3		26.2	27.6	26.2	21.1		13.2	26.9	27.1	25.9	26	28.3	24.5

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
23.8	-	22.3	26.1	23.6	22.9	-	12.5	23.5	20.3	22.8	20.8	24.1	22.1
58.2	26.8	34.7	57.1	46.9	58	-	43.6	47.2	30.4	52.6	30.1	44.5	44.5
45.6	-	41	51.7	46.5	45	35.2	18.2	46.2	44.2	51	34	46.6	41.8
24.7		27	29.3	27.8	21.2		6.4	26.8	25.8	25.5	25	28.1	24.3

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
26.3	-	25.2	29.8	28.8	27.5	-	16.9	26.3	24.2	26.4	25.5	26.8	25.8
-	20.5	22.4	23.6	23.9	-	18.9	21	22.1	21.9	23.5	20.1	23.5	21.9
-	24.9	26	32.5	29.5	-	25.1	26.3	27.6	25.3	24.3	21.7	27.7	26.4
17.5		20.2	21.7	22.2	17.3		20.7	19.4	19.3	18.8	18.9	21.2	19.7

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
16.5	-	17.1	18.1	19	15.2	-	11.8	26.3	17.4	17.3	16.3	18.6	17.6
30.8	-	25.8	32.7	28.3	32.2	-	17.4	27.8	27	29.9	23	27.8	27.2
-	24.7	24.6	30.5	26.1	-	25.3	26.1	25.4	24.3	24.5	21.4	25.4	25.3
17		19.6	21	20.3	19		19.8	22.3	17	18.2	17.3	20	19.2

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
25.4	20.6	21.4	28.5	24.8	25.6	20.7	23.8	21.9	21.7	24.2	26.9	24.3	23.8
48.2	30.5	37.1	53.2	42.4	50.5	-	32	45.3	39.4	49.1	30.9	43.5	41.8
42.8	25.1	35.8	43.7	39.6	39.1	24.2	35.2	38.5	35.1	42.6	26.7	42.1	36.2
15.9		19.3	21.4	21.8	15.2		20.8	19.1	20	18.1	19.1	20.8	19.2

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
28	25.3	24.9	31.2	27	27.1	20.7	9.1	28.4	25.1	30.4	30.4	29.3	25.9
57.3	35.2	45.3	59	50.2	60		33.3	52.7	53.6	61.4	39.3	49.6	49.7
42		38.3	47	42.2	37.8		19.1	41.5	39.8	43.6	34.3	40.6	38.7
26.2		29.9	30.7	30	27.6		30.5	29.9	27.9	28.8	28.3	30.1	29.1

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
33.2	26.3	26.3	33.3	29.9	35.5	22.7	7.6	34.3	26.4	30.0	35.1	30.9	28.6
74.7	48.5	50.4	56.2	54.0	64.5	47.4	18.8	47.7	52.6	64.6	41.9	56.7	50.4
57.5	39.0	45.8	58.0	53.3	47.8	38.9	20.1	48.9	52.9	52.7	39.7	52.1	46.4
26.9		30.0	31.2	30.7	28.1		30.9	30.5	28.4	29.1	28.7	30.5	29.8

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
31.9	26.6	27.8	33.8	32	29.2	27	30.1	29.8	28	31	26.6	30.3	29.5
61.5	42.4	51.2	66.9	58	64.7	-	50.2	55.9	51.8	67.8	47.7	56.6	57.1
61.1	48.7	56.2	68.3	60.5	61.9	49.9	57.4	61.8	57.6	65.3	49.7	61.6	58.5
													#DIV/0!

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
29.4		28.5	31.1	30.7	28.2		24.3	34.3	28.3	30.3	28.0	30.0	29.4
29.6		28.0	34.0	31.9	27.2		20.7	28.9	24.2	31.2	24.5	29.2	28.0
57.5	39	45.8	58	53.3	47.8	38.9	20.1	48.9	52.9	52.7	39.7	52.1	46.4
17.3		19.7	20.7	20.4	18.0		20.0	23.7	17.3	18.8	17.3	20.4	19.6

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
													#DIV/0!
-	22	21.5	22.8	22.8	-	20.6	20.2	20.9	20.6	21.9	19.6	22.3	21.3
-	19.6	19.3	20.6	21	-	18.2	18.1	19.6	18.2	19.7	17.2	19.7	19.2
16.9		16.9	17.5	18.2	16.2		17.1	16.8	16.7	16.7	16.4	17.1	17.0

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
18.9		18.6	19.4	19.5	18.8		17.8	19.1	18.6	18.8	18.5	19.6	18.9
24.0		23.3	24.9	23.9	23.0		18.4	22.4	20.8	22.5	19.5		22.1
18.3		19.4	21.5	20.5	19.3		17.7	17.3	18.1	18.9	17.7	18.7	18.9
19.5		19.5	21.3	20.3	18.7		20.1						20.0

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
26.6	25.3	26.1	29.4	27.1	27.7		21.1	25.9	24.4	25.3	24.3	26.1	25.8
37.8		33.7	46.2	38.3	45.6		26.3	29.6	35.4	40.4	32.7	38.3	36.7
35.5	30.5	36.2	48.7	43.2	36.9	31.8	15.3	40.5	40.7	42.9	33.4	41.8	37.4
20.7		23.3	25.6	26.7	19.4		19.8	26.3	23.5	22.4	22.5	25.5	23.5

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
-	16.3	17	18.3	18.4	-	15.8	17.3	17.2	16.9	17.6	16.6	17.9	17.2
-	29	28.2	37.7	32	-	34.3	26.5	30.7	27.4	32.9	26.7	28.8	30.5
35.4	27.2	31.2	44	37.1	39.1	27.4	34.9	35.5	29.8	37.4	27.4	33.9	34.3
17.5		21	24.1	23.6	17.8		22.5	21	19.5	18.6	19.1	21.9	20.9

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
19.1		19.8	24.1	22.8	20.4		19.0	19.7	18.3	19.2	20.3	21.8	20.4
32.0		30.3	36.9	32.5	36.0		18.7	32.8	28.8	33.8	26.3	33.0	30.9
29.7		29.8	42.7	34.8	32.2	24.0	11.0	29.5	28.8	35.0	21.5	32.8	29.3
19.1		19.2	21.1	20.2	18.4		20.0	20.0	21.0	19.4	19.5	19.8	19.9

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
26.9	24.6	24.7	30.8	28.1	29.6	25.4	25.9	24.9	23.9	26.6	26.8	27	26.6
57.9	35.6	44.7	59.1	49.9	57.9	-	37.3	50.1	36.5	55.3	36.2	49.2	47.6
37.2	29.9	36.3	45	40.6	36.1	30	34.1	39.7	34.9	40.3	30.9	40.3	37.1
18.8		20.8	24.2	24	18.4		23	22.7	22	21.5	21.4	24.4	22.4

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
32.9	24.6	28.8	35.8	31.1	31.4	23.9	22.0	36.4	26.1	31.4	30.8	29.6	29.6
51.0	34.8	44.4	55.4	51.6	55.4		27.5	43.2	44.2	51.6	37.9	48.7	46.0
31.2	28.9	34.8	41.1	37.7	36.9	29.2	17.1	47.8	33.9	39.7	28.5	39.0	35.1
25.0		25.7	27.1	27.5	22.1		27.0	25.4	25.0	23.9	24.9	28.0	25.7

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
27.4	20.4	24.7	28.6	27.0	29.1	22.6	15.5	25.5	21.8	27.9	27.5	27.0	25.0
28.1		29.7	36.2	32.9	30.8		22.6	31.0	29.8	32.8	26.5	32.5	30.5
35.6	29.1	35.1	43.5	37.7	39.4	32.7	27.4	36.2	31.5	42.4	27.1	36.8	35.4
15.8		19.3	22.1	22.4	17.2		20.1	19.8	19.8	20.2	19.8	23.6	20.4

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
22.4	21.5	21.1	24.8	23.7	21.9	21.3	23.3	21.5	21.6	21.7	20.4	22.7	22.1
53.9	37.3	38.3	48.3	40.9	49.9	-	33.1	41.5	33.3	45	30	39.8	40.0
44.8	26.2	36.3	45.9	40.7	37.9	26.7	37.1	39.3	32.8	42.6	28.7	41.3	37.2
15.1		17.4	20.4	20.7	14.2		20.7	18.4	17.8	17.1	17.7	20.9	18.7

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
14.0		14.5	14.6	14.6	14.0		14.2	15.2	14.8	15.7	14.9	15.9	14.8
34.4	29.4	31.0	42.0	34.0	34.1	31.3	31.0	34.0	31.3	38.5	25.3	31.8	33.1
32.9	26.3	30.7	40.9	35.1	36.6	26.3	29.0	36.4	30.5	33.5	27.0	32.4	32.6
15.7		16.7	19.1	19.9	14.2		19.9	17.2	16.6	17.0	17.3	20.7	17.9

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
25.1	20.3	20.7	25.6	23.6	21.5	18.7	22.5	20.6	20.3	22.3	18.4	23.1	21.7
41.4	18.4	27.1	45.4	33.8	46.9	-	22.8	35	18.3	42.6	18.9	37.8	32.9
38	27.4	34.2	44.1	38	34.3	24.6	31.5	37.7	29.8	40.2	27	39.7	34.6
17.8		22.2	23.8	24.3	17.7		23.7	21.7	21.9	21.1	21.5	23.3	22.1

Data Logger no. 4 - pole 4 - Post office

4.01	4.02	4.03	4.04	4.05	4.06	4.07	4.08	4.09	4.10	4.11	4.12	4.13	
Wood chips		White reflective curb	Asphalt	Concrete gutter	Timber seat table		Metal	Concrete edge	Orange brick wall	Brown brick edge	White brick wall	Ground concrete	average @ data poles
sun	shade				sun	shade							
29.3	21.3	25.6	32.1	28.1	30.2	23.1	20.2	27.3	25.1	28.9	29.2	28.7	26.9
41.9	38.0	37.1	47.1	39.5	48.8	40.4	41.0	41.8	41.5	45.9	32.2	41.0	41.5
38.0	33.7	38.2	43.3	38.7	39.4	38.5	38.5	41.3	40.1	40.1	34.8	40.0	39.4
25.5		29.5	29.8	29.5	27.1		30.1	29.5	27.8	28.3	27.8	29.6	28.9

10. Appendix

1.3.5 Site 5 2021 Temperature readings

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
missed temp			
40.8	41.6	43.8	42.1
42.8	35.3	42.9	40.3
25.7	20.5	27	24.4

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
21.7	21.1	23.1	22.0
46.9	49.5	44.3	46.9
48.3	40.5	45.8	44.9
25.9	19.5	25.7	23.7

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
25.7	27.3	26.5	26.5
21.9	22.2	23	22.4
25.9	25.8	27.5	26.4
19.5	17.6	21.5	19.5

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
17.2	16.3	18.1	17.2
27.8	28.2	29.5	28.5
25.4	25.1	27.4	26.0
18.6	16.8	20.5	18.6

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
26.4	29.5	23.2	26.4
44.6	41.2	42.7	42.8
34.6	34	37.9	35.5
19.2	16.9	21.6	19.2

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
23.4	33.3	29	28.6
54.7	47.7	50.9	51.1
40.9	36	43.4	40.1
28.3	27.8	29.9	28.7

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
26.2	30.0	29.6	28.6
56.6	51.6	56.1	54.8
50.8	44.3	52.5	49.2
28.9	28.1	30.2	29.1

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
32.2	31.9	32.1	32.1
54	50.2	56.3	53.5
59.2	61.2	58.1	59.5

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
25.9	27.3	26.8	26.7
33.8	40.2	36.0	36.7
40.1	35.1	42.9	39.4
23.8	18.6	24.6	22.3

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
16.8	15.9	18.5	17.1
32	32.4	30.1	31.5
35.1	35.5	33.9	34.8
19.9	18.7	21.5	20.0

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
20.4	20.7	21.3	20.8
32.6	31.7	32.2	32.2
29.0	23.0	32.8	28.3
19.0	18.5	19.7	19.1

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
22	28.6	27	25.9
47.5	42.9	49.3	46.6
36.6	35.7	38.4	36.9
21.7	20.1	24.6	22.1

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
35.1	31.5	30.1	32.2
50.0	49.3	48.9	49.4
36.7	34.3	38.6	36.5
25.6	20.1	28.2	24.6

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
26.5	28.0	27.9	27.5
31.3	28.9	31.5	30.6
35.4	27.6	39.4	34.1
20.3	17.9	21.7	20.0

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
20.9	22.9	22.8	22.2
37	36.3	39.1	37.5
36.4	34.4	39.6	36.8
17.7	16.1	20.8	18.2

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
14.3	13.4	15.4	14.4
29.0	35.1	29.9	31.3
33.9	28.8	35.8	32.8
17.2	15.6	18.6	17.1

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
20.2	23.4	23.8	22.5
33.6	29.5	35.8	33.0
36	35.4	38.6	36.7
21.5	19.5	24	21.7

Data Logger no. 5 - pole 5 - drive way			
5.01	5.02	5.03	
Edge concrete	Bin	Ground concrete	average @ data poles
30.1	29.9	28.7	29.6
41.3	42.5	38.7	40.8
38.3	37.6	38.9	38.3
27.6	27.0	29.1	27.9

10. Appendix

1.3.6 Site 6 2021 Temperature readings

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
								missed temp									
31.7	30.7	31.1	33.8	48	43.8	41.2	24.1	22.5	36.5	20.2	29.9		32.4	29.8	39.8	56.7	34.5
31.1	29.8	32	37.8	40.4	33.2	34.2	34.4		29.5	24.6	29.3		32.7	24.6	37.9	48.6	33.3
26.2	25.7	26.1	27.5	24.6	23	21.7		24.8		22.1			21	21.9	26.4	30	24.7

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
20.8	20.3	20.1	21.4	22.4	21.1	23.2	-	20	-	20.9	-		18.4	20.6	23.2	26.7	21.5
26.1	24.6	25.4	27.2	50.6	32.2	57.8	24.4	20.7	38.2	20	34.9		38.5	25.9	41	54.9	33.9
34.6	34.3	37.3	39.9	42.4	38.9	51		41.9		31.2	39.1		38.9	32.7	43.7	52	39.9
24.9	25	26.3	25.8	26.2	22.6	21.7		25.7		23.2			22.5	22.3	26.6	30.7	24.9

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
24	23.4	23.7	24	22.4	25.6	25.8	-	23.5	-	24.4	-		22.7	22.9	26.1	29.1	24.4
20.7	20.4	20.9	21.6	21.4	19.7	-	19.1	19.9	-	19.2	-		19.9	18.6	22.1	24.8	20.6
22.9	21.7	23.7	24.2	23.5	21.9	-	19	20.4	-	21.3	-		23.9	18.1	27.6	31.6	23.1
18.3	18.1	18.4	18.6	18.7	17	16.9		18		17.3			17.3	16.1	20.1	22.3	18.2

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
16.6	16.5	16.5	16.5	16.4	16.1	16.2	-	16.2	-	17.1	-		15	15.8	18.7	19.3	16.7
254	25	26.4	26.9	29.9	29.3	30.3	-	26.5	-	28.4	-		26.4	23.7	30.1	36.1	45.6
22.7	21.5	23.5	24	23.9	22	-	19.6	19.9	-	20.4	-		23.3	17.9	27.2	31.2	22.9
19.2	18.5	18.3	18.4	18	18.6	16.2		16.5		18.9			17.8	17.6	20.9	21	18.5

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
18.4	17.3	17	17.7	22.7	19.8	22	16.4	18.7	19.7	18.2	22		15.9	18.9	23.1	26.8	19.7
26.9	25.8	26.2	27.7	24.9	22.4	47.5	25.3	24.6	37.3	26.1	39.1		40.8	38.5	40.7	51	32.8
26.2	24.8	28.8	31.8	32.2	33	35.9	24	27	30.2	23.7	33.1		35.9	24.9	39.8	49.2	31.3
18.5	18.4	19.6	20.3	19.8	17.4	16.5		18.4		16.9			15.8	16	21.9	22.7	18.6

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
22.1	21.1	21.6	22.2	26.7	27.6	29.5	22.5		22.9	25.7	19.5		21.9	23	26.3	31.8	24.3
34.3	33	33.6	35.2	57.4	58.4	56.4	34	28.7	44.1	31.3	45		42.9	35.7	46.2	59.9	42.3
34.6	34.2	33.9	38.2	42.9	45.8	39.9	34.3	34.2	41.4	34.8	36.9		39.9	33.5	41	49.9	38.5
27.9	27.4	28.6	29	29.5	26.4	26.7		26.3		25.4			27.1	25	29.4	32.2	27.8

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
25.2	23.6	23.8	24.0	28.5	30.5	35.8	27.7		24.9	28.8	26.5		23.6	24.8	29.2	32.8	27.3
38.4	36.7	37.0	38.9	64.7	66.6	66.2	36.0	32.5	49.9	52.5	36.2		48.2	41.7	52.2	65.9	47.7
38.4	37.4	41.9	43.7	46.5	45.4	46.2	37.3	38.5	48.0	42.9	36.6		45.6	37.7	50.8	58.9	43.5
28.2	28.0	29.2	29.5	29.9	27.1	26.8		26.7		25.6			27.5	25.4	29.8	32.5	28.2

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
26	24.9	25.6	25.8	29.5	28.1	33.4	25.3	27.2	29.5	26.2	29.6		28.1	27.1	29.9	34.4	28.2
40.9	39.4	40.1	41.1	38.9	35.7	59.4	38.4	36	48.3	37.7	50.4		52.7	44.5	52.7	64.8	45.1
49.5	48.1	50.3	54.1	54.9	55.6	64.9	50.2	48.4	52.3	45.1	54.9		57.1	48.1	57.6	68.3	53.7
																	#DIV/0!

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
27.7	27.2	27.3	27.6	29.2	30.3	28.2			28.1		28.2		26.7	25.8	29.4	32.4	28.3
25.7	24.4	24.6	26.6	26.5	29.5	23.7		23.2	26.5		26.6		25.8	21.1	29.9	34.7	26.3
38.4	37.4	41.9	43.7	46.5	45.4	46.2	37.3	38.5	48	36.6	42.9		45.6	37.7	50.8	58.9	43.5
19.4	18.7	18.5	18.5	18.3	19.0	17.5		18.8		18.8			18.0	17.8	21.1	21.2	18.9

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
																	#DIV/0!
19.6	19.2	19.9	20	19.9	20.7	-	20.3	18.5	19.5	18.3	19.8		20.5	18.9	21.8	23.6	20.0
17.9	17.2	17.9	18.1	19.2	18.8	-	18.6	18.5	-	18.8	-		18.5	16.9	20	21	18.6
16.6	16.5	16.5	16.5	17	17.2	16.9		16.7		17.2			17.1	16.5	18.1	18.4	17.0

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
18.1	17.9	18.0	18.2	18.2	18.7	18.7			18.4		17.9		18.3	18.2	19.8	20.2	18.5
21.8	20.2	21.3	22.2	21.8	22.3	22.9	21.5	18.8	20.1	18.2	21.1		21.1	20.0	24.1	27.4	21.6
19.6	19.3	20.0	20.9	18.0	19.0	17.3	17.0	16.8	17.5	16.2	17.6		17.7	17.8	19.8	24.8	18.7
20.0	20.0	19.6	19.9	19.3	19.9	19.3		19.2		19.7			18.8	19.0	19.7	20.5	19.6

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
24.0	23.2	23.4	23.9	23.9	23.6	26.0	22.7	22.3	22.1	22.4	22.4		21.5	22.7	25.1	29.5	23.7
31.0	29.5	31.3	32.3	27.8	30.3	34.3	26.2	25.6	28.3	25.2	30.9		32.0	27.7	36.9	46.7	31.0
31.4	30.4	32.2	35.1	34.1	33.4	41.4	30.2	26.8	29.1	25.4	29.0		35.6	30.8	40.3	49.9	33.4
22.4	22.0	22.5	22.8	20.1	20.3	20.0		19.5		19.1			19.5	20.5	24.5	26.8	21.5

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
16.6	16.3	16.8	17	17.1	16.8	-	16.1	16.8	-	16.8	-		15.8	15.7	17.9	18.8	16.8
26.7	25	26.6	27.3	22.7	24.5	-	27.7	21.1	23.1	23.1	27.8		28.5	26.8	29.3	41.4	26.8
25	23.6	27.6	27.4	23	24.5	27.1	21.7	18.5	22	16.7	22.3		28.8	22.3	31.2	43.2	25.3
18.5	18.2	19.7	20.2	16.1	16.6	16.4		16.1		15.8			15.5	16.7	20.8	24.4	18.1

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
19.1	18.5	19.0	19.4	18.4	18.7	19.3		17.3	17.4	17.4	18.2		16.7	18.1	21.2	25.0	18.9
24.5	23.1	26.3	27.3	29.7	30.0	30.8		19.6	20.9	18.5	21.4		26.3	22.6	31.3	40.1	26.2
24.0	22.7	24.6	27.4	32.2	32.7	31.1	22.7	18.5	23.4	17.0	23.3		29.9	23.4	38.2	46.3	27.3
19.0	19.0	18.6	18.9	19.0	19.5	19.1		19.0		19.5			18.6	18.7	19.1	20.0	19.1

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
21.8	20.9	21.7	21.8	24.7	23.1	26.1	22	20.2	21.5	19.9	21.8		21.6	22.8	24.7	29.1	22.7
32.7	31	31.3	32.6	27.7	25.7	59.3	29.9	25.6	42.4	26.6	36.9		44.4	35	46.5	59.9	36.7
29.2	28.1	31.6	32.6	28	27.3	36.9	29.2	24.6	26.2	22.7	30.3		37.5	26.2	38.5	47.7	31.0
21.9	21.1	22.4	22.8	20.1	18.2	19.2		18.5		18.6			21.3	19.3	24.5	26.5	21.1

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
25.2	24.2	24.6	25.5	30.5	31.5	33.2	26.8	25.8	26.8	24.7	27.1		28.2	28.3	32.4	36.4	28.2
32.0	30.4	32.3	32.3	57.0	56.8	44.8	32.0	27.3	42.8	28.9	41.4		41.0	34.7	43.7	61.0	39.9
29.7	29.2	31.0	33.2	40.6	42.0	35.0	29.2	26.4	29.1	25.6	31.5		32.3	29.8	40.3	48.4	33.3
24.3	24.0	24.4	25.2	25.5	21.9	22.8		22.1		21.5			21.1	22.4	27.1	30.0	24.0

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
22.7	21.0	21.8	21.5	28.8	28.8	31.2	24.0	21.7	22.4	21.1	25.5		23.1	25.1	26.7	32.4	24.9
27.7	26.3	26.8	28.7	30.7	31.1	26.6		23.1	25.3	22.6	23.1		28.4	25.2	31.7	39.1	27.8
25.5	24.7	26.9	29.0	34.2	31.9	34.4	26.5	23.4	28.4	22.2	27.1		32.9	27.0	37.4	47.2	29.9
19.7	18.9	20.7	21.4	19.4	21.4	17.0		19.2		17.1			16.8	16.9	22.7	23.4	19.6

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
20.1	19.5	20.3	20.5	20	18.4	20.5	19.4	18.4	18.7	19.2	18.4		18.5	19.5	21.9	24.6	19.9
29.1	27.6	28.8	30	27.9	24.1	48.8	28.7	24.2	32.7	26.5	33.7		35.6	32.8	38.1	48.5	32.3
25.5	24.8	28.9	29.7	29.3	27.4	38.5	25.2	23.4	28.1	21.8	31		40	26.8	36.9	45.2	30.2
17.2	16.3	18.1	18	16.2	15.4	15.3		16.6		16			15	14.1	19.4	21.5	16.9

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
13.4	13.5	14.3	14.2	14.0	14.8	14.1		13.7		13.7	13.8		13.8	14.2	15.1	15.3	14.1
25.0	23.6	24.9	27.8	27.7	33.4	25.0	21.5	18.8	21.5	25.1	18.6		24.3	21.7	29.1	41.9	25.6
27.9	27.3	28.3	30.5	30.6	32.2	34.6	23.8	24.1	23.8	26.4	23.6		29.5	25.4	32.2	41.4	28.9
17.6	17.0	18.5	18.6	15.5	16.4	13.7		14.8		14.5			13.4	14.0	17.4	18.2	16.1

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
17.9	17.4	18.4	18.4	22.7	19	22.3	16.9	17.6	18.9	17.3	19.9		17.9	18.3	20.1	25.2	19.3
15.7	14.3	15	16.6	15.1	33.9	45	13.5	10.4	28.2	11.9	24.9		27.2	27	33.2	51.4	24.0
25.5	25.2	27.9	29.2	38.7	43	32.7	23.9	25.4	36.8	22.7	25.4		37.3	28.4	38.7	50.9	32.0
20.9	20.5	21.5	22	19.8	18.1	17.1		18.7		17.2			18.2	17.7	23.1	24.9	20.0

Data Logger no. 6 - Takeaway shop corner													Data Logger no. 6.2 - rain garden near takaway corner				
6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.1	6.11	6.12		6.2.1	6.2.2	6.2.3	6.2.4	
				Brick Seat	Brick paver	Mulch		Sitting rock		DG							
Frog	Water	Red	Duck			Sun	Shade	Sun	Shade	Sun	Shade		Rocks	Vegetation	Concrete	Asphalt	average @ data poles
22.8	23.1	23.9	23.8	29.1	30.2	32.3	26.1	22.6	25.5	26.2	23.7		27.8	27.1	29.6	34.2	26.8
31.2	29.5	32.9	33.2	47.4	42.7	47.0	37.9	30.1	37.0	33.7	29.0		35.0	34.1	38.4	48.8	36.7
35.9	34.9	36.0	38.3	40.3	40.6	39.0	32.6	32.3	34.3	31.3	29.8		37.8	32.9	39.5	45.8	36.3
27.5	27.1	28.2	28.6	28.0	25.3	26.1		25.7		24.1			26.4	24.3	28.7	31.2	27.0

10. Appendix

1.3.7 Site 7 2021 Temperature readings

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
missed temp									
33.3	27.3	55	28.5	-	24.3	40.8	24	21.2	31.8
30.2	25.7	36.7	26.9	43.2	30.3	34.3	23.3	27.2	30.9
22		20.2		21.4		20.4		22.4	21.3

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
23	-	24	-	23.9	-	22.7	-	19.3	22.6
36	26.6	65.2	36.8	-	26	57	24.6	26.1	37.3
32.6	28.6	39.6	32.4	42.8	36.3	36.4	34.3	33.3	35.1
20.7		19.8		20.7		20.4		21.9	20.7

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
24.8	-	30.3	-	27.7	-	26.9	-	24.1	26.8
-	20.2	-	20.6	-	20.9	-	18.8	20.8	20.3
-	19.6	-	23.9	-	21.9	25.1	20.9	21	22.1
16.4		16.2		16.4		16.6		16.8	16.5

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
17.8	-	17.5	-	17.3	-	16.4	-	16.7	17.1
32.4	-	38	-	-	30.6	36.6	-	25.8	32.7
-	19	-	23.6	-	21.7	24.5	20.2	20.5	21.6
17.9		17.8		17.5		17.5		17.3	17.6

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
24	16.2	26.3	16.4	34.1	26.9	24.2	16.4	23.2	23.1
34.8	-	44.6	32.8	-	31.4	48.5	31	31.8	36.4
28.5	22.4	42.3	25	42	33.5	41.5	25.7	30.9	32.4
14.6		15.5		16.2		15.4		16.6	15.7

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
26.1	21.4	50.8	18.8	41.5	25.6	29.3	19.5	22.5	28.4
41.6	31.3	59.6		32.8	32.6	55.7	31.9	29.9	39.4
32	30.4	36.2	32.3	35	33.4	35.1	33.6	32.4	33.4
25		26.1		27.1		26.7		26	26.2

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
29.4	22.3	51.9	22.3	44.2	30.3	33.2	22.2	26.4	31.4
56.9	34.8	72.5	37.2	42.3	38.0	62.1	35.9	33.5	45.9
45.6	39.1	44.9	36.9	44.2	42.8	442.8	35.7	36.7	85.4
25.4		26.8		27.8		27.0		27.1	26.8

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
29.9	22.9	34.8	24.4	39.9	30.5	33.8	23.6	28.3	29.8
48.4	-	65.8	38.4	-	39.8	52.2	36.6	35.9	45.3
51.5	43.3	58	47	67.4	55.8	60.8	47.1	50.1	53.4
									#DIV/0!

