

City Analytics, Smart cities and sustainability

Prof Chris Pettit
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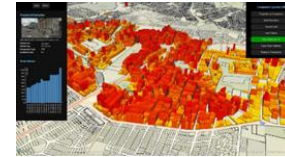
City Analytics

Is a digital toolkit comprising a set of frameworks and methods to support collaborative city planning and user centred design.





Masters of City Analytics



City Analytics Research Program



City Analytics



City Analytics Lab





UNSW
SYDNEY

Built Environment

Design and build sustainable, liveable cities.

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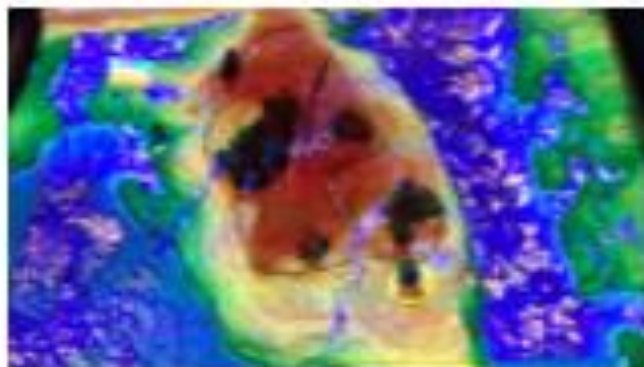
City Analytics

"This course will play an integral role in growing the skill set and culture of data driven evidence based policy and decision making across our cities, both in Australia and Internationally. "

Professor Chris Pettit, Director of Discipline



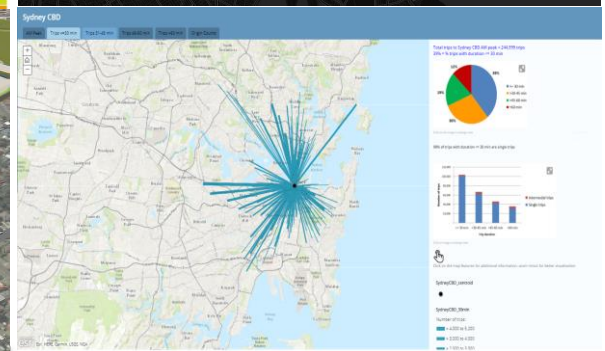
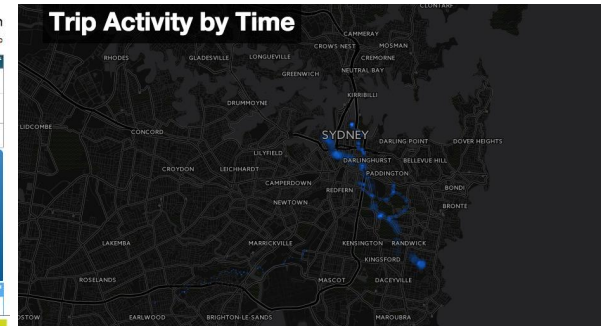
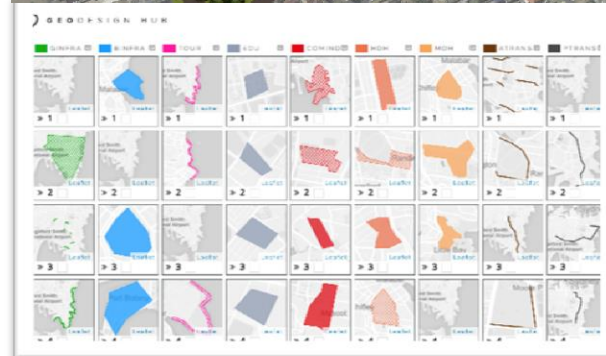
<https://www.be.unsw.edu.au/postgraduate-degrees/city-analytics/about>



<https://www.be.unsw.edu.au/content/city-analytics-lab>

City Analytics

Digital Planning
Decision Support
Scenario
planning
Geodesign
Big Data
Open data
Dashboard
Data analytics
Modelling
Simulation
Usability
Visualisation
Virtual Reality



City Analytics Supporting Smart Cities

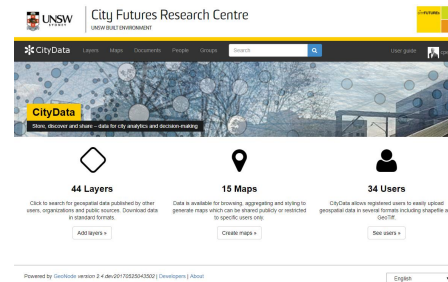


Smart Cities Plan

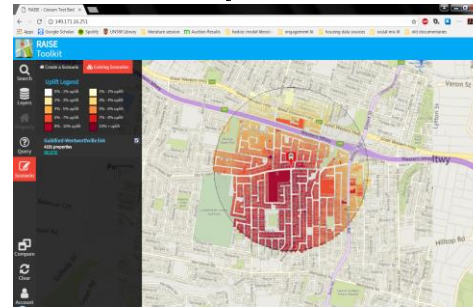


Smart Cities Plan for Australia (2016)

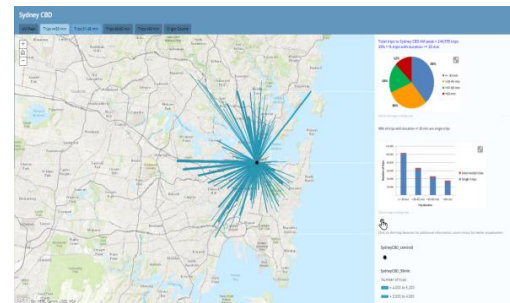
Open data solutions



Value capture



30 minute cities



CityData

Store, discover and share – data for city analytics and decision-making



44 Layers

Click to search for geospatial data published by other users, organizations and public sources. Download data in standard formats.

[Add layers »](#)

15 Maps

Data is available for browsing, aggregating and styling to generate maps which can be shared publicly or restricted to specific users only.

[Create maps »](#)

34 Users

CityData allows registered users to easily upload geospatial data in several formats including shapefile and GeoTiff.

[See users »](#)

Explore Groups

[Create a New Group](#)


Airbnb

CityFutures researchers working on Airbnb. Restricted Airbnb data from AirDNA or other sources are a...

4 Members 2 Managers



Cycling

City Futures research on active transportation with focus on bicycling. Analysis of bicycling patter...

5 Members 3 Managers

UADI

Urban Analytics Data Infrastructure (UADI) project team

6 Members 2 Managers



CF

City Futures Research Centre

11 Members 2 Managers



BE

UNSW Built Environment

2 Members 2 Managers



CityData Librarians

Group responsible for curation of CityData content and level 1 user support.

3 Members 1 Manager



Blacktown

This is the GIS group of the project titled: Community Co-design of Low Carbon Precincts for Urban R...

4 Members 1 Manager



Digital Cities

MUPS0006 (Digital Cities) Students can add themselves to this group.

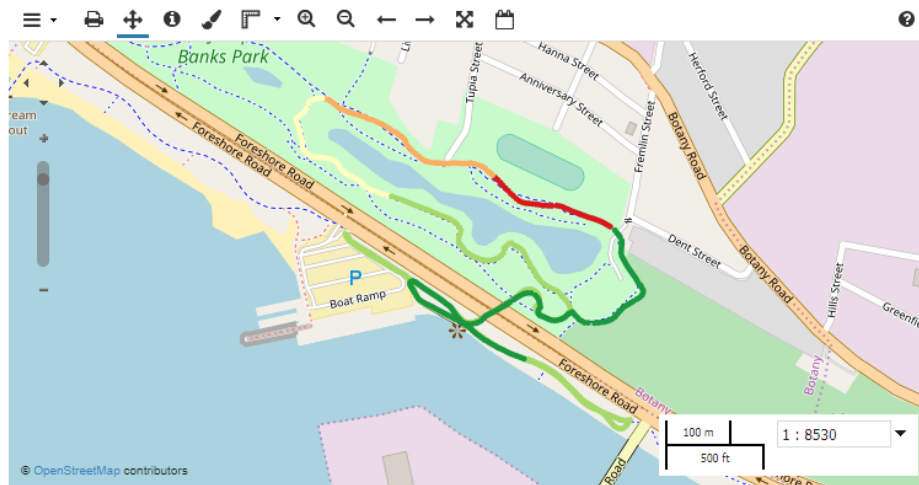
13 Members 1 Manager

Geodesign 2017 Files

Users invited to this group can upload non-confidential data related to the Geodesign 2017 project w...

3 Members 1 Manager

Bicycle Air Quality Monitoring: VOCs (0-25pm sensor), Sir Joseph Banks Park, 26 August 2017





Info

Attributes

Share

Ratings

Comments

Title Bicycle Air Quality Monitoring: VOCs (0-25pm sensor), Sir Joseph Banks Park, ...
License Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) 
Abstract Air quality measurements taken from a bicycle by Lauren Coyle using an Aeroqual Series 500 Portable Air Monitor.
Publication Date Sept. 5, 2017, 2:42 p.m.
Type Vector Data
Keywords Cycling , air quality
Category Environment 
Regions Australia
Owner jdoig

[Download or Connect to Layer](#)[Download Metadata](#)

Legend

- < 0.08
- 0.08 - 0.16
- 0.16 - 0.24
- 0.24 - 0.32
- > 0.32

Maps using this layer

List of maps using this layer:

[Bicycle Air Quality Monitoring, Sir Joseph Banks Park, 26 August 2017](#)



Create a map using this layer

Click the button below to generate a new map based on this layer.

