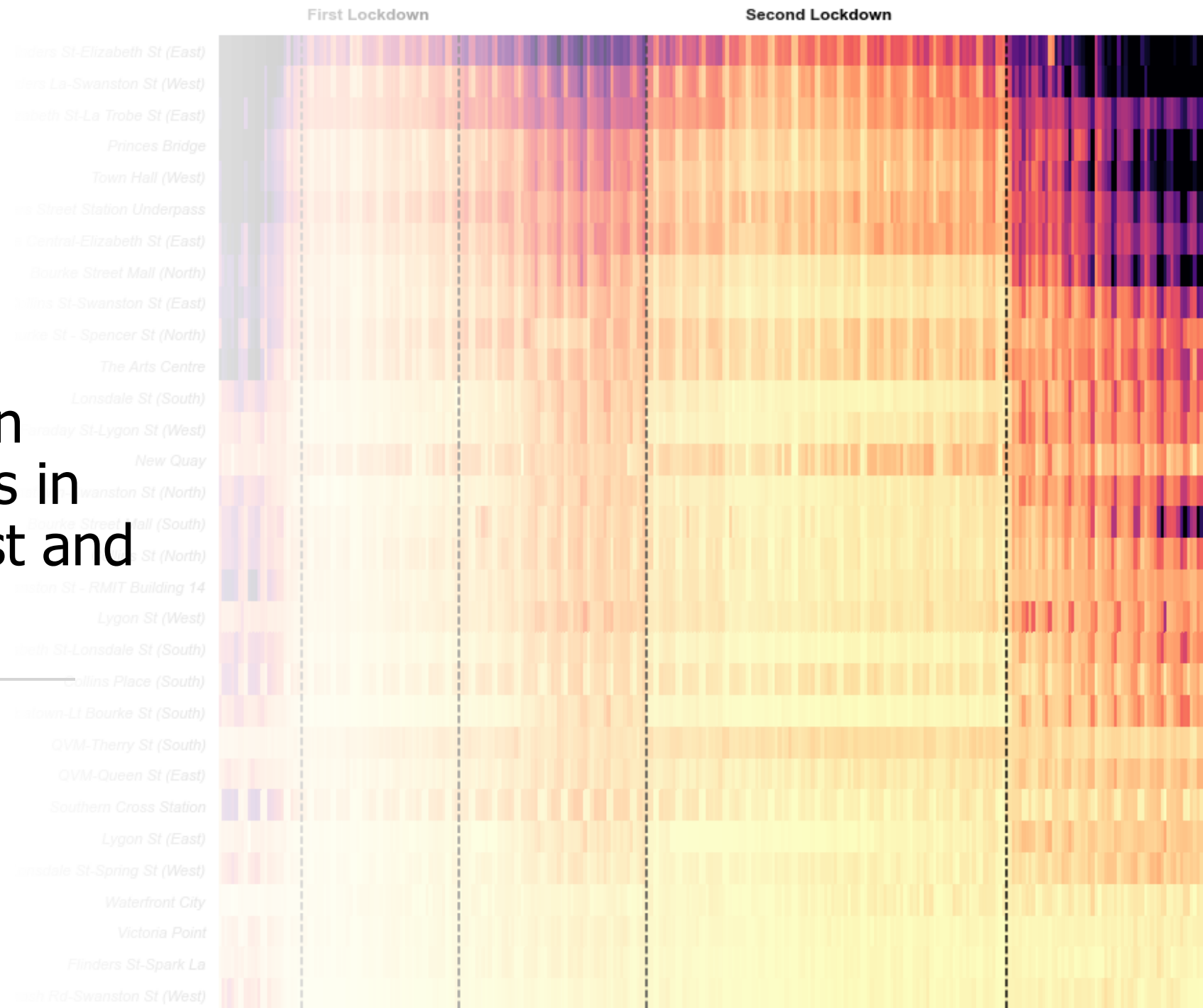


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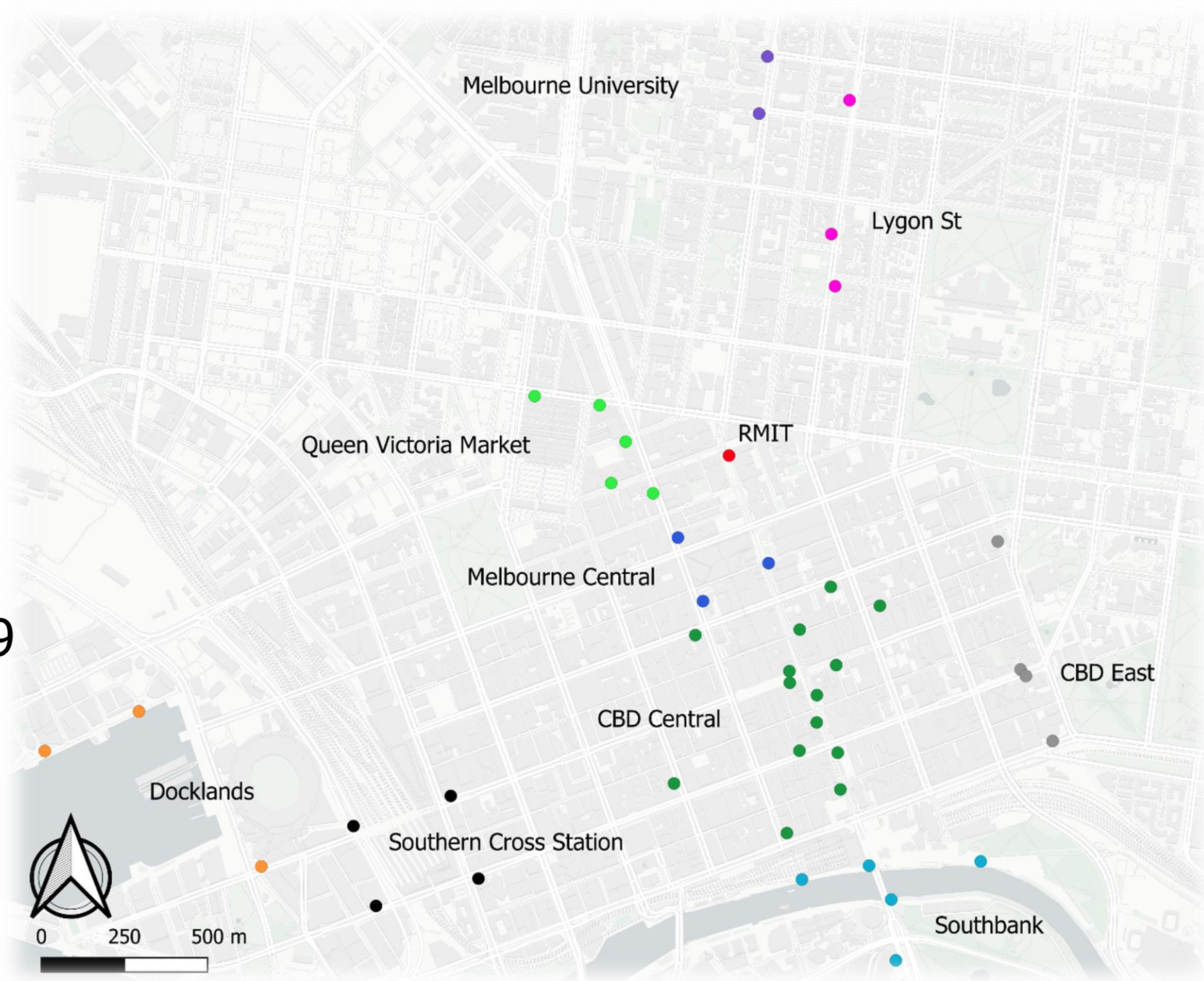
Structure

*The COVID-19 pandemic and subsequent recovery efforts have changed **how, when, and where** people moved.*

- **Where** is the study?
- **How** and **Where** people moved pre-pandemic