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
27.6		27.5		26.6		27.3		26.4	27.1
25.1		30.3		24.9		27.7		23.4	26.3
45.6	39.1	44.9	36.9	44.2	42.8	44	35.7	36.7	41.1
18.2		18.1		17.7		17.9		18.5	18.1

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
									#DIV/0!
-	21.6	-	20.8	-	19.6	-	21.4	19	20.5
-	18.7	-	17.9	-	16.7	-	17.7	17	17.6
17.1		16.9		16.7		16.8		16.9	16.9

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
19.6		19.0		18.4		18.9		18.2	18.8
24.0		24.9			21.7	21.1	20.7	19.5	22.0
19.9		21.2			17.9	18.5	17.7	18.1	18.9
19.6		19.3		19.2		19.1		19.0	19.2

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
25.4	24.3	30.6	26.0	31.5	27.7	28.5	24.3	25.1	27.0
32.9		45.3	34.9		32.7	36.8	30.5	28.4	34.5
32.7	28.7	38.8	31.0	36.1	32.6	35.6	30.5	35.8	33.5
20.2		20.5		19.8		20.2		20.4	20.2

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	16.9	-	16.1	-	15.6	-	16.2	15.4	16.0
-	31.5	-	37.2	-	27.9	30.2	26.8	25.1	29.8
27.9	20.9	34.7	22.1	35.6	30.5	31.8	27.8	29.1	28.9
16.6		16		16.6		16.2		17.2	16.5

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
21.1		22.6	20.9	22.4	20.9	20.9		20.3	21.3
28.2		38.6			28.3	33.4	25.6	24.5	29.8
28.6	23.4	35.0	29.1	38.7	27.8	39.7	26.4	27.0	30.6
19.4		19.1		18.9		18.8		18.7	19.0

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
25.2	18.9	31.5	20.5	39.7	23.8	28	19.7	26.5	26.0
40.5	30.3	60.9	33.5	-	31.8	53.4	31.7	30.2	39.0
26.4	25.3	36.4	28.2	31.2	28.8	31.3	27.8	28	29.3
18.6		18.7		19.7		18.4		19.9	19.1

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
30.0	24.8	37.4	28.4	43.0	33.6	35.0	26.1	29.7	32.0
42.2	32.7	58.2	35.1	36.0	33.8	51.7	33.3	30.9	39.3
31.4	28.8	32.7	28.7	37.2	31.2	34.1	31.2	34.1	32.2
21.6		22.6		22.8		21.7		22.5	22.2

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
28.2	21.1	34.0	25.5	26.1	37.6	29.4	22.2	23.1	27.5
27.7		37.1	33.7		28.8	31.0	28.2	27.2	30.5
30.7	25.8	41.0	30.4	46.2	37.9	40.8	28.4	31.3	34.7
17.0		17.7		17.9		16.7		18.4	17.5

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
19.4	19.4	22	20.8	22.3	21	21	20.3	19.9	20.7
37.1	27.2	48.6	34	-	31.5	44.2	30.9	27.9	35.2
25.3	19.4	38.4	23	39.7	32.1	36	23.6	31.1	29.8
14.2		13.5		15.3		13.8		15.7	14.5

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
13.6		14.8		14.0		14.6		13.3	14.1
28.6	21.5	26.1	30.9		25.8	25.8	21.7	22.3	25.3
28.4	24.0	34.9	27.2	37.5	31.2	27.6	26.9	28.4	29.6
13.7		14.0		14.1		12.5		14.4	13.7

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
21.3	15.7	27.2	15.5	36.4	19.2	26.6	16.5	24	22.5
30	17	55.1	22.4	-	19.6	49.3	16.8	19	28.7
28.2	22.3	37.2	25.6	40.4	32.8	39.9	23.4	27.8	30.8
16.9		17.3		17.8		17.2		18.6	17.6

Data Logger no. 7 - first tree pit - opposite patch of grass

7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08	7.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
29.6		35.1		30.3		30.1		24.3	29.9
39.2	28.9	50.1	36.8		36.3	45.8	32.5	30.0	37.5
32.7	31.4	36.7	34.8	38.4	35.7	36.3	34.7	33.3	34.9
24.2		25.0		25.6		25.2		25.4	25.1

10. Appendix

1.3.8 Site 8 2021 Temperature readings

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
missed temp									
30.7	24.6	54.3	28.3	-	23.9	40	20.6	20.2	30.3
25	22	30.3	26.6	32.3	28.9	30.2	23.7	26.1	27.2
21.3		20.7		21.1		20.6		22.6	21.3

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
20.5	-	23.3	-	25.2	-	22.5	-	20.8	22.5
36.9	24.4	61.9	32.6	-	25.7	55.8	23.2	23.8	35.5
30	27.8	38.4	32.4	39.5	37.7	40.4	33.7	37.5	35.3
21.1		20.2		20.5		20.7		21.8	20.9

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
24.2	-	31.1	-	29.2	-	27.5	-	26.4	27.7
-	20	-	21.4	-	20.5	-	20	20.8	20.5
-	21.1	-	25.1	-	21.5	23	20.8	21.1	22.1
16		16.6		16.1		16		16.5	16.2

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
18.6	-	17.3	-	18.6	-	17	-	17.1	17.7
27.8	-	35.5	-	30.6	-	33.1	-	27.7	30.9
-	20.8	-	24.9	-	21.1	22.6	20	21.1	21.8
17.4		18.2		17.4		17.5		18.8	17.9

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
22.1	14.9	24.7	14.8	30.9	22.4	26.1	16	20.7	21.4
43.4	-	53.7	34.2	-	32.8	55.2	32	31.2	40.4
29.1	23.7	35.9	26.4	38.6	34.1	39	29.5	30.3	31.8
14.6		15.4		16.3		15.6		16.7	15.7

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
24.3	18.5	46.8	22.9	36.3	28.6	32.1	21.8	23.8	28.3
38.2	30.8	49.7	32.7	31.2	-	51.3	30.3	29.5	36.7
30.1	-	36.5	33.5	34.8	33.4	34.2	32.7	33.2	33.6
25.2		26.5		25.1		26		25.3	25.6

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
28.8	22.4	45.4	24.7	46.1	37.6	32.8	23.7	32.6	32.7
49.5	36.1	71.6	37.2		36.7	62.3	33.9	33.9	45.2
39.1	33.1	46.1	37.3	45.7	43.2	43.7	38.1	39.1	40.6
25.4		26.7		25.6		26.4		26.0	26.0

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
27.1	22.8	32.1	22.5	32.4	26.3	30.5	22.7	26.6	27.0
49	-	61.8	-	-	36.6	58.2	35.7	36.3	46.3
46.9	41.7	57.8	45.9	65.1	54.2	60.5	49.5	53.2	52.8
									#DIV/0!

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
26.7		27.3		27.1		27.5		26.4	27.0
24.6		30.2		26.5		28.9		25.1	27.1
39.1	33.1	46.1	37.3	45.7	43.2	43.7	38.1	39.1	40.6
18.6		18.5		18.5		18.6		19.8	18.8

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
									#DIV/0!
-	21.3	-	21.2	20.3	19.4	21.2	19.2	19.3	20.3
-	18.9	-	17.9	-	16.8	-	18	17.1	17.7
17.4		16.9		16.6		16.8		16.4	16.8

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
19.8		19.6		18.6		18.7		18.3	19.0
24.1		26.4			21.9	22.5	20.9	20.1	22.7
20.3		21.6		19.4		18.3		18.1	19.5
19.3		18.8		19.2		19.3		19.0	19.1

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
26.5	24.2	31.4	26.4	31.4	27.0	27.3	25.2	26.2	27.3
31.6	27.1	39.1	32.4		33.1	38.7	31.1	29.1	32.8
30.9	27.6	41.6	30.9	38.3	33.5	33.8	28.6	29.8	32.8
19.9		20.7		20.1		19.5		20.8	20.2

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
-	16.1	-	15.7	-	15.7	-	16.1	15.5	15.8
-	27.7	-	36.7	-	24.7	29.7	23.5	23.5	27.6
28.2	23.2	36.6	24.5	40.8	31.1	32.7	26.2	30.1	30.4
17		16.4		16.9		16.2		16.9	16.7

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
22.1	21.1	22.0	20.9	23.8	22.9	20.8	20.2	21.3	21.7
33.4	26.8	43.2	37.4	32.9		40.6	31.0	27.8	34.1
29.2	26.2	37.4	31.0	35.7	30.5	34.7	24.2	28.3	30.8
19.1		18.7		19.0		19.1		18.9	19.0

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
24.3	17.7	32.4	17.6	33.1	19.8	24.5	17.6	19.7	23.0
41.4	-	58.8	-	-	32	53.1	30.4	31.7	41.2
26.1	24.9	34.2	27.7	32.2	29	30.5	28.5	28.7	29.1
18.4		18.9		19.2		18.6		19.6	18.9

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
31.2	25.6	37.3	28.2	35.3	30.5	35.0	27.0	29.1	31.0
41.3	34.0	53.8	39.4		32.8	48.0	31.1	46.0	40.8
28.6	27.4	35.7	33.2	36.8	28.4	33.5	28.3	27.0	31.0
21.5		23.2		22.8		22.4		23.0	22.6

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
22.4	19.4	29.1	22.1	32.3	27.1	26.4	22.4	23.2	24.9
27.7	26.5	36.1	30.4	29.7	26.7	31.1	28.2	27.5	29.3
33.5	26.6	45.4	32.8	42.7	39.1	40.9	38.8	36.5	37.4
16.8		17.8		17.4		16.6		19.5	17.6

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
20.1	19.8	21.3	20.9	21.4	20.9	20.9	19.8	19.8	20.5
32.9	-	44	32.1	-	27.4	41.6	27.2	26.8	33.1
26.8	20.7	37.6	23.6	37	30.2	32.3	26.2	28.6	29.2
13.3		13.8		14.8		13.3		15.1	14.1

Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
15.3		15.7		15.9		16.7		15.5	15.8
28.2	23.1	40.2	28.4	29.1	26.0	25.9	25.7	23.4	27.8
26.8	23.4	28.2	26.7	26.3	23.4	24.9	22.5	26.0	25.4
13.1		14.6		13.3		12.9		15.1	13.8

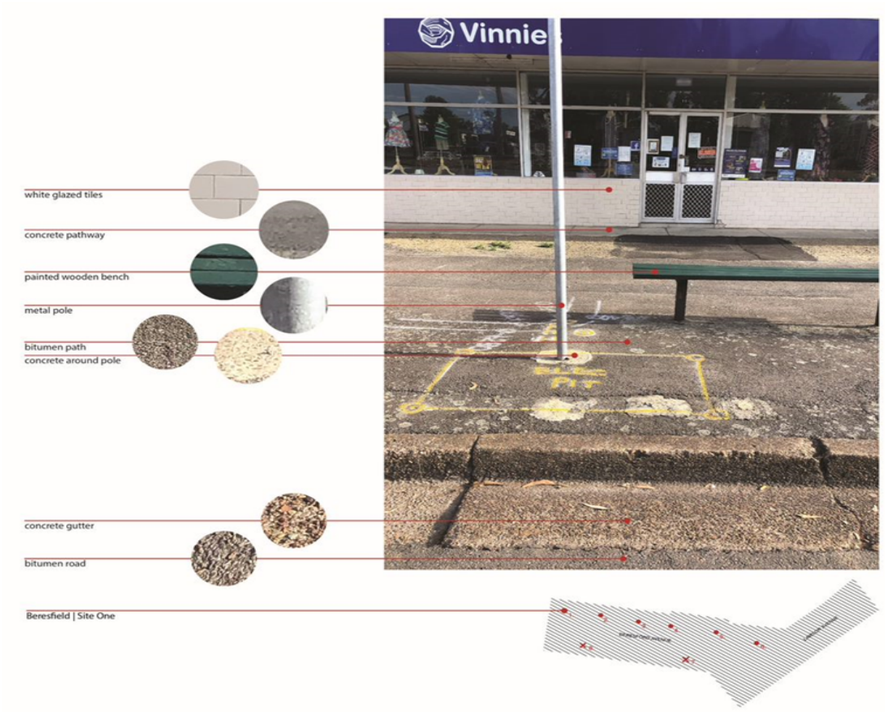
Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
20.4	14.7	29.7	15.9	30.1	17.2	22.9	15.1	17.9	20.4
32.9	-	54.8	-	-	20.2	43	17.3	20.1	31.4
31.5	24.3	36.2	26.3	41.5	33	36.1	28.2	34	32.3
16.4		17.1		18		16.9		18	17.3

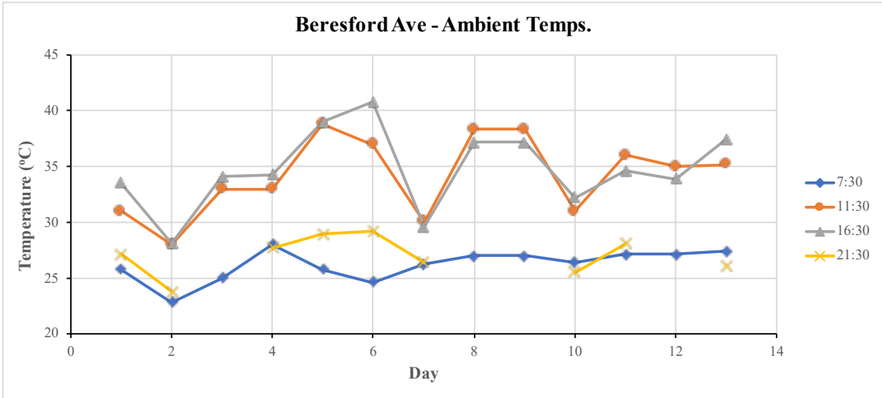
Data Logger no.8 - second last tree pit - opposite Vinnies									
8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	
Grass		Plastic edging		Rubber edging		Wood chips		Tree trunk	average @ data poles
Sun	Shade	Sun	Shade	Sun	Shade	Sun	Shade		
25.6		30.1		33.3		29.2		24.1	28.5
33.8	29.2	50.1	36.4		35.0	44.7	31.9	38.2	37.4
30.5	30.9	39.7	34.3	39.5	36.3	37.0	35.7	38.0	35.8
24.8		25.4		24.6		25.0		24.8	24.9

10. Appendix

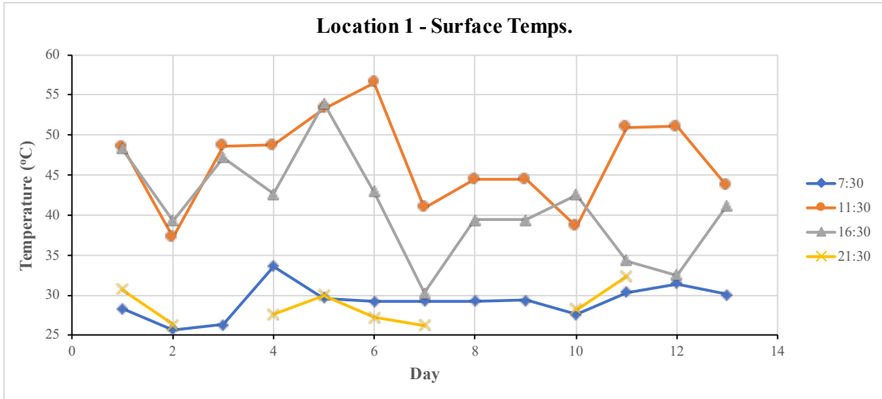
2.1.1 Site 1 2019 Temperature Results

LOCATION 1 (AVERAGE)





Ambient	
Time	Average Temp. (°C)
7:30:00	26.2
11:30:00	34.2
16:30:00	34.8
21:30:00	27.0



Surface	
Time	Average Temp. (°C)
7:30:00	29.2
11:30:00	46.7
16:30:00	41.1
21:30:00	28.1

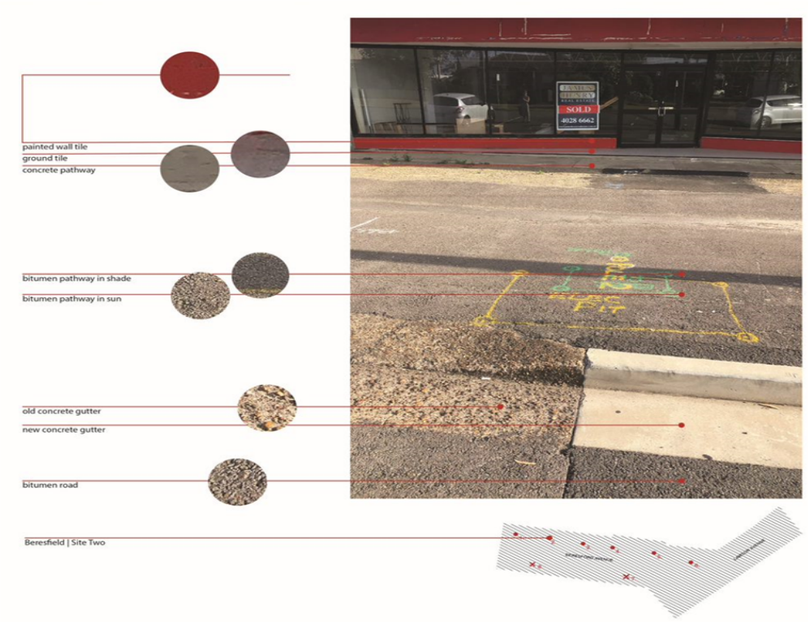
Ambient (All of Beresford Ave Sites)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	25.8	31.0	33.5	27.1
Jan-10	2	27, 21	22.8	28.0	28.1	23.8
Jan-11	3	26, 19	25.0	33.0	34.1	
Jan-14	4	29, 20	28.0	33.0	34.3	27.7
Jan-15	5	34, 21	25.8	38.8	39.0	28.9
Jan-17	6	33, 20	24.6	37.0	40.8	29.2
Jan-20	7	31, 21	26.2	30.0	29.6	26.4
Jan-21	8	29, 21	27.0	38.3	37.2	
Jan-22	9	33, 22	27.0	38.3	37.2	
Jan-24	10	34, 23	26.4	31.0	32.2	25.5
Jan-29	11	33, 22	27.1	36.0	34.6	28.1
Jan-30	12	34, 23	27.1	35.0	33.9	
Jan-31	13	37, 21	27.4	35.2	37.4	26.0
Data Collection Concluded						
Average Temp. (°C)			26.2	34.2	34.8	27.0

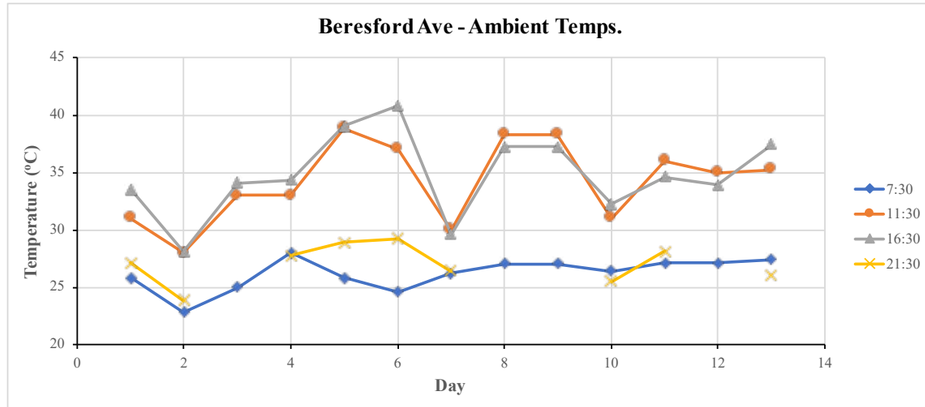
Surface (Location 1)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	28.3	48.6	48.3	30.7
Jan-10	2	27, 21	25.6	37.2	39.3	26.3
Jan-11	3	26, 19	26.3	48.7	47.2	
Jan-14	4	29, 20	33.6	48.8	42.7	27.6
Jan-15	5	34, 21	29.6	53.3	54.0	30.0
Jan-17	6	33, 20	29.2	56.5	42.9	27.2
Jan-20	7	31, 21	29.3	40.9	30.3	26.2
Jan-21	8	29, 21	29.3	44.4	39.4	
Jan-22	9	33, 22	29.3	44.4	39.4	
Jan-24	10	34, 23	27.5	38.6	42.5	28.2
Jan-29	11	33, 22	30.3	51.0	34.3	32.3
Jan-30	12	34, 23	31.4	51.1	32.5	
Jan-31	13	37, 21	30.1	43.6	41.2	24.1
Data Collection Concluded						
Average Temp. (°C)			29.2	46.7	41.1	28.1

10. Appendix

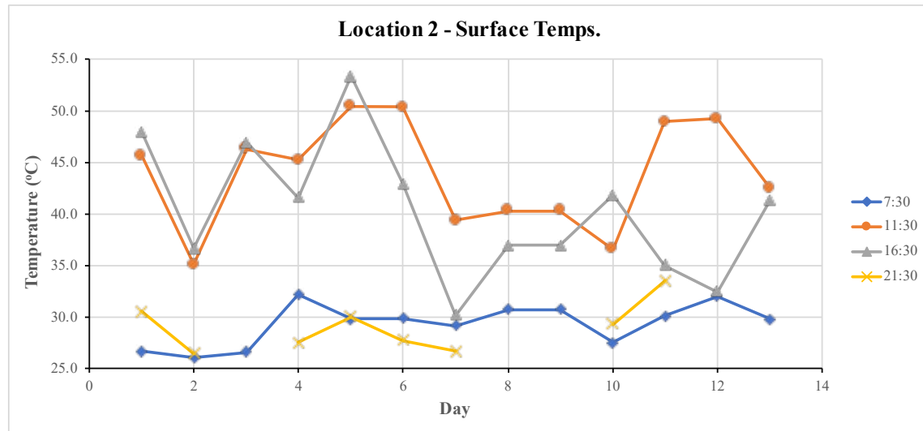
2.1.2 Site 2 2019 Temperature Results

LOCATION 2 (AVERAGE)





Ambient	
Time	Average Temp. (°C)
7:30:00	26.2
11:30:00	34.2
16:30:00	34.8
21:30:00	27.0



Surface	
Time	Average Temp. (°C)
7:30:00	29.3
11:30:00	43.9
16:30:00	40.3
21:30:00	28.2

Ambient (All of Beresford Ave Sites)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	25.8	31.0	33.5	27.1
Jan-10	2	27, 21	22.8	28.0	28.1	23.8
Jan-11	3	26, 19	25.0	33.0	34.1	
Jan-14	4	29, 20	28.0	33.0	34.3	27.7
Jan-15	5	34, 21	25.8	38.8	39.0	28.9
Jan-17	6	33, 20	24.6	37.0	40.8	29.2
Jan-20	7	31, 21	26.2	30.0	29.6	26.4
Jan-21	8	29, 21	27.0	38.3	37.2	
Jan-22	9	33, 22	27.0	38.3	37.2	
Jan-24	10	34, 23	26.4	31.0	32.2	25.5
Jan-29	11	33, 22	27.1	36.0	34.6	28.1
Jan-30	12	34, 23	27.1	35.0	33.9	
Jan-31	13	37, 21	27.4	35.2	37.4	26.0
Data Collection Concluded						
Average Temp. (°C)			26.2	34.2	34.8	27.0

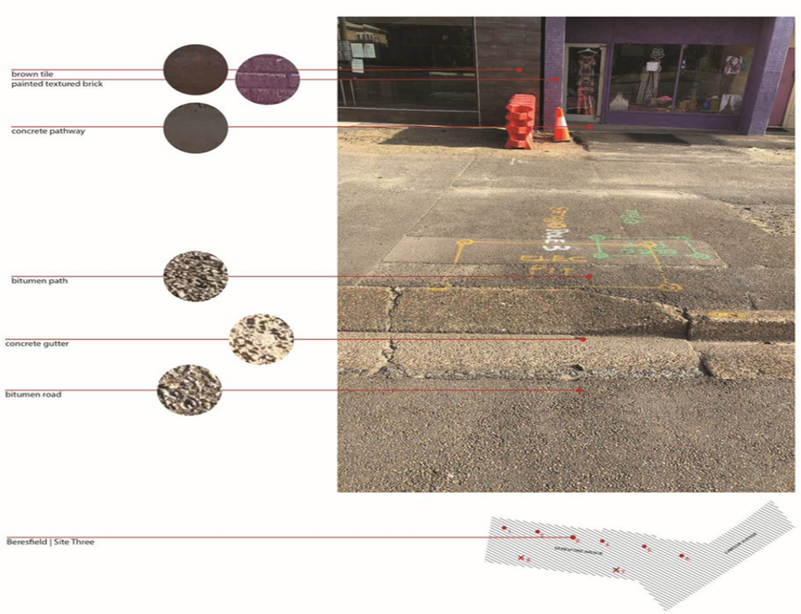
Surface (Location 2)

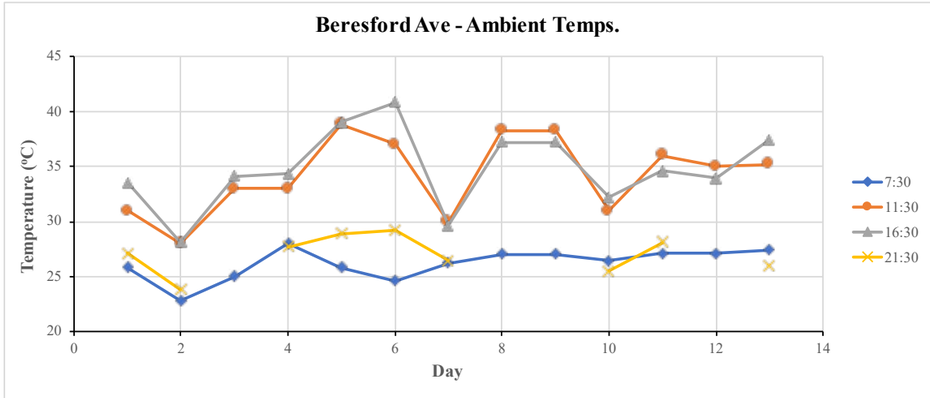
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	26.7	45.6	47.9	30.5
Jan-10	2	27, 21	26.0	35.1	36.6	26.4
Jan-11	3	26, 19	26.6	46.3	46.9	
Jan-14	4	29, 20	32.2	45.2	41.6	27.5
Jan-15	5	34, 21	29.8	50.4	53.4	30.0
Jan-17	6	33, 20	29.8	50.3	42.9	27.7
Jan-20	7	31, 21	29.1	39.4	30.1	26.6
Jan-21	8	29, 21	30.7	40.3	36.9	
Jan-22	9	33, 22	30.7	40.3	36.9	
Jan-24	10	34, 23	27.5	36.6	41.8	29.3
Jan-29	11	33, 22	30.1	48.9	35.0	33.5
Jan-30	12	34, 23	32.0	49.2	32.4	
Jan-31	13	37, 21	29.8	42.5	41.3	22.2
Data Collection Concluded						
Average Temp. (°C)			29.3	43.9	40.3	28.2

10. Appendix

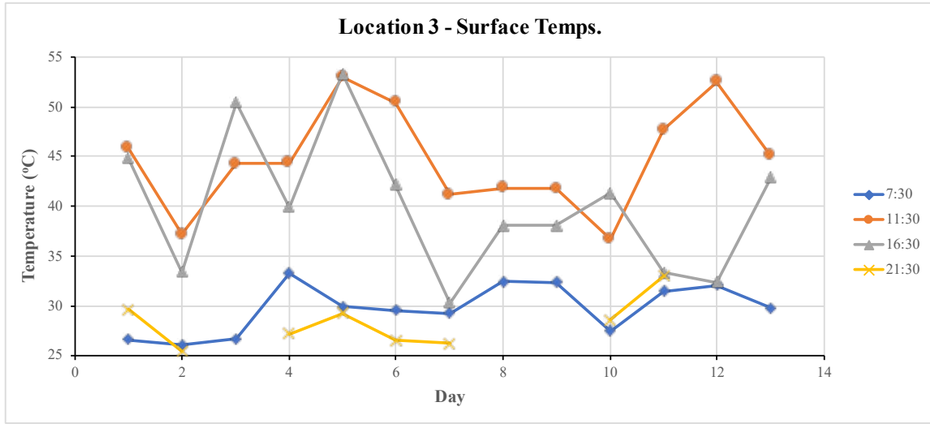
2.1.3 Site 3 2019 Temperature Results

LOCATION 3 (AVERAGE)





Ambient	
Time	Average Temp. (°C)
7:30:00	26.2
11:30:00	34.2
16:30:00	34.8
21:30:00	27.0



Surface	
Time	Average Temp. (°C)
7:30:00	29.8
11:30:00	44.8
16:30:00	40.0
21:30:00	27.4

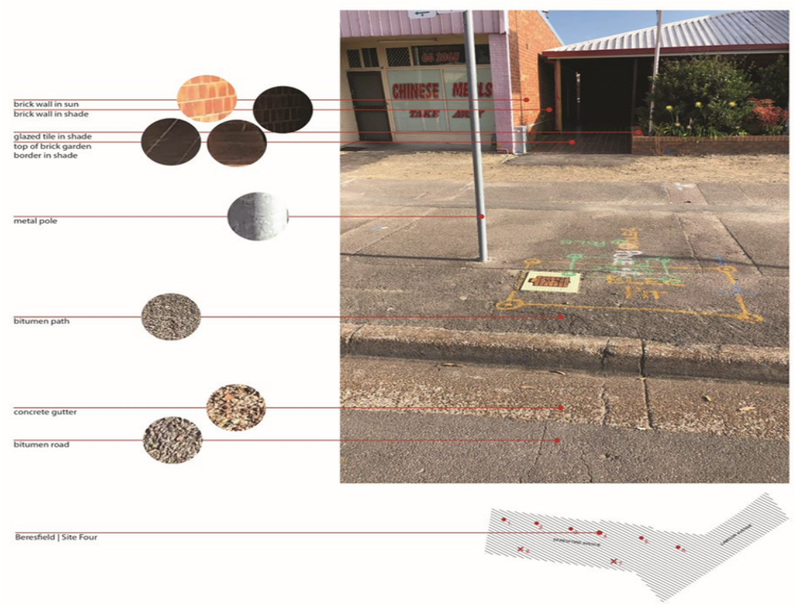
Ambient (All of Beresford Ave Sites)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	25.8	31.0	33.5	27.1
Jan-10	2	27, 21	22.8	28.0	28.1	23.8
Jan-11	3	26, 19	25.0	33.0	34.1	
Jan-14	4	29, 20	28.0	33.0	34.3	27.7
Jan-15	5	34, 21	25.8	38.8	39.0	28.9
Jan-17	6	33, 20	24.6	37.0	40.8	29.2
Jan-20	7	31, 21	26.2	30.0	29.6	26.4
Jan-21	8	29, 21	27.0	38.3	37.2	
Jan-22	9	33, 22	27.0	38.3	37.2	
Jan-24	10	34, 23	26.4	31.0	32.2	25.5
Jan-29	11	33, 22	27.1	36.0	34.6	28.1
Jan-30	12	34, 23	27.1	35.0	33.9	
Jan-31	13	37, 21	27.4	35.2	37.4	26.0
Data Collection Concluded						
Average Temp. (°C)			26.2	34.2	34.8	27.0

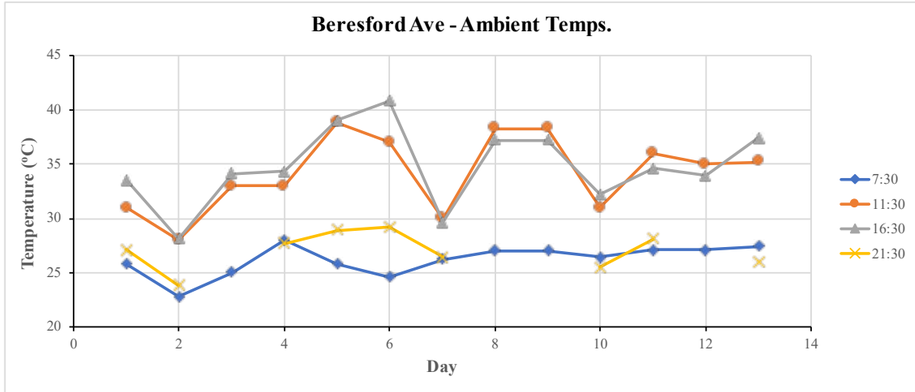
Surface (Location 3)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	26.6	45.9	44.8	29.6
Jan-10	2	27, 21	26.1	37.2	33.4	25.4
Jan-11	3	26, 19	26.6	44.3	50.4	
Jan-14	4	29, 20	33.3	44.4	39.9	27.2
Jan-15	5	34, 21	29.9	53.0	53.3	29.3
Jan-17	6	33, 20	29.5	50.4	42.1	26.5
Jan-20	7	31, 21	29.2	41.2	30.3	26.2
Jan-21	8	29, 21	32.4	41.8	38.1	
Jan-22	9	33, 22	32.4	41.8	38.1	
Jan-24	10	34, 23	27.5	36.7	41.3	28.6
Jan-29	11	33, 22	31.5	47.7	33.3	33.0
Jan-30	12	34, 23	32.1	52.5	32.4	
Jan-31	13	37, 21	29.8	45.1	42.9	21.0
Data Collection Concluded						
Average Temp. (°C)			29.8	44.8	40.0	27.4