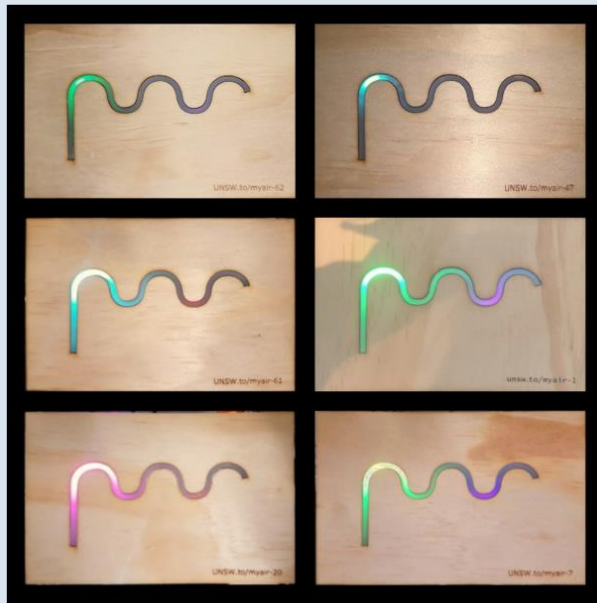
[Create a Map](#)

Styles

The following styles are associated with this layer.
Choose a style to view it in the preview map.

-  dark yellow square point style
-  (default style) VOC 0-25 ppm

Smart Buildings



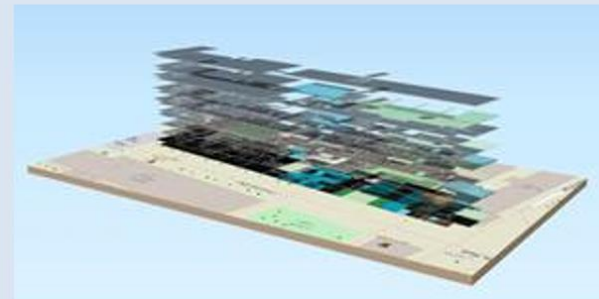
Eye-catching *myair* devices display CO₂.



Each device has a unique public URL to explore the data.



At the centre of each *myair* is a precision Telaire T6713 CO₂ sensor.



The *myairs* report continuous data from 65 rooms in the Red Centre.

City Dashboards

Sydney

33.8675° S, 151.2070° E

Wednesday 28 November 1:38:38 pm



Weather Station (Bureau of Meteorology)

Station	Wind Speed	Wind Gusts	Direction	Temperature	Humidity	Rain Today	Pressure	Forecast
Sydney - Observatory Hill	43 kph		ESE	18.4 °C	81%	17.4 mm	997.1 hPa	
Parramatta	26 kph		E	18.2 °C	95%	27.0 mm		
Campbelltown	19 kph	35 kph	SE	17.9 °C	91%	46.6 mm		

Air Quality Index (NSW OE&H)

SITE	O ₃	NO ₂	Visibility	SO ₂	PM _{2.5}	PM ₁₀
Randwick	35	0	15	0	22	49
Rozelle	24	10	14	0	25	38
St Marys	29	5	5	0	12	45

Sydney Trains Network

T1 North Shore, Northern & Western Line	North Shore Line, Northern Line, Western Line - Delays
T2 Airport, Inner West & South	Airport & South Line, Bankstown Line, Inner West & Leppington Line - Delays
T3 Bankstown Line	Airport & South Line, Bankstown Line, Inner West & Leppington Line - Delays
T4 Eastern Suburbs & Illawarra Line	Severe weather conditions forecast
T5 Cumberland Line	Severe weather conditions forecast
T6 Carlingford Line	Severe weather conditions forecast
T7 Olympic Park Line	Severe weather conditions forecast

Sydney Ferries Network

F1 Manly	Normal Service
F2 Taronga Zoo	Normal Service
F3 Parramatta River	Tidal Restrictions
F4 Darling Harbour	Cancel on Edit
F5 Neutral Bay	Normal Service
F6 Mosman Bay	Normal Service
F7 Eastern Suburbs	Wharf Closed

Live Traffic Cameras

Pennant Hills Road (Thornleigh) Princes Highway (Bulli)

SUN SMART

SUN PROTECTION REQUIRED

8:40 AM TO 4:50 PM

MAX UV 11 UV IS NOW 0.6

28 NOVEMBER
Rain, heavy at times. Windy.

Sydney 16° 22° MIN MAX

ADD THIS TO YOUR WEBSITE

Twitter Trends for Sydney

#SydneyStorm Matthew Guy Warwick Farm Treasurer Josh Frydenberg Natalie Portman Stephen Hillenborg Anthony Mundine #SDLive #TEQSA2018 SpongeBob SquarePants #qldfires Warriors #Deepwater Richard Di Natale High Court

ABC Sydney News (ABC)

In pictures: How wild weather lashed the Harbour City | Police slam 'idiotic' drivers as deluge wreaks havoc on Sydney's roads | Gay student gets standing ovation after coming out in front of whole Catholic school

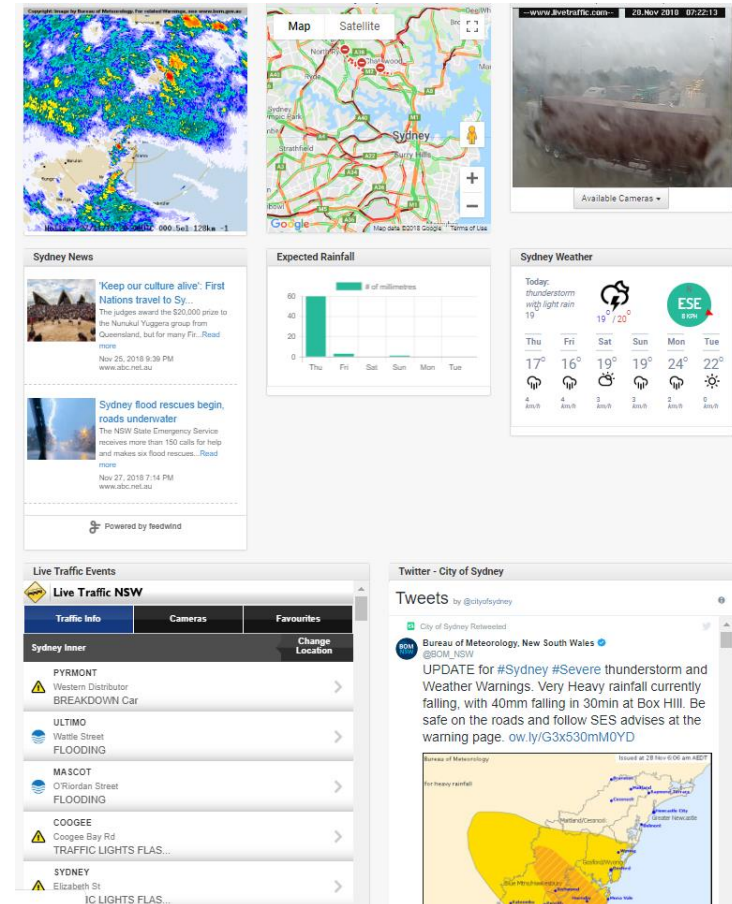
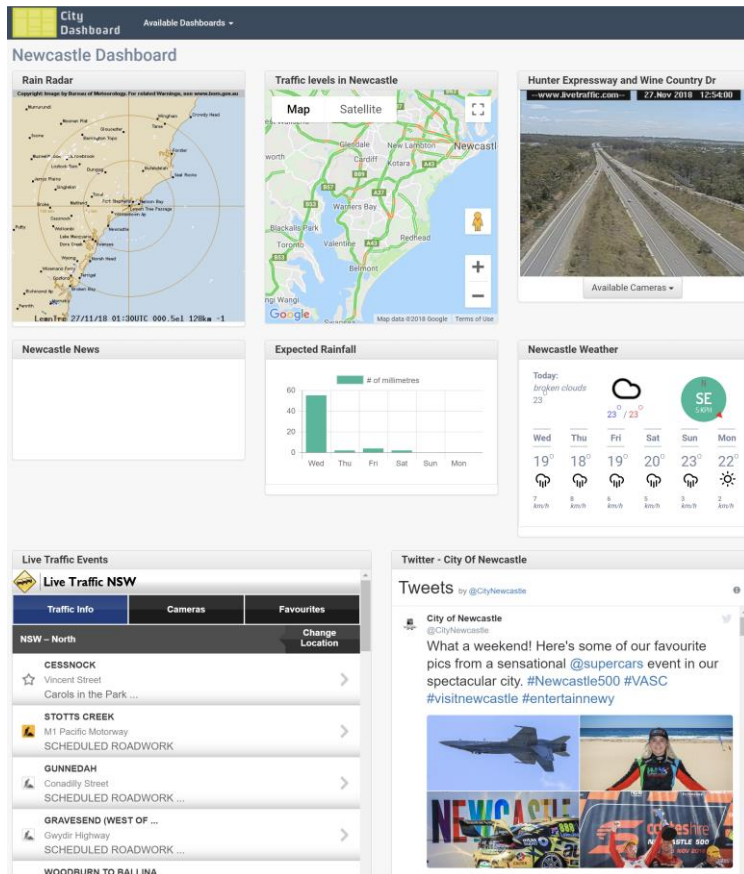
Sydney Universities

Western Sydney Uni "Peace is ours, it belongs only to us, and it is in our hands to make it positive peace" Paula Gaviria Betancur, Fo... t.co/UUP6W1b1fs

University of Sydney #HOSW8 gives #FirstNations peoples a forum for working together to sustain strong identities and to celebrate tradi... t.co/bpPpXSKtql



