Melbourne Urbanisation Mapping, 2011 to 2051

Creating spatial layers of imperviousness

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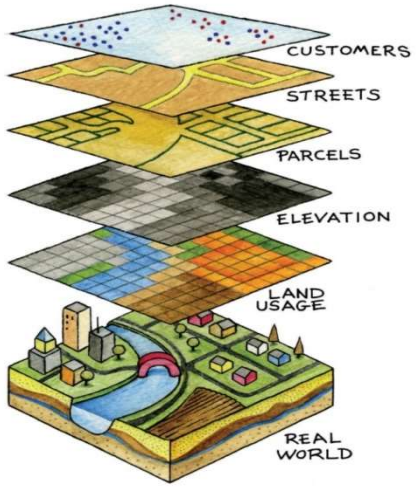
Introducing the Project Team

Melbourne Water: Kristina Sestokas
Water Technology: Rianda Mills, Amelia Leavesley
GraceGIS: Jasper Kunapo
DELWP: Brigid Adams

Melbourne Water: Andrew Grant (future contact)



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Why are we here?

We embarked on a courageous project!
We thought “What if…”

- we could gather all available population & dwelling forecast data
- we could get access to historical development data
- we could combine the two and attempt to predict the future

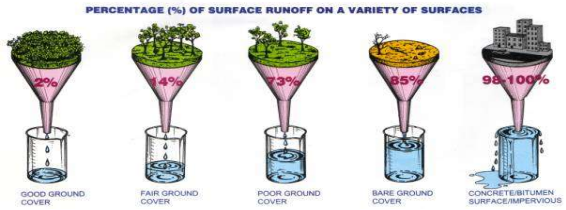
Project Vision – MUM, 2011 to 2051

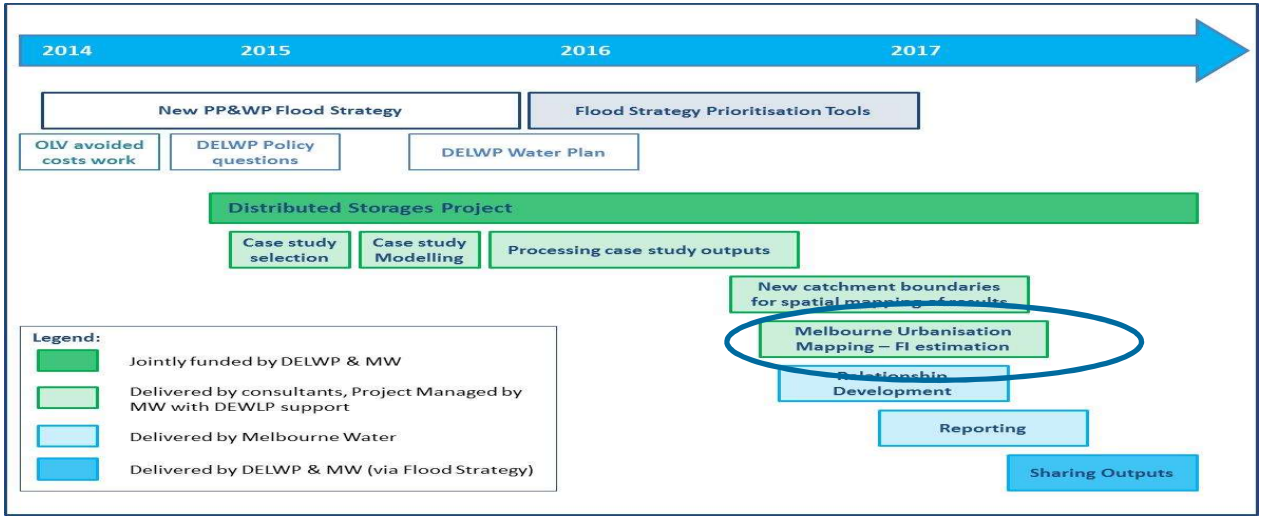
Develop a series of spatial layers that provide a good* indication of how Greater Melbourne imperviousness will change over time with development, using the best currently available population and urban development data, and logical and transparent methodologies and decision-making processes.