- **How** this changed during the pandemic
- How can we group changes in behaviour in **How, Where** and **When** people moved?

Study Area

- 44 Sensors
- 10 Areas
- Hourly Pedestrian Counts since 2009

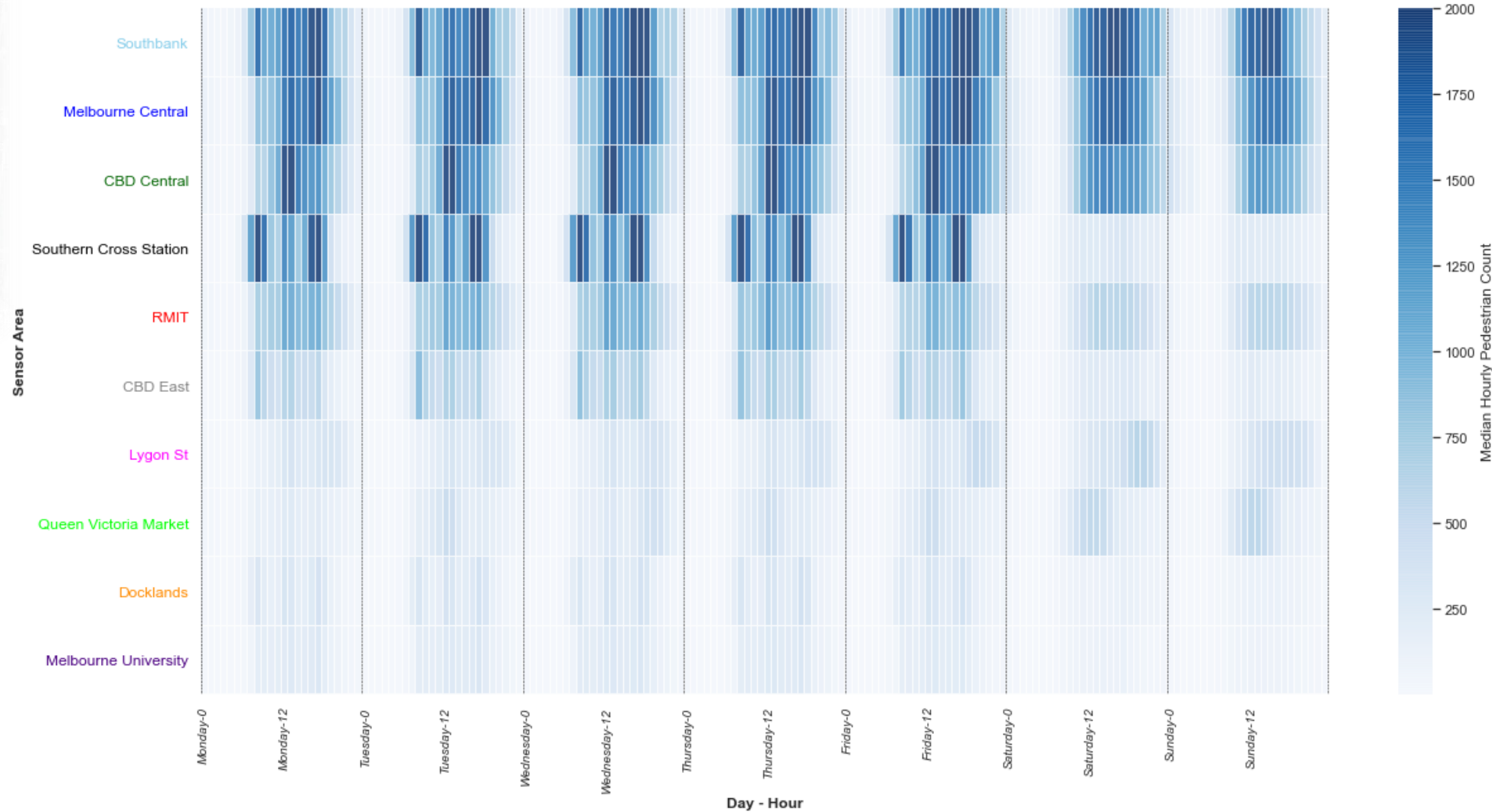
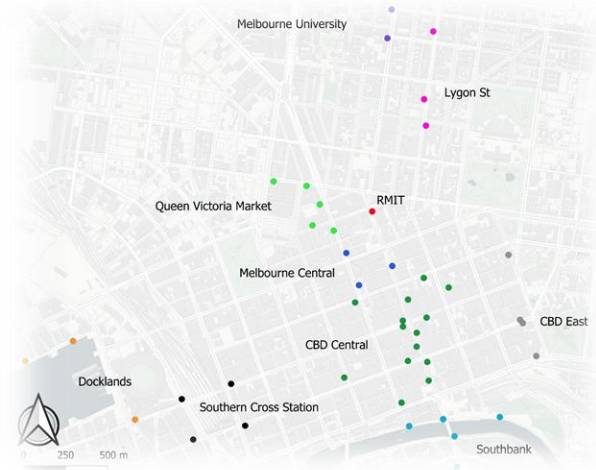