Dashboards for City Resilience

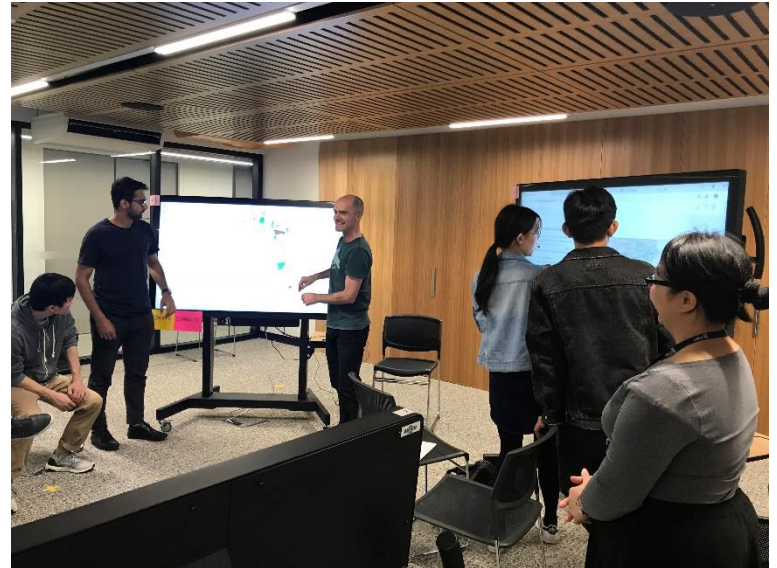
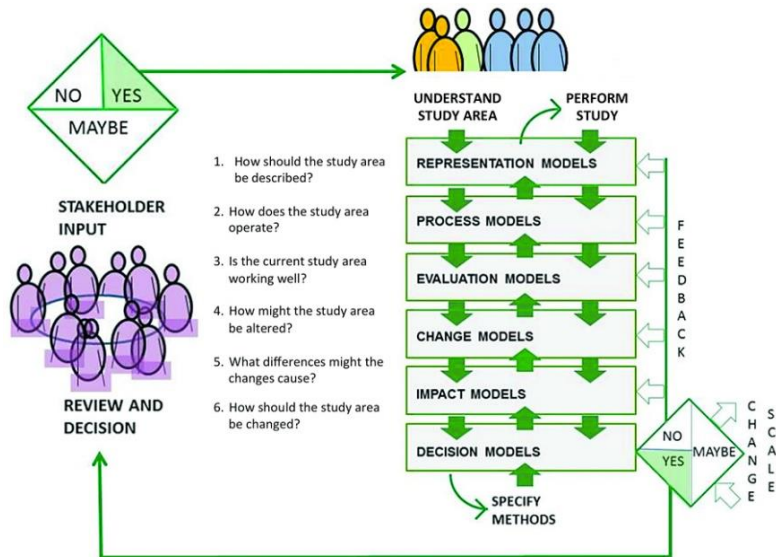


<http://www.citydashboard.com.au/>

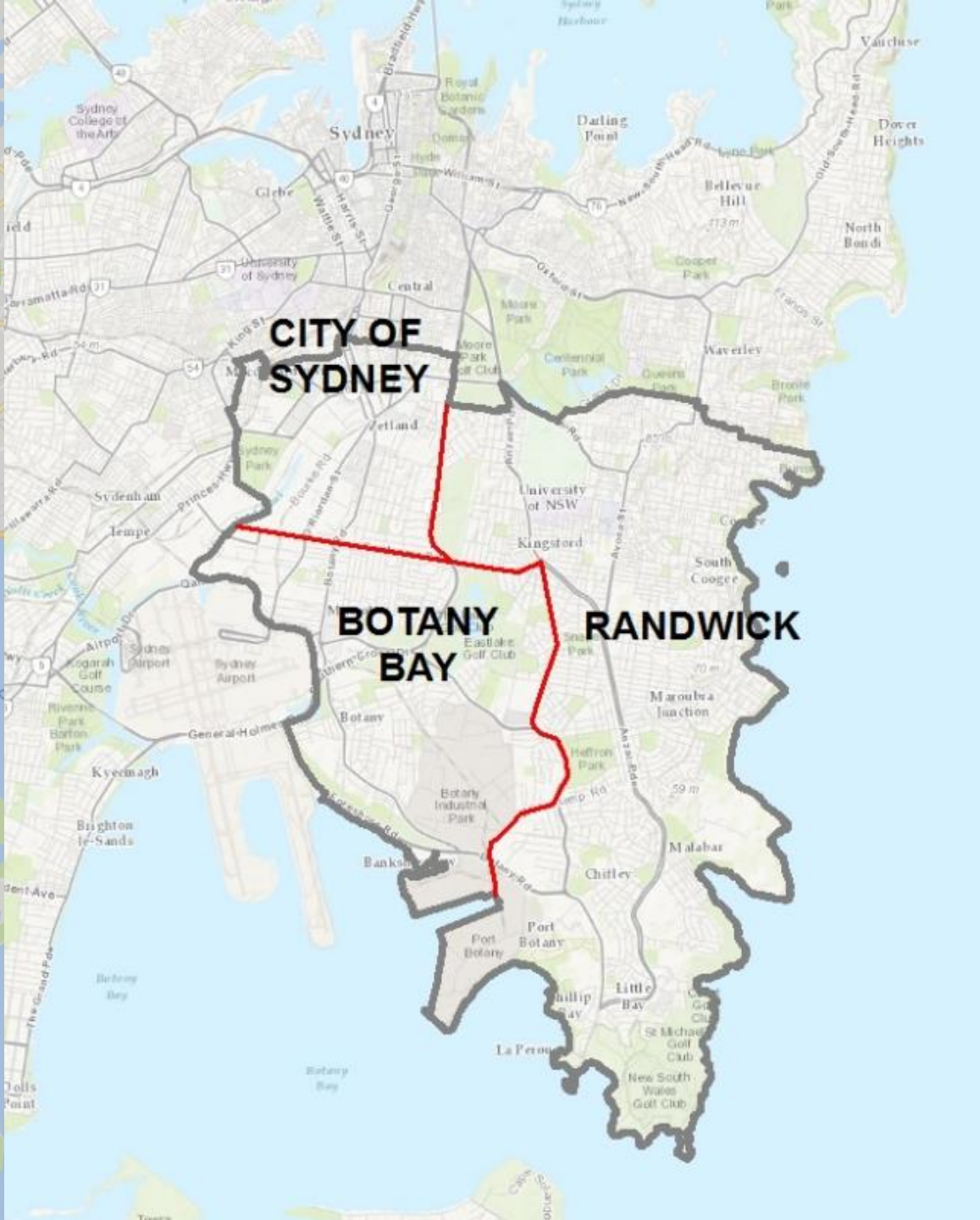
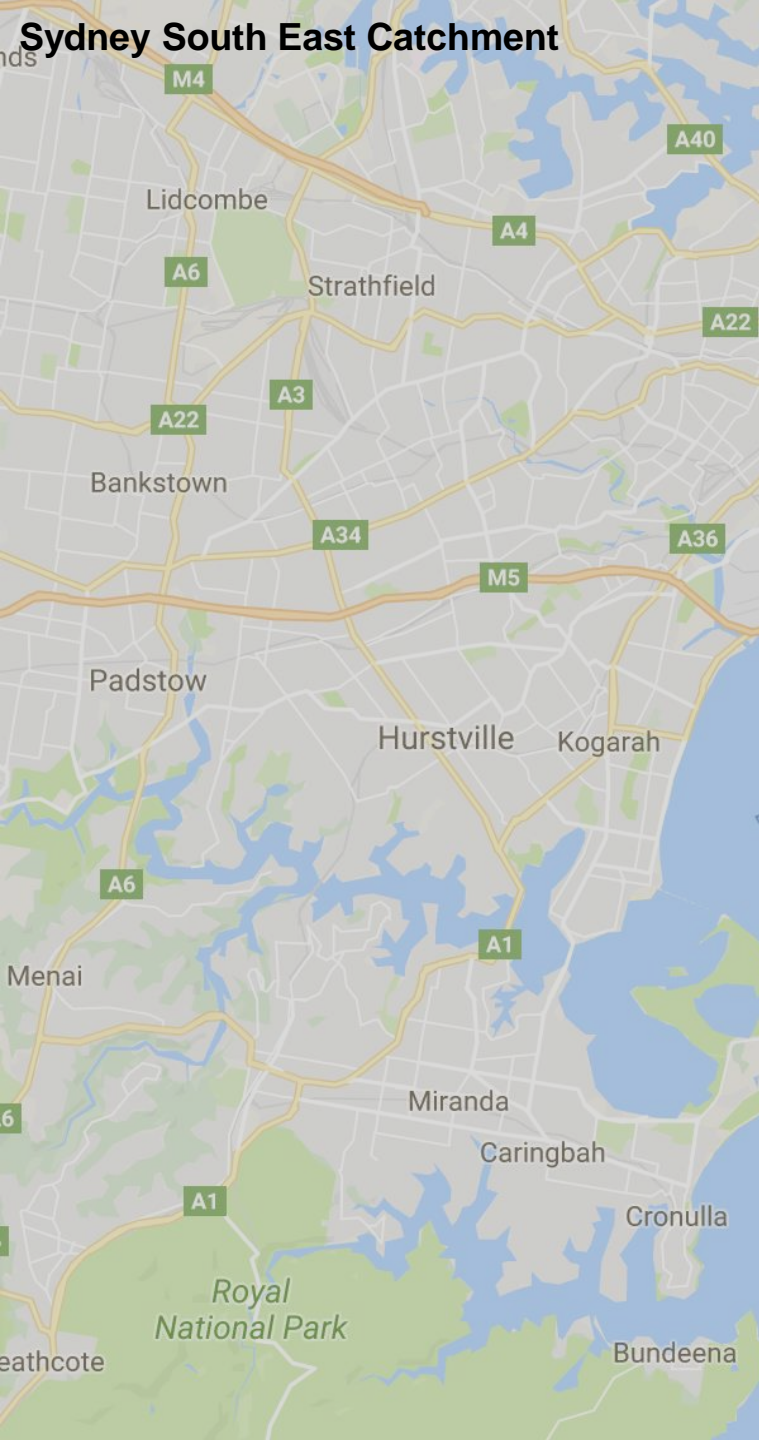
Geodesigning future cities

Geodesign is a design and planning method which tightly couples the creation of design proposals with impact simulations informed by geographic contexts.