Background – Bigger picture

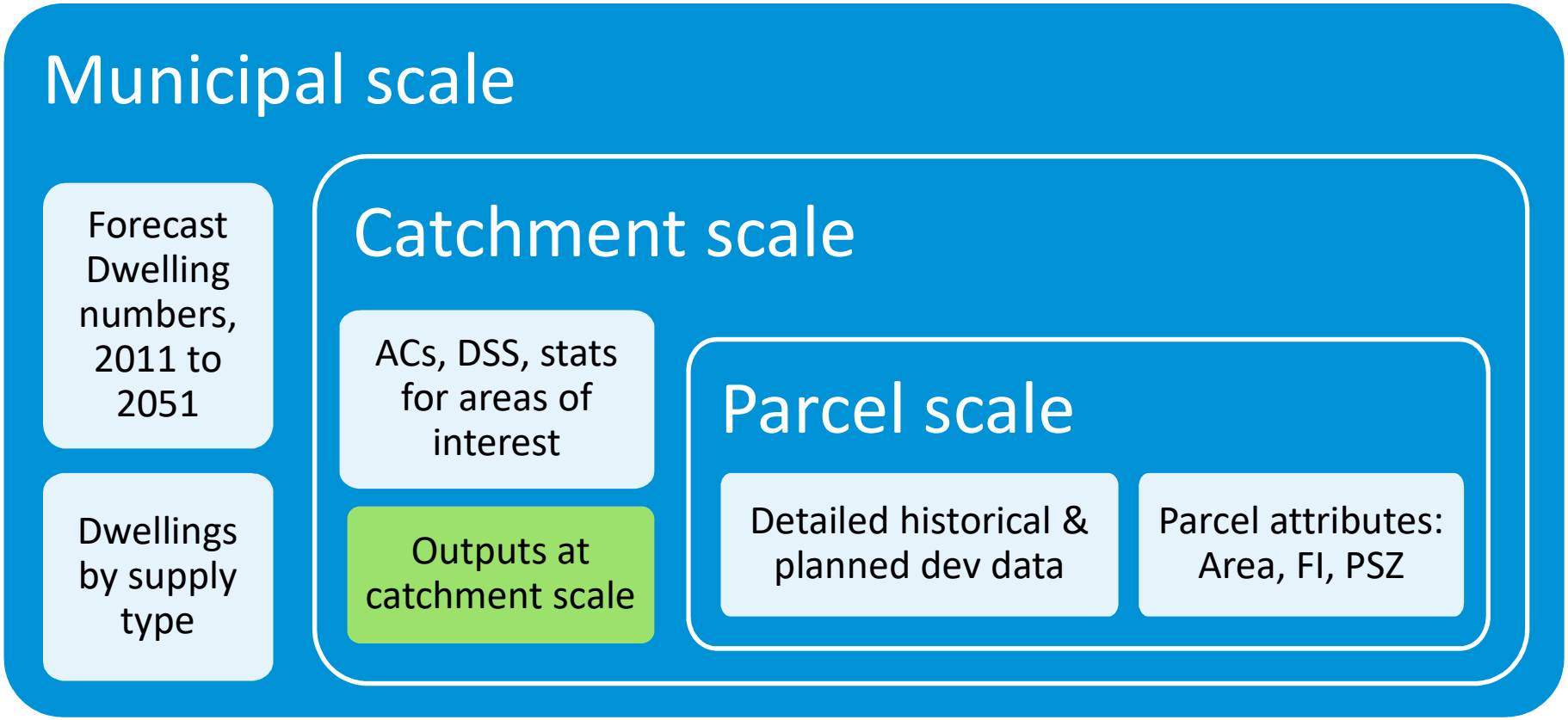
Distributed Storages Project:

- Joint project – DELWP & MW – to build knowledge around the potential effectiveness of storages for flood effects reduction & support the new Flood Strategy – Port Phillip & Westernport

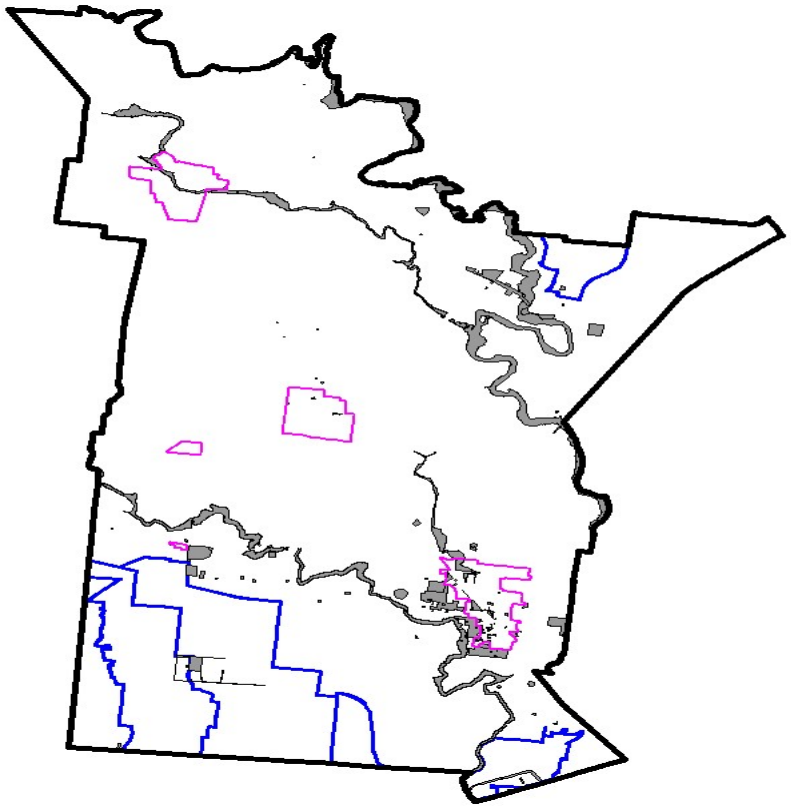




Methodology Overview & Key Data



Municipal Data



For each Municipality we had:

- Identified Activity Centres
- Broadhectare areas
- Planning Scheme overlays
- Dwelling forecasts for:
  - ACs
  - Broadhectare areas
  - Rural zoned land
  - Dispersed residential
  - One:One developments

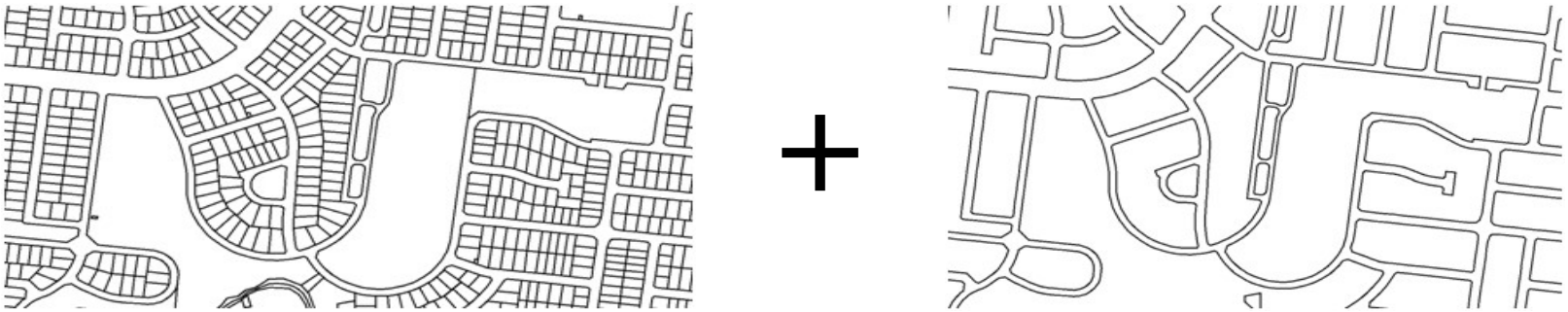
Parcel Data

For each parcel we had:

- Parcel size
- Location (LGA, AC, etc)
- Planning Scheme Zone
- Planning overlays
- Recent development history: No. of dwellings built
- Proposed sites about to be developed
- Aerial photography with infrared data

Creating a Base Layer for the Project: 2011

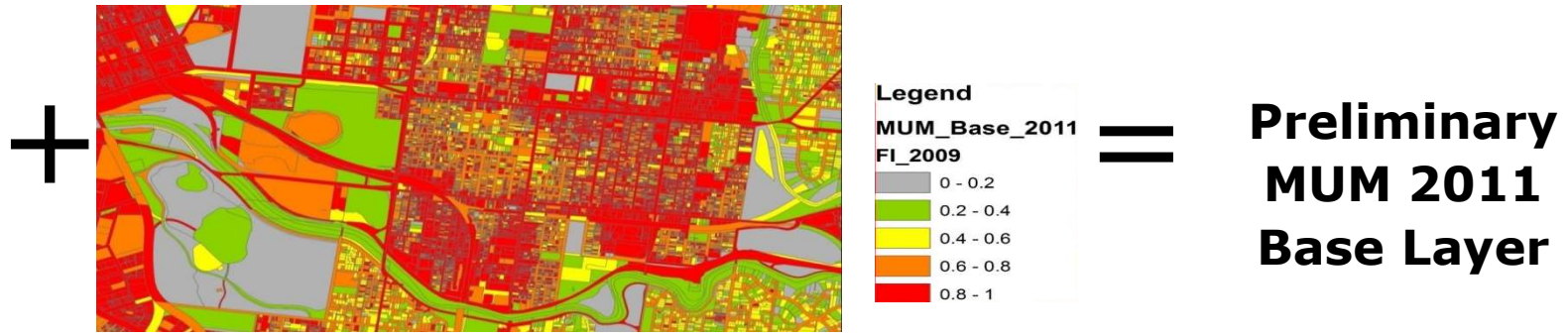
- Typologically correct the 2011 parcel layer
- Add in roads & any other "out of parcel" areas



- Add in location information:
  - Municipality, Suburb, Activity Centre, Developer Services Scheme
- Add in other attribute information:
  - Parcel area, PSZ, Planning Overlay flag, parcel

Adding in 2009 FI & Known Development

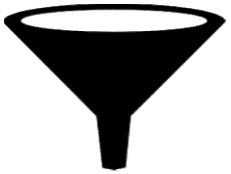
- Attach 2009 FI to each parcel & road (Parcel area/ Total Imp)



Preliminary MUM 2011 Base Layer

- Add in known development data: dwellings built, year built
- Export parcel data and Known development data

Looking at Parcels to Understand Imperviousness & Typical Dwellings Built

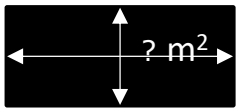
Parcel + ? =  & 

Fraction Impervious

Typical Dwellings

Looking at Parcels to Understand Imperviousness

What are the drivers for parcel imperviousness?