Pre-pandemic Pedestrian Behaviour

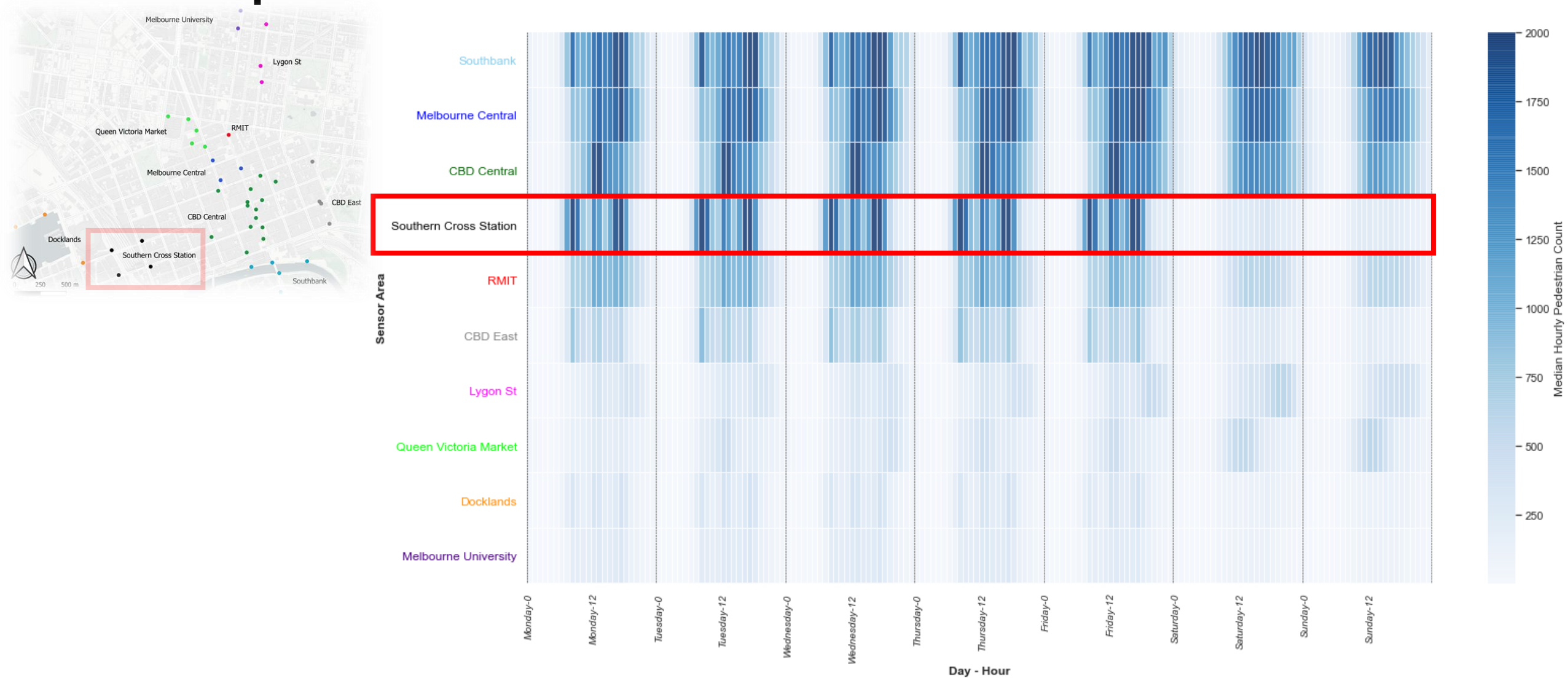
- Interpret different land-use and urban setting's travel profiles
 - Workplace, Transit Zones, Commercial, Residential, etc.
- ***How*** and ***When*** people move at these land-use
 - Visualise peaks in demand at various times to indicate urban activities ^[1]
- How do these change between and within areas?