Flaxman (2010)



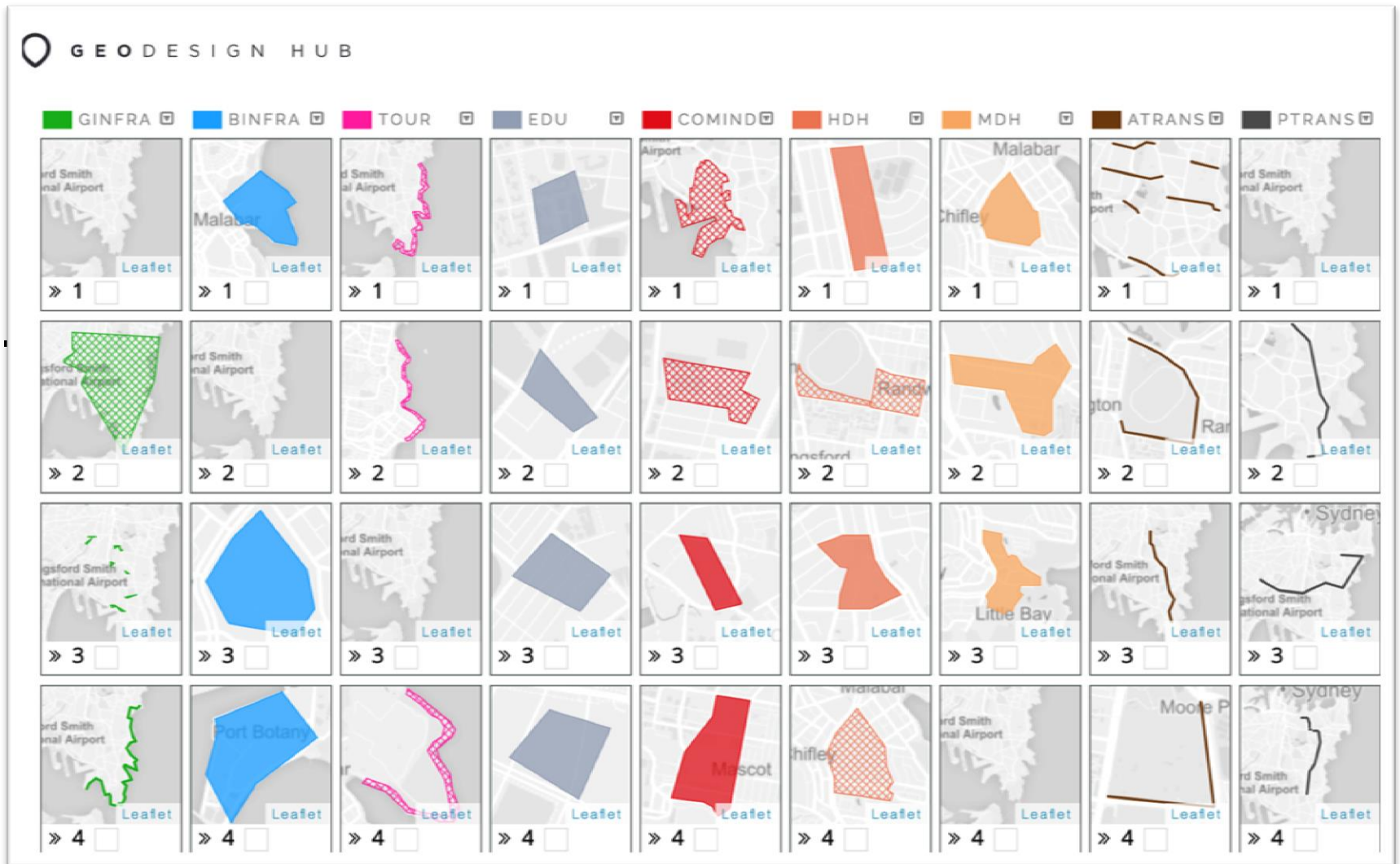
Sydney South East Catchment

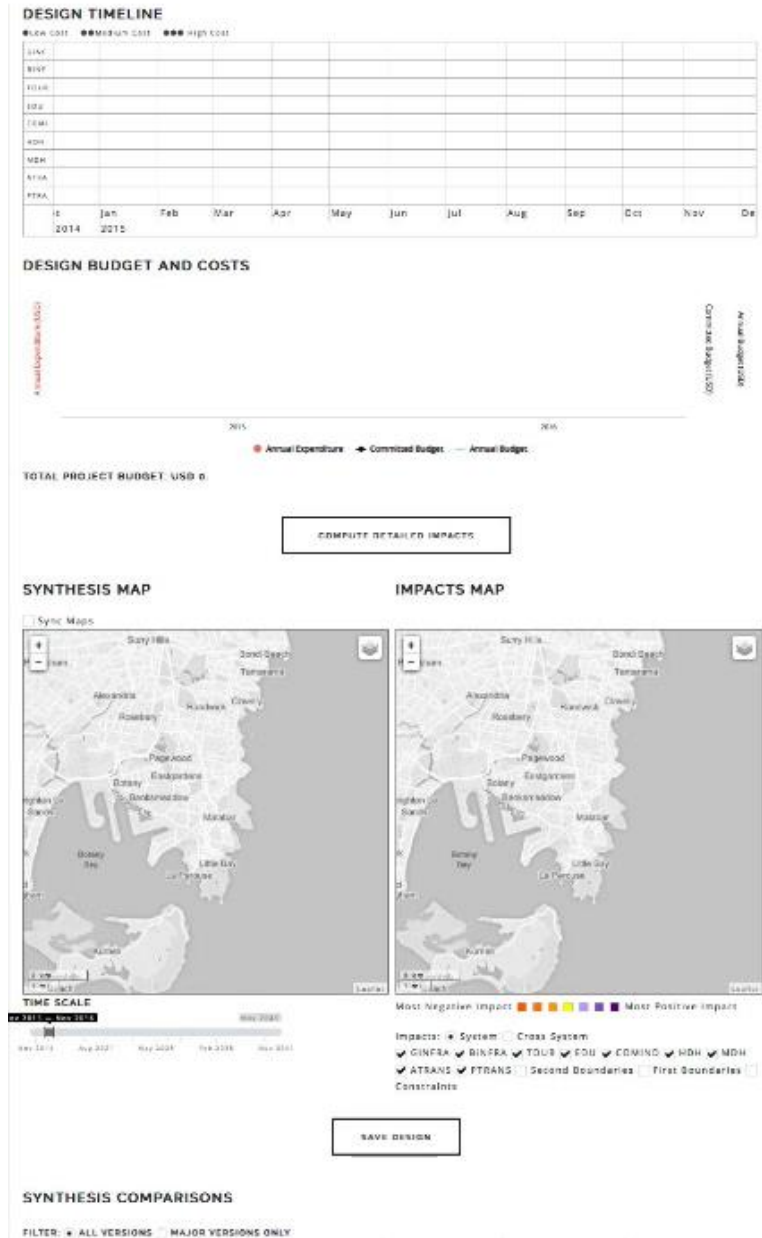




Sydney South East Catchment

Geodesigning future cities





Greyfields urban regeneration

Lower Carbon

- Reduced travel distances/ accessible amenities
- Better, more accessible public transport
- Lower energy consumption housing forms

HASSELL, 2015



To this ?



2 x no dwellings/ floor area
2 x public space

This



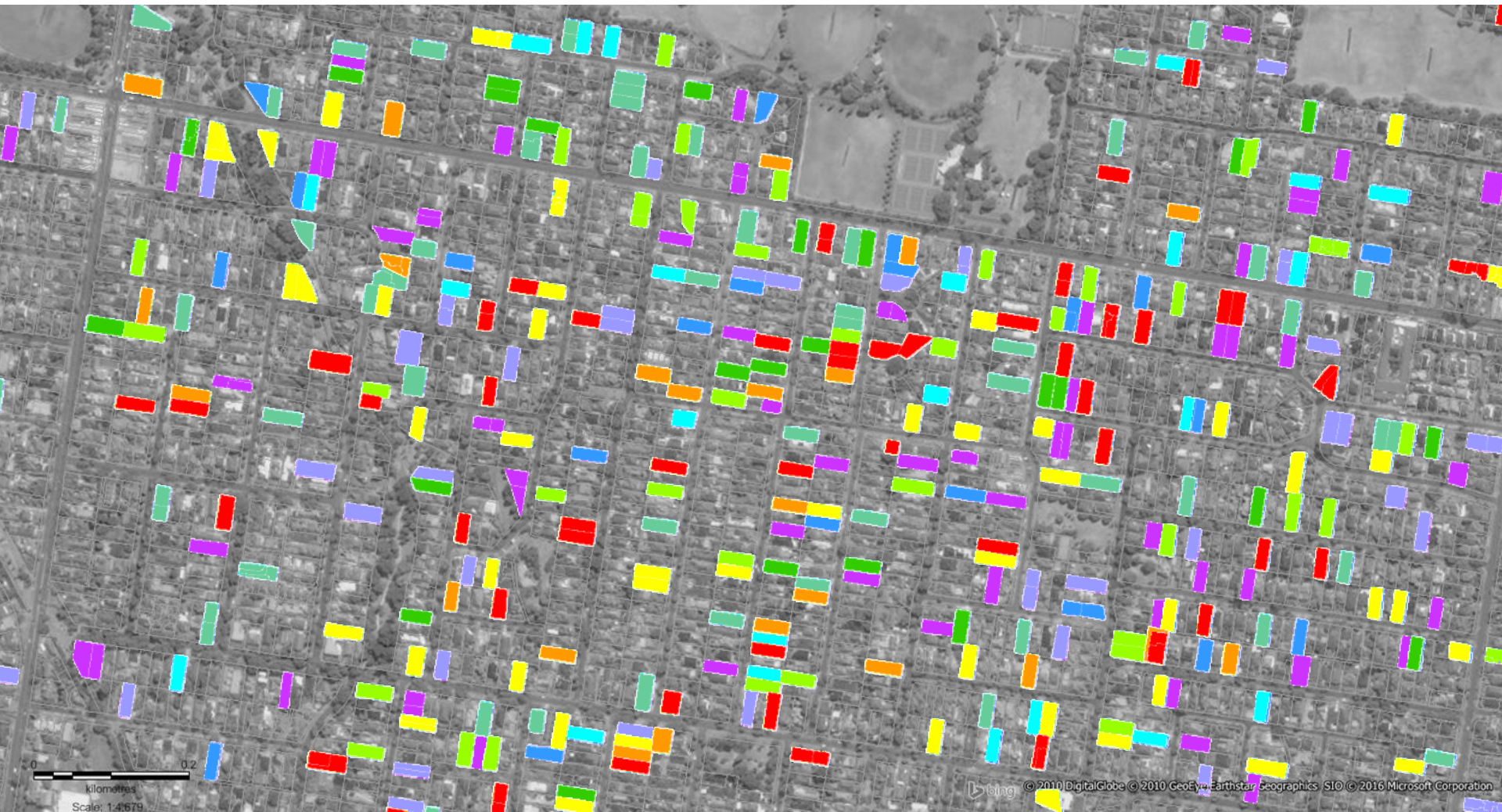
Financially attractive

- Better utilization of existing infrastructure
- Unlocking underutilized land value.