Parcel area

Land-use type

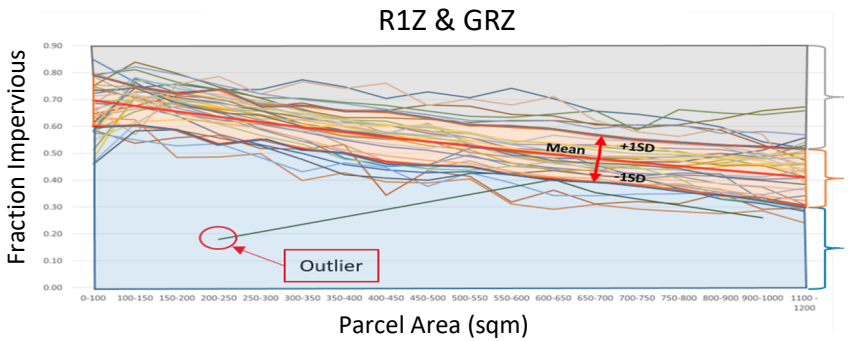
Municipal characteristics

Parcel

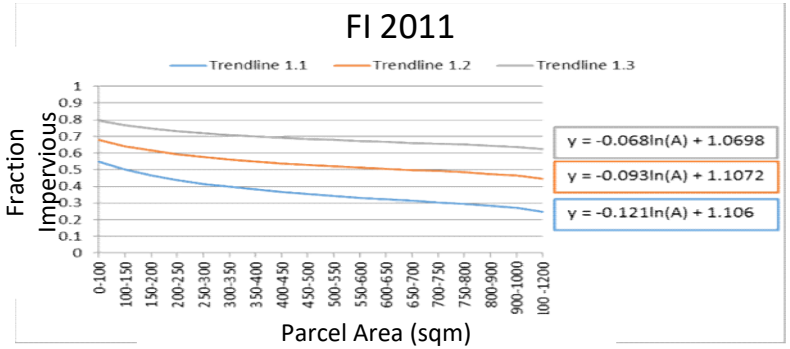
Fraction Imperviousness

Imperviousness Mapping

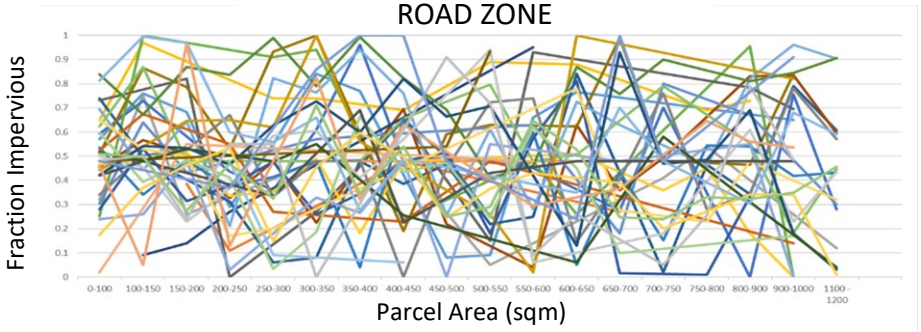
Clear Trend



Average trends



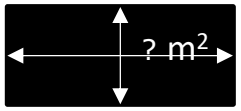
No Trend



FI 2011 = FI 2009

Looking at Parcels to Understand Typical Dwellings Built

How many dwellings are likely to be built on any one parcel in the future?



Parcel size
(S, M, L, XL)

"Supply type"

(Activity Centres, DSS, Major & Minor Dev, Rural Res and One-to-one replacements)

Parcel

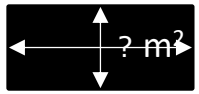
Typical Total Net Dwellings

Municipal characteristics

Typical TNDs

Land-use type

Typical Total Net Dwellings



Parcel area

Minor Res

MUM PSZ Code	S	M	L	XL
R1Z	1	1	1	3
R3Z	1	1	1	3
RES_SP	1	1	1	5
COM_RES	2	5	4.5	4.5
MU_RES	1	1	6.5	8
UGZ	1	1	1	1
R2Z	1	3	5	15
COM_SP	0	0	1	0
ACZ	1	0	1	1

Major Res

MUM PSZ Code	S	M	L	XL
R1Z	16.5	13	18	37
R3Z	15.2	12	28	27
RES_SP	59	59	59	59
COM_RES	11.5	23	48	344
MU_RES	13	24	62	74
UGZ	1	1	1	1
R2Z	11	15	35	30
COM_SP	0	0	0	0
ACZ	2	2	42	144