[1] Kandt, J. and Batty, M., 2021. Smart cities, big data and urban policy: Towards urban analytics for the long run. *Cities*, 109, p.102992.

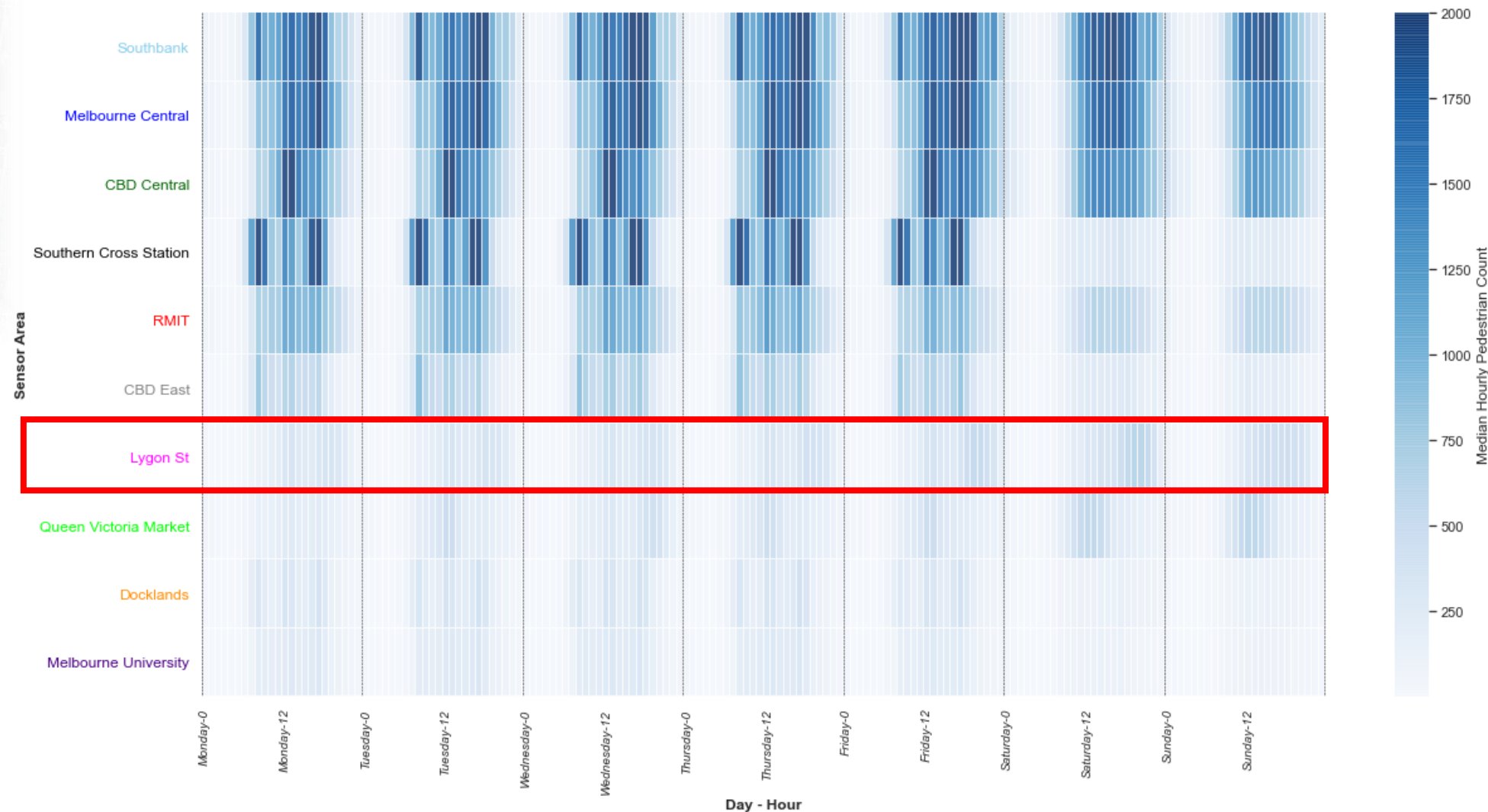
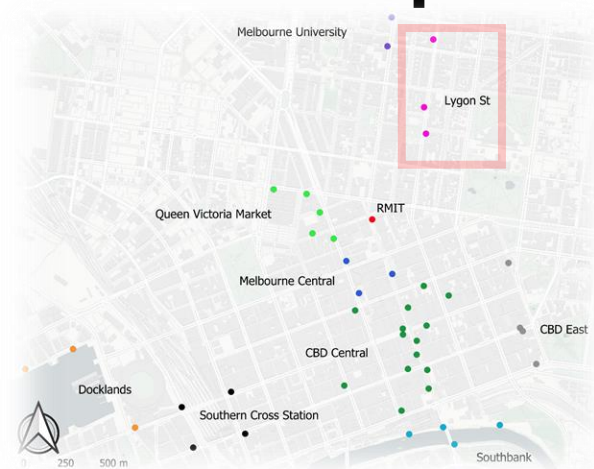
Pre-pandemic Pedestrian Behaviour