10. Appendix

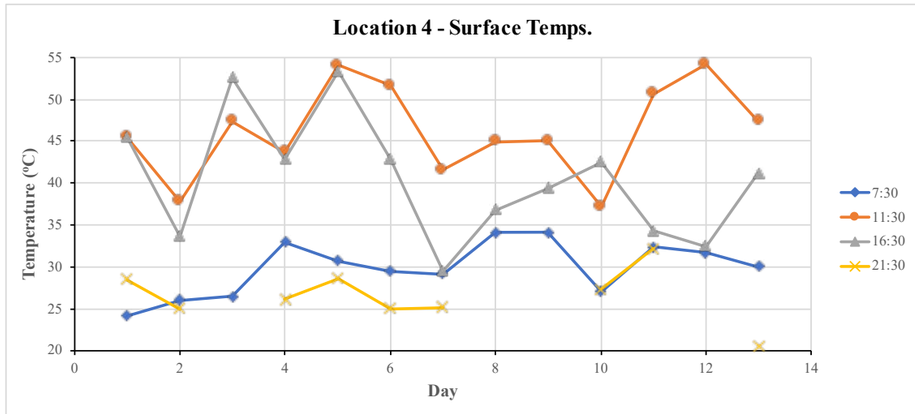
2.1.4 Site 4 2019 Temperature Results

LOCATION 4 (AVERAGE)





Ambient	
Time	Average Temp. (°C)
7:30:00	26.2
11:30:00	34.2
16:30:00	34.8
21:30:00	27.0



Surface	
Time	Average Temp. (°C)
7:30:00	29.9
11:30:00	46.2
16:30:00	40.5
21:30:00	26.5

Ambient (All of Beresford Ave Sites)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C) 7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	25.8	31.0	33.5	27.1
Jan-10	2	27, 21	22.8	28.0	28.1	23.8
Jan-11	3	26, 19	25.0	33.0	34.1	
Jan-14	4	29, 20	28.0	33.0	34.3	27.7
Jan-15	5	34, 21	25.8	38.8	39.0	28.9
Jan-17	6	33, 20	24.6	37.0	40.8	29.2
Jan-20	7	31, 21	26.2	30.0	29.6	26.4
Jan-21	8	29, 21	27.0	38.3	37.2	
Jan-22	9	33, 22	27.0	38.3	37.2	
Jan-24	10	34, 23	26.4	31.0	32.2	25.5
Jan-29	11	33, 22	27.1	36.0	34.6	28.1
Jan-30	12	34, 23	27.1	35.0	33.9	
Jan-31	13	37, 21	27.4	35.2	37.4	26.0
Data Collection Concluded						
Average Temp. (°C)			26.2	34.2	34.8	27.0

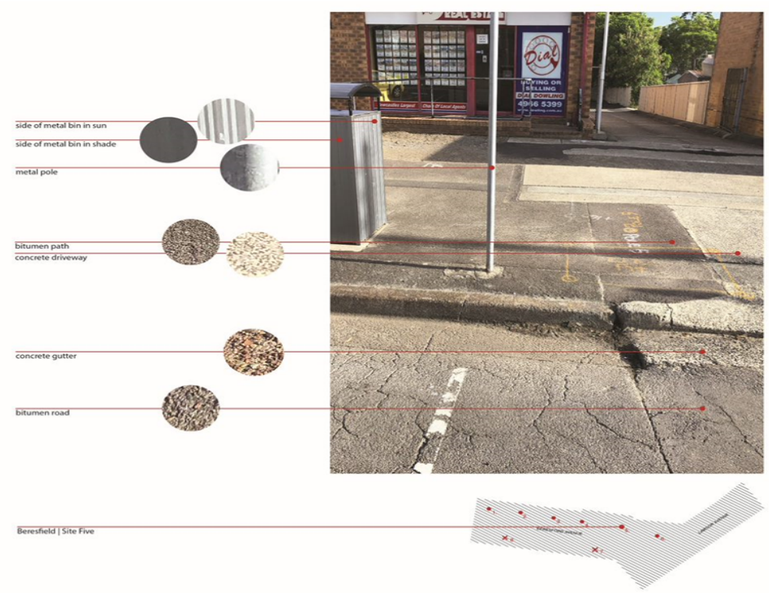
Surface (Location 4)

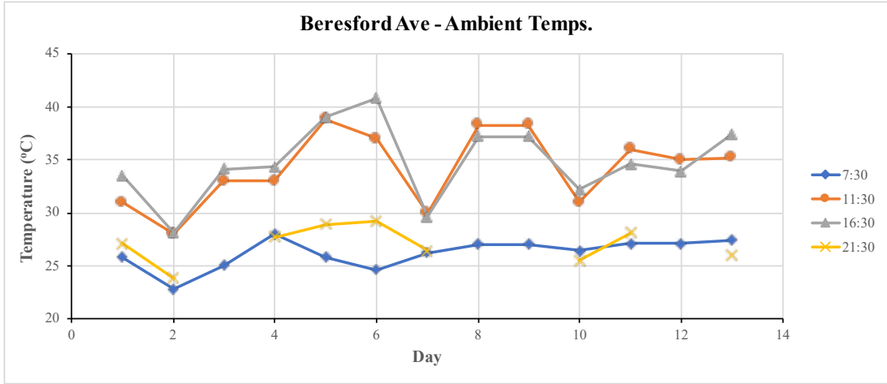
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C) 7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	24.2	45.4	45.5	28.5
Jan-10	2	27, 21	26.0	37.8	33.6	25.0
Jan-11	3	26, 19	26.4	47.4	52.6	
Jan-14	4	29, 20	33.0	43.8	42.8	26.2
Jan-15	5	34, 21	30.7	54.1	53.3	28.6
Jan-17	6	33, 20	29.5	51.6	42.9	25.0
Jan-20	7	31, 21	29.2	41.6	29.5	25.2
Jan-21	8	29, 21	34.1	45.0	36.8	
Jan-22	9	33, 22	34.1	45.0	39.4	
Jan-24	10	34, 23	27.1	37.2	42.5	27.3
Jan-29	11	33, 22	32.4	50.7	34.3	32.2
Jan-30	12	34, 23	31.7	54.2	32.5	
Jan-31	13	37, 21	30.0	47.4	41.2	20.6
Data Collection Concluded						
Average Temp. (°C)			29.9	46.2	40.5	26.5

10. Appendix

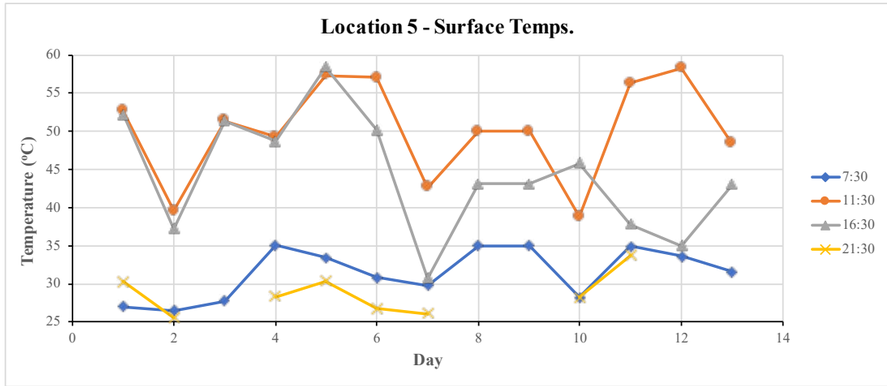
2.1.5 Site 5 2019 Temperature Results

LOCATION 5 (AVERAGE)





Ambient	
Time	Average Temp. (°C)
7:30:00	26.2
11:30:00	34.2
16:30:00	34.8
21:30:00	27.0



Surface	
Time	Average Temp. (°C)
7:30:00	31.4
11:30:00	50.1
16:30:00	44.4
21:30:00	27.9

Ambient (All of Beresford Ave Sites)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	25.8	31.0	33.5	27.1
Jan-10	2	27, 21	22.8	28.0	28.1	23.8
Jan-11	3	26, 19	25.0	33.0	34.1	
Jan-14	4	29, 20	28.0	33.0	34.3	27.7
Jan-15	5	34, 21	25.8	38.8	39.0	28.9
Jan-17	6	33, 20	24.6	37.0	40.8	29.2
Jan-20	7	31, 21	26.2	30.0	29.6	26.4
Jan-21	8	29, 21	27.0	38.3	37.2	
Jan-22	9	33, 22	27.0	38.3	37.2	
Jan-24	10	34, 23	26.4	31.0	32.2	25.5
Jan-29	11	33, 22	27.1	36.0	34.6	28.1
Jan-30	12	34, 23	27.1	35.0	33.9	
Jan-31	13	37, 21	27.4	35.2	37.4	26.0
Data Collection Concluded						
Average Temp. (°C)			26.2	34.2	34.8	27.0

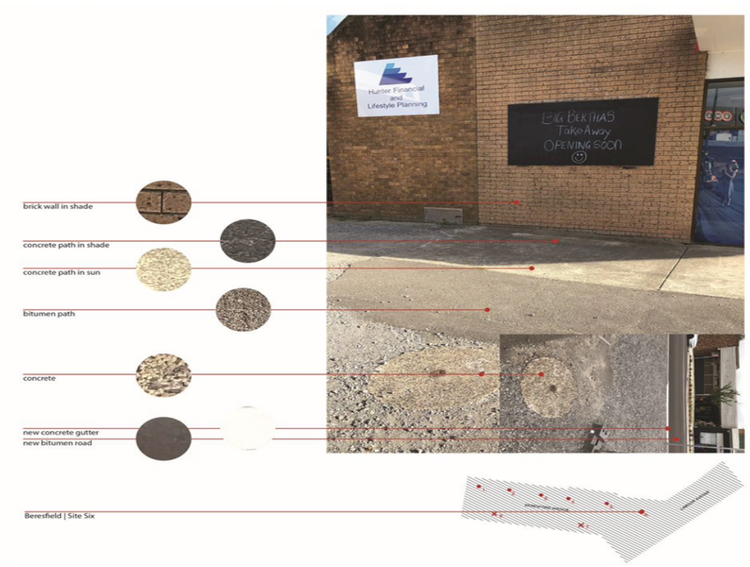
Surface (Location 5)

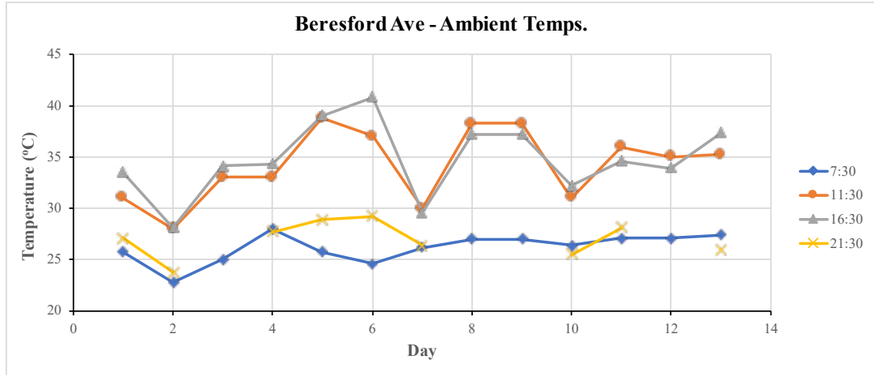
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	26.9	52.7	52.3	30.2
Jan-10	2	27, 21	26.4	39.5	37.3	25.5
Jan-11	3	26, 19	27.7	51.4	51.4	
Jan-14	4	29, 20	35.1	49.2	48.7	28.3
Jan-15	5	34, 21	33.4	57.3	58.4	30.4
Jan-17	6	33, 20	30.8	57.1	50.2	26.7
Jan-20	7	31, 21	29.7	42.6	30.7	26.1
Jan-21	8	29, 21	35.0	50.0	43.1	
Jan-22	9	33, 22	35.0	50.0	43.1	
Jan-24	10	34, 23	28.2	38.8	45.8	28.2
Jan-29	11	33, 22	34.9	56.3	37.8	33.7
Jan-30	12	34, 23	33.6	58.3	35.0	
Jan-31	13	37, 21	31.5	48.4	43.0	22.4
Data Collection Concluded						
Average Temp. (°C)			31.4	50.1	44.4	27.9

10. Appendix

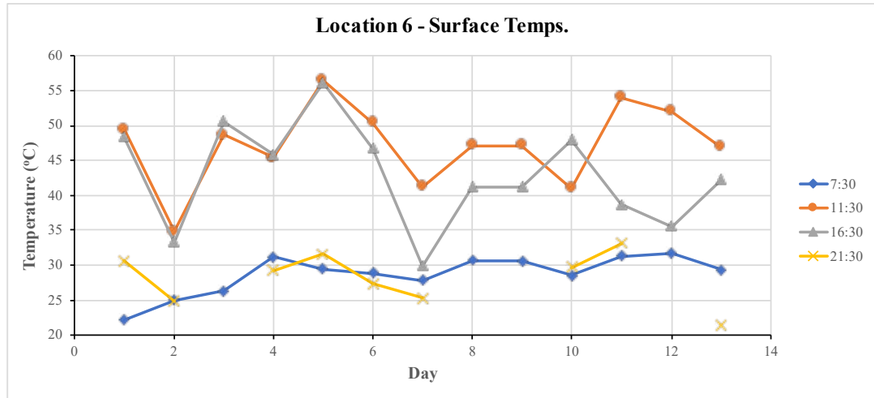
2.1.6 Site 6 2019 Temperature Results

LOCATION 6 (AVERAGE)





Ambient	
Time	Average Temp. (°C)
7:30:00	26.2
11:30:00	34.2
16:30:00	34.8
21:30:00	27.0



Surface	
Time	Average Temp. (°C)
7:30:00	28.7
11:30:00	47.3
16:30:00	42.9
21:30:00	28.1

Ambient (All of Beresford Ave Sites)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	25.8	31.0	33.5	27.1
Jan-10	2	27, 21	22.8	28.0	28.1	23.8
Jan-11	3	26, 19	25.0	33.0	34.1	
Jan-14	4	29, 20	28.0	33.0	34.3	27.7
Jan-15	5	34, 21	25.8	38.8	39.0	28.9
Jan-17	6	33, 20	24.6	37.0	40.8	29.2
Jan-20	7	31, 21	26.2	30.0	29.6	26.4
Jan-21	8	29, 21	27.0	38.3	37.2	
Jan-22	9	33, 22	27.0	38.3	37.2	
Jan-24	10	34, 23	26.4	31.0	32.2	25.5
Jan-29	11	33, 22	27.1	36.0	34.6	28.1
Jan-30	12	34, 23	27.1	35.0	33.9	
Jan-31	13	37, 21	27.4	35.2	37.4	26.0
Data Collection Concluded						
Average Temp. (°C)			26.2	34.2	34.8	27.0

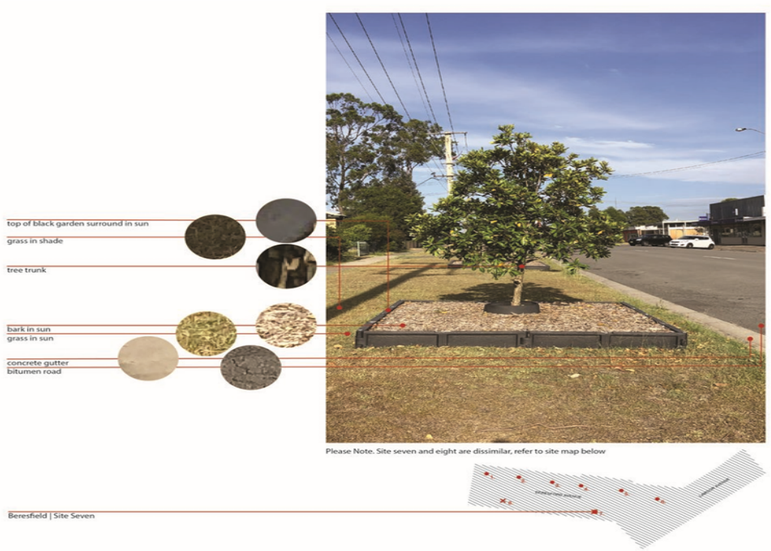
Surface (Location 6)

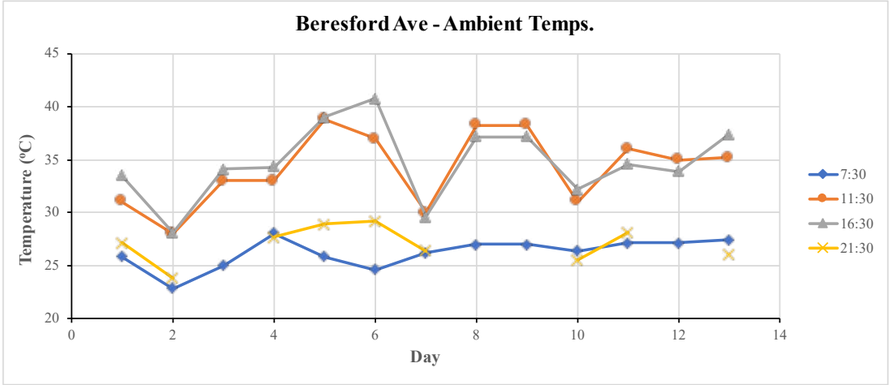
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	22.2	49.4	48.3	30.6
Jan-10	2	27, 21	25.0	34.9	33.4	24.9
Jan-11	3	26, 19	26.3	48.6	50.6	
Jan-14	4	29, 20	31.1	45.3	45.8	29.3
Jan-15	5	34, 21	29.5	56.5	56.1	31.6
Jan-17	6	33, 20	28.9	50.4	46.7	27.4
Jan-20	7	31, 21	27.9	41.2	29.9	25.3
Jan-21	8	29, 21	30.6	47.1	41.2	
Jan-22	9	33, 22	30.6	47.1	41.2	
Jan-24	10	34, 23	28.5	41.0	47.9	29.7
Jan-29	11	33, 22	31.3	54.0	38.7	33.1
Jan-30	12	34, 23	31.7	52.0	35.5	
Jan-31	13	37, 21	29.4	46.9	42.2	21.4
Data Collection Concluded						
Average Temp. (°C)			28.7	47.3	42.9	28.1

10. Appendix

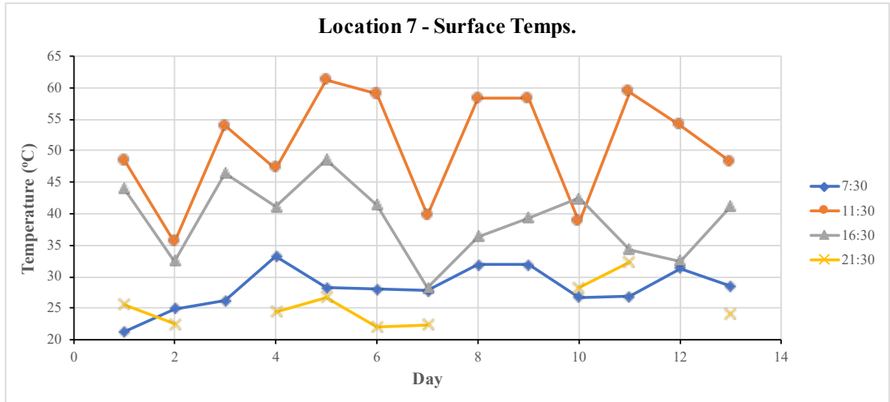
2.1.7 Site 7 2019 Temperature Results

LOCATION 7 (AVERAGE)





Ambient	
Time	Average Temp. (°C)
7:30:00	26.2
11:30:00	34.2
16:30:00	34.8
21:30:00	27.0



Surface	
Time	Average Temp. (°C)
7:30:00	28.2
11:30:00	50.9
16:30:00	39.1
21:30:00	25.4

Ambient (All of Beresford Ave Sites)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C) 7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	25.8	31.0	33.5	27.1
Jan-10	2	27, 21	22.8	28.0	28.1	23.8
Jan-11	3	26, 19	25.0	33.0	34.1	
Jan-14	4	29, 20	28.0	33.0	34.3	27.7
Jan-15	5	34, 21	25.8	38.8	39.0	28.9
Jan-17	6	33, 20	24.6	37.0	40.8	29.2
Jan-20	7	31, 21	26.2	30.0	29.6	26.4
Jan-21	8	29, 21	27.0	38.3	37.2	
Jan-22	9	33, 22	27.0	38.3	37.2	
Jan-24	10	34, 23	26.4	31.0	32.2	25.5
Jan-29	11	33, 22	27.1	36.0	34.6	28.1
Jan-30	12	34, 23	27.1	35.0	33.9	
Jan-31	13	37, 21	27.4	35.2	37.4	26.0
Data Collection Concluded						
Average Temp. (°C)			26.2	34.2	34.8	27.0

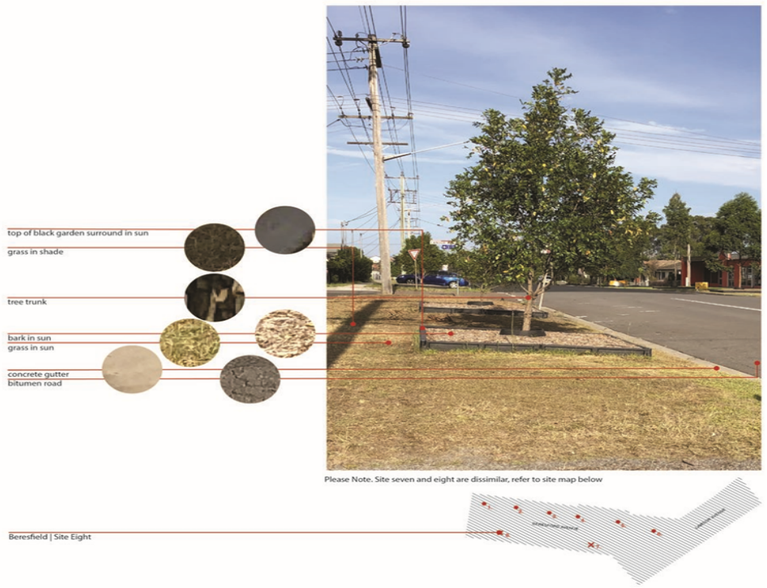
Surface (Location 7)

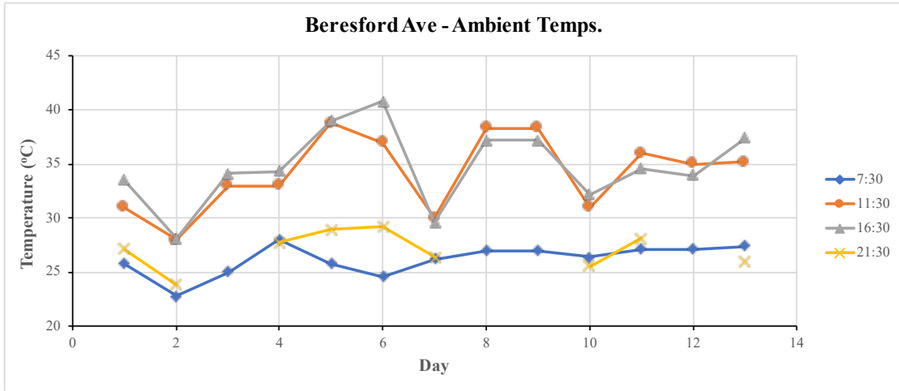
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C) 7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	21.3	48.4	43.9	25.7
Jan-10	2	27, 21	25.0	35.5	32.5	22.5
Jan-11	3	26, 19	26.1	53.9	46.5	
Jan-14	4	29, 20	33.2	47.1	41.1	24.5
Jan-15	5	34, 21	28.3	61.2	48.6	26.8
Jan-17	6	33, 20	28.0	59.0	41.5	22.0
Jan-20	7	31, 21	27.7	39.7	28.3	22.4
Jan-21	8	29, 21	31.9	58.3	36.4	
Jan-22	9	33, 22	31.9	58.3	39.4	
Jan-24	10	34, 23	26.7	38.7	42.5	28.2
Jan-29	11	33, 22	26.9	59.3	34.3	32.3
Jan-30	12	34, 23	31.3	54.0	32.5	
Jan-31	13	37, 21	28.5	48.2	41.2	24.1
Data Collection Concluded						
Average Temp. (°C)			28.2	50.9	39.1	25.4

10. Appendix

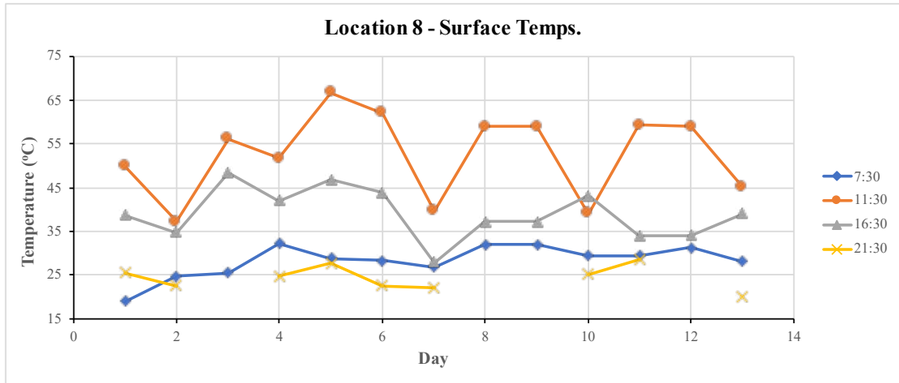
2.1.8 Site 8 2019 Temperature Results

LOCATION 8 (AVERAGE)





Ambient	
Time	Average Temp. (°C)
7:30:00	26.2
11:30:00	34.2
16:30:00	34.8
21:30:00	27.0



Surface	
Time	Average Temp. (°C)
7:30:00	28.3
11:30:00	52.6
16:30:00	39.0
21:30:00	24.3

Ambient (All of Beresford Ave Sites)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	25.8	31.0	33.5	27.1
Jan-10	2	27, 21	22.8	28.0	28.1	23.8
Jan-11	3	26, 19	25.0	33.0	34.1	
Jan-14	4	29, 20	28.0	33.0	34.3	27.7
Jan-15	5	34, 21	25.8	38.8	39.0	28.9
Jan-17	6	33, 20	24.6	37.0	40.8	29.2
Jan-20	7	31, 21	26.2	30.0	29.6	26.4
Jan-21	8	29, 21	27.0	38.3	37.2	
Jan-22	9	33, 22	27.0	38.3	37.2	
Jan-24	10	34, 23	26.4	31.0	32.2	25.5
Jan-29	11	33, 22	27.1	36.0	34.6	28.1
Jan-30	12	34, 23	27.1	35.0	33.9	
Jan-31	13	37, 21	27.4	35.2	37.4	26.0
Data Collection Concluded						
Average Temp. (°C)			26.2	34.2	34.8	27.0

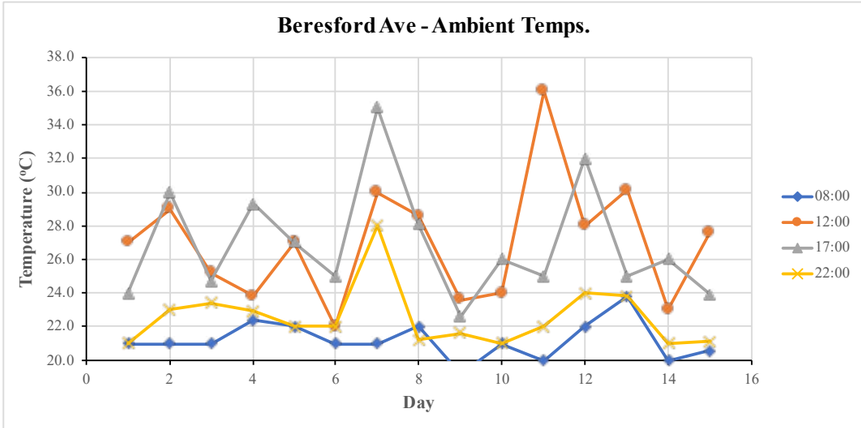
Surface (Location 8)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			7:30:00	11:30:00	16:30:00	21:30:00
Jan-08	1	28, 21	19.0	50.0	38.7	25.6
Jan-10	2	27, 21	24.8	37.3	34.8	22.5
Jan-11	3	26, 19	25.5	56.2	48.4	
Jan-14	4	29, 20	32.2	51.8	42.0	24.8
Jan-15	5	34, 21	28.8	66.7	46.8	27.7
Jan-17	6	33, 20	28.4	62.1	43.8	22.7
Jan-20	7	31, 21	26.9	39.6	27.8	22.1
Jan-21	8	29, 21	32.0	59.0	37.2	
Jan-22	9	33, 22	32.0	59.0	37.2	
Jan-24	10	34, 23	29.5	39.0	43.1	25.2
Jan-29	11	33, 22	29.5	59.3	33.9	28.6
Jan-30	12	34, 23	31.3	58.9	34.1	
Jan-31	13	37, 21	28.1	45.2	39.1	19.9
Data Collection Concluded						
Average Temp. (°C)			28.3	52.6	39.0	24.3

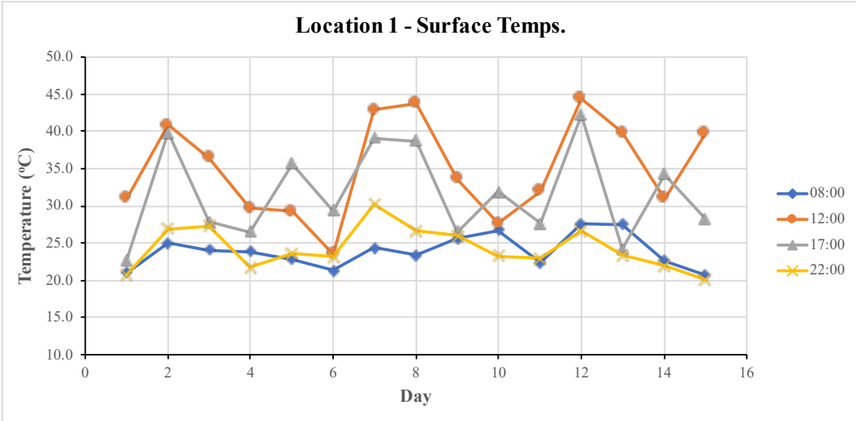
10. Appendix

2.2.1 Site 1 2020 Temperature Results

Data Logger 1 (Concrete)



	Average Temp. (°C)
08:00	21.2
12:00	27.0
17:00	26.9
22:00	22.5



	Average Temp. (°C)
08:00	23.9
12:00	35.0
17:00	31.6
22:00	24.3

Ambient (All of Beresford Ave Sites)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C) 8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	21.0	27.0	24.0	21.0
Feb-11	2	35, 24	21.0	29.0	30.0	23.0
Feb-12	3	23, 21	21.0	25.2	24.7	23.4
Feb-13	4	23, 21	22.4	23.8	29.3	22.9
Feb-14	5	23, 21	22.0	27.0	27.0	22.0
Feb-17	6	24, 22	21.0	22.0	25.0	22.0
Feb-18	7	28, 20	21.0	30.0	35.0	28.0
Feb-19	8	28, 22	22.0	28.6	28.1	21.2
Feb-20	9	23, 19	19.2	23.6	22.6	21.6
Feb-21	10	25, 21	21.0	24.0	26.0	21.0
Feb-24	11	26, 21	20.0	36.0	25.0	22.0
Feb-25	12	25, 21	22.0	28.0	32.0	24.0
Feb-26	13	31, 21	23.8	30.1	25.0	23.8
Feb-27	14	24, 20	20.0	23.0	26.0	21.0
Feb-28	15	23, 19	20.6	27.6	23.9	21.1
Average Temp. (°C)			**21.2**	**27.0**	**26.9**	**22.5**