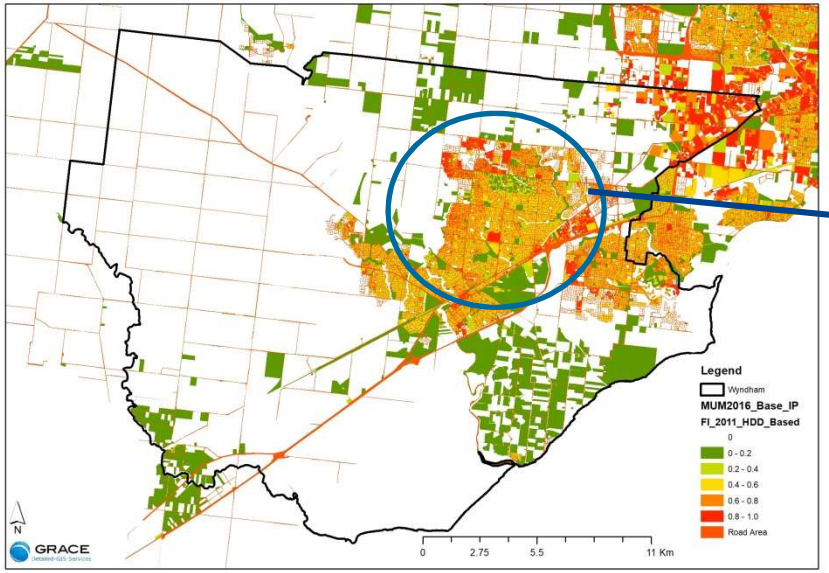
Finalising the 2011 Base Layer

Non-Res

- 2009 FI, unless clear trend

Res

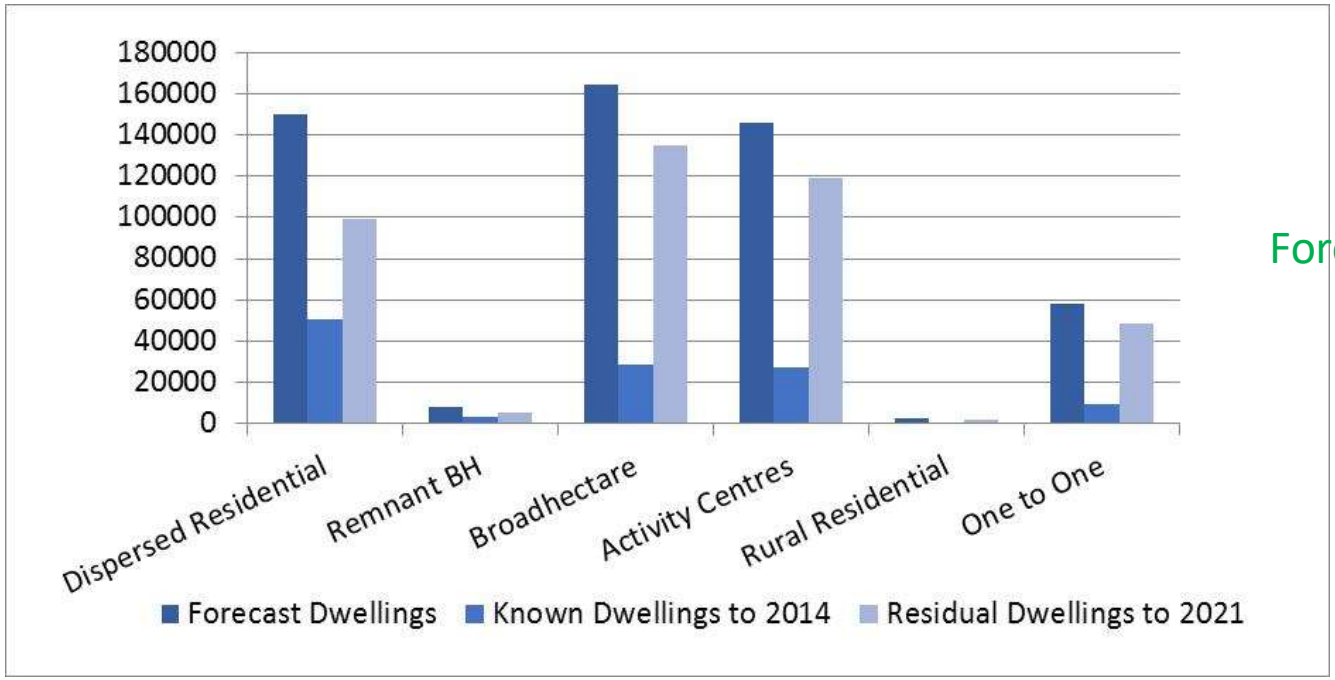
- Pre 2004 'average' FI trends
- Post 2004 'recently developed' FI trends