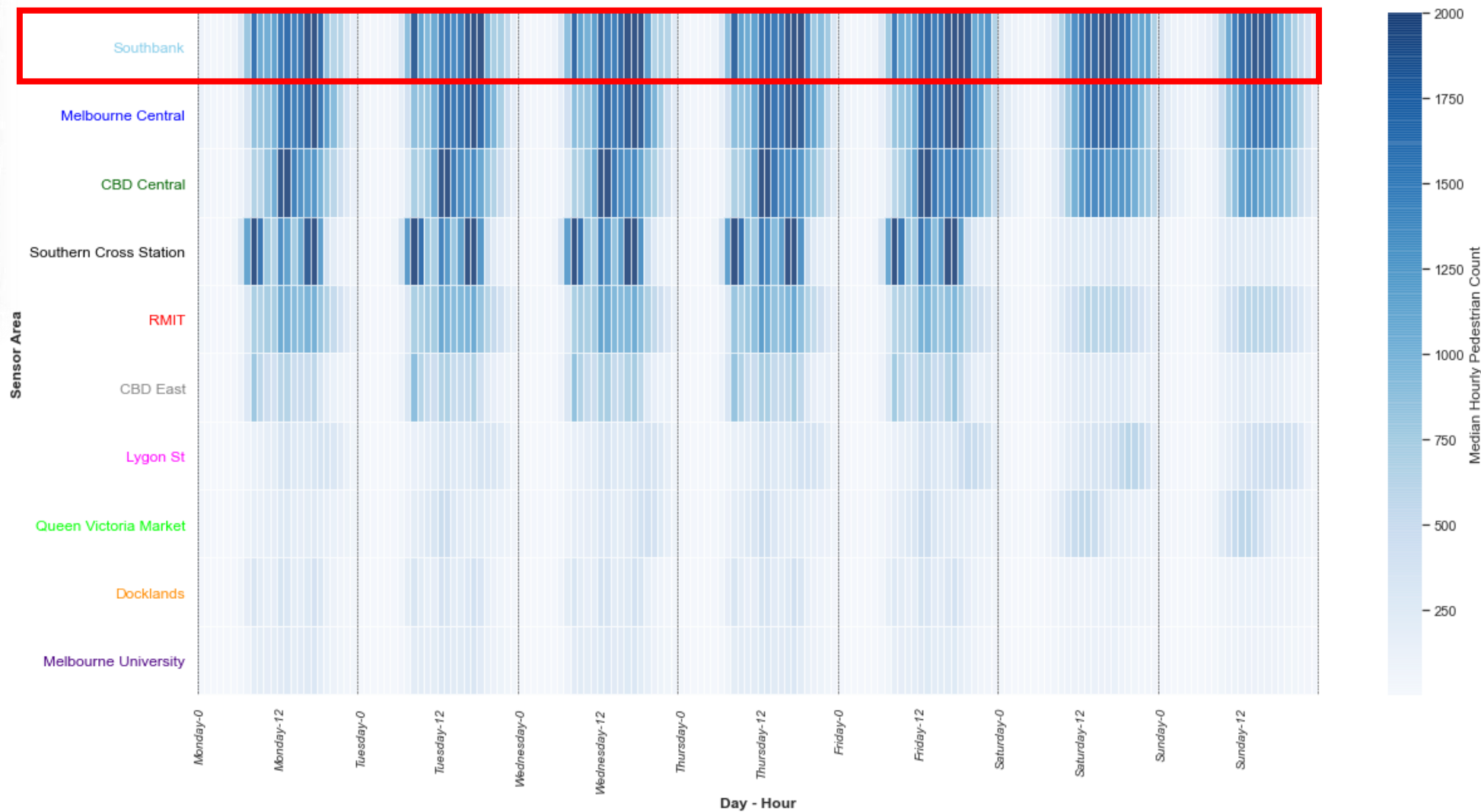
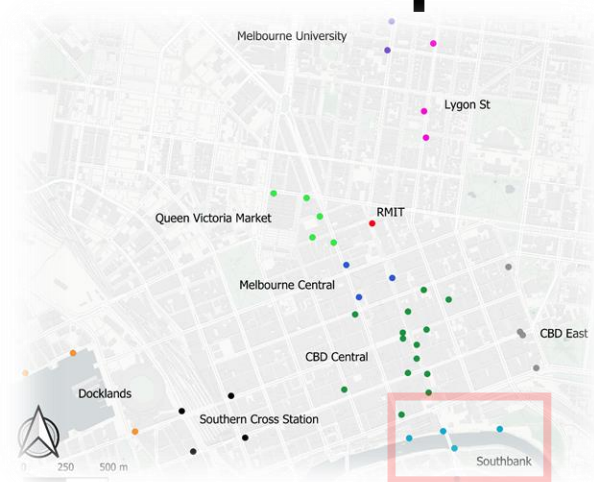
Pre-pandemic Pedestrian Behaviour