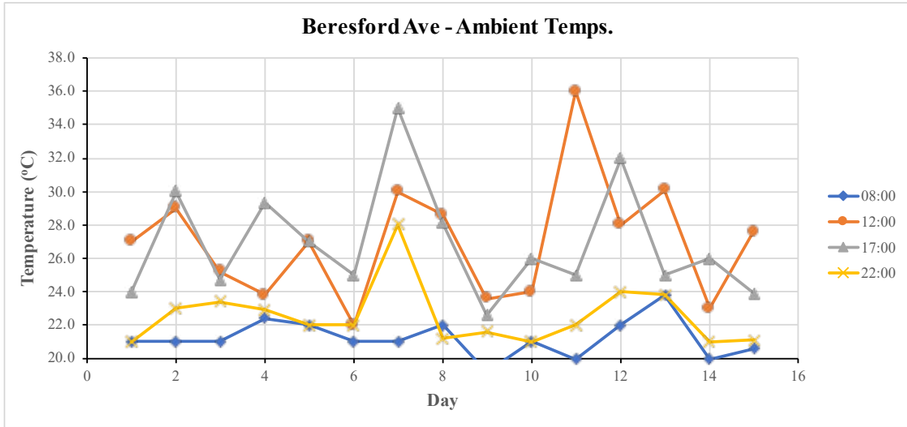
Surface (Location 1)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C) 8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	21.0	31.0	22.7	20.7
Feb-11	2	35, 24	25.0	40.8	39.8	26.9
Feb-12	3	23, 21	24.1	36.5	27.8	27.3
Feb-13	4	23, 21	23.9	29.7	26.5	21.7
Feb-14	5	23, 21	22.8	29.3	35.7	23.6
Feb-17	6	24, 22	21.3	23.5	29.4	23.1
Feb-18	7	28, 20	24.4	42.9	39.1	30.2
Feb-19	8	28, 22	23.4	43.8	38.7	26.6
Feb-20	9	23, 19	25.6	33.6	26.5	26.0
Feb-21	10	25, 21	26.7	27.6	31.9	23.2
Feb-24	11	26, 21	22.3	32.0	27.6	22.9
Feb-25	12	25, 21	27.6	44.4	42.2	26.6
Feb-26	13	31, 21	27.5	39.8	24.2	23.4
Feb-27	14	24, 20	22.6	31.0	34.2	21.9
Feb-28	15	23, 19	20.7	39.7	28.2	20.1
Average Temp. (°C)			**23.9**	**35.0**	**31.6**	**24.3**

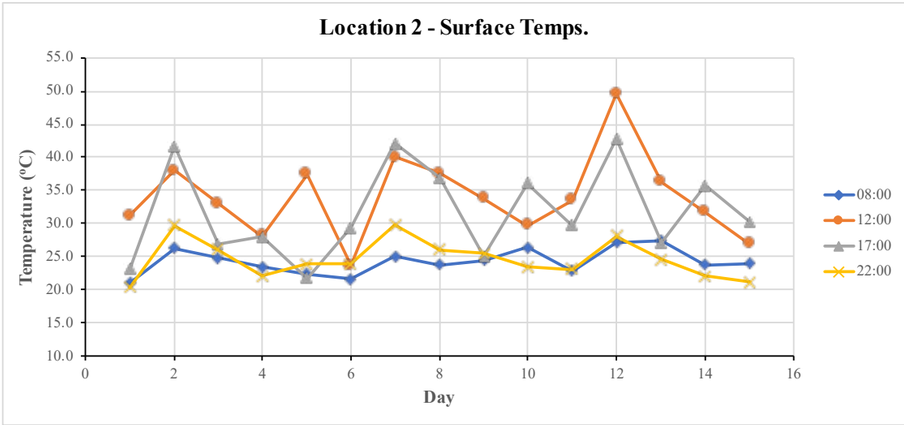
10. Appendix

2.2.2 Site 2 2020 Temperature Results

Data Logger 2 (Concrete)



Ambient	
Time	Average Temp. (°C)
8:00:00	21.2
12:00:00	27.0
17:00:00	26.9
22:00:00	22.5



Surface	
Time	Average Temp. (°C)
8:00:00	24.3
12:00:00	34.0
17:00:00	31.8
22:00:00	24.6

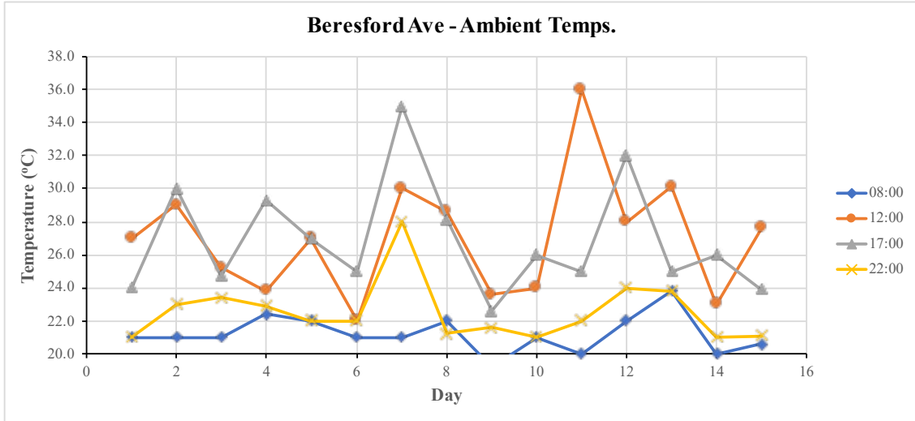
Ambient (All of Site X Locations)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	21.0	27.0	24.0	21.0
Feb-11	2	35, 24	21.0	29.0	30.0	23.0
Feb-12	3	23, 21	21.0	25.2	24.7	23.4
Feb-13	4	23, 21	22.4	23.8	29.3	22.9
Feb-14	5	23, 21	22.0	27.0	27.0	22.0
Feb-17	6	24, 22	21.0	22.0	25.0	22.0
Feb-18	7	28, 20	21.0	30.0	35.0	28.0
Feb-19	8	28, 22	22.0	28.6	28.1	21.2
Feb-20	9	23, 19	19.2	23.6	22.6	21.6
Feb-21	10	25, 21	21.0	24.0	26.0	21.0
Feb-24	11	26, 21	20.0	36.0	25.0	22.0
Feb-25	12	25, 21	22.0	28.0	32.0	24.0
Feb-26	13	31, 21	23.8	30.1	25.0	23.8
Feb-27	14	24, 20	20.0	23.0	26.0	21.0
Feb-28	15	23, 19	20.6	27.6	23.9	21.1
Average Temp. (°C)			21.2	27.0	26.9	22.5

Surface (Location 2)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	21.0	31.2	23.1	20.3
Feb-11	2	35, 24	26.3	38.0	41.7	29.7
Feb-12	3	23, 21	24.8	33.0	26.8	26.0
Feb-13	4	23, 21	23.4	28.1	28.0	22.1
Feb-14	5	23, 21	22.4	37.4	21.7	23.9
Feb-17	6	24, 22	21.6	23.7	29.4	23.9
Feb-18	7	28, 20	25.0	40.1	42.1	29.8
Feb-19	8	28, 22	23.8	37.6	36.9	26.0
Feb-20	9	23, 19	24.5	33.8	25.0	25.5
Feb-21	10	25, 21	26.4	29.7	36.1	23.4
Feb-24	11	26, 21	22.8	33.6	29.7	23.1
Feb-25	12	25, 21	27.2	49.6	42.8	28.1
Feb-26	13	31, 21	27.4	36.3	27.1	24.6
Feb-27	14	24, 20	23.8	31.7	35.7	22.1
Feb-28	15	23, 19	24.0	26.9	30.3	21.1
Average Temp. (°C)			24.3	34.0	31.8	24.6

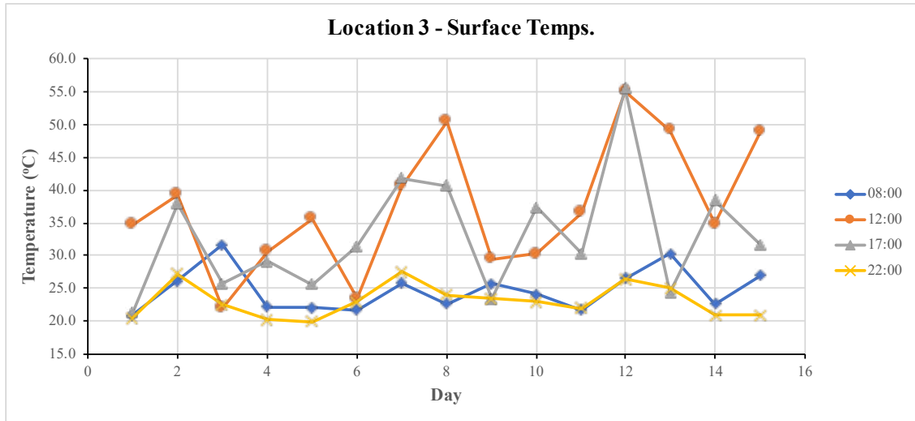
10. Appendix

2.2.3 Site 3 2020 Temperature Results

Data Logger 3 (Brick Paving)



Ambient	
Time	Average Temp. (°C)
8:00:00	21.2
12:00:00	27.0
17:00:00	26.9
22:00:00	22.5



Surface	
Time	Average Temp. (°C)
8:00:00	24.8
12:00:00	37.4
17:00:00	33.0
22:00:00	23.1

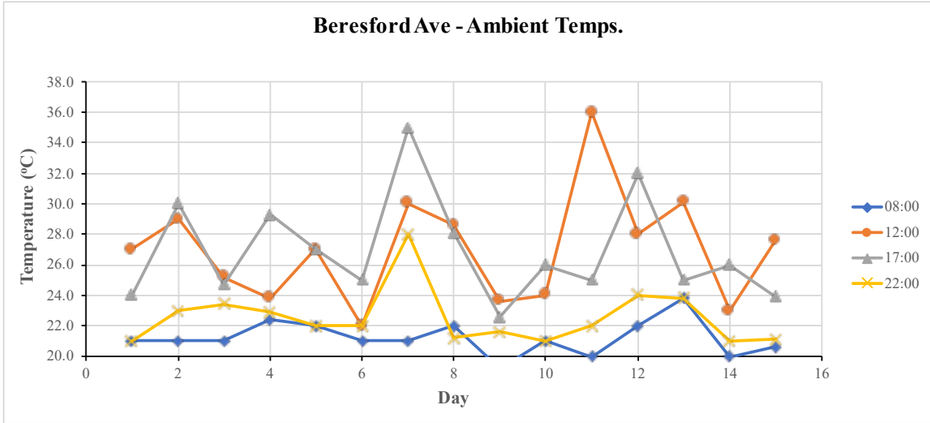
Ambient (All of Site X Locations)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	21.0	27.0	24.0	21.0
Feb-11	2	35, 24	21.0	29.0	30.0	23.0
Feb-12	3	23, 21	21.0	25.2	24.7	23.4
Feb-13	4	23, 21	22.4	23.8	29.3	22.9
Feb-14	5	23, 21	22.0	27.0	27.0	22.0
Feb-17	6	24, 22	21.0	22.0	25.0	22.0
Feb-18	7	28, 20	21.0	30.0	35.0	28.0
Feb-19	8	28, 22	22.0	28.6	28.1	21.2
Feb-20	9	23, 19	19.2	23.6	22.6	21.6
Feb-21	10	25, 21	21.0	24.0	26.0	21.0
Feb-24	11	26, 21	20.0	36.0	25.0	22.0
Feb-25	12	25, 21	22.0	28.0	32.0	24.0
Feb-26	13	31, 21	23.8	30.1	25.0	23.8
Feb-27	14	24, 20	20.0	23.0	26.0	21.0
Feb-28	15	23, 19	20.6	27.6	23.9	21.1
Average Temp. (°C)			21.2	27.0	26.9	22.5

Surface (Location 3)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	21.0	34.7	21.3	20.5
Feb-11	2	35, 24	26.2	39.3	37.9	27.2
Feb-12	3	23, 21	31.7	22.0	25.7	22.5
Feb-13	4	23, 21	22.2	30.6	29.2	20.3
Feb-14	5	23, 21	22.1	35.6	25.6	19.9
Feb-17	6	24, 22	21.8	23.5	31.4	23.0
Feb-18	7	28, 20	25.8	40.7	41.8	27.6
Feb-19	8	28, 22	22.6	50.4	40.6	24.0
Feb-20	9	23, 19	25.7	29.5	23.5	23.4
Feb-21	10	25, 21	24.1	30.3	37.4	23.0
Feb-24	11	26, 21	21.7	36.5	30.3	22.0
Feb-25	12	25, 21	26.5	55.0	55.4	26.4
Feb-26	13	31, 21	30.3	49.1	24.4	25.0
Feb-27	14	24, 20	22.6	34.8	38.4	21.0
Feb-28	15	23, 19	27.0	48.8	31.7	21.0
Average Temp. (°C)			24.8	37.4	33.0	23.1

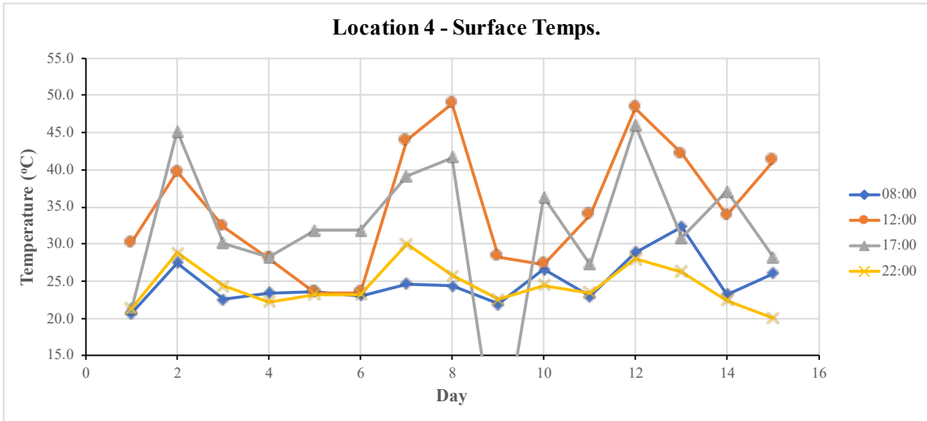
10. Appendix

2.2.4 Site 4 2020 Temperature Results

Data Logger 4 (Concrete)



Ambient	
Time	Average Temp. (°C)
8:00:00	21.2
12:00:00	27.0
17:00:00	26.9
22:00:00	22.5



Surface	
Time	Average Temp. (°C)
8:00:00	24.8
12:00:00	35.0
17:00:00	31.7
22:00:00	24.4

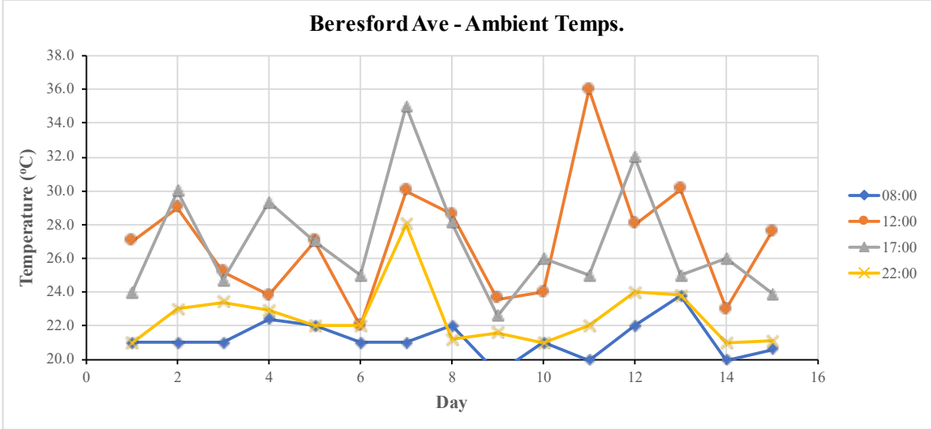
Ambient (All of Site X Locations)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	21.0	27.0	24.0	21.0
Feb-11	2	35, 24	21.0	29.0	30.0	23.0
Feb-12	3	23, 21	21.0	25.2	24.7	23.4
Feb-13	4	23, 21	22.4	23.8	29.3	22.9
Feb-14	5	23, 21	22.0	27.0	27.0	22.0
Feb-17	6	24, 22	21.0	22.0	25.0	22.0
Feb-18	7	28, 20	21.0	30.0	35.0	28.0
Feb-19	8	28, 22	22.0	28.6	28.1	21.2
Feb-20	9	23, 19	19.2	23.6	22.6	21.6
Feb-21	10	25, 21	21.0	24.0	26.0	21.0
Feb-24	11	26, 21	20.0	36.0	25.0	22.0
Feb-25	12	25, 21	22.0	28.0	32.0	24.0
Feb-26	13	31, 21	23.8	30.1	25.0	23.8
Feb-27	14	24, 20	20.0	23.0	26.0	21.0
Feb-28	15	23, 19	20.6	27.6	23.9	21.1
Average Temp. (°C)			21.2	27.0	26.9	22.5

Surface (Location 4)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	20.7	30.2	21.3	21.3
Feb-11	2	35, 24	27.5	39.7	45.2	28.8
Feb-12	3	23, 21	22.5	32.3	30.1	24.3
Feb-13	4	23, 21	23.4	28.1	28.2	22.2
Feb-14	5	23, 21	23.6	23.4	31.8	23.2
Feb-17	6	24, 22	23.0	23.4	31.8	23.2
Feb-18	7	28, 20	24.6	44.0	39.1	30.0
Feb-19	8	28, 22	24.3	48.9	41.6	25.8
Feb-20	9	23, 19	21.9	28.3	0.0	22.5
Feb-21	10	25, 21	26.6	27.3	36.3	24.4
Feb-24	11	26, 21	22.9	34.0	27.3	23.4
Feb-25	12	25, 21	28.9	48.3	46.0	28.0
Feb-26	13	31, 21	32.3	42.2	30.8	26.3
Feb-27	14	24, 20	23.2	33.9	37.1	22.4
Feb-28	15	23, 19	26.1	41.2	28.2	20.0
Average Temp. (°C)			24.8	35.0	31.7	24.4

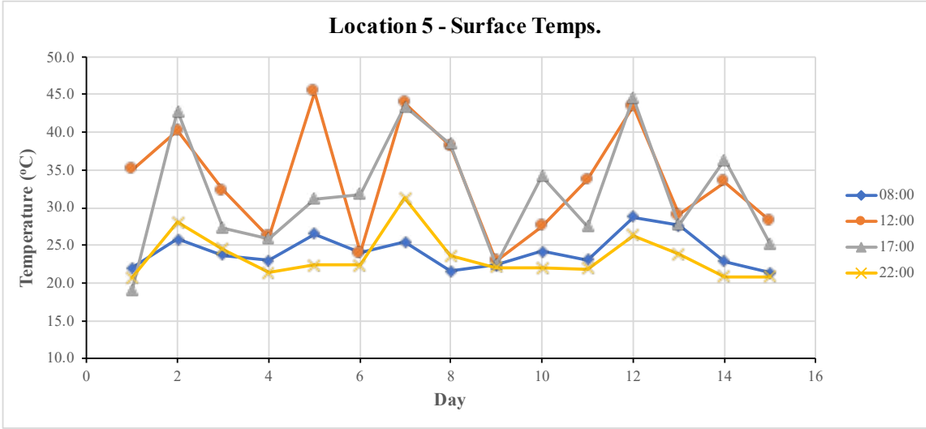
10. Appendix

2.2.5 Site 5 2020 Temperature Results

Data Logger 5 (Concrete)



Ambient	
Time	Average Temp. (°C)
8:00:00	21.2
12:00:00	27.0
17:00:00	26.9
22:00:00	22.5



Surface	
Time	Average Temp. (°C)
8:00:00	0.0
12:00:00	0.0
17:00:00	0.0
22:00:00	0.0

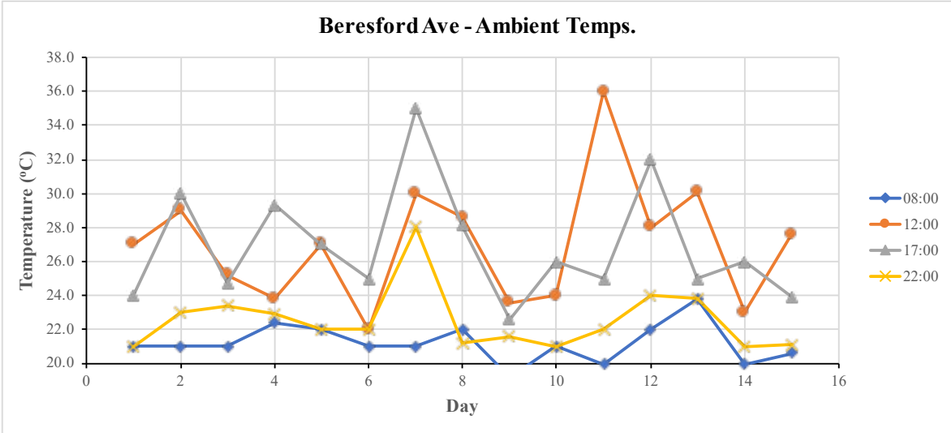
Ambient (All of Site X Locations)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	21.0	27.0	24.0	21.0
Feb-11	2	35, 24	21.0	29.0	30.0	23.0
Feb-12	3	23, 21	21.0	25.2	24.7	23.4
Feb-13	4	23, 21	22.4	23.8	29.3	22.9
Feb-14	5	23, 21	22.0	27.0	27.0	22.0
Feb-17	6	24, 22	21.0	22.0	25.0	22.0
Feb-18	7	28, 20	21.0	30.0	35.0	28.0
Feb-19	8	28, 22	22.0	28.6	28.1	21.2
Feb-20	9	23, 19	19.2	23.6	22.6	21.6
Feb-21	10	25, 21	21.0	24.0	26.0	21.0
Feb-24	11	26, 21	20.0	36.0	25.0	22.0
Feb-25	12	25, 21	22.0	28.0	32.0	24.0
Feb-26	13	31, 21	23.8	30.1	25.0	23.8
Feb-27	14	24, 20	20.0	23.0	26.0	21.0
Feb-28	15	23, 19	20.6	27.6	23.9	21.1
Average Temp. (°C)			21.2	27.0	26.9	22.5

Surface (Location 5)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	22.0	35.0	19.0	20.7
Feb-11	2	35, 24	25.8	40.2	42.8	28.0
Feb-12	3	23, 21	23.7	32.3	27.3	24.5
Feb-13	4	23, 21	23.0	26.1	25.9	21.4
Feb-14	5	23, 21	26.5	45.3	31.2	22.4
Feb-17	6	24, 22	24.1	24.0	31.8	22.4
Feb-18	7	28, 20	25.4	43.9	43.4	31.3
Feb-19	8	28, 22	21.6	38.2	38.5	23.6
Feb-20	9	23, 19	22.4	22.9	22.5	22.1
Feb-21	10	25, 21	24.2	27.5	34.2	22.0
Feb-24	11	26, 21	23.1	33.7	27.5	21.9
Feb-25	12	25, 21	28.7	43.4	44.6	26.3
Feb-26	13	31, 21	27.6	29.1	27.7	23.8
Feb-27	14	24, 20	22.9	33.4	36.3	20.9
Feb-28	15	23, 19	21.4	28.2	25.2	20.9
Average Temp. (°C)			0.0	0.0	0.0	0.0

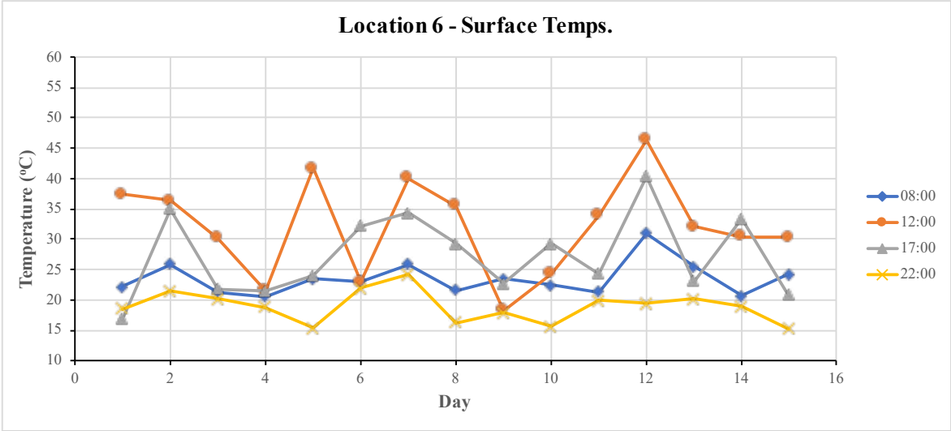
10. Appendix

2.2.6 Site 6 2020 Temperature Results

Data Logger 6 (Grass)



Ambient	
Time	Average Temp. (°C)
8:00:00	21.2
12:00:00	27.0
17:00:00	26.9
22:00:00	22.5



Surface	
Time	Average Temp. (°C)
8:00:00	23.5
12:00:00	32.1
17:00:00	27.2
22:00:00	18.9

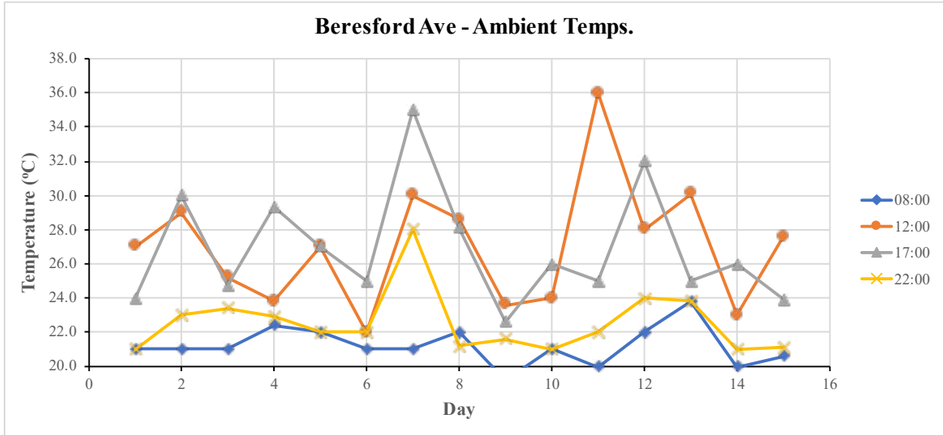
Ambient (All of Site X Locations)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	21.0	27.0	24.0	21.0
Feb-11	2	35, 24	21.0	29.0	30.0	23.0
Feb-12	3	23, 21	21.0	25.2	24.7	23.4
Feb-13	4	23, 21	22.4	23.8	29.3	22.9
Feb-14	5	23, 21	22.0	27.0	27.0	22.0
Feb-17	6	24, 22	21.0	22.0	25.0	22.0
Feb-18	7	28, 20	21.0	30.0	35.0	28.0
Feb-19	8	28, 22	22.0	28.6	28.1	21.2
Feb-20	9	23, 19	19.2	23.6	22.6	21.6
Feb-21	10	25, 21	21.0	24.0	26.0	21.0
Feb-24	11	26, 21	20.0	36.0	25.0	22.0
Feb-25	12	25, 21	22.0	28.0	32.0	24.0
Feb-26	13	31, 21	23.8	30.1	25.0	23.8
Feb-27	14	24, 20	20.0	23.0	26.0	21.0
Feb-28	15	23, 19	20.6	27.6	23.9	21.1
Average Temp. (°C)			21.2	27.0	26.9	22.5

Surface (Location 6)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	22.2	37.4	16.8	18.5
Feb-11	2	35, 24	25.8	36.4	35.0	21.4
Feb-12	3	23, 21	21.3	30.2	21.8	20.1
Feb-13	4	23, 21	20.5	21.6	21.4	18.8
Feb-14	5	23, 21	23.5	41.7	24.0	15.4
Feb-17	6	24, 22	23.0	22.9	32.2	21.9
Feb-18	7	28, 20	25.8	40.0	34.3	24.2
Feb-19	8	28, 22	21.5	35.5	29.2	16.2
Feb-20	9	23, 19	23.5	18.2	22.7	17.9
Feb-21	10	25, 21	22.4	24.3	29.2	15.6
Feb-24	11	26, 21	21.3	34.0	24.3	19.9
Feb-25	12	25, 21	30.9	46.3	40.3	19.4
Feb-26	13	31, 21	25.5	32.1	23.1	20.1
Feb-27	14	24, 20	20.6	30.4	33.3	18.9
Feb-28	15	23, 19	24.2	30.3	20.8	15.2
Average Temp. (°C)			23.5	32.1	27.2	18.9

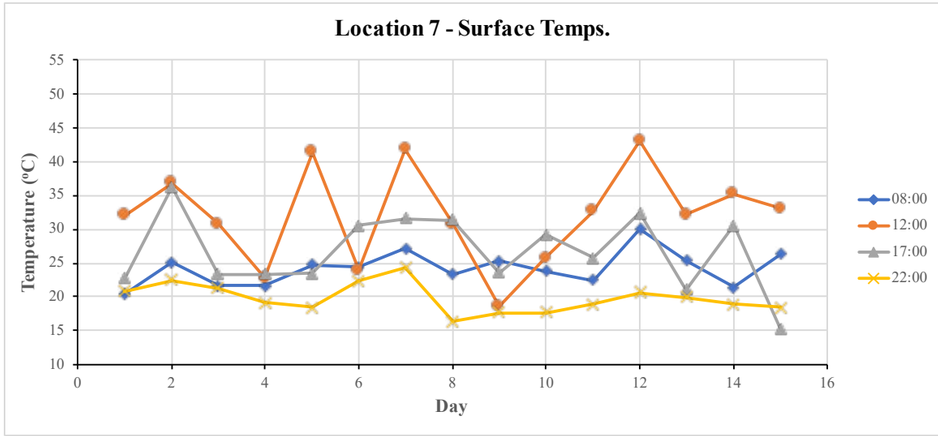
10. Appendix

2.2.7 Site 7 2020 Temperature Results

Data Logger 7 (Grass)



Ambient	
Time	Average Temp. (°C)
8:00:00	21.2
12:00:00	27.0
17:00:00	26.9
22:00:00	22.5



Surface	
Time	Average Temp. (°C)
8:00:00	24.2
12:00:00	32.0
17:00:00	26.7
22:00:00	19.8