On the way to 2021…… From 2011 to 2016

For all known developments, counted:

- No. of dwellings across each Municipality & within AC, DSS, Rural & Res areas
- No. of One:one replacements



Forecast – Known
= Residual for 2021

Using Known Development to Predict Unknown

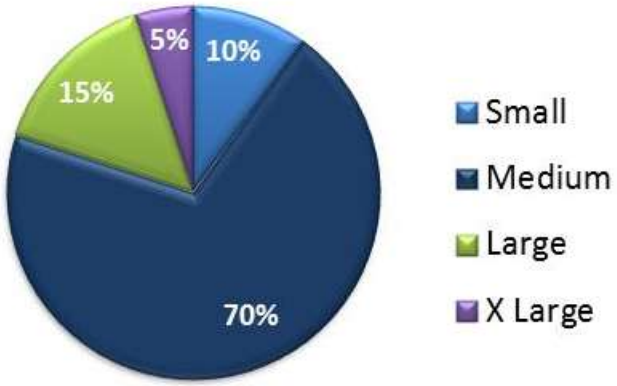
Two parts to this:

a. We know where, but not how (or necessarily when)

b. We have no idea where or how

We considered a number of approaches:

- Look at history to tell us where the parcels go



Parcel Size	R1Z	R2Z	R3Z
Small	10%	10%	40%
Medium	70%	15%	45%
Large	15%	60%	10%
X Large	5%	15%	5%

Using Known Development to Predict Unknown – cont.

- Assume all type "a" developments are completed by 2021

- Use a "Cluster" methodology where the methodology itself favours the most recent development locations & selects available parcels nearby

We adopted the "Cluster" methodology

A key assumption is that new development is most likely to occur in the vicinity of other recent development… like a virus!

The Cluster Methodology – Creating the 2021 MUM layer

50m buffer around all known dev,
9 partially known parcels selected

100m buffer around all known dev,
14 partially known parcels selected

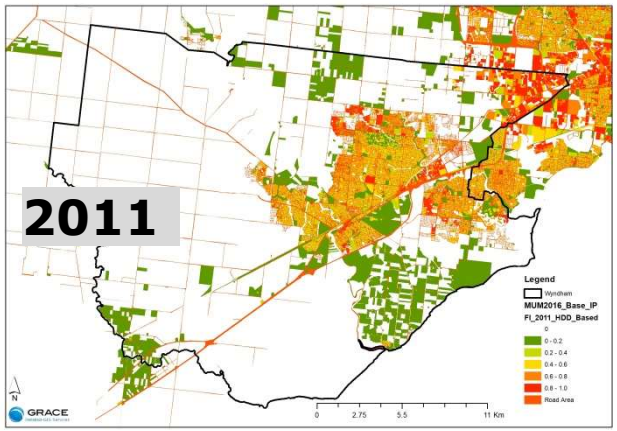
The Cluster Methodology – Creating the 2021 MUM layer