19

2014

Greening the Greyfields



Greening the Greyfields

This is what WILL occur
(BAU: lot-by-lot development)



This is what COULD occur
(precinct-scale development)



Greening the Greyfields



Greening the Greyfields

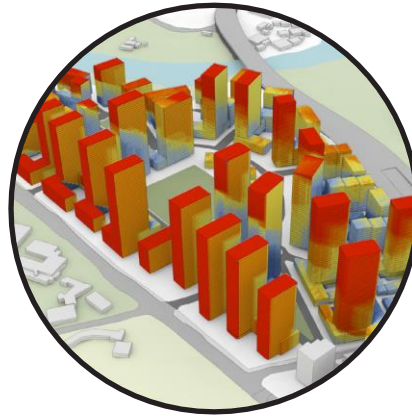
The study promotes...



Data-driven
approaches



Development
Transparency



Environmental
Performance



Collaborative
Planning &
Design

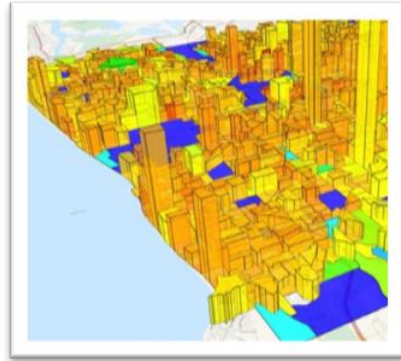
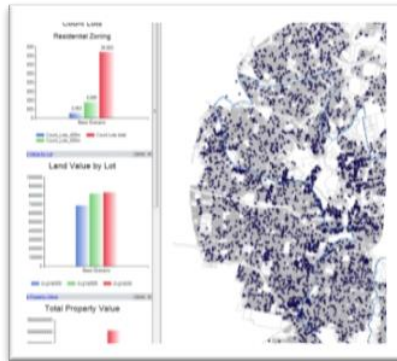
Importance of the study

– RAISE Project Collaboration



RAISE Objectives:

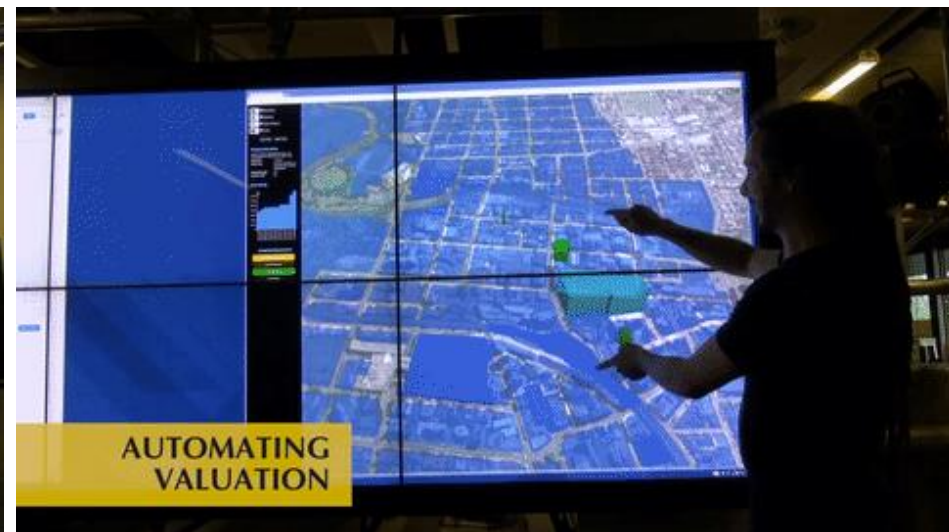
- Develop open, cloud-based architecture to combine data, models, and visualisation.
- Develop an interactive scenario explorer 'toolkit'.
- Explore collaborative visualisation methods.
- Apply toolkit to automated valuation modelling.
- Apply toolkit to land value uplift modelling.



Value uplift from transportation infrastructure



Value uplift modelling – transit infrastructure



Rapid Analytics Interactive Scenario Explorer (RAISE)