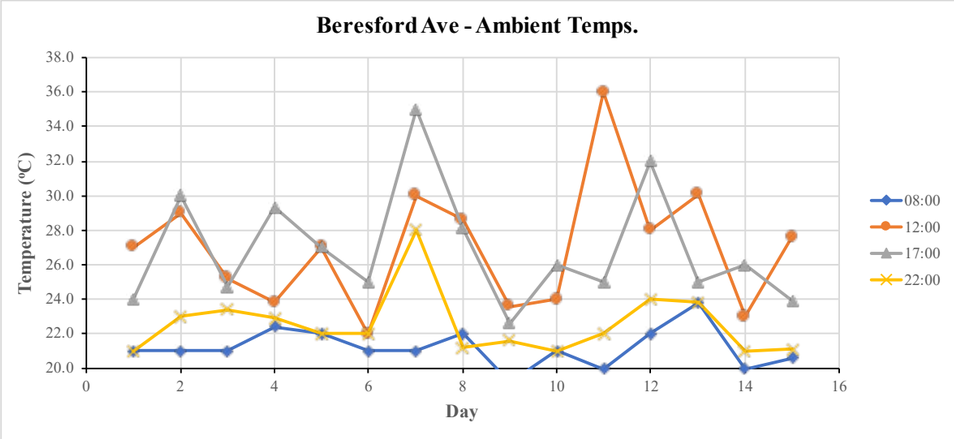
Ambient (All of Site X Locations)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	21.0	27.0	24.0	21.0
Feb-11	2	35, 24	21.0	29.0	30.0	23.0
Feb-12	3	23, 21	21.0	25.2	24.7	23.4
Feb-13	4	23, 21	22.4	23.8	29.3	22.9
Feb-14	5	23, 21	22.0	27.0	27.0	22.0
Feb-17	6	24, 22	21.0	22.0	25.0	22.0
Feb-18	7	28, 20	21.0	30.0	35.0	28.0
Feb-19	8	28, 22	22.0	28.6	28.1	21.2
Feb-20	9	23, 19	19.2	23.6	22.6	21.6
Feb-21	10	25, 21	21.0	24.0	26.0	21.0
Feb-24	11	26, 21	20.0	36.0	25.0	22.0
Feb-25	12	25, 21	22.0	28.0	32.0	24.0
Feb-26	13	31, 21	23.8	30.1	25.0	23.8
Feb-27	14	24, 20	20.0	23.0	26.0	21.0
Feb-28	15	23, 19	20.6	27.6	23.9	21.1
Average Temp. (°C)			21.2	27.0	26.9	22.5

Surface (Location 7)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	20.4	32.0	22.7	20.8
Feb-11	2	35, 24	25.1	36.8	36.2	22.4
Feb-12	3	23, 21	21.6	30.8	23.3	21.3
Feb-13	4	23, 21	21.6	22.8	23.3	19.1
Feb-14	5	23, 21	24.7	41.3	23.5	18.5
Feb-17	6	24, 22	24.4	23.9	30.5	22.3
Feb-18	7	28, 20	27.1	41.8	31.5	24.3
Feb-19	8	28, 22	23.4	30.7	31.3	16.4
Feb-20	9	23, 19	25.3	18.6	23.6	17.6
Feb-21	10	25, 21	23.8	25.7	29.1	17.6
Feb-24	11	26, 21	22.4	32.7	25.7	18.9
Feb-25	12	25, 21	30.0	43.0	32.3	20.6
Feb-26	13	31, 21	25.4	32.1	21.1	19.9
Feb-27	14	24, 20	21.4	35.2	30.5	18.9
Feb-28	15	23, 19	26.3	33.0	15.3	18.4
Average Temp. (°C)			24.2	32.0	26.7	19.8

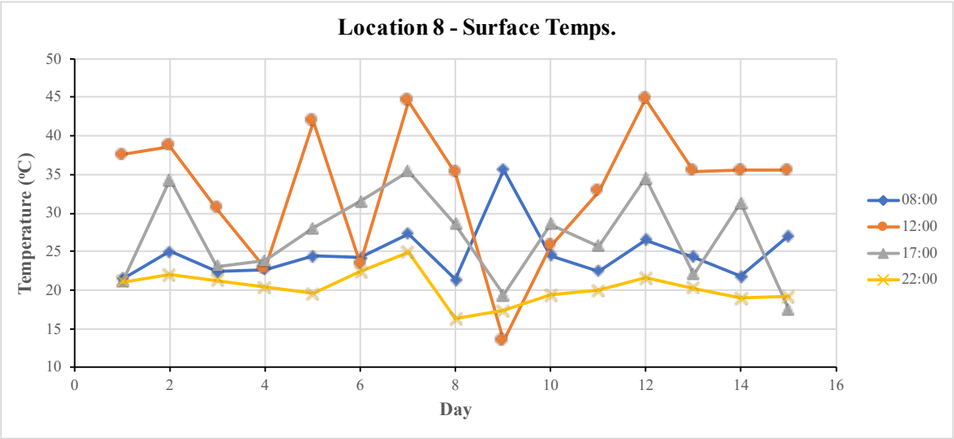
10. Appendix

2.2.8 Site 8 2020 Temperature Results

Data Logger 8 (Grass)



Ambient	
Time	Average Temp. (°C)
8:00:00	21.2
12:00:00	27.0
17:00:00	26.9
22:00:00	22.5



Surface	
Time	Average Temp. (°C)
8:00:00	24.7
12:00:00	33.2
17:00:00	27.0
22:00:00	20.3

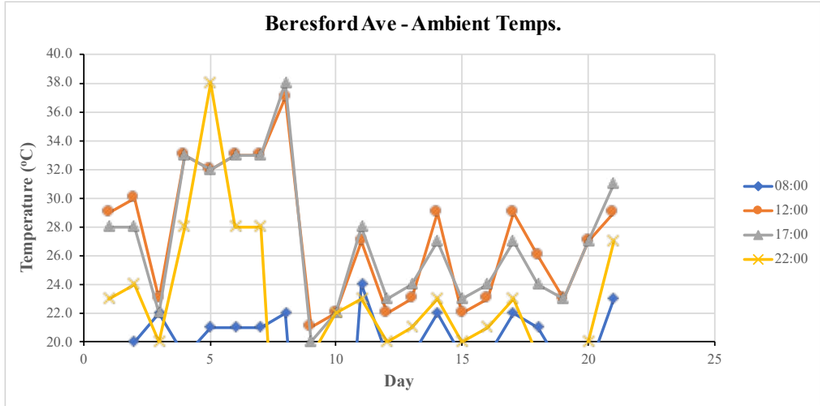
Ambient (All of Site X Locations)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	21.0	27.0	24.0	21.0
Feb-11	2	35, 24	21.0	29.0	30.0	23.0
Feb-12	3	23, 21	21.0	25.2	24.7	23.4
Feb-13	4	23, 21	22.4	23.8	29.3	22.9
Feb-14	5	23, 21	22.0	27.0	27.0	22.0
Feb-17	6	24, 22	21.0	22.0	25.0	22.0
Feb-18	7	28, 20	21.0	30.0	35.0	28.0
Feb-19	8	28, 22	22.0	28.6	28.1	21.2
Feb-20	9	23, 19	19.2	23.6	22.6	21.6
Feb-21	10	25, 21	21.0	24.0	26.0	21.0
Feb-24	11	26, 21	20.0	36.0	25.0	22.0
Feb-25	12	25, 21	22.0	28.0	32.0	24.0
Feb-26	13	31, 21	23.8	30.1	25.0	23.8
Feb-27	14	24, 20	20.0	23.0	26.0	21.0
Feb-28	15	23, 19	20.6	27.6	23.9	21.1
Average Temp. (°C)			21.2	27.0	26.9	22.5

Surface (Location 8)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Feb-10	1	27, 21	21.5	37.6	21.1	21.1
Feb-11	2	35, 24	25.0	38.7	34.3	22.0
Feb-12	3	23, 21	22.4	30.6	23.1	21.3
Feb-13	4	23, 21	22.7	22.8	23.8	20.3
Feb-14	5	23, 21	24.4	41.9	28.0	19.5
Feb-17	6	24, 22	24.2	23.4	31.5	22.4
Feb-18	7	28, 20	27.3	44.5	35.4	24.9
Feb-19	8	28, 22	21.4	35.2	28.5	16.3
Feb-20	9	23, 19	35.6	13.4	19.3	17.3
Feb-21	10	25, 21	24.5	25.7	28.5	19.3
Feb-24	11	26, 21	22.5	32.8	25.7	19.9
Feb-25	12	25, 21	26.5	44.8	34.5	21.6
Feb-26	13	31, 21	24.3	35.4	22.1	20.2
Feb-27	14	24, 20	21.8	35.5	31.3	18.9
Feb-28	15	23, 19	27.0	35.5	17.5	19.1
Average Temp. (°C)			24.7	33.2	27.0	20.3

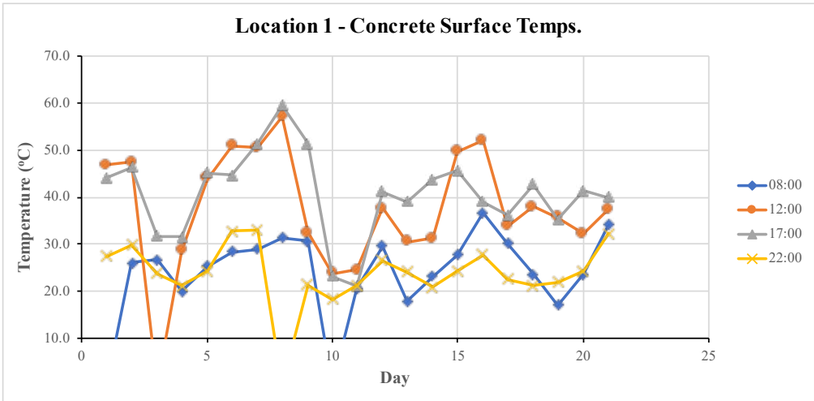
10. Appendix

2.3.1 Site 1 2021 Temperature Results

Data Logger 1 (Concrete)



	Average Temp. (°C)
08:00	20.6
12:00	27.3
17:00	27.1
22:00	23.3



	Average Temp. (°C)
08:00	26.4
12:00	39.2
17:00	40.7
22:00	24.9

Ambient (All of Beresford Ave Sites)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	29.0	28.0	23.0
Jan-18	2	26, 20	20.0	30.0	28.0	24.0
Jan-19	3	23, 19	22.0	23.0	22.0	20.0
Jan-20	4	22, 19	19.0	33.0	33.0	28.0
Jan-21	5	24, 16	21.0	32.0	32.0	38.0
Jan-22	6	30, 19	21.0	33.0	33.0	28.0
Jan-25	7	26, 21	21.0	33.0	33.0	28.0
Jan-26	8	36, 21	22.0	37.0	38.0	-
Jan-27	9	26, 20	-	21.0	20.0	19.0
Jan-28	10	21, 20	-	22.0	22.0	22.0
Jan-29	11	22, 20	24.0	27.0	28.0	23.0
Feb-01	12	24, 21	19.0	22.0	23.0	20.0
Feb-02	13	22, 19	19.0	23.0	24.0	21.0
Feb-03	14	22, 19	22.0	29.0	27.0	23.0
Feb-04	15	25, 21	19.0	22.0	23.0	20.0
Feb-05	16	25, 21	19.0	23.0	24.0	21.0
Feb-08	17	23, 21	22.0	29.0	27.0	23.0
Feb-09	18	23, 21	21.0	26.0	24.0	19.0
Feb-10	19	23, 18	18.0	23.0	23.0	18.0
Feb-11	20	24, 17	18.0	27.0	27.0	20.0
Feb-12	21	27, 19	23.0	29.0	31.0	27.0
Average Temp. (°C)			**20.6**	**27.3**	**27.1**	**23.3**

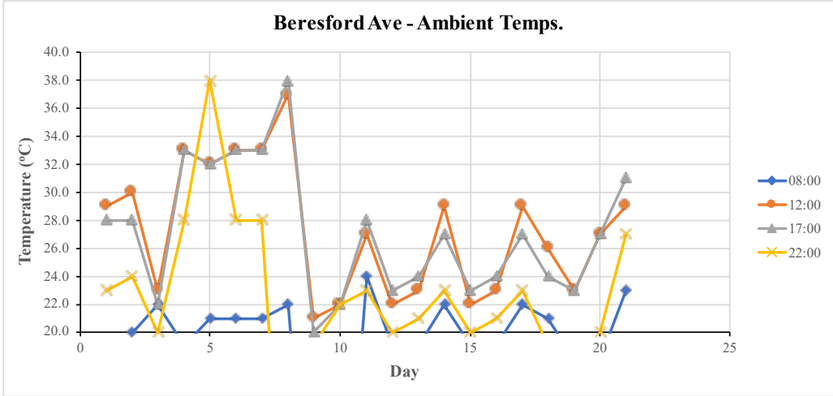
Surface (Location 1) concrete

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	46.8	44.0	27.5
Jan-18	2	26, 20	26.0	47.4	46.3	29.8
Jan-19	3	23, 19	26.6	-	31.7	23.7
Jan-20	4	22, 19	19.9	28.6	31.6	21.1
Jan-21	5	24, 16	25.3	43.9	45.2	24.3
Jan-22	6	30, 19	28.4	51.0	44.7	32.7
Jan-25	7	26, 21	29.0	50.5	51.4	33.0
Jan-26	8	36, 21	31.4	57.1	59.5	-
Jan-27	9	26, 20	30.7	32.5	51.4	21.4
Jan-28	10	21, 20	-	23.7	23.1	18.3
Jan-29	11	22, 20	20.5	24.5	21.1	21.2
Feb-01	12	24, 21	29.6	37.7	41.1	26.5
Feb-02	13	22, 19	17.8	30.5	39.0	24.1
Feb-03	14	22, 19	23.2	31.2	43.8	20.8
Feb-04	15	25, 21	27.7	49.7	45.6	24.2
Feb-05	16	25, 21	36.7	52.0	39.0	27.8
Feb-08	17	23, 21	30.2	33.8	36.1	22.6
Feb-09	18	23, 21	23.6	37.9	42.7	21.2
Feb-10	19	23, 18	17.1	35.6	35.2	21.9
Feb-11	20	24, 17	23.6	32.2	41.3	24.3
Feb-12	21	27, 19	34.2	37.3	40.0	32.2
Average Temp. (°C)			**26.4**	**39.2**	**40.7**	**24.9**

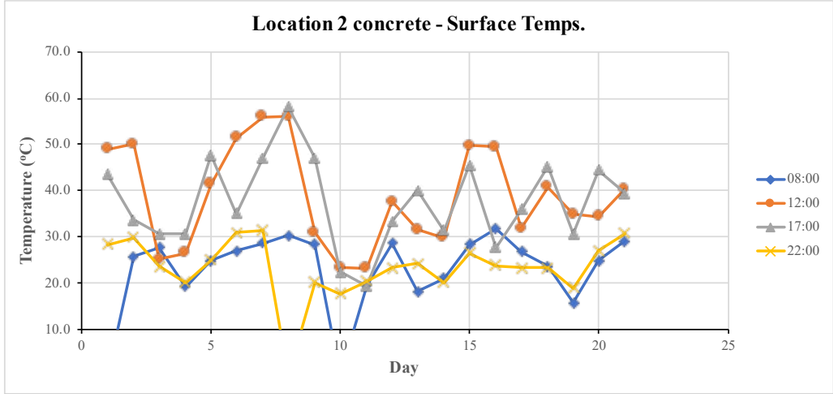
10. Appendix

2.3.2 Site 2 2021 Temperature Results

Data Logger 2 (Concrete)



Ambient	
Time	Average Temp. (°C)
8:00:00	20.6
12:00:00	27.3
17:00:00	27.1
22:00:00	23.3



Surface	
Time	Average Temp. (°C)
8:00:00	25.3
12:00:00	38.7
17:00:00	37.6
22:00:00	24.4

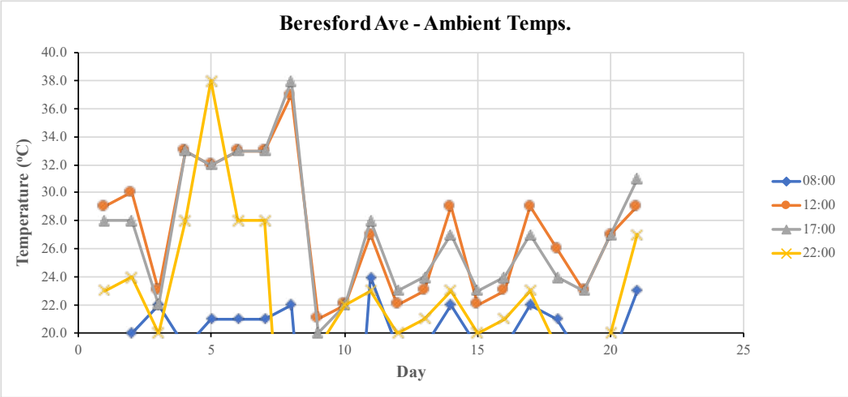
Ambient (All of Site X Locations)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	29.0	28.0	23.0
Jan-18	2	26, 20	20.0	30.0	28.0	24.0
Jan-19	3	23, 19	22.0	23.0	22.0	20.0
Jan-20	4	22, 19	19.0	22.0	22.0	20.0
Jan-21	5	24, 16	21.0	32.0	32.0	28.0
Jan-22	6	30, 19	21.0	33.0	33.0	28.0
Jan-25	7	26, 21	21.0	33.0	33.0	28.0
Jan-26	8	36, 21	22.0	37.0	38.0	-
Jan-27	9	26, 20	26.0	23.0	33.0	20.0
Jan-28	10	21, 20	-	21.0	20.0	19.0
Jan-29	11	22, 20	21.0	22.0	22.0	22.0
Feb-01	12	24, 21	24.0	27.0	28.0	23.0
Feb-02	13	22, 19	19.0	22.0	23.0	20.0
Feb-03	14	22, 19	19.0	23.0	24.0	21.0
Feb-04	15	25, 21	22.0	29.0	27.0	23.0
Feb-05	16	25, 21	24.0	30.0	28.0	23.0
Feb-08	17	23, 21	22.0	24.0	24.0	19.0
Feb-09	18	23, 21	21.0	26.0	24.0	18.0
Feb-10	19	23, 18	18.0	23.0	23.0	18.0
Feb-11	20	24, 17	18.0	27.0	27.0	20.0
Feb-12	21	27, 19	23.0	29.0	31.0	27.0
Average Temp. (°C)			21.2	26.9	27.1	22.2

Surface (Location 2) concrete						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	49.0	43.5	28.3
Jan-18	2	26, 20	25.8	50.1	33.6	29.8
Jan-19	3	23, 19	27.8	25.2	30.7	23.6
Jan-20	4	22, 19	19.3	26.5	30.6	20.1
Jan-21	5	24, 16	24.9	41.4	47.7	25.0
Jan-22	6	30, 19	27.0	51.4	35.1	30.9
Jan-25	7	26, 21	28.7	56.0	47.0	31.4
Jan-26	8	36, 21	30.3	56.1	58.1	-
Jan-27	9	26, 20	28.3	30.9	47.0	20.2
Jan-28	10	21, 20	-	23.4	22.4	17.7
Jan-29	11	22, 20	19.6	23.2	19.4	20.5
Feb-01	12	24, 21	28.6	37.6	33.3	23.3
Feb-02	13	22, 19	18.2	31.5	40.1	24.2
Feb-03	14	22, 19	21.1	29.8	31.4	20.1
Feb-04	15	25, 21	28.4	49.8	45.5	26.5
Feb-05	16	25, 21	31.8	49.4	27.8	23.8
Feb-08	17	23, 21	26.9	31.8	36.0	23.3
Feb-09	18	23, 21	23.6	40.8	45.2	23.3
Feb-10	19	23, 18	15.8	34.9	30.7	19.0
Feb-11	20	24, 17	24.8	34.5	44.5	27.0
Feb-12	21	27, 19	29.1	40.3	39.4	30.8
Average Temp. (°C)			25.3	38.7	37.6	24.4

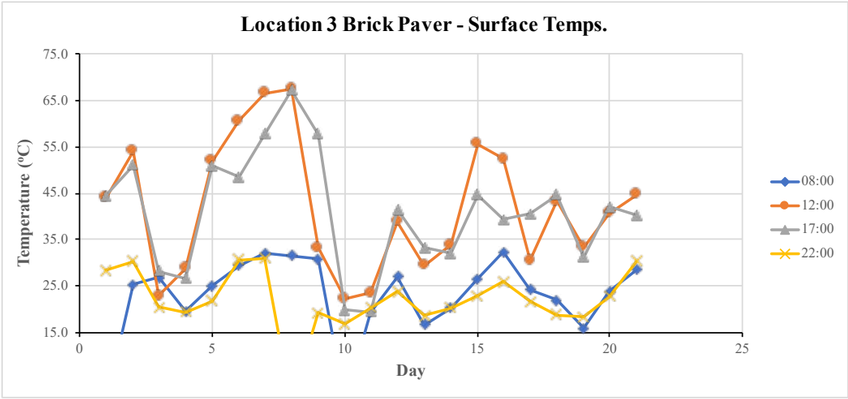
10. Appendix

2.3.3 Site 3 2021 Temperature Results

Data Logger 3 (Brick Paving)



Ambient	
Time	Average Temp. (°C)
8:00:00	20.6
12:00:00	27.3
17:00:00	27.1
22:00:00	23.3



Surface	
Time	Average Temp. (°C)
8:00:00	25.1
12:00:00	41.8
17:00:00	41.0
22:00:00	23.1

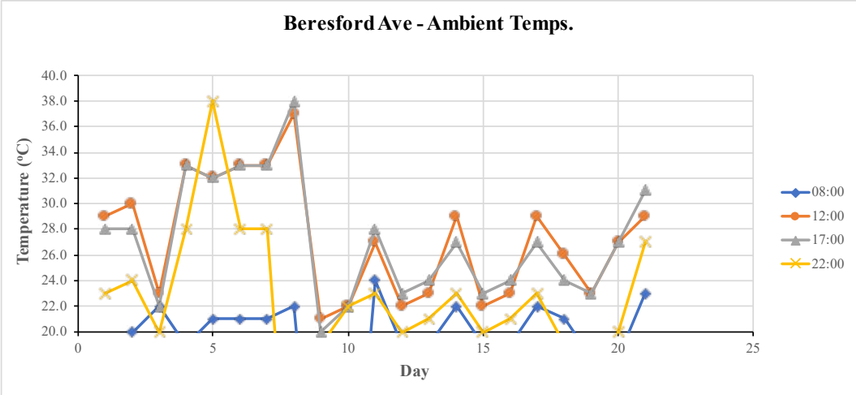
Ambient (All of Site X Locations)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	29.0	28.0	23.0
Jan-18	2	26, 20	20.0	30.0	28.0	24.0
Jan-19	3	23, 19	22.0	23.0	22.0	20.0
Jan-20	4	22, 19	19.0	22.0	22.0	20.0
Jan-21	5	24, 16	21.0	32.0	32.0	28.0
Jan-22	6	30, 19	21.0	33.0	33.0	28.0
Jan-25	7	26, 21	21.0	33.0	33.0	28.0
Jan-26	8	36, 21	22.0	37.0	38.0	-
Jan-27	9	26, 20	26.0	23.0	33.0	20.0
Jan-28	10	21, 20	-	21.0	20.0	19.0
Jan-29	11	22, 20	21.0	22.0	22.0	22.0
Feb-01	12	24, 21	24.0	27.0	28.0	23.0
Feb-02	13	22, 19	19.0	22.0	23.0	20.0
Feb-03	14	22, 19	19.0	23.0	24.0	21.0
Feb-04	15	25, 21	22.0	29.0	27.0	23.0
Feb-05	16	25, 21	24.0	30.0	28.0	23.0
Feb-08	17	23, 21	22.0	24.0	24.0	19.0
Feb-09	18	23, 21	21.0	26.0	24.0	18.0
Feb-10	19	23, 18	18.0	23.0	23.0	18.0
Feb-11	20	24, 17	18.0	27.0	27.0	20.0
Feb-12	21	27, 19	23.0	29.0	31.0	27.0
Average Temp. (°C)			**21.2**	**26.9**	**27.1**	**22.2**

Surface (Location 3) Brick Paver						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	44.1	44.5	28.4
Jan-18	2	26, 20	25.3	54.1	51.0	30.4
Jan-19	3	23, 19	26.9	22.9	28.3	20.5
Jan-20	4	22, 19	19.6	28.9	26.7	19.5
Jan-21	5	24, 16	25.1	51.9	50.8	21.9
Jan-22	6	30, 19	29.4	60.6	48.5	30.6
Jan-25	7	26, 21	32.0	66.5	57.7	31.0
Jan-26	8	36, 21	31.6	67.4	67.1	-
Jan-27	9	26, 20	30.9	33.3	57.7	19.3
Jan-28	10	21, 20	-	22.3	19.9	16.8
Jan-29	11	22, 20	19.5	23.6	19.4	20.4
Feb-01	12	24, 21	27.0	38.8	41.5	23.9
Feb-02	13	22, 19	16.7	29.4	33.3	18.7
Feb-03	14	22, 19	20.4	33.9	32.1	20.3
Feb-04	15	25, 21	26.5	55.5	44.7	23.0
Feb-05	16	25, 21	32.4	52.4	39.3	26.0
Feb-08	17	23, 21	24.3	30.5	40.6	21.7
Feb-09	18	23, 21	22.0	43.3	44.6	18.9
Feb-10	19	23, 18	15.9	33.4	31.3	18.3
Feb-11	20	24, 17	23.8	40.7	42.1	22.8
Feb-12	21	27, 19	28.5	44.7	40.3	30.4
Average Temp. (°C)			**25.1**	**41.8**	**41.0**	**23.1**

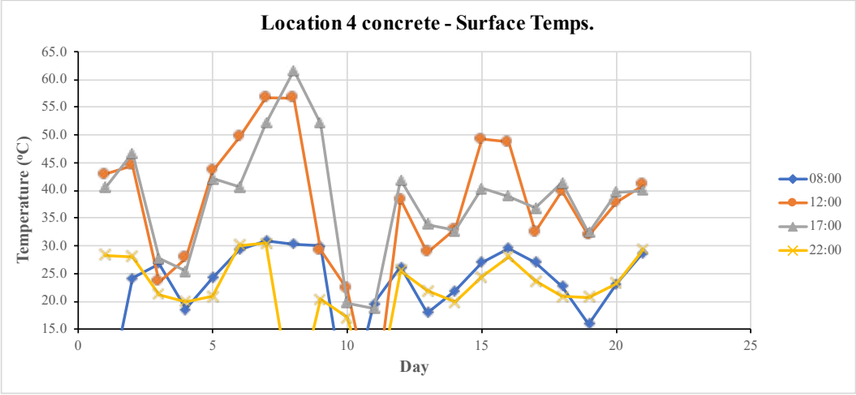
10. Appendix

2.3.4 Site 4 2021 Temperature Results

Data Logger 4 (Concrete)



Ambient	
Time	Average Temp. (°C)
8:00:00	20.6
12:00:00	27.3
17:00:00	27.1
22:00:00	23.3



Surface	
Time	Average Temp. (°C)
8:00:00	24.9
12:00:00	38.9
17:00:00	38.3
22:00:00	23.9

Ambient (All of Site X Locations)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C) 8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	29.0	28.0	23.0
Jan-18	2	26, 20	20.0	30.0	28.0	24.0
Jan-19	3	23, 19	22.0	23.0	22.0	20.0
Jan-20	4	22, 19	19.0	22.0	22.0	20.0
Jan-21	5	24, 16	21.0	32.0	32.0	28.0
Jan-22	6	30, 19	21.0	33.0	33.0	28.0
Jan-25	7	26, 21	21.0	33.0	33.0	28.0
Jan-26	8	36, 21	22.0	37.0	38.0	-
Jan-27	9	26, 20	26.0	23.0	33.0	20.0
Jan-28	10	21, 20	-	21.0	20.0	19.0
Jan-29	11	22, 20	21.0	22.0	22.0	22.0
Feb-01	12	24, 21	24.0	27.0	28.0	23.0
Feb-02	13	22, 19	19.0	22.0	23.0	20.0
Feb-03	14	22, 19	19.0	23.0	24.0	21.0
Feb-04	15	25, 21	22.0	29.0	27.0	23.0
Feb-05	16	25, 21	24.0	30.0	28.0	23.0
Feb-08	17	23, 21	22.0	24.0	24.0	19.0
Feb-09	18	23, 21	21.0	26.0	24.0	18.0
Feb-10	19	23, 18	18.0	23.0	23.0	18.0
Feb-11	20	24, 17	18.0	27.0	27.0	20.0
Feb-12	21	27, 19	23.0	29.0	31.0	27.0
Average Temp. (°C)			**21.2**	**26.9**	**27.1**	**22.2**

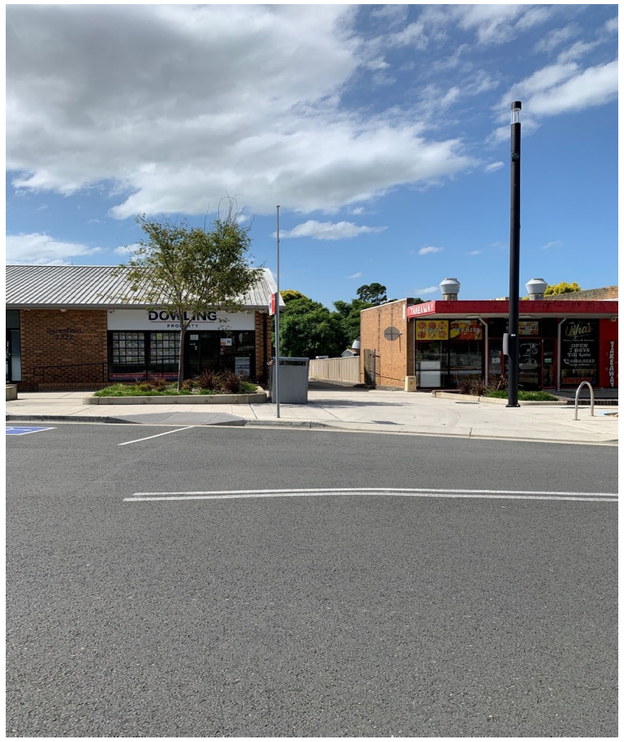
Surface (Location 4) concrete

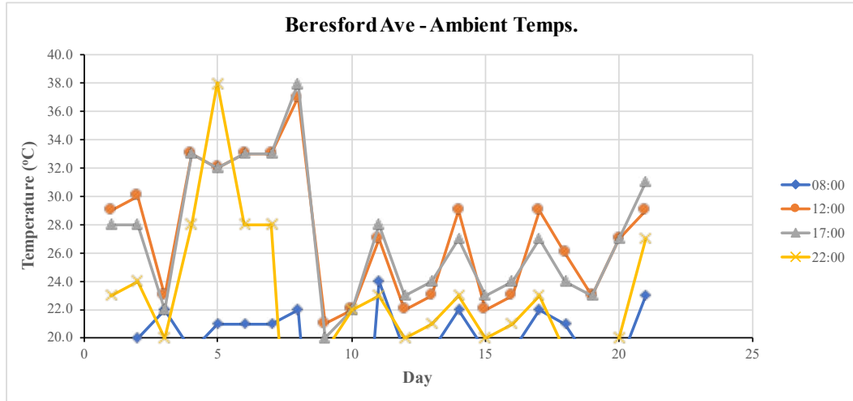
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C) 8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	42.9	40.5	28.3
Jan-18	2	26, 20	24.1	44.5	46.6	28.1
Jan-19	3	23, 19	26.8	23.5	27.7	21.2
Jan-20	4	22, 19	18.6	27.8	25.4	20.0
Jan-21	5	24, 16	24.3	43.5	42.1	20.8
Jan-22	6	30, 19	29.3	49.6	40.6	30.1
Jan-25	7	26, 21	30.9	56.7	52.1	30.5
Jan-26	8	36, 21	30.3	56.6	61.6	-
Jan-27	9	26, 20	30.0	29.2	52.1	20.4
Jan-28	10	21, 20	-	22.3	19.7	17.1
Jan-29	11	22, 20	19.6	-	18.7	-
Feb-01	12	24, 21	26.1	38.3	41.8	25.5
Feb-02	13	22, 19	17.9	28.8	33.9	21.9
Feb-03	14	22, 19	21.8	33.0	32.8	19.8
Feb-04	15	25, 21	27.0	49.2	40.3	24.4
Feb-05	16	25, 21	29.6	48.7	39.0	28.0
Feb-08	17	23, 21	27.0	32.5	36.8	23.6
Feb-09	18	23, 21	22.7	39.8	41.3	20.9
Feb-10	19	23, 18	15.9	31.8	32.4	20.7
Feb-11	20	24, 17	23.1	37.8	39.7	23.3
Feb-12	21	27, 19	28.7	41.0	40.0	29.3
Average Temp. (°C)			**24.9**	**38.9**	**38.3**	**23.9**