Pre-pandemic Pedestrian Behaviour



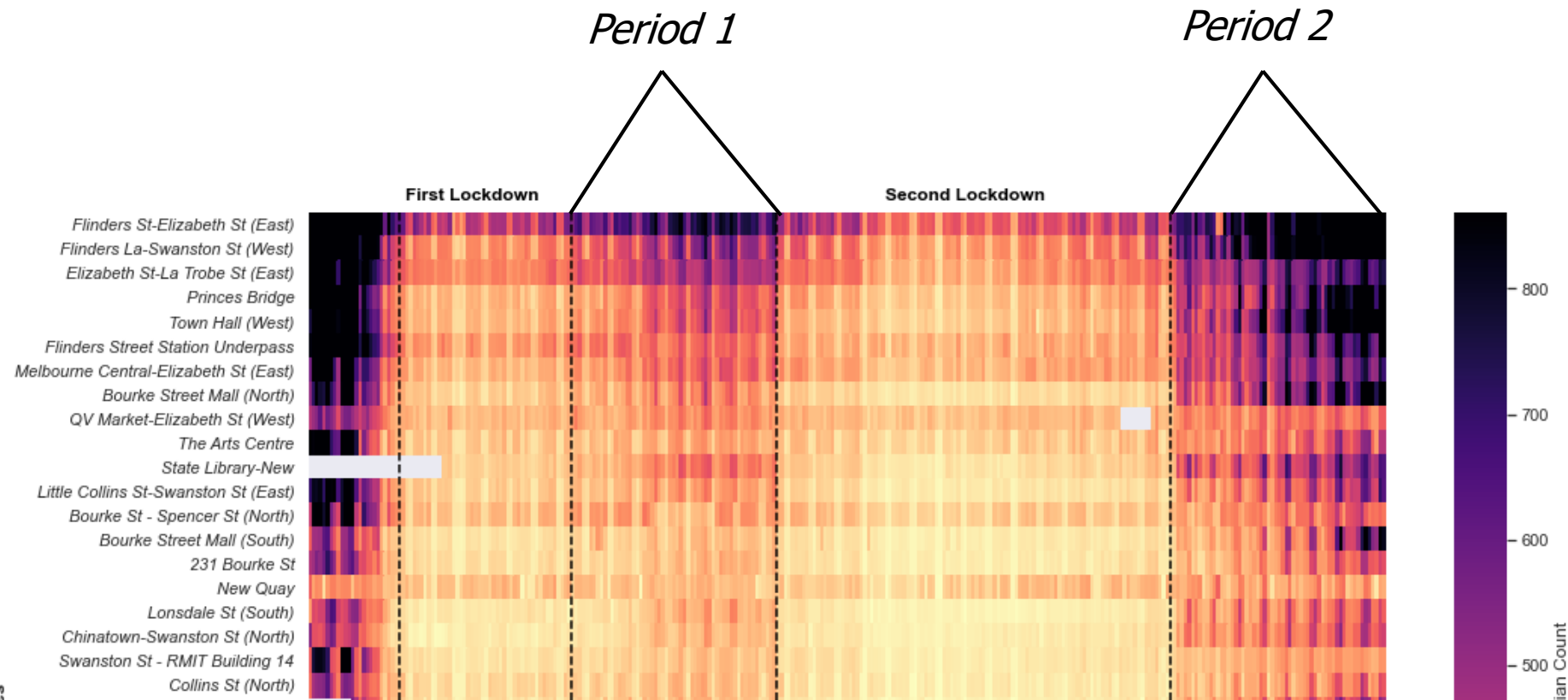
Pre-pandemic Pedestrian Behaviour



How did pedestrian and mobility behaviour change during/post lockdown?

- **Melbourne:** different lockdown stringency and easing of restrictions between first and second lockdown
- **Literature:** Major transit stations, Workplaces, and Commercial zones experienced greatest impact due to higher perceived risk, due to closures, and changing behaviours.
- How have differences in lockdown stringency and land-use behaviours changed spatio-temporal pedestrian behaviours across Melbourne?

How did pedestrian and mobility behaviour change during/post lockdown?