RAISE data driven Approach

Rapid Analytics Interactive Scenario Explorer



Analysis

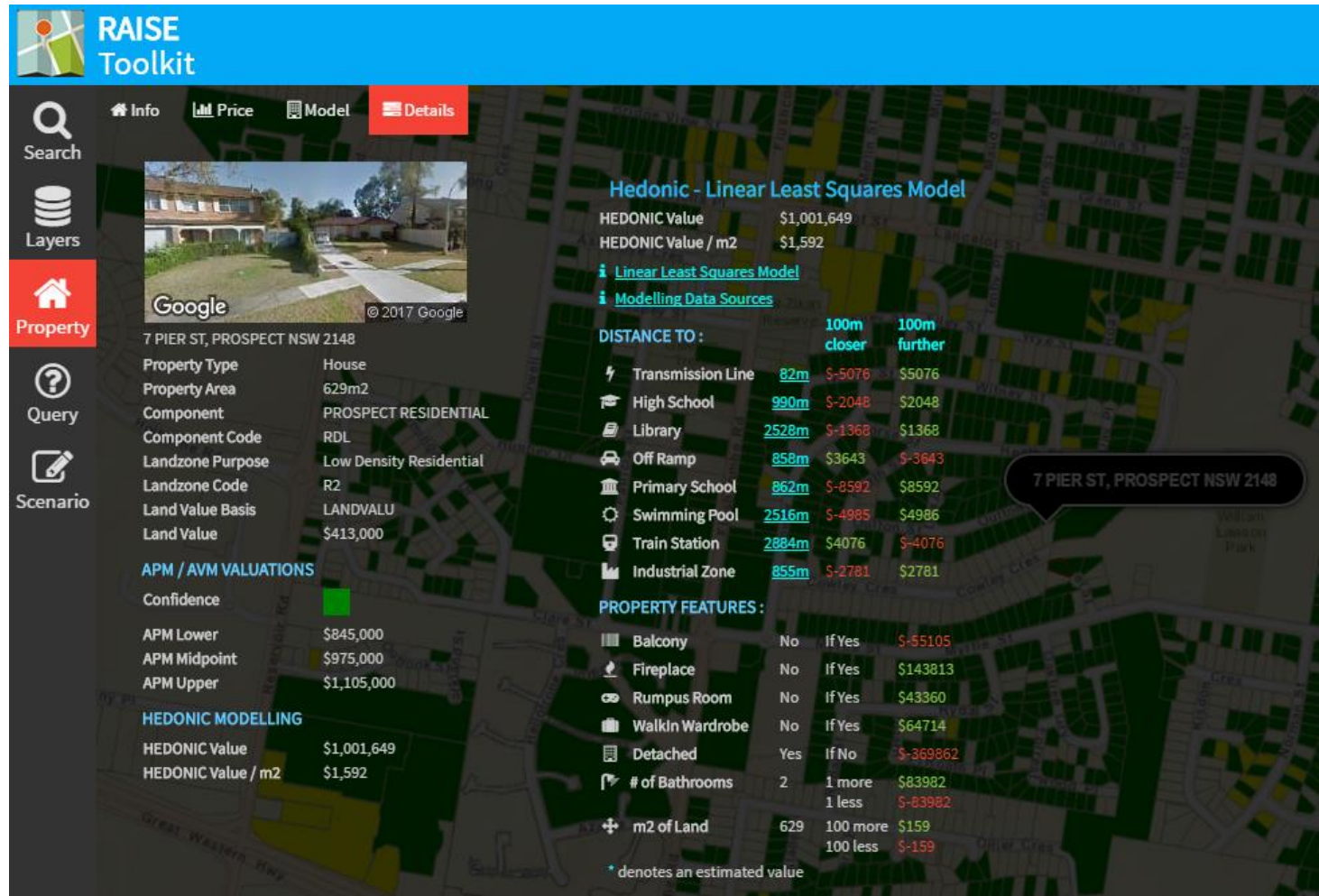


Collaboration

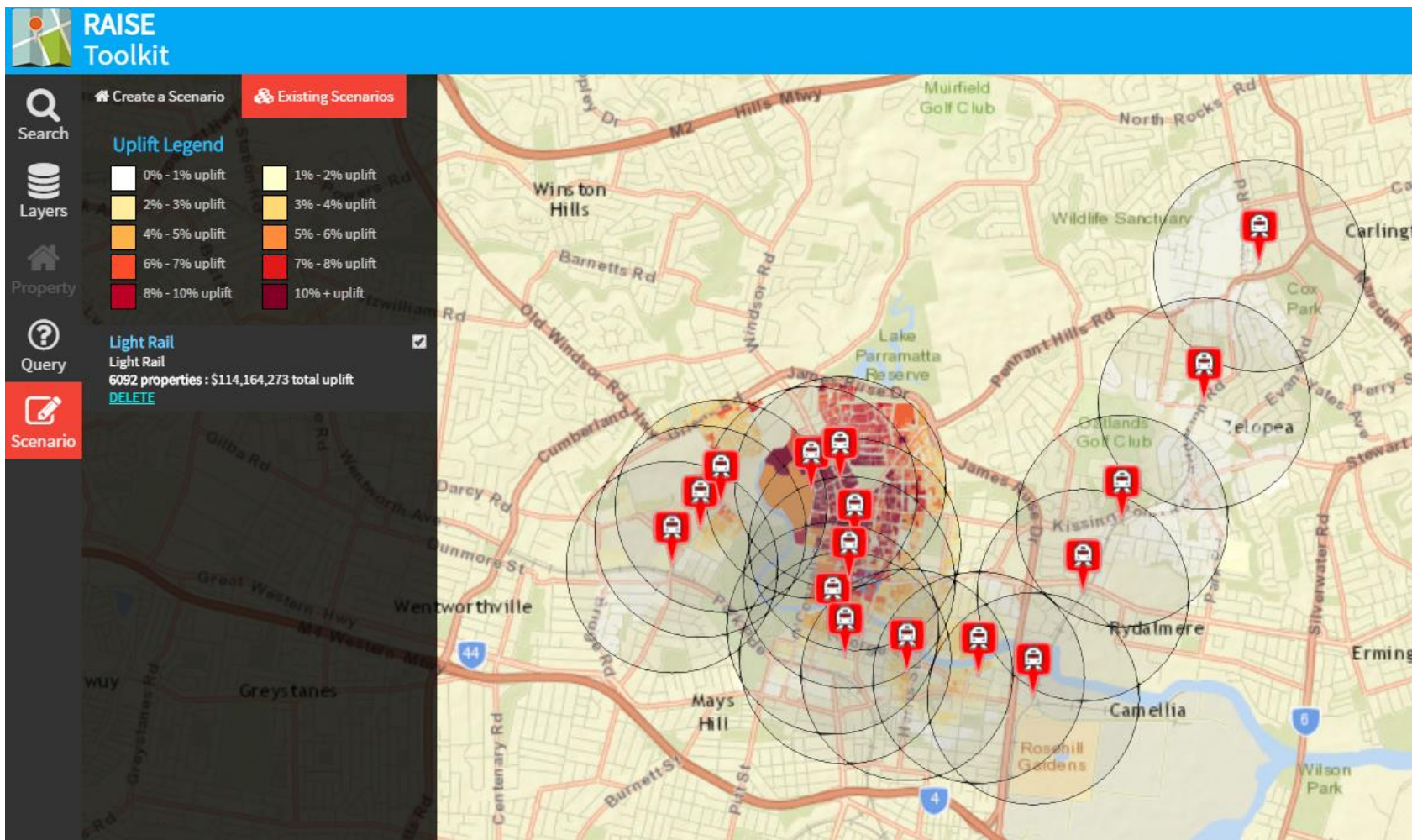


Location
Intelligence

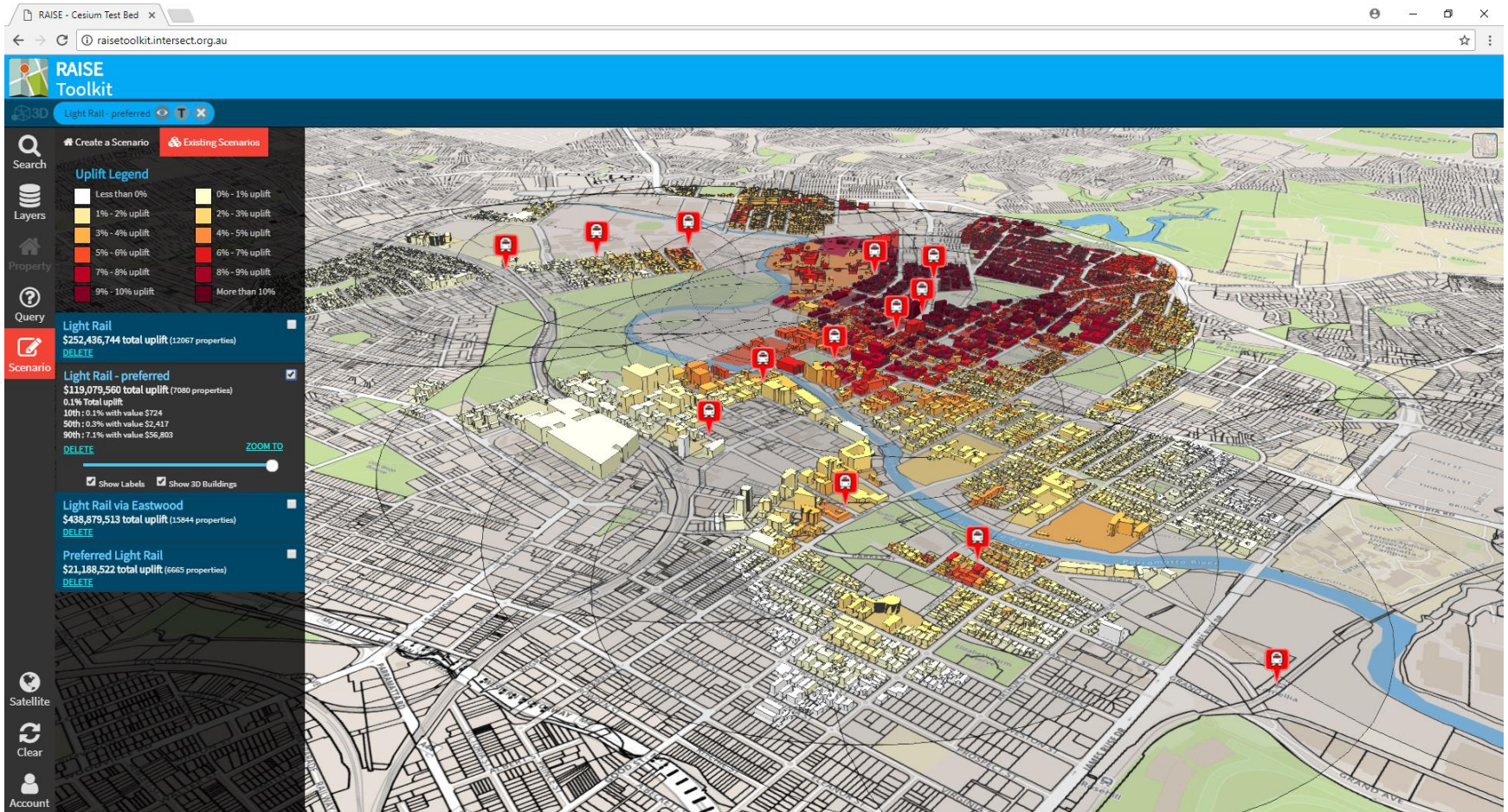
Property valuation model



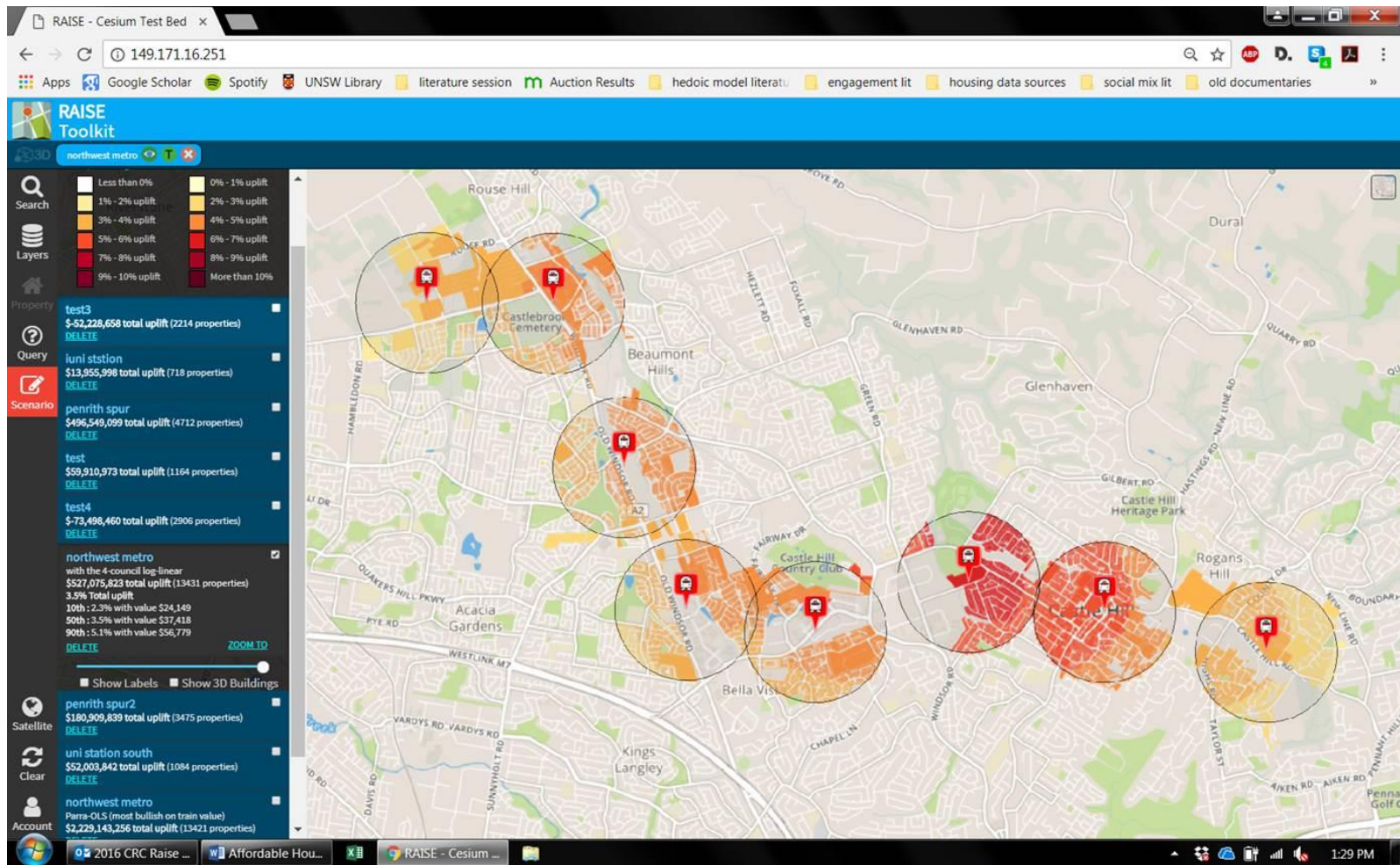
Value uplift Functionality



Parramatta Light Rail options



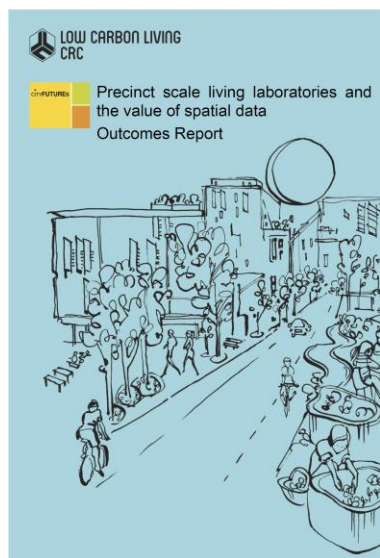
Sydney Metro North West



RAISE workshop



Randwick Living Lab Co-design exercise



PLUS ALLIANCE

ARIZONA STATE
UNIVERSITY
PHOENIX

KING'S COLLEGE
LONDON
LONDON

UNSW
AUSTRALIA
SYDNEY

 ARIZONA STATE
UNIVERSITY



UNSW
AUSTRALIA

Measuring City Performance- Sustainability Indicators

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

Target 11.2: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

Indicator 11.2.1: Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities

Monitoring: This indicator will be monitored by the proportion of the population that has convenient access to public transport. The access to public transport is considered convenient when an officially **recognized stop is accessible within a distance of 0.5 km** from a reference point such as a home, school, work place, market, etc. Additional criteria for defining public transport that is convenient include:
a. Public transport accessible to all special-needs customers, including those who are physically, visually, and/or hearing-impaired, as well as those with temporary disabilities, the elderly, children and other people in vulnerable situations. b. Public transport with frequent service during peak travel times c. Stops present a safe and comfortable station environment.

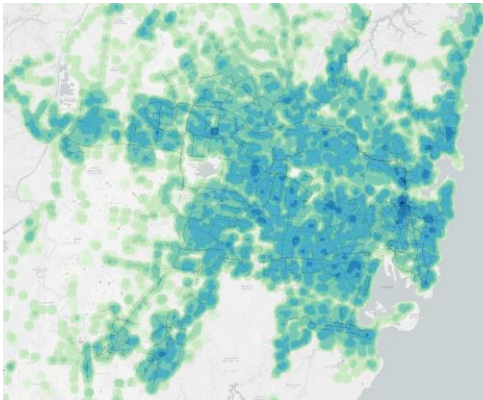
See: <https://unstats.un.org/sdgs/metadata/files/Metadata-11-02-01.pdf>



Total public
transport
stations/stops
within 500m

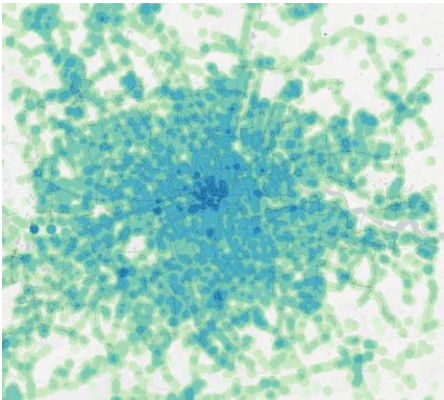
- 1 stop
- 2 - 4 stops
- 5 - 8 stops
- 9 - 16 stops
- 17 - 32 stops
- 33 - 64 stops
- Above 64 stops

Sydney



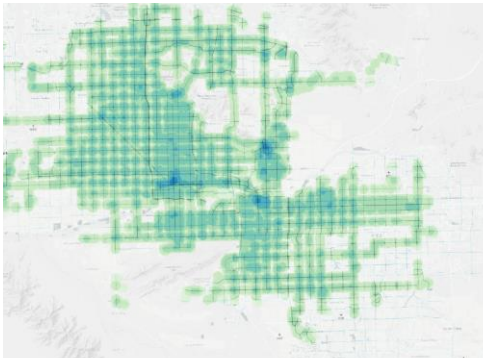
Population
~5 million (Metro)

London



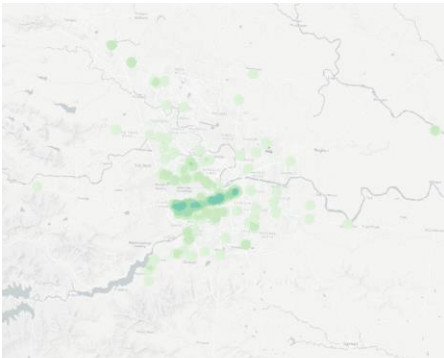
Population
~9 million (Greater London)

Phoenix



Population
~4.5 million (Metro)

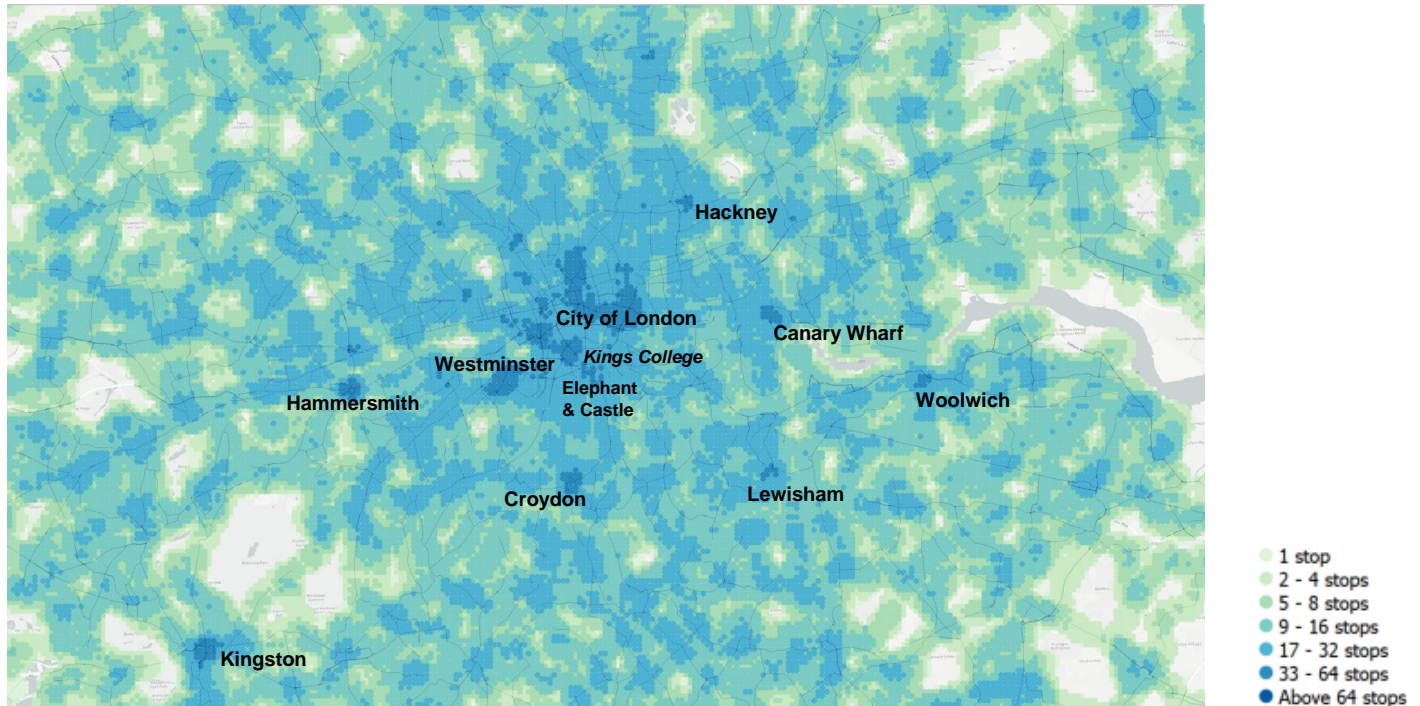
Pune



Population
~6.75 million (Metro)