10. Appendix

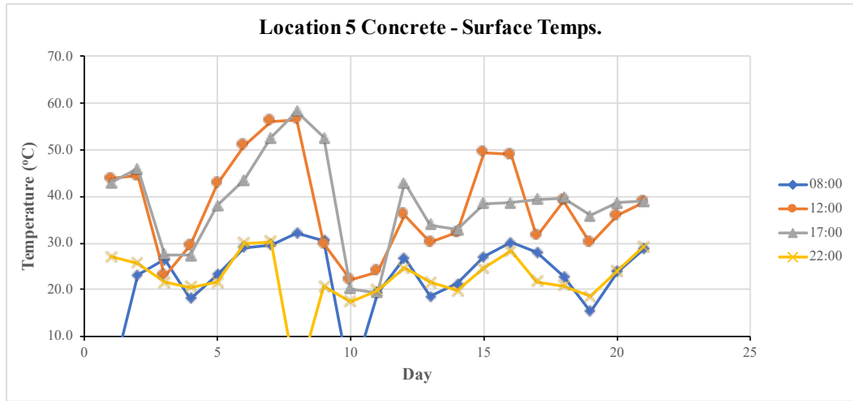
2.3.5 Site 5 2021 Temperature Results

Data Logger 5 (Concrete)





Ambient	
Time	Average Temp. (°C)
8:00:00	20.6
12:00:00	27.3
17:00:00	27.1
22:00:00	23.3



Surface	
Time	Average Temp. (°C)
8:00:00	0.0
12:00:00	0.0
17:00:00	0.0
22:00:00	0.0

Ambient (All of Site X Locations)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C) 8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	29.0	28.0	23.0
Jan-18	2	26, 20	20.0	30.0	28.0	24.0
Jan-19	3	23, 19	22.0	23.0	22.0	20.0
Jan-20	4	22, 19	19.0	22.0	22.0	20.0
Jan-21	5	24, 16	21.0	32.0	32.0	28.0
Jan-22	6	30, 19	21.0	33.0	33.0	28.0
Jan-25	7	26, 21	21.0	33.0	33.0	28.0
Jan-26	8	36, 21	22.0	37.0	38.0	-
Jan-27	9	26, 20	26.0	23.0	33.0	20.0
Jan-28	10	21, 20	-	21.0	20.0	19.0
Jan-29	11	22, 20	21.0	22.0	22.0	22.0
Feb-01	12	24, 21	24.0	27.0	28.0	23.0
Feb-02	13	22, 19	19.0	22.0	23.0	20.0
Feb-03	14	22, 19	19.0	23.0	24.0	21.0
Feb-04	15	25, 21	22.0	29.0	27.0	23.0
Feb-05	16	25, 21	24.0	30.0	28.0	23.0
Feb-08	17	23, 21	22.0	24.0	24.0	19.0
Feb-09	18	23, 21	21.0	26.0	24.0	18.0
Feb-10	19	23, 18	18.0	23.0	23.0	18.0
Feb-11	20	24, 17	18.0	27.0	27.0	20.0
Feb-12	21	27, 19	23.0	29.0	31.0	27.0
Average Temp. (°C)			21.2	26.9	27.1	22.2

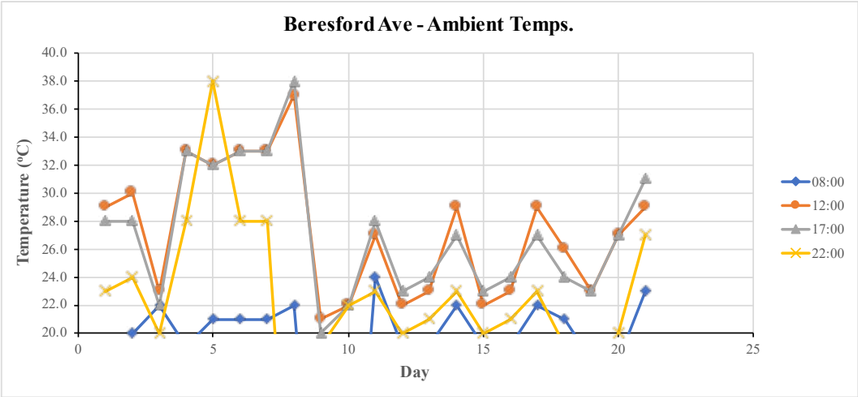
Surface Concrete (Location 5)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C) 8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	43.8	42.9	27.0
Jan-18	2	26, 20	23.1	44.3	45.8	25.7
Jan-19	3	23, 19	26.5	23.0	27.5	21.5
Jan-20	4	22, 19	18.1	29.5	27.4	20.5
Jan-21	5	24, 16	23.2	42.7	37.9	21.6
Jan-22	6	30, 19	29.0	50.9	43.4	29.9
Jan-25	7	26, 21	29.6	56.1	52.5	30.2
Jan-26	8	36, 21	32.1	56.3	58.1	-
Jan-27	9	26, 20	30.6	29.7	52.5	20.7
Jan-28	10	21, 20	-	22.1	20.2	17.4
Jan-29	11	22, 20	19.3	23.9	19.3	19.9
Feb-01	12	24, 21	26.8	36.0	42.9	24.6
Feb-02	13	22, 19	18.5	30.1	33.9	21.5
Feb-03	14	22, 19	21.3	32.2	32.8	19.7
Feb-04	15	25, 21	27.0	49.3	38.4	24.6
Feb-05	16	25, 21	30.1	48.9	38.6	28.2
Feb-08	17	23, 21	27.9	31.5	39.4	21.7
Feb-09	18	23, 21	22.8	39.1	39.6	20.8
Feb-10	19	23, 18	15.4	29.9	35.8	18.6
Feb-11	20	24, 17	23.8	35.8	38.6	24.0
Feb-12	21	27, 19	28.7	38.7	38.9	29.1
Average Temp. (°C)			0.0	0.0	0.0	0.0

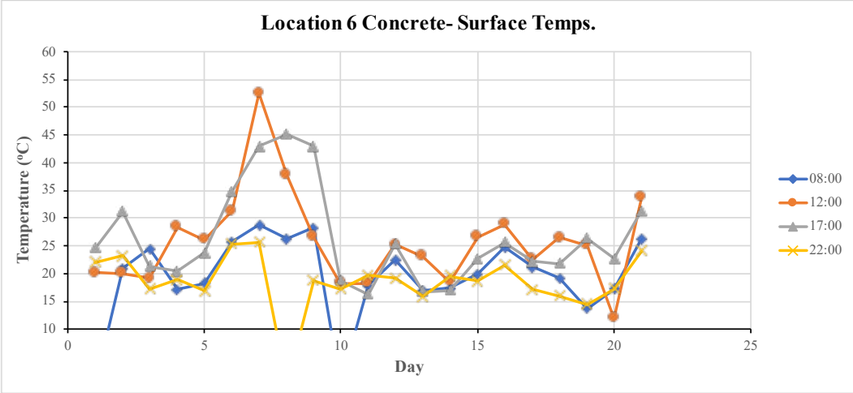
10. Appendix

2.3.6 Site 6 2021 Temperature Results

Data Logger 6 (Grass)



Ambient	
Time	Average Temp. (°C)
8:00:00	20.6
12:00:00	27.3
17:00:00	27.1
22:00:00	23.3



Surface	
Time	Average Temp. (°C)
8:00:00	21.4
12:00:00	25.7
17:00:00	26.4
22:00:00	19.4

Ambient (All of Site X Locations)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	29.0	28.0	23.0
Jan-18	2	26, 20	20.0	30.0	28.0	24.0
Jan-19	3	23, 19	22.0	23.0	22.0	20.0
Jan-20	4	22, 19	19.0	22.0	22.0	20.0
Jan-21	5	24, 16	21.0	32.0	32.0	28.0
Jan-22	6	30, 19	21.0	33.0	33.0	28.0
Jan-25	7	26, 21	21.0	33.0	33.0	28.0
Jan-26	8	36, 21	22.0	37.0	38.0	-
Jan-27	9	26, 20	26.0	23.0	33.0	20.0
Jan-28	10	21, 20	-	21.0	20.0	19.0
Jan-29	11	22, 20	21.0	22.0	22.0	22.0
Feb-01	12	24, 21	24.0	27.0	28.0	23.0
Feb-02	13	22, 19	19.0	22.0	23.0	20.0
Feb-03	14	22, 19	19.0	23.0	24.0	21.0
Feb-04	15	25, 21	22.0	29.0	27.0	23.0
Feb-05	16	25, 21	24.0	30.0	28.0	23.0
Feb-08	17	23, 21	22.0	24.0	24.0	19.0
Feb-09	18	23, 21	21.0	26.0	24.0	18.0
Feb-10	19	23, 18	18.0	23.0	23.0	18.0
Feb-11	20	24, 17	18.0	27.0	27.0	20.0
Feb-12	21	27, 19	23.0	29.0	31.0	27.0
Average Temp. (°C)			21.2	26.9	27.1	22.2

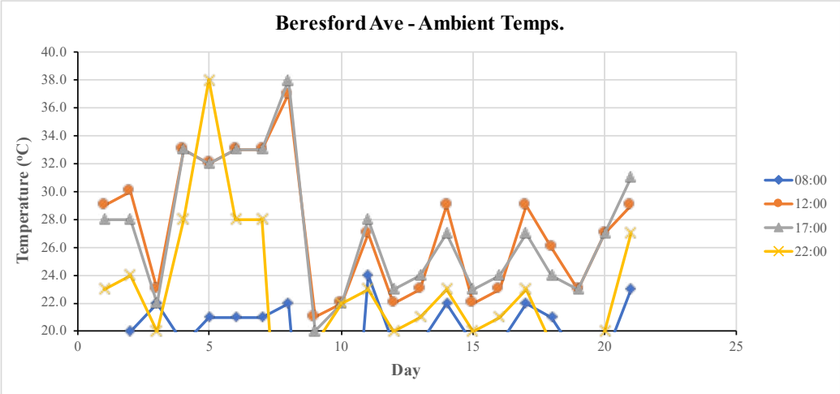
Surface Concrete (Location 6)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	20.2	24.6	22.1
Jan-18	2	26, 20	20.9	20.0	31.2	23.2
Jan-19	3	23, 19	24.4	19.2	21.3	17.3
Jan-20	4	22, 19	17.1	28.4	20.4	18.9
Jan-21	5	24, 16	18.2	26.1	23.7	16.9
Jan-22	6	30, 19	25.7	31.3	34.8	25.4
Jan-25	7	26, 21	28.8	52.5	42.9	25.6
Jan-26	8	36, 21	26.2	37.7	45.1	-
Jan-27	9	26, 20	28.2	26.6	42.9	18.8
Jan-28	10	21, 20	-	18.3	18.8	17.2
Jan-29	11	22, 20	17.9	18.2	16.2	19.7
Feb-01	12	24, 21	22.4	25.2	25.4	19.1
Feb-02	13	22, 19	16.8	23.1	16.7	15.8
Feb-03	14	22, 19	17.4	18.5	17.0	19.5
Feb-04	15	25, 21	19.9	26.6	22.7	18.6
Feb-05	16	25, 21	24.7	28.9	25.6	21.5
Feb-08	17	23, 21	21.1	22.6	22.2	17.1
Feb-09	18	23, 21	19.2	26.5	21.8	16.0
Feb-10	19	23, 18	13.7	25.1	26.4	14.5
Feb-11	20	24, 17	17.3	11.9	22.7	17.2
Feb-12	21	27, 19	26.2	33.7	31.3	24.1
Average Temp. (°C)			21.4	25.7	26.4	19.4

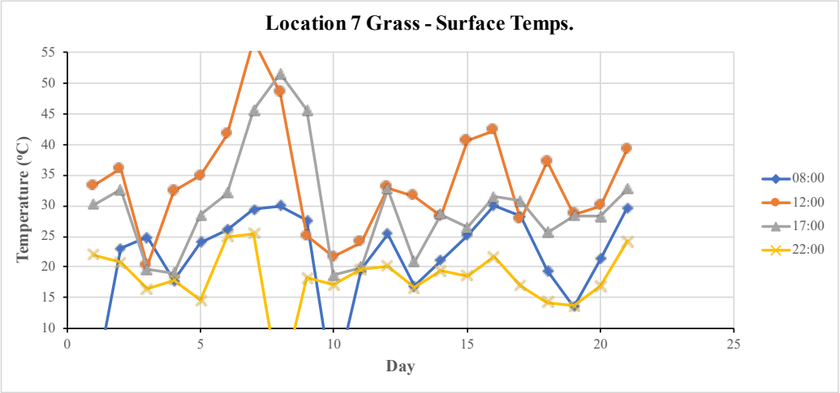
10. Appendix

2.3.7 Site 7 2021 Temperature Results

Data Logger 7 (Grass)



Ambient	
Time	Average Temp. (°C)
8:00:00	20.6
12:00:00	27.3
17:00:00	27.1
22:00:00	23.3



Surface	
Time	Average Temp. (°C)
8:00:00	23.8
12:00:00	33.9
17:00:00	29.9
22:00:00	19.0

Ambient (All of Site X Locations)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	29.0	28.0	23.0
Jan-18	2	26, 20	20.0	30.0	28.0	24.0
Jan-19	3	23, 19	22.0	23.0	22.0	20.0
Jan-20	4	22, 19	19.0	22.0	22.0	20.0
Jan-21	5	24, 16	21.0	32.0	32.0	28.0
Jan-22	6	30, 19	21.0	33.0	33.0	28.0
Jan-25	7	26, 21	21.0	33.0	33.0	28.0
Jan-26	8	36, 21	22.0	37.0	38.0	-
Jan-27	9	26, 20	26.0	23.0	33.0	20.0
Jan-28	10	21, 20	-	21.0	20.0	19.0
Jan-29	11	22, 20	21.0	22.0	22.0	22.0
Feb-01	12	24, 21	24.0	27.0	28.0	23.0
Feb-02	13	22, 19	19.0	22.0	23.0	20.0
Feb-03	14	22, 19	19.0	23.0	24.0	21.0
Feb-04	15	25, 21	22.0	29.0	27.0	23.0
Feb-05	16	25, 21	24.0	30.0	28.0	23.0
Feb-08	17	23, 21	22.0	24.0	24.0	19.0
Feb-09	18	23, 21	21.0	26.0	24.0	18.0
Feb-10	19	23, 18	18.0	23.0	23.0	18.0
Feb-11	20	24, 17	18.0	27.0	27.0	20.0
Feb-12	21	27, 19	23.0	29.0	31.0	27.0
Average Temp. (°C)			**21.2**	**26.9**	**27.1**	**22.2**

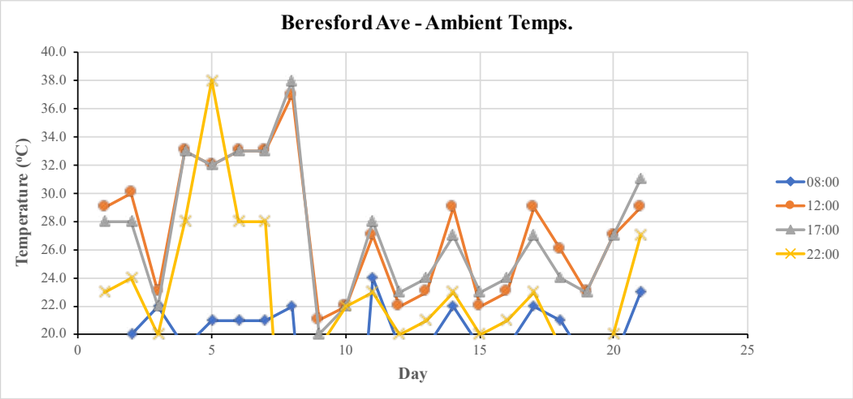
Surface Grass (Location 7)

Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	33.3	30.2	22.0
Jan-18	2	26, 20	23.0	36.0	32.6	20.7
Jan-19	3	23, 19	24.8	20.2	19.6	16.4
Jan-20	4	22, 19	17.8	32.4	19.0	17.9
Jan-21	5	24, 16	24.0	34.8	28.5	14.6
Jan-22	6	30, 19	26.1	41.6	32.0	25.0
Jan-25	7	26, 21	29.4	56.9	45.6	25.4
Jan-26	8	36, 21	29.9	48.4	51.5	-
Jan-27	9	26, 20	27.6	25.1	45.6	18.2
Jan-28	10	21, 20	-	21.6	18.7	17.1
Jan-29	11	22, 20	19.6	24.0	19.9	19.6
Feb-01	12	24, 21	25.4	32.9	32.7	20.2
Feb-02	13	22, 19	16.9	31.5	20.9	16.6
Feb-03	14	22, 19	21.1	28.2	28.6	19.4
Feb-04	15	25, 21	25.2	40.5	26.4	18.6
Feb-05	16	25, 21	30.0	42.2	31.4	21.6
Feb-08	17	23, 21	28.2	27.7	30.7	17.0
Feb-09	18	23, 21	19.4	37.1	25.6	14.2
Feb-10	19	23, 18	13.6	28.6	28.4	13.7
Feb-11	20	24, 17	21.3	30.0	28.2	16.9
Feb-12	21	27, 19	29.6	39.2	32.7	24.2
Average Temp. (°C)			**23.8**	**33.9**	**29.9**	**19.0**

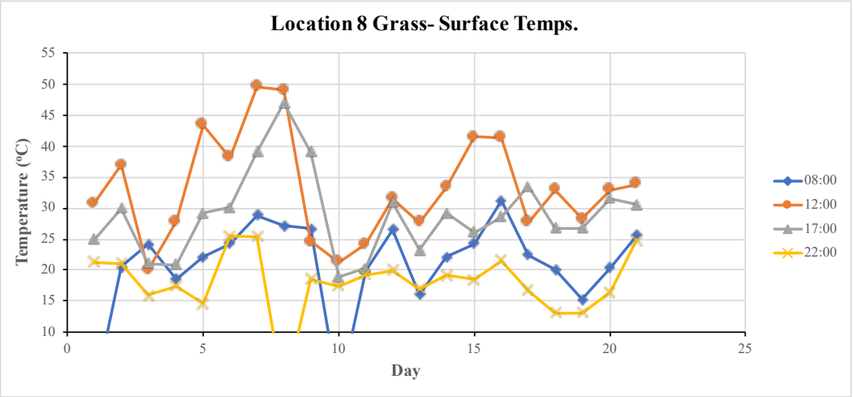
10. Appendix

2.3.8 Site 8 2021 Temperature Results

Data Logger 8 (Grass)



Ambient	
Time	Average Temp. (°C)
8:00:00	20.6
12:00:00	27.3
17:00:00	27.1
22:00:00	23.3



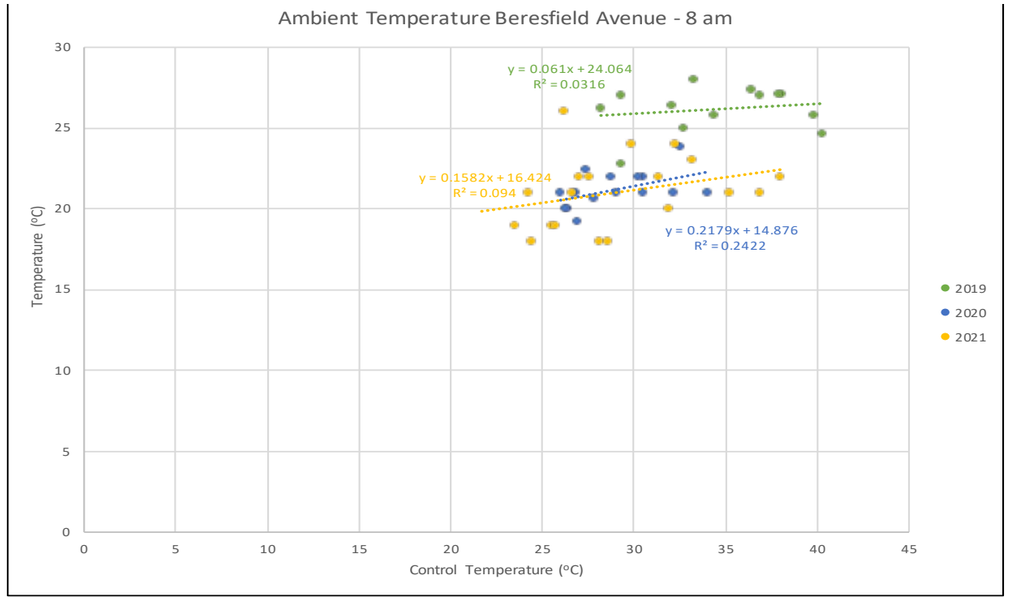
Surface	
Time	Average Temp. (°C)
8:00:00	23.0
12:00:00	33.2
17:00:00	28.9
22:00:00	18.8

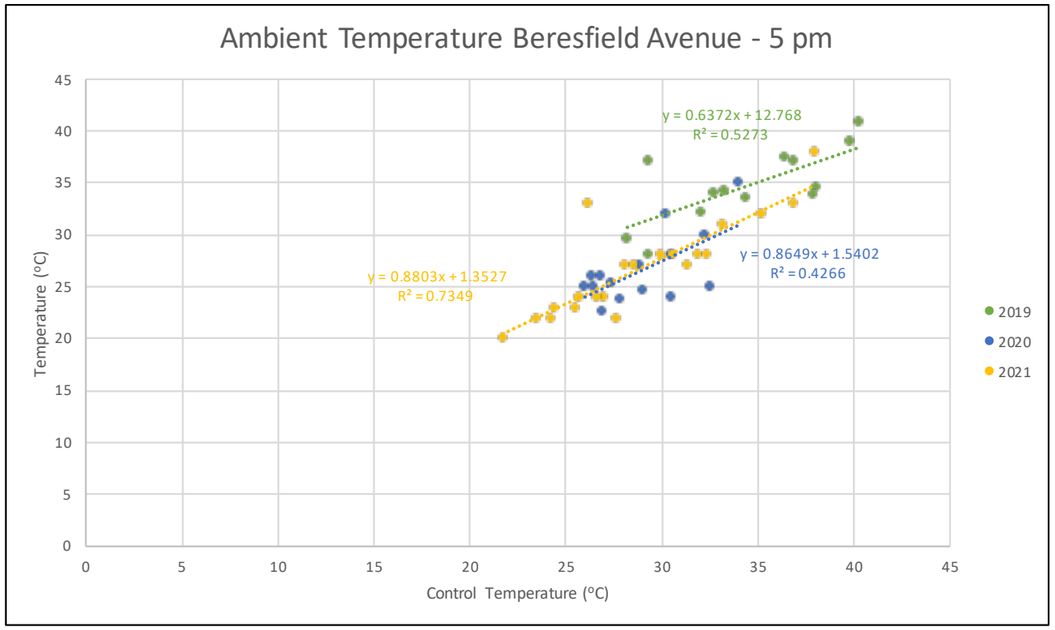
Ambient (All of Site X Locations)						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Ambient Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	29.0	28.0	23.0
Jan-18	2	26, 20	20.0	30.0	28.0	24.0
Jan-19	3	23, 19	22.0	23.0	22.0	20.0
Jan-20	4	22, 19	19.0	22.0	22.0	20.0
Jan-21	5	24, 16	21.0	32.0	32.0	28.0
Jan-22	6	30, 19	21.0	33.0	33.0	28.0
Jan-25	7	26, 21	21.0	33.0	33.0	28.0
Jan-26	8	36, 21	22.0	37.0	38.0	-
Jan-27	9	26, 20	26.0	23.0	33.0	20.0
Jan-28	10	21, 20	-	21.0	20.0	19.0
Jan-29	11	22, 20	21.0	22.0	22.0	22.0
Feb-01	12	24, 21	24.0	27.0	28.0	23.0
Feb-02	13	22, 19	19.0	22.0	23.0	20.0
Feb-03	14	22, 19	19.0	23.0	24.0	21.0
Feb-04	15	25, 21	22.0	29.0	27.0	23.0
Feb-05	16	25, 21	24.0	30.0	28.0	23.0
Feb-08	17	23, 21	22.0	24.0	24.0	19.0
Feb-09	18	23, 21	21.0	26.0	24.0	18.0
Feb-10	19	23, 18	18.0	23.0	23.0	18.0
Feb-11	20	24, 17	18.0	27.0	27.0	20.0
Feb-12	21	27, 19	23.0	29.0	31.0	27.0
Average Temp. (°C)			21.2	26.9	27.1	22.2

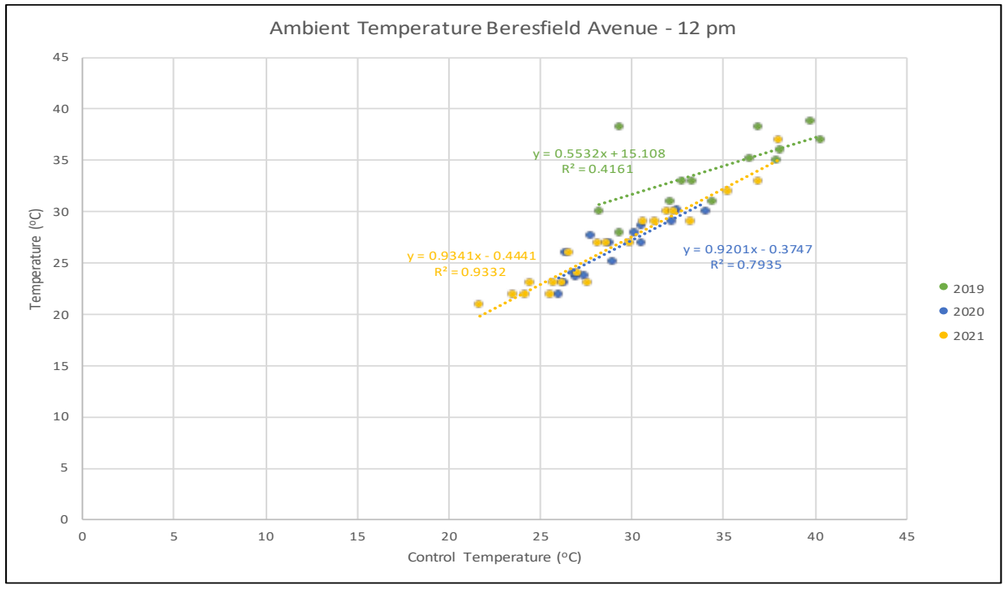
0						
Date	Day	Weather Forecast (Max, Min) (°C)	Time/Surface Temp. (°C)			
			8:00:00	12:00:00	17:00:00	22:00:00
Jan-15	1	25, 22	-	30.7	25.0	21.3
Jan-18	2	26, 20	20.5	36.9	30.0	21.1
Jan-19	3	23, 19	24.2	20.0	21.1	16.0
Jan-20	4	22, 19	18.6	27.8	20.8	17.4
Jan-21	5	24, 16	22.1	43.4	29.1	14.6
Jan-22	6	30, 19	24.3	38.2	30.1	25.5
Jan-25	7	26, 21	28.8	49.5	39.1	25.4
Jan-26	8	36, 21	27.1	49.0	46.9	-
Jan-27	9	26, 20	26.7	24.6	39.1	18.6
Jan-28	10	21, 20	-	21.3	18.9	17.4
Jan-29	11	22, 20	19.8	24.1	20.3	19.3
Feb-01	12	24, 21	26.5	31.6	30.9	19.9
Feb-02	13	22, 19	16.1	27.7	23.2	17.0
Feb-03	14	22, 19	22.1	33.4	29.2	19.1
Feb-04	15	25, 21	24.3	41.4	26.1	18.4
Feb-05	16	25, 21	31.2	41.3	28.6	21.5
Feb-08	17	23, 21	22.4	27.7	33.5	16.8
Feb-09	18	23, 21	20.1	32.9	26.8	13.1
Feb-10	19	23, 18	15.3	28.2	26.8	13.1
Feb-11	20	24, 17	20.4	32.9	31.5	16.4
Feb-12	21	27, 19	25.6	33.8	30.5	24.8
Average Temp. (°C)			23.0	33.2	28.9	18.8