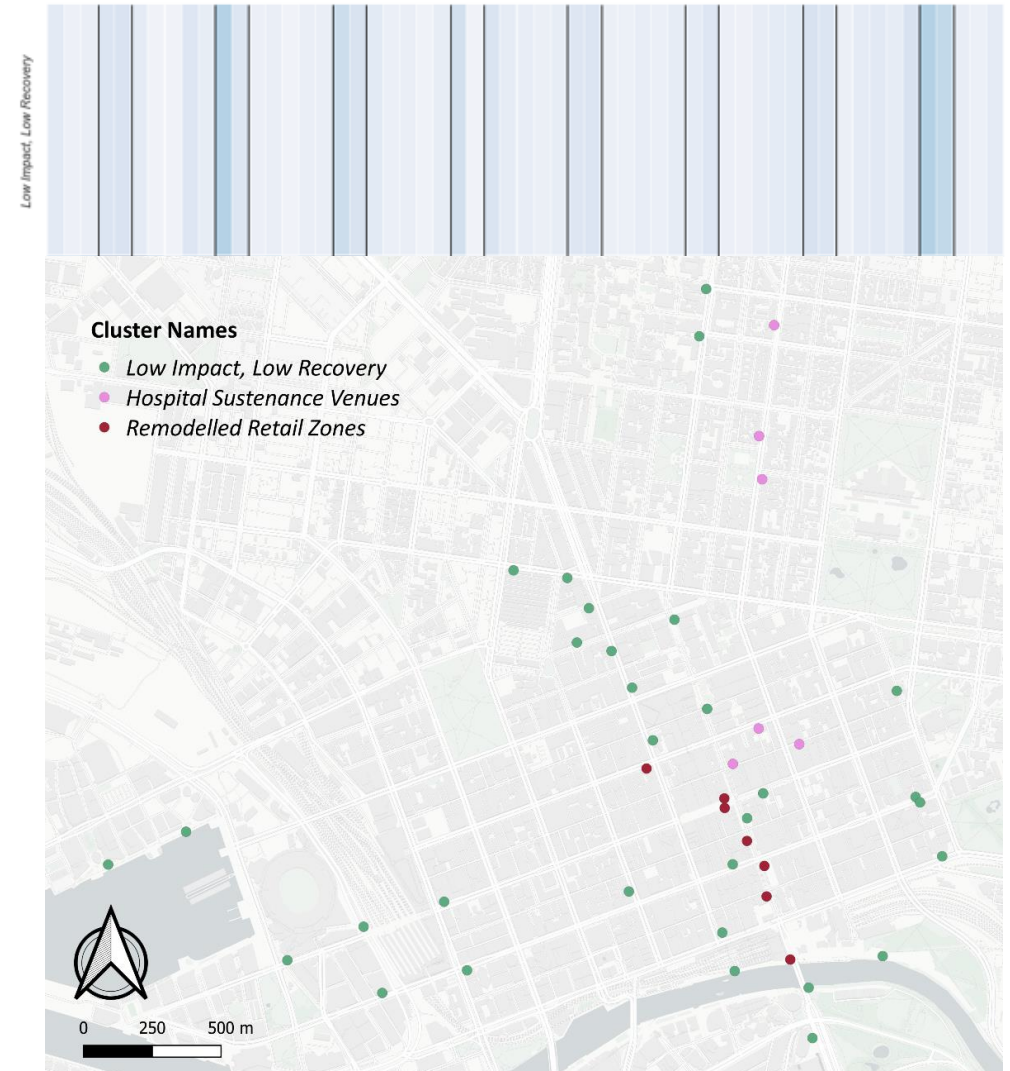
Grouping post-lockdown behaviours

- Simplify **44** time-series by clustering into **groups** of similar pedestrian behaviours
- Three clusters:
 - *Low Impact, Low Recovery*
 - *Hospitable Sustenance Venues*
 - *Remodelled Retail Zones*

Grouping post-lockdown behaviours

Low Impact, Low Recovery

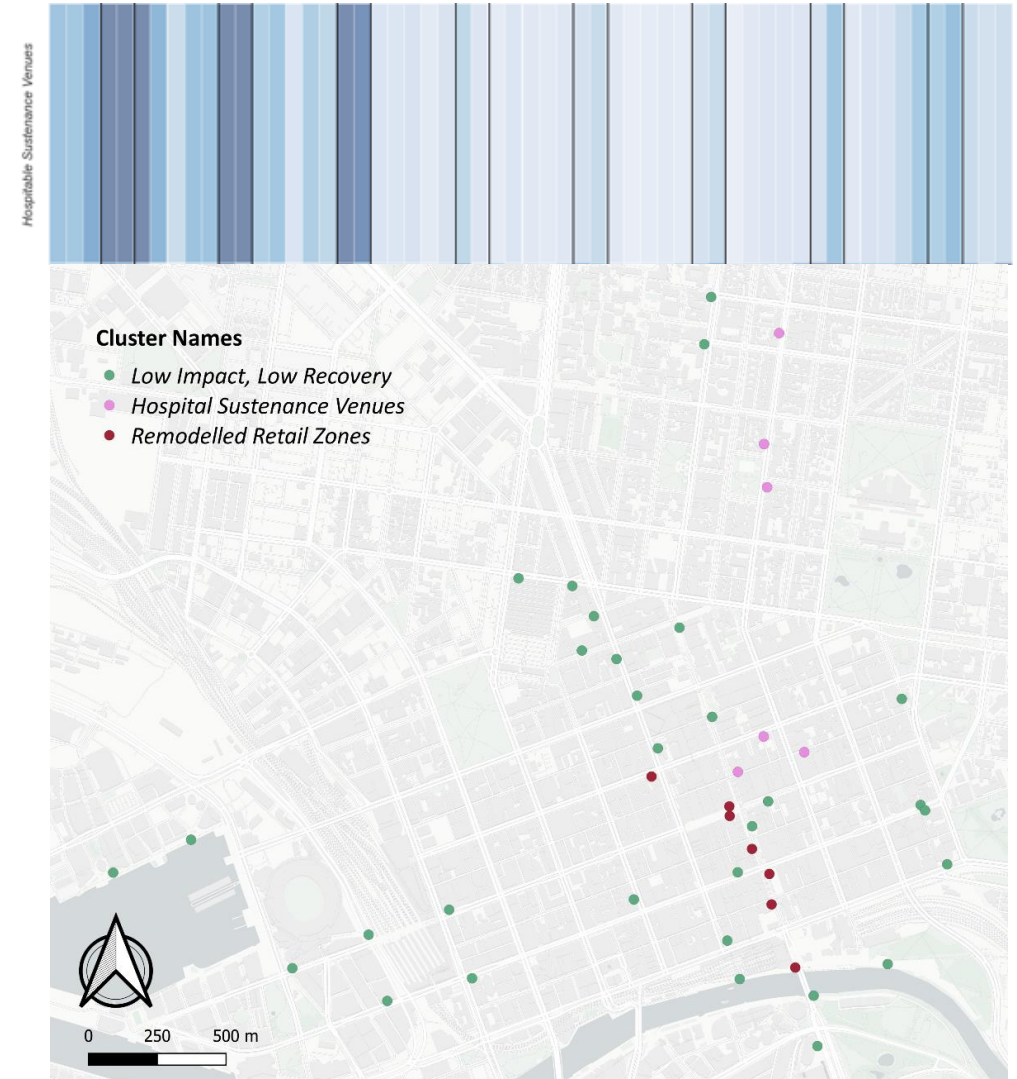
- Least change between two periods
- *Low Impact:*
 - Little difference caused by lockdown
 - Residential, Supermarkets, etc.
- *Low Recovery:*
 - Big impact from COVID-19
 - Signs of delayed/hindered recovery
 - Major transit stations, University Campus, etc.