Total public
transport
stations/stops
within 500m

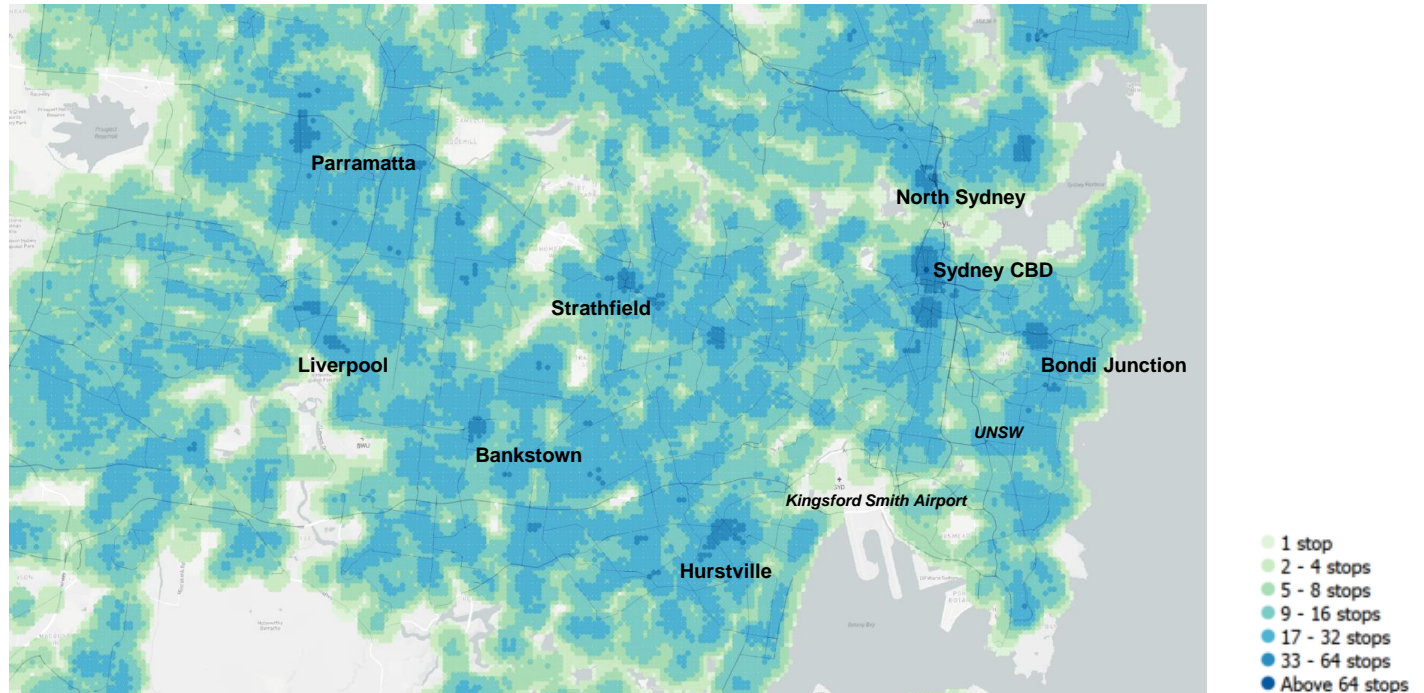
London



Scale 1:100,000
Projection British National Grid EPSG:27700
Stop Source OpenStreetMap (OSM)

Total public
transport
stations/stops
within 500m

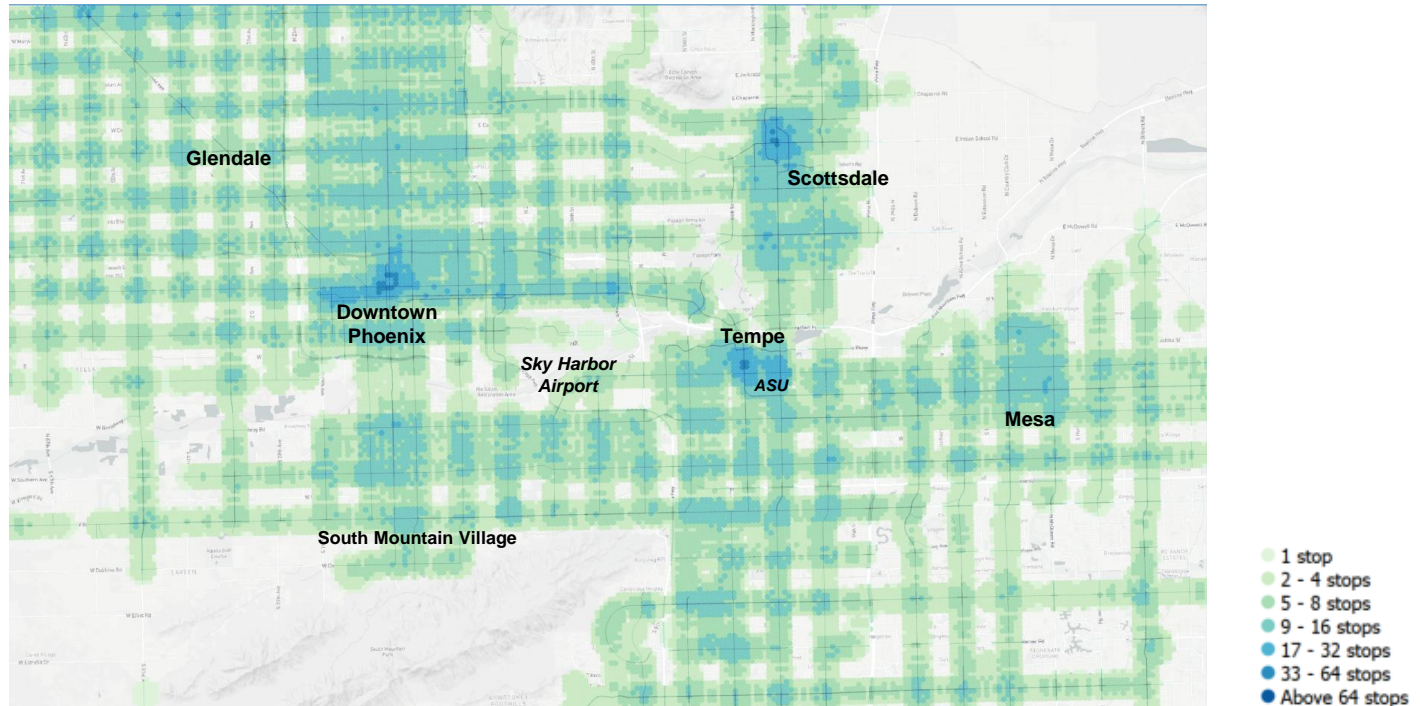
Sydney



Scale 1:100,000
Projection Map Grid of Australia – Zone 56
Stop Source Transport for NSW GTFS

Total public
transport
stations/stops
within 500m

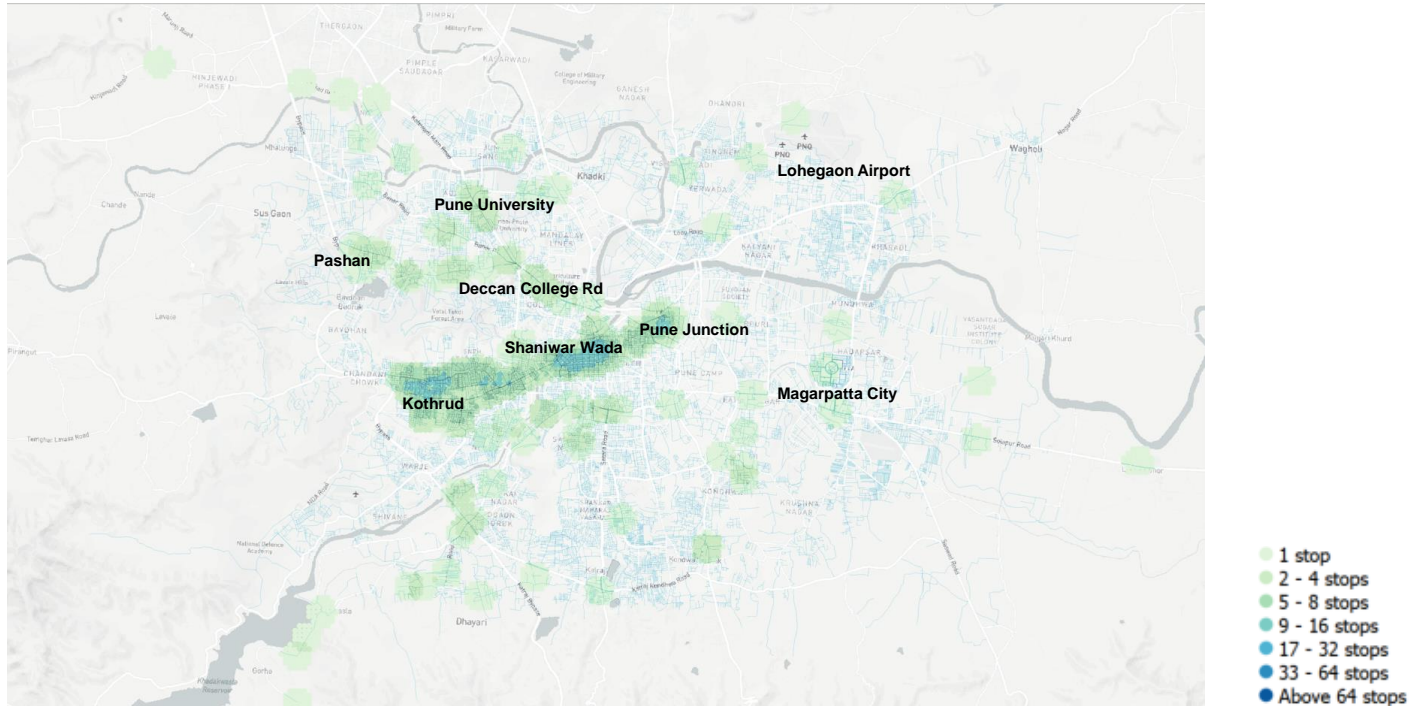
Phoenix



Scale 1:100,000
Projection Arizona State Plane EPSG:26949
Stop Source Valley Metro GTFS

Total public
transport
stations/stops
within 500m

Pune



Scale 1:100,000
Projection Indian Grid IND-III-M
Stop Source OpenStreetMap (OSM)

PLuSData

Store, discover and share – data for the PLuS Alliance



1 Layer

Click to search for geospatial data published by other users, organizations and public sources. Download data in standard formats.

[Explore layers »](#)



1 Map

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6 Users

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[See users »](#)

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LONDON

UNSW SYDNEY

SYDNEY

Concluding thoughts

- **City data stores** and **dashboards** can support **community engagement** and transparency in decision-making – smart city 3.0
- **Digital planning tools** need to be part of the smart city agenda.
- **Rapid Analytics** can be use for exploring **What if? city scenarios**.
- **Open source** and **open data** can deliver be **very costed effective** solutions.
- **Training and Education** – absolutely critical we train the next generation of city planners, policy-makers with skills in smart cities, big data, city analytics....

Menu Degrees Research Contact Intranet



City Analytics

"This course will play an integral role in growing the skill set and culture of data driven evidence based policy and decision making across our cities, both in Australia and Internationally."

Professor Chris Pettit, Director of Discipline



<https://www.be.unsw.edu.au/postgraduate-degrees/city-analytics/about>

Thank-you!

Prof. Chris Pettit
c.pettit@unsw.edu.au