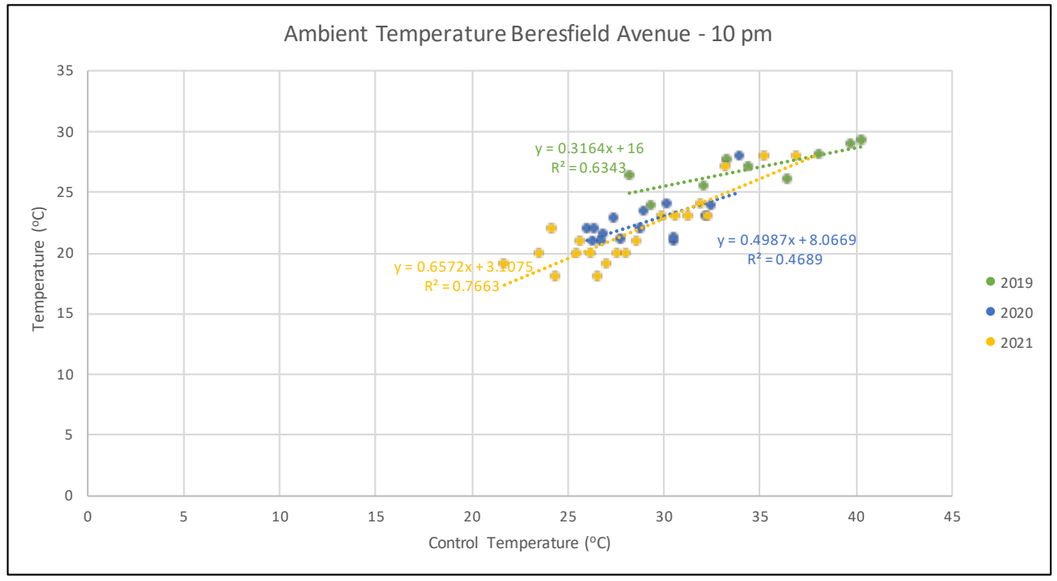
10. Appendix

3.1 Ambient temperature Scatter plots 2019, 2020 and 2021



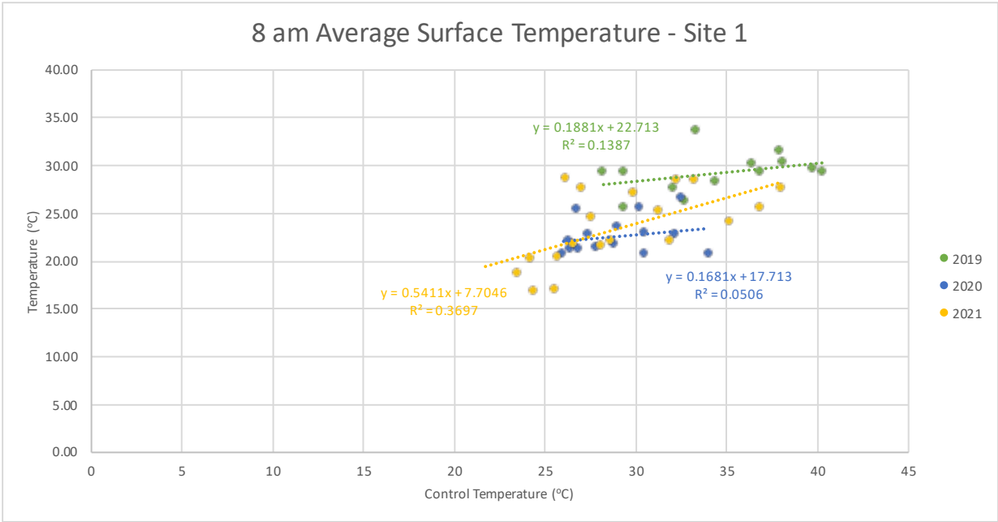


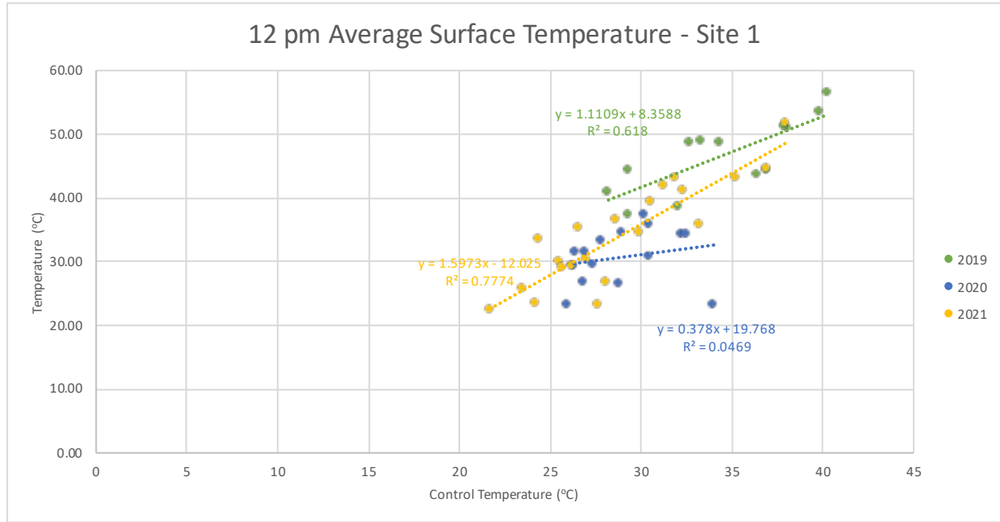


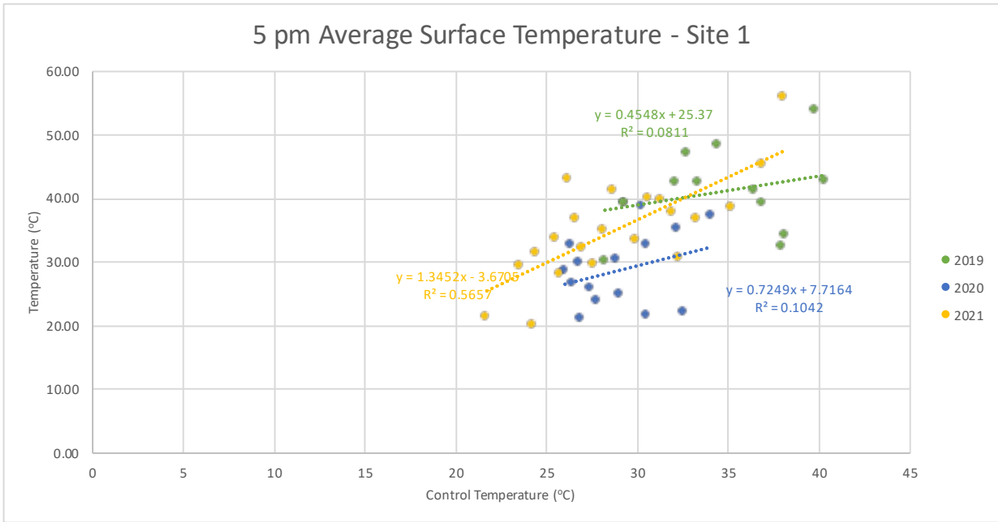


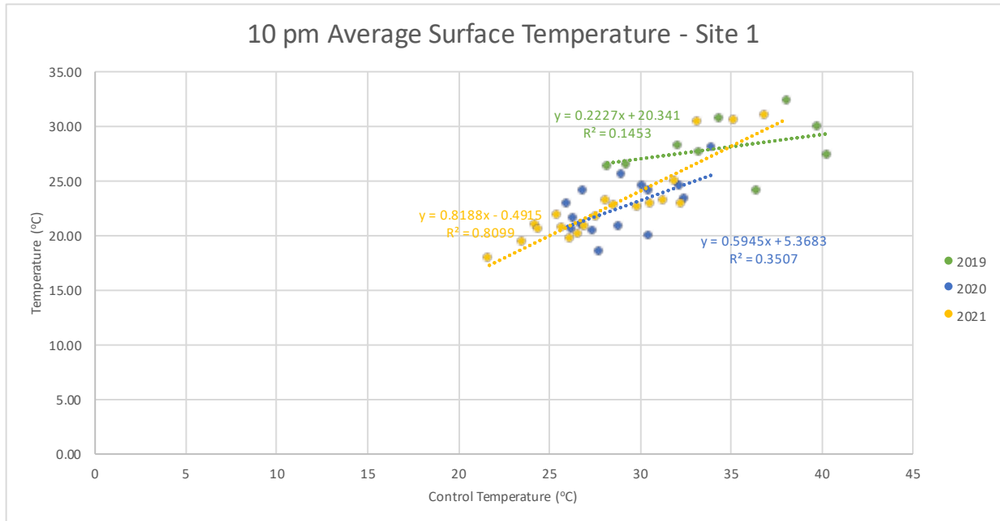
10. Appendix

4.1 Average Surface temperature Scatter plots Site 1 2019, 2020 and 2021



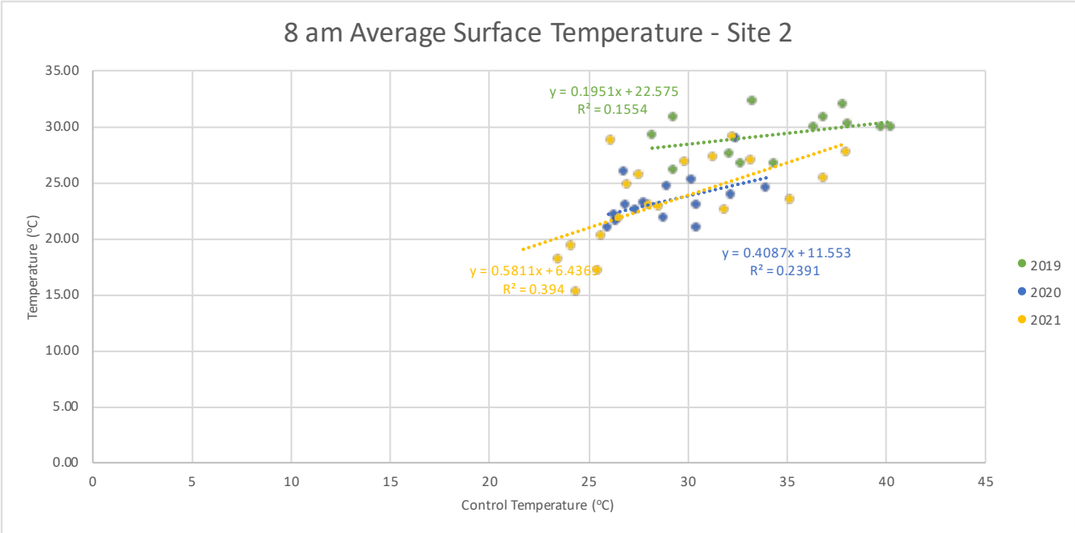


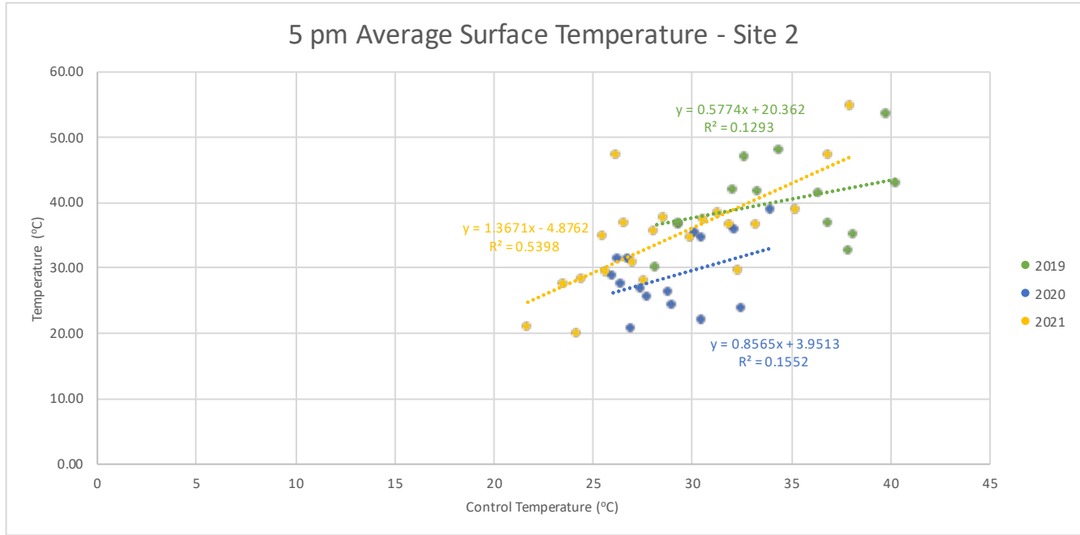


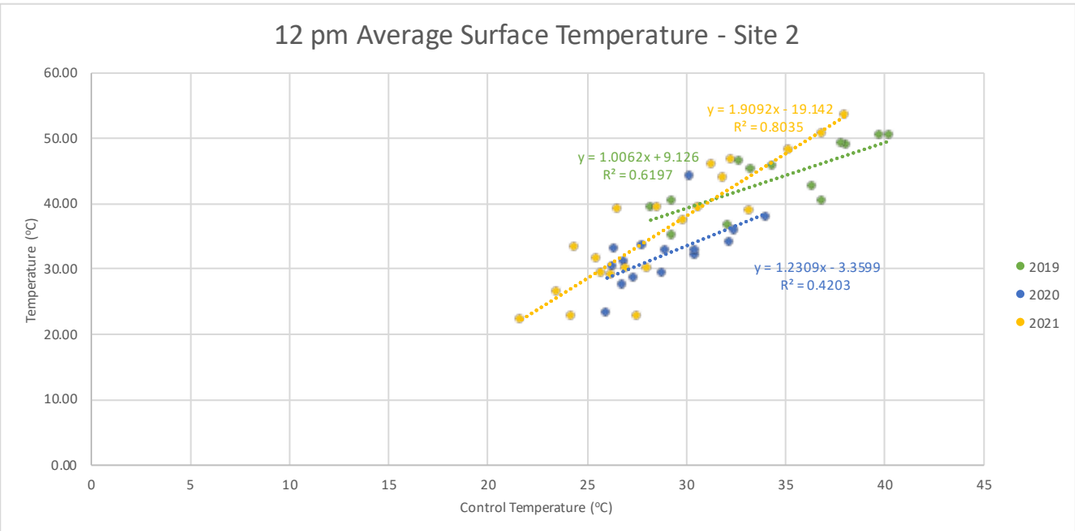


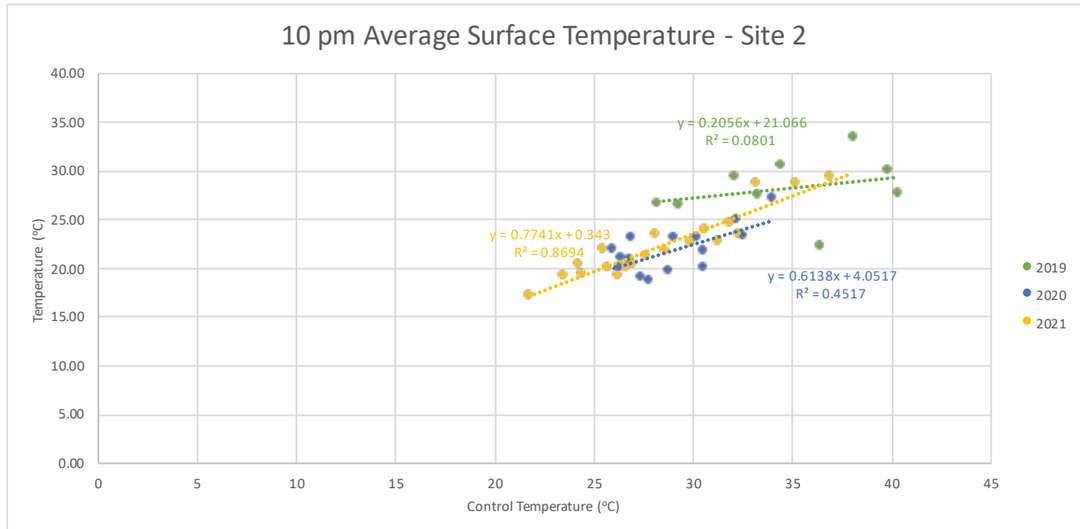
10. Appendix

4.2 Average Surface temperature Scatter plots Site 2 2019, 2020 and 2021



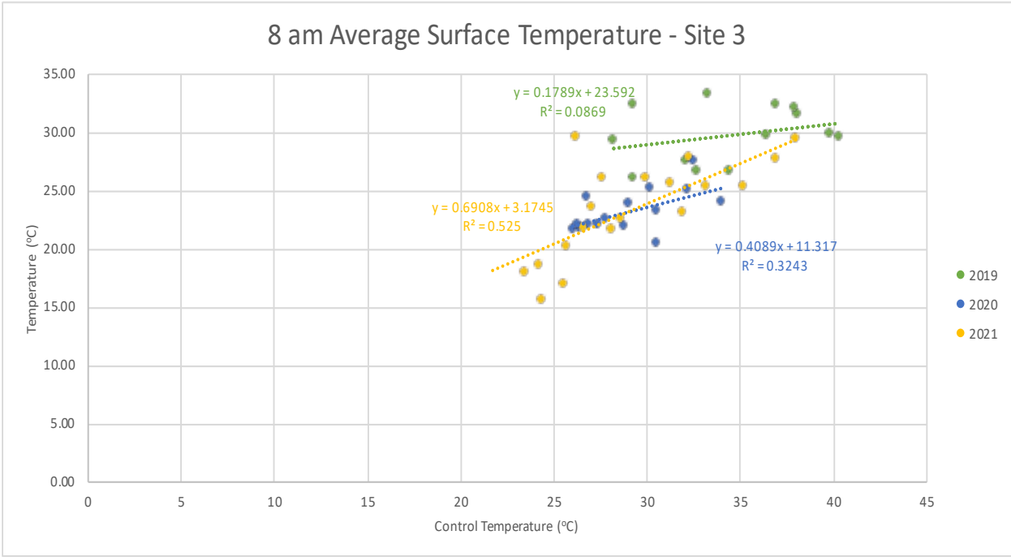


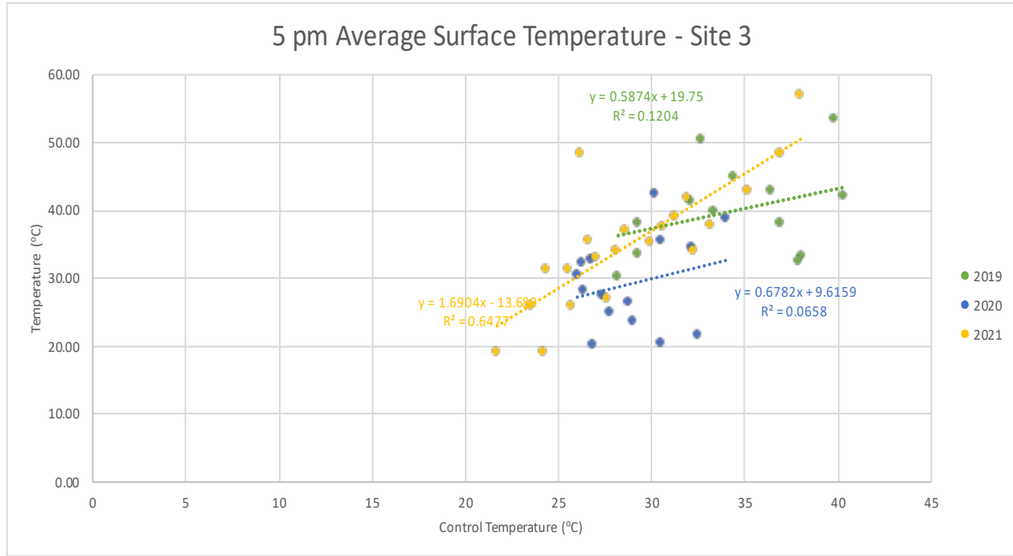


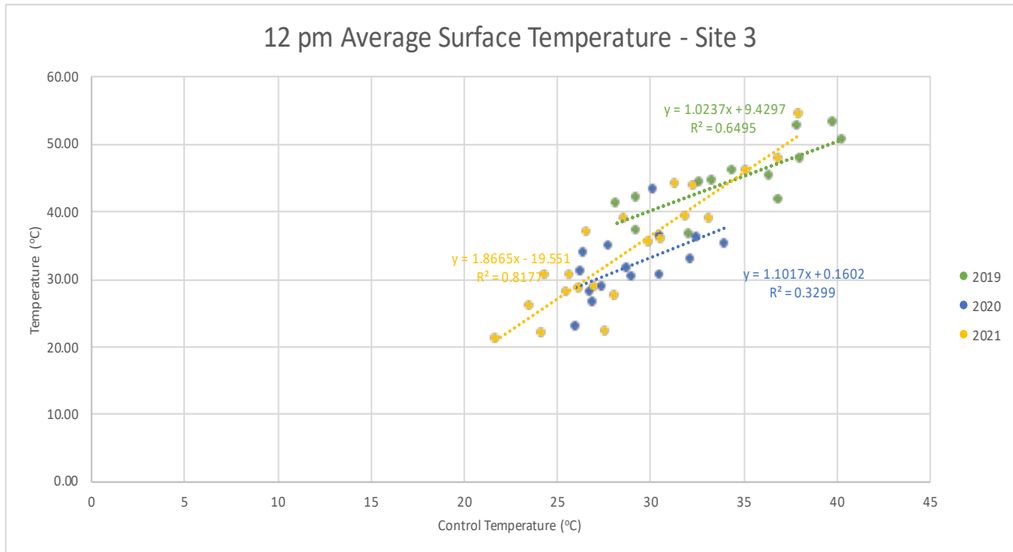


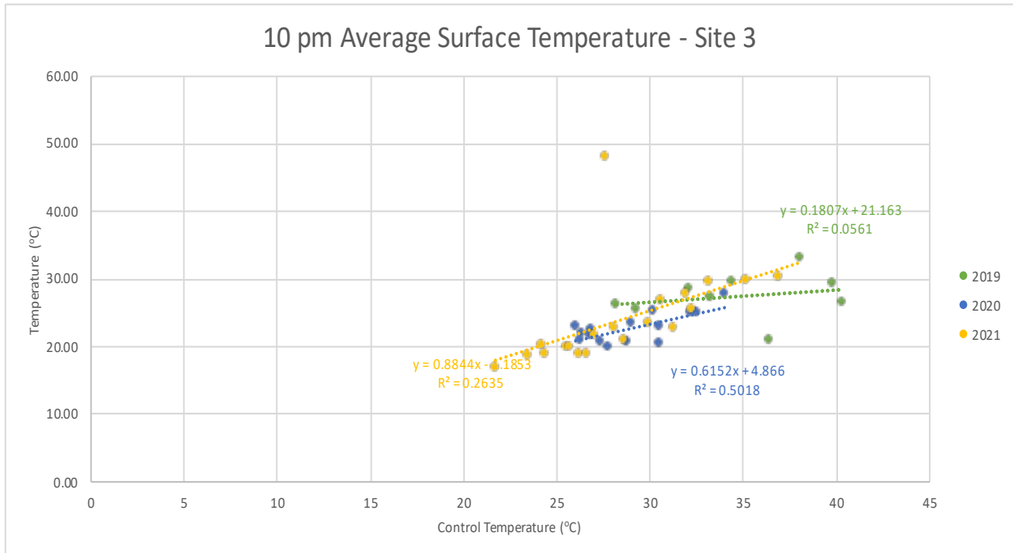
10. Appendix

4.3 Average Surface temperature Scatter plots Site 3 2019, 2020 and 2021



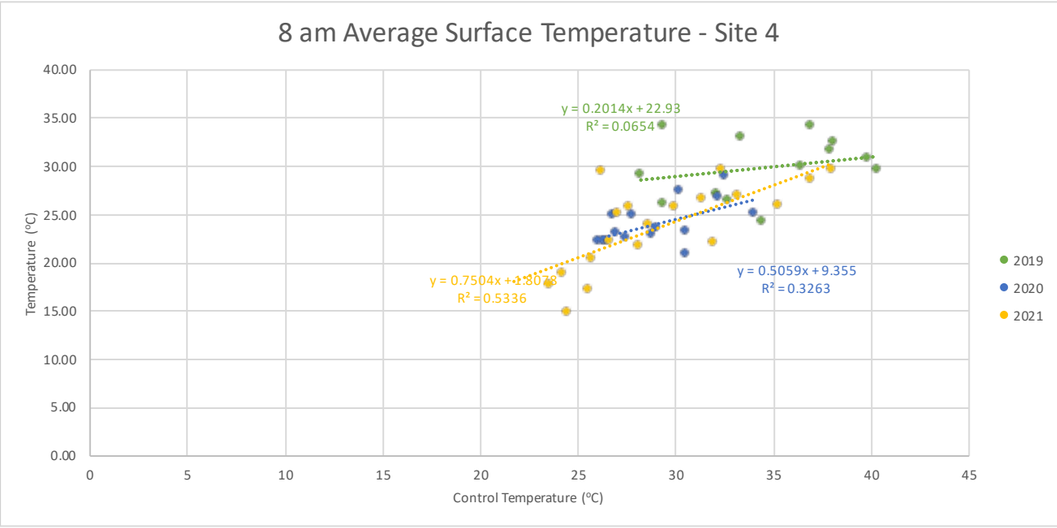


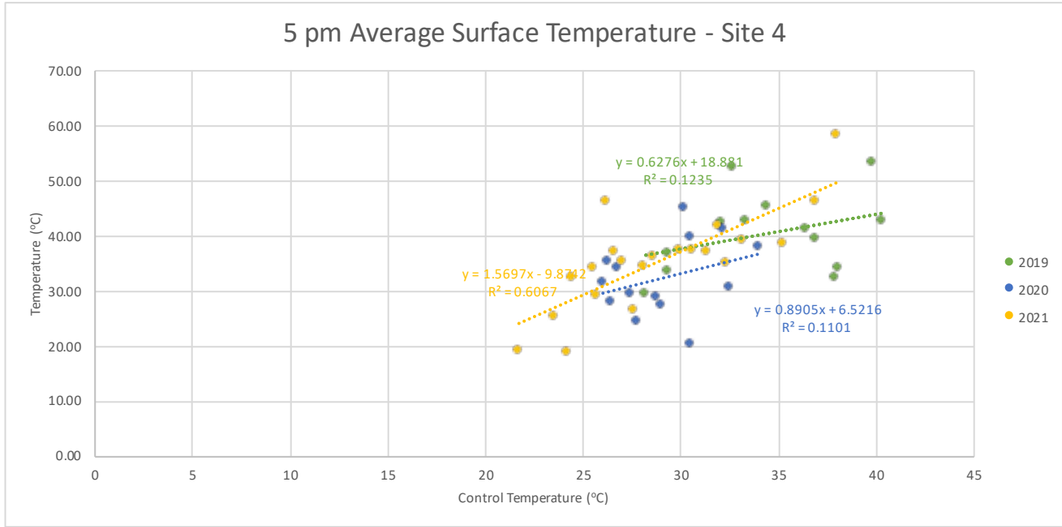


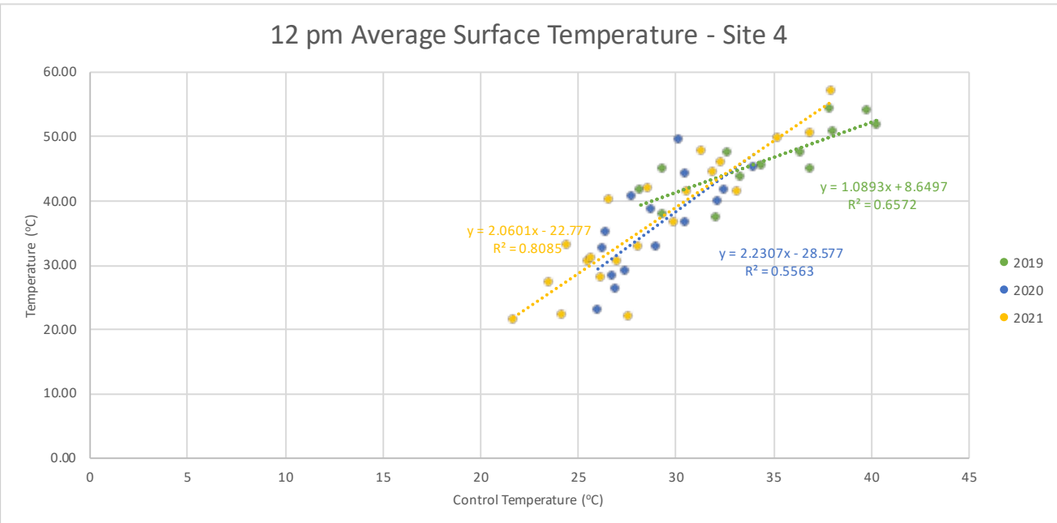


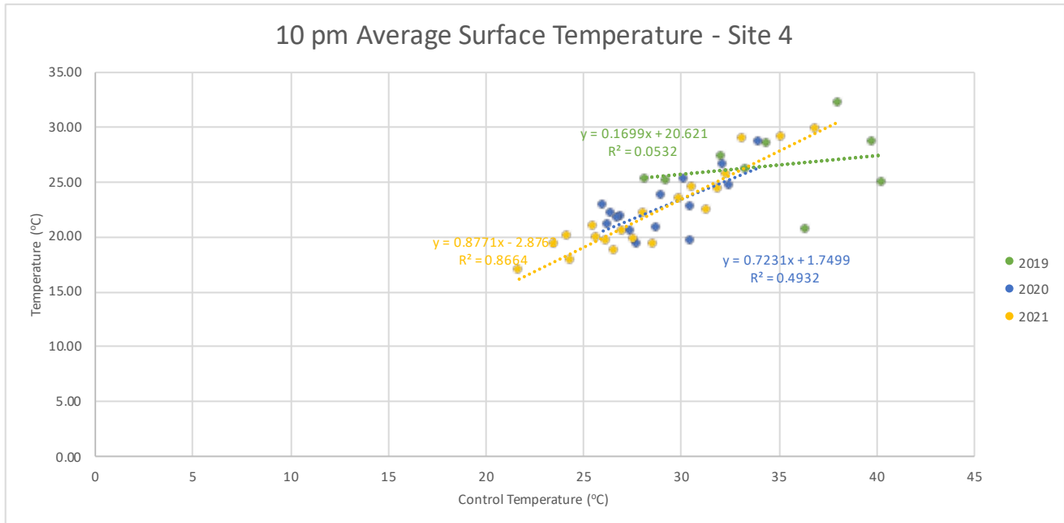
10. Appendix

4.4 Average Surface temperature Scatter plots Site 4 2019, 2020 and 2021