Grouping post-lockdown behaviours

Hospitable Sustenance Venues

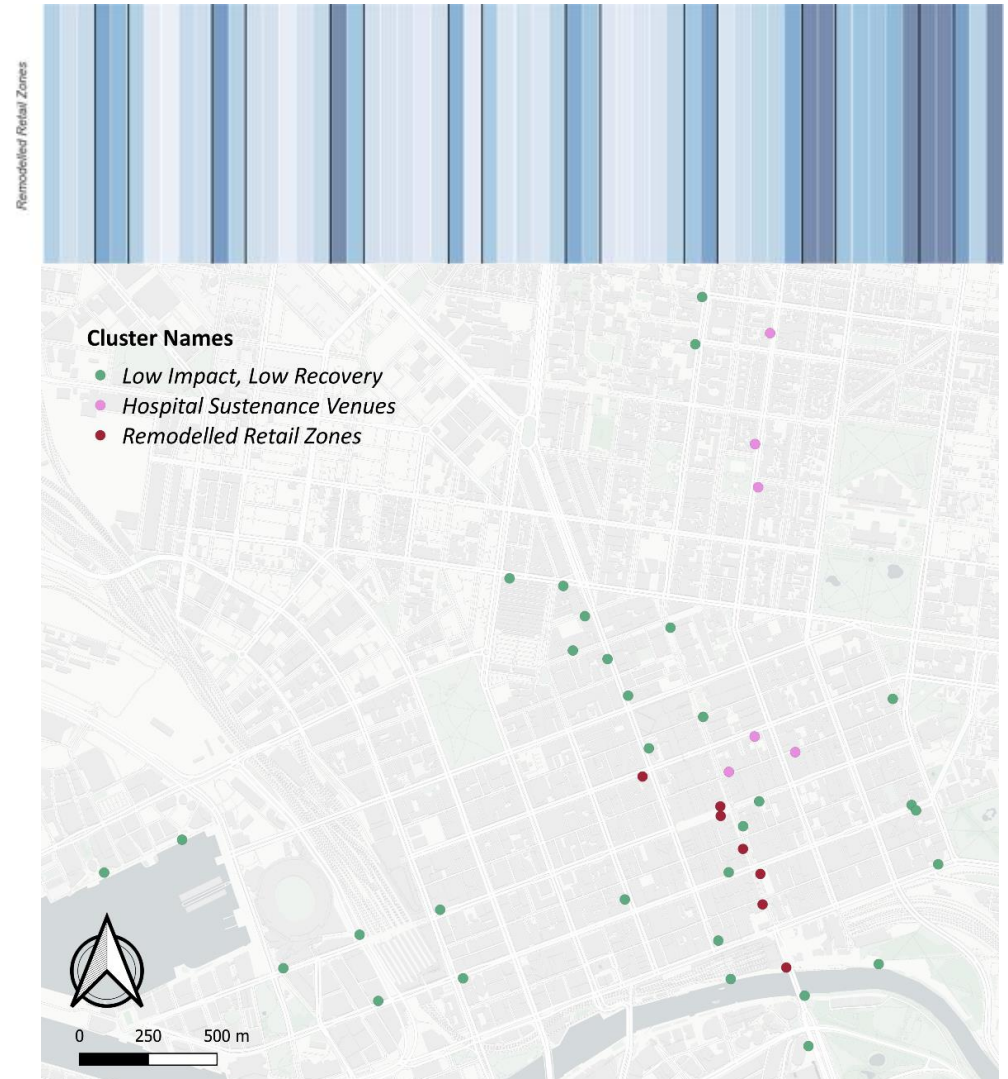
- Immediate resurgence in activity
- High concentration of sustenance venues
 - Lygon Street and Chinatown
- Sustenance venues were restricted to take-away basis only post-first lockdown



Grouping post-lockdown behaviours

Remodelled Retail Zones

- Higher activity but comparatively delayed
- High concentration of retail stores
 - Bourke Street Mall
- Changing shopping behaviours or perceived risk of confined, crowded spaces?
- Spike in activity towards the end coincides with Christmas.



Summary

- Between and within-area differences in pre-pandemic pedestrian behaviour
- Reflected in post-lockdown behaviour
 - Little change in residential and major transit stations
 - Big resurgence at sustenance venues
 - Delayed resurgence at major retail zones

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