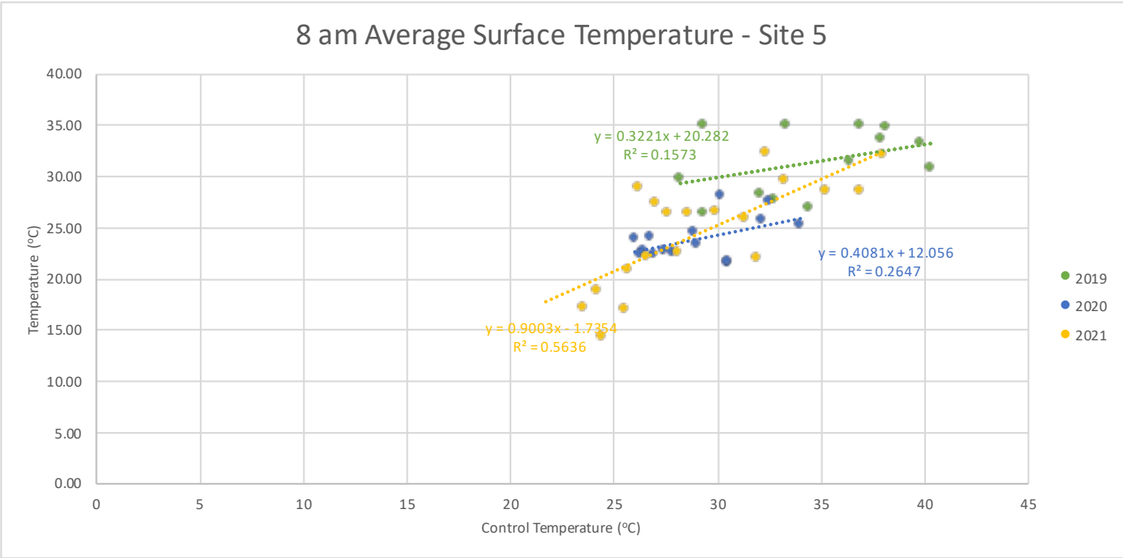


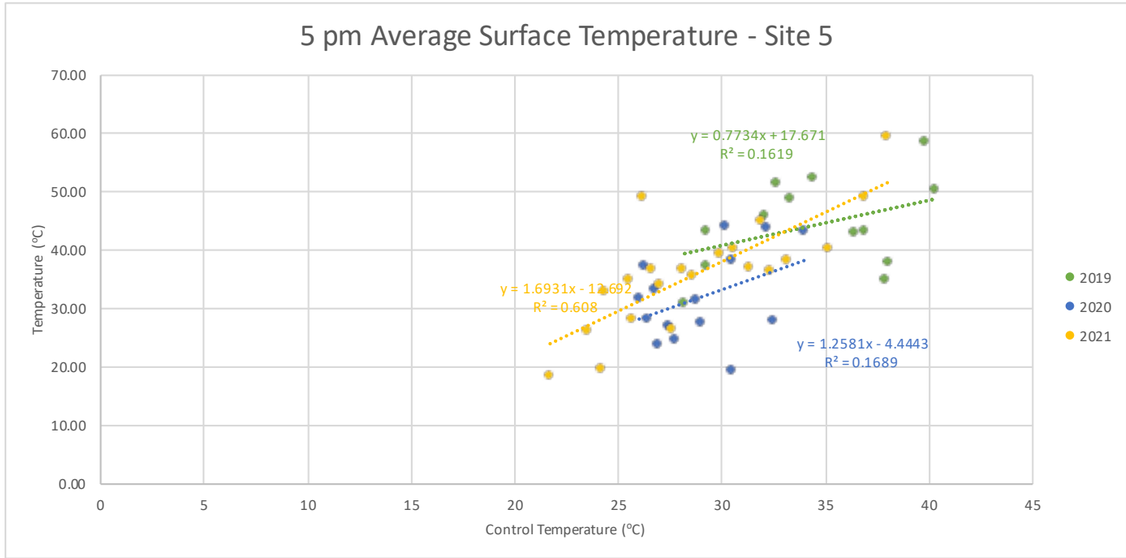


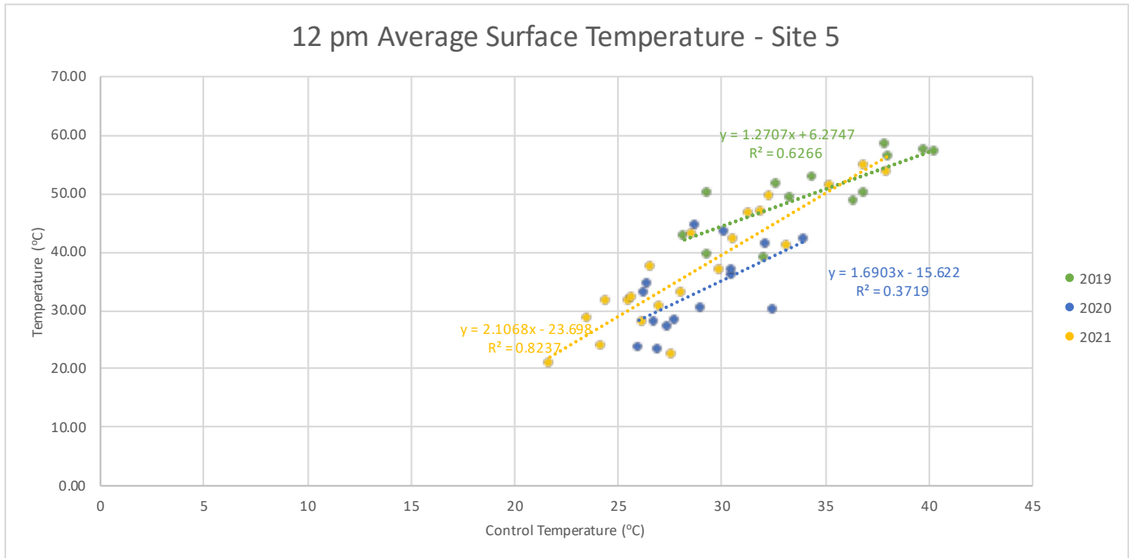


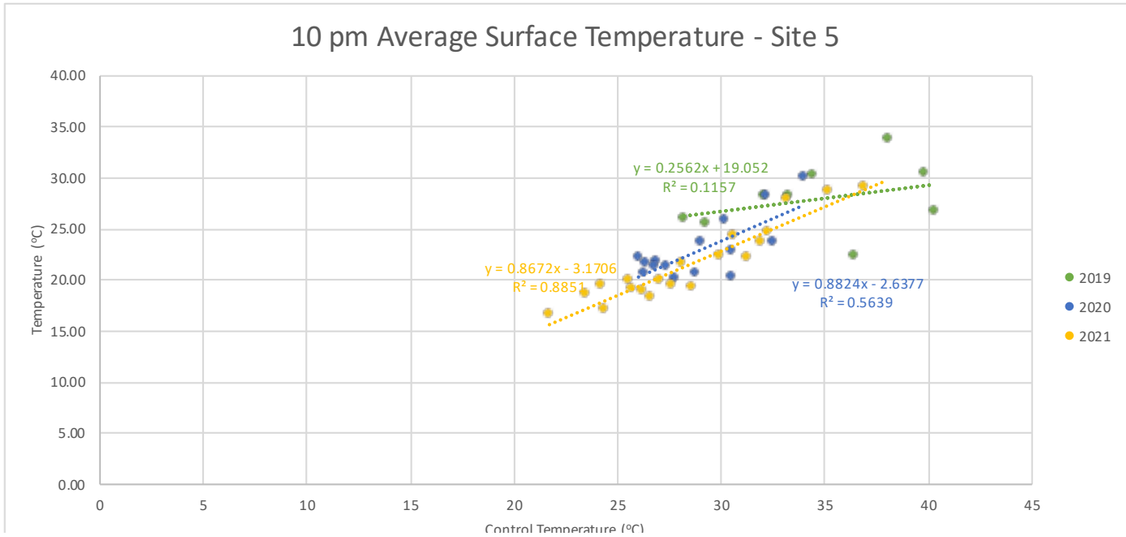
10. Appendix

4.5 Average Surface temperature Scatter plots Site 5 2019, 2020 and 2021



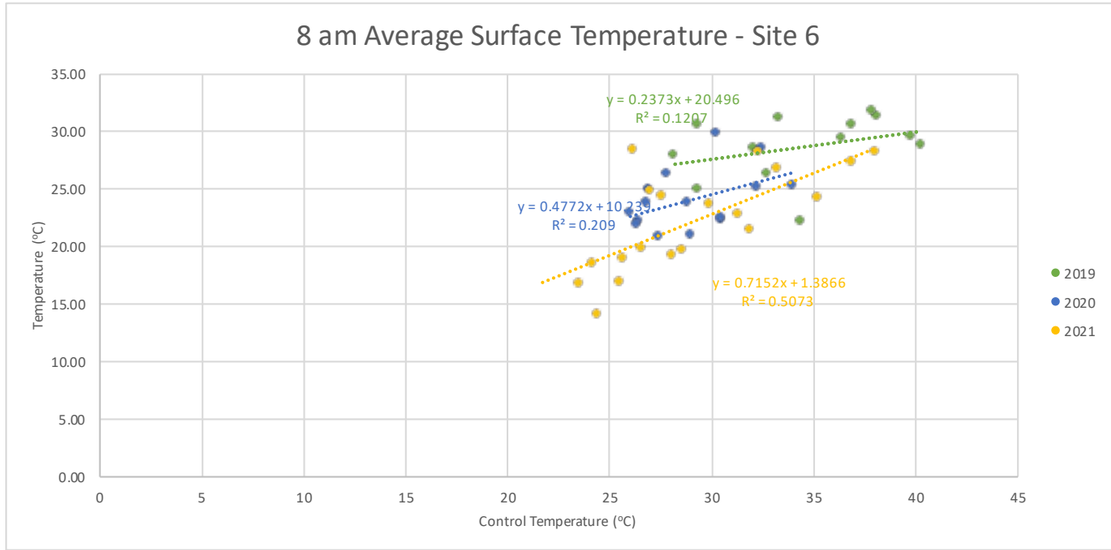


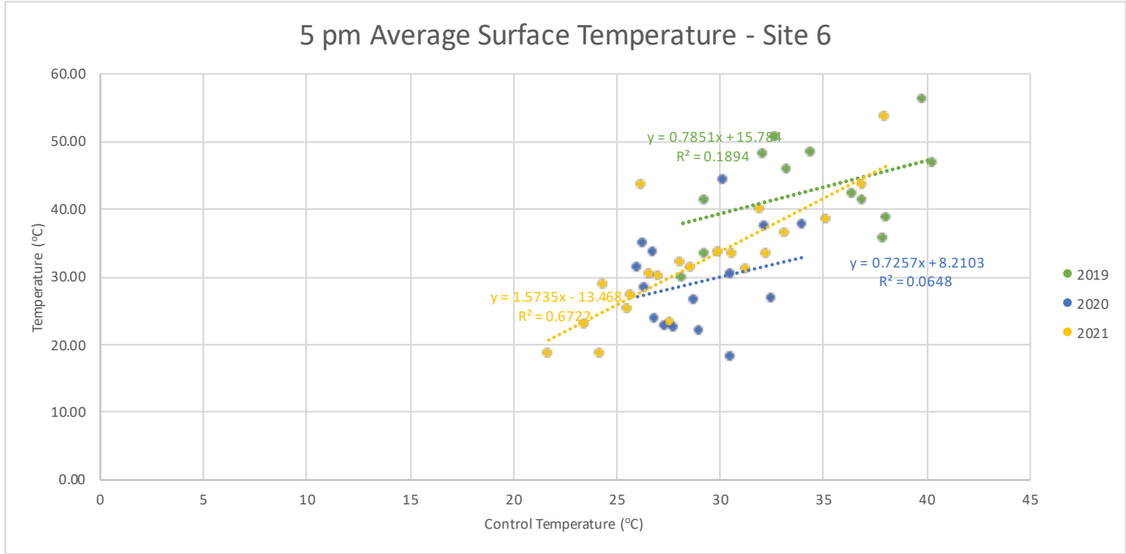


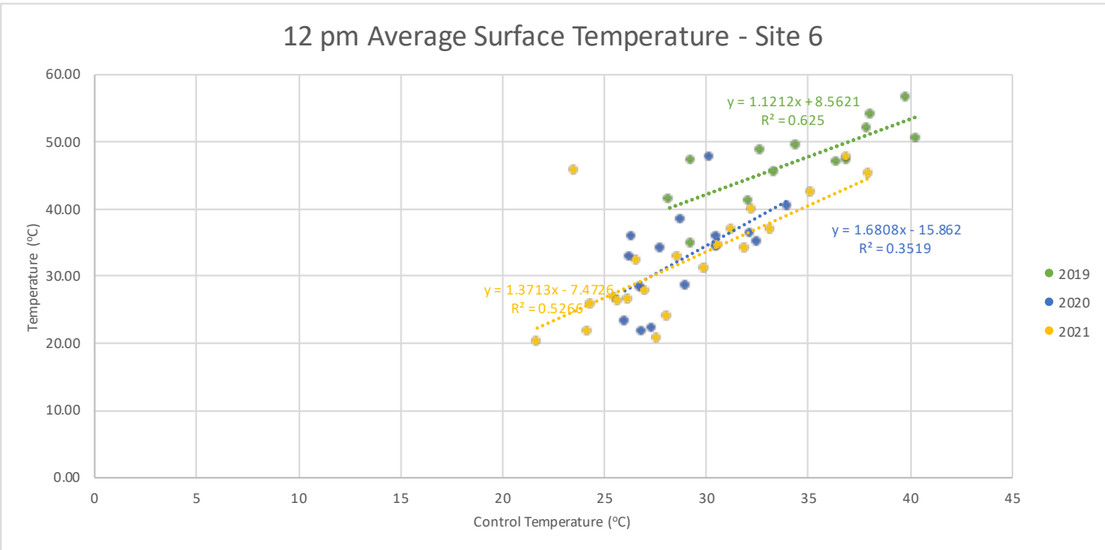


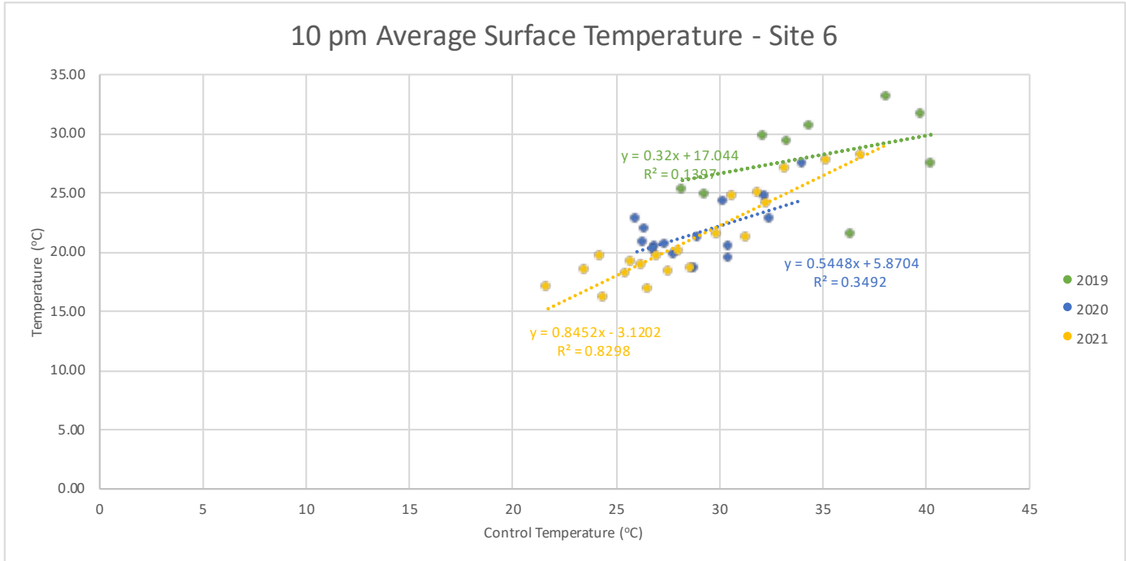
10. Appendix

4.6 Average Surface temperature Scatter plots Site 6 2019, 2020 and 2021



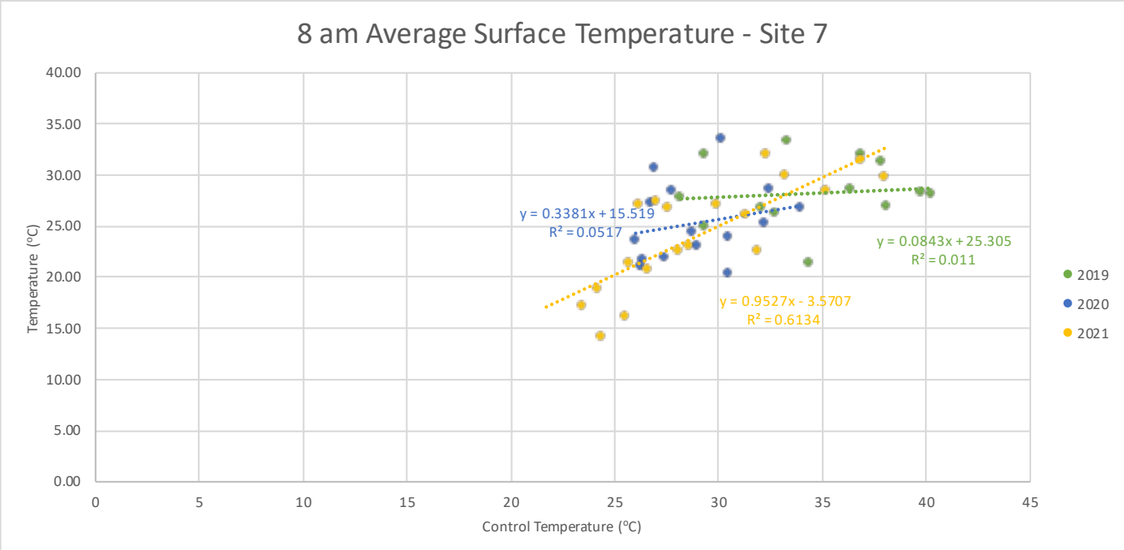


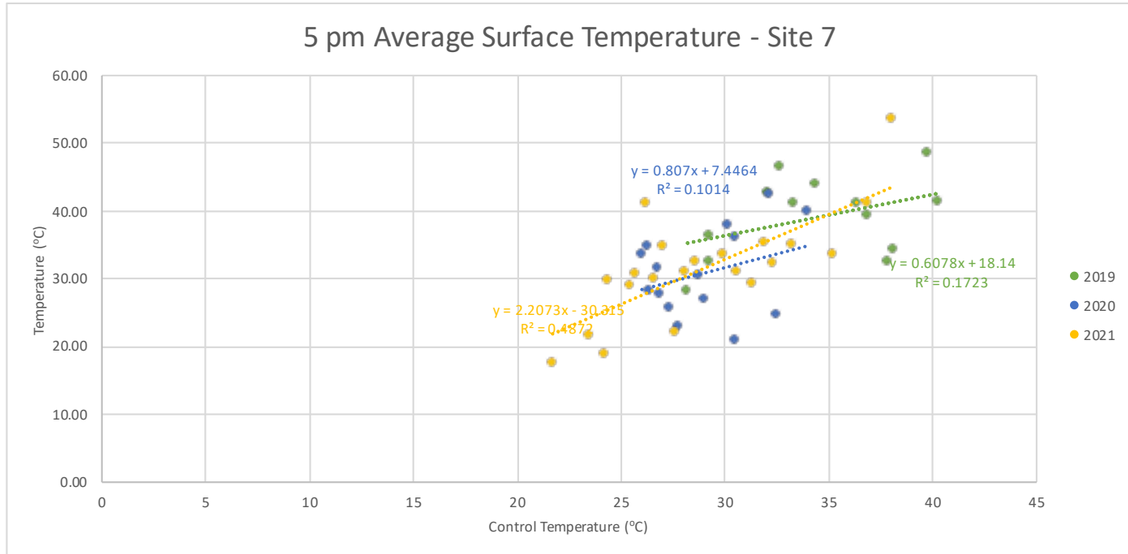


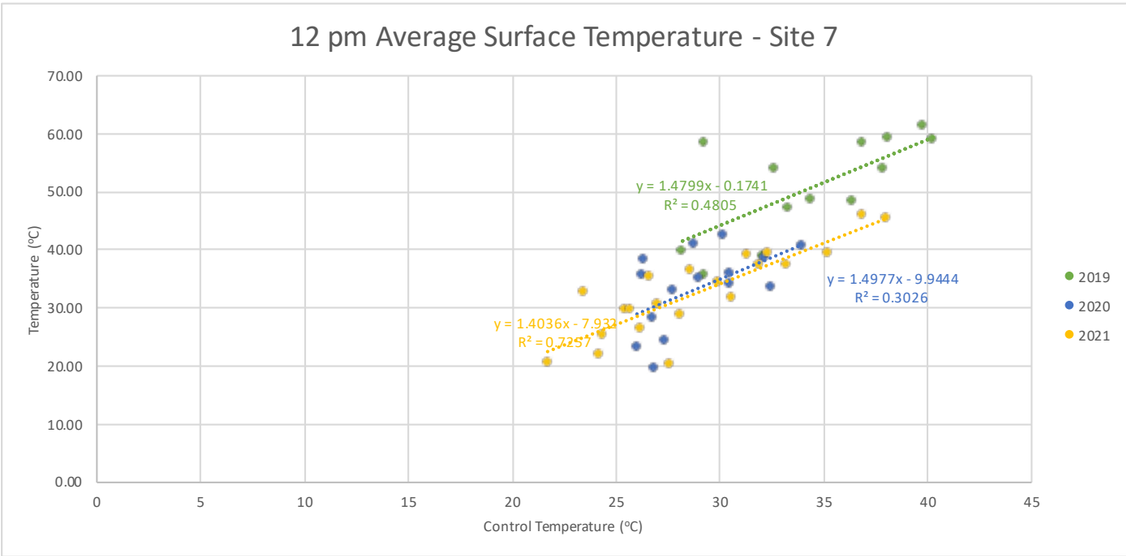


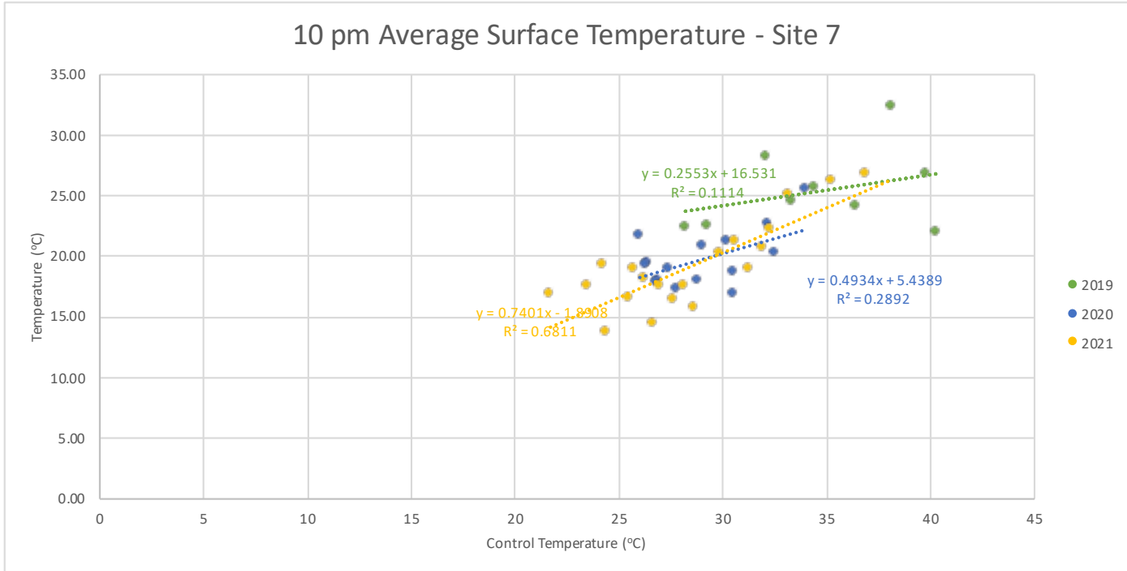
10. Appendix

4.7 Average Surface temperature Scatter plots Site 7 2019, 2020 and 2021



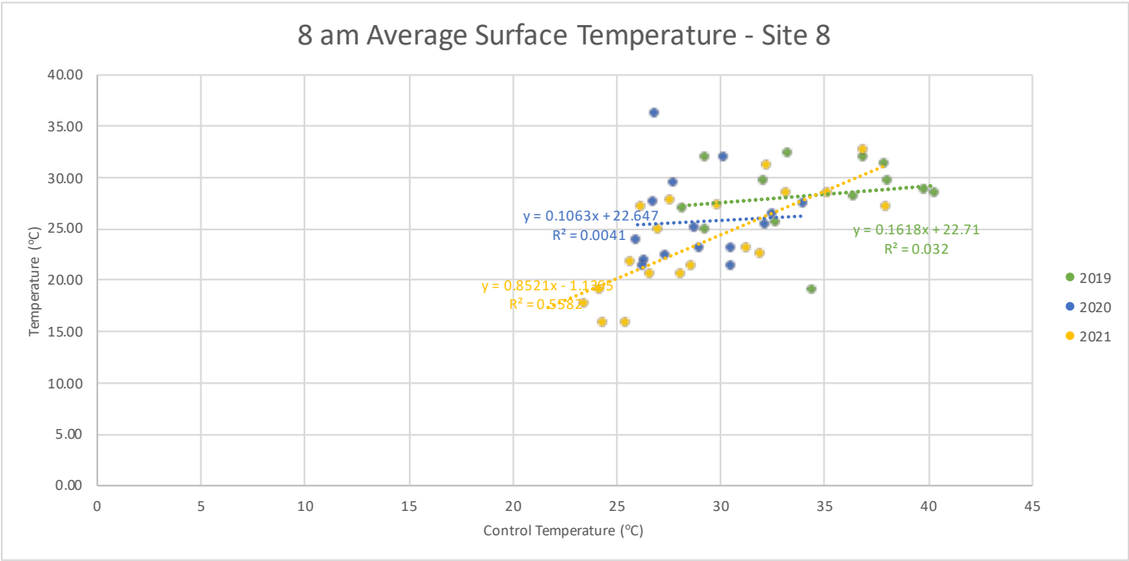


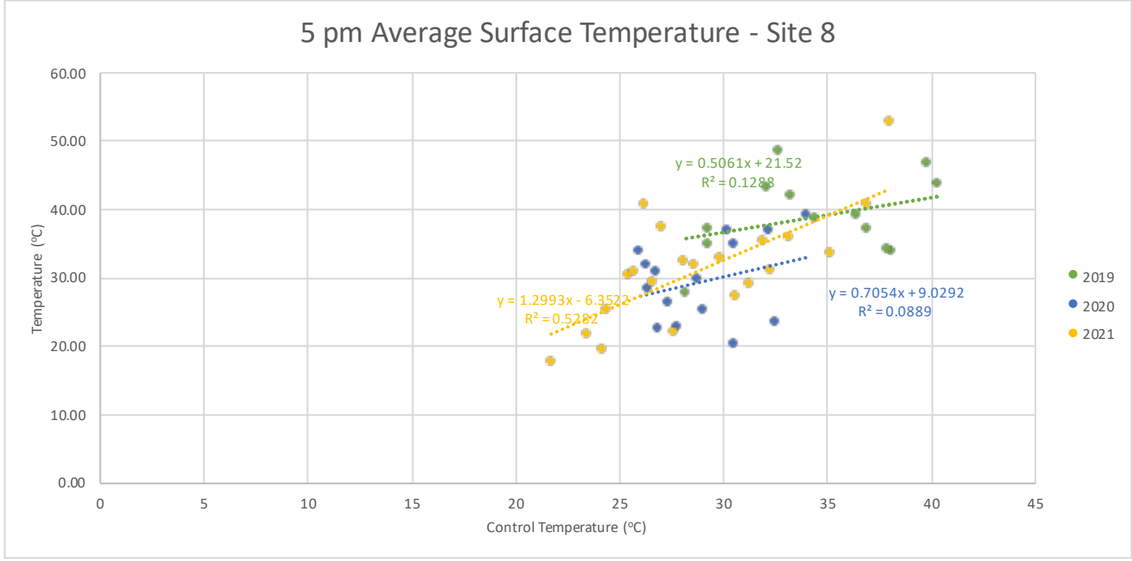


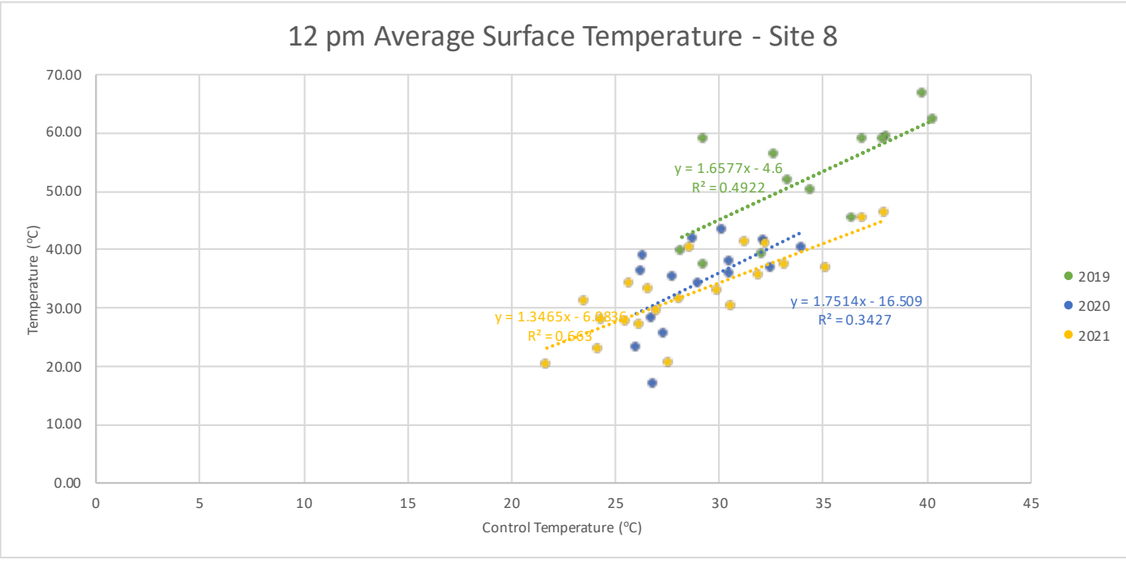


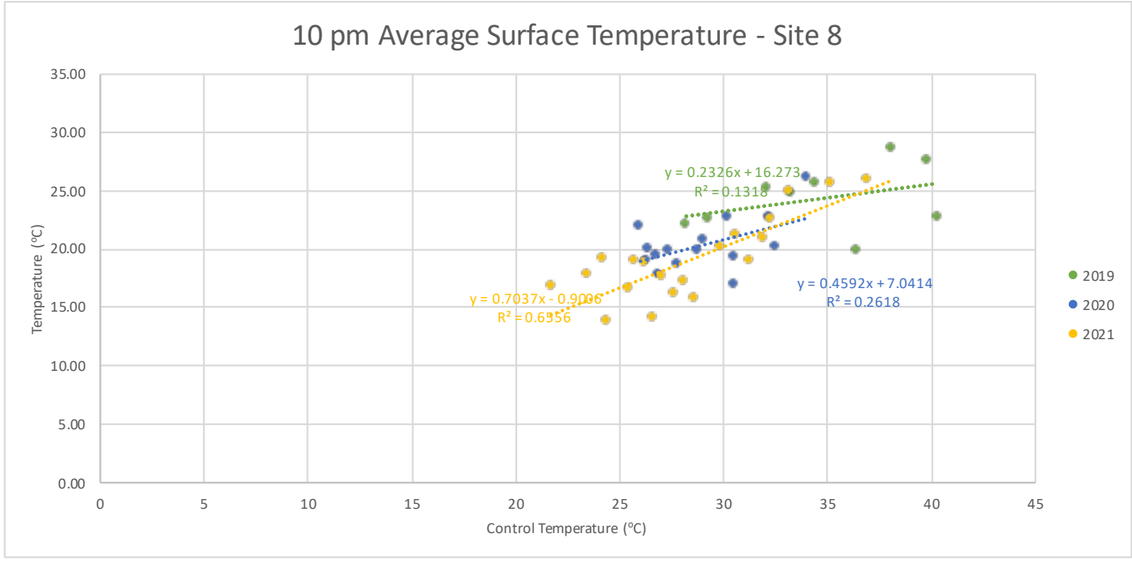
10. Appendix

4.8 Average Surface temperature Scatter plots Site 8 2019, 2020 and 2021









THE UNIVERSITY OF NEWCASTLE AUSTRALIA

City of Newcastle

ISBN 978-0-7259-9995-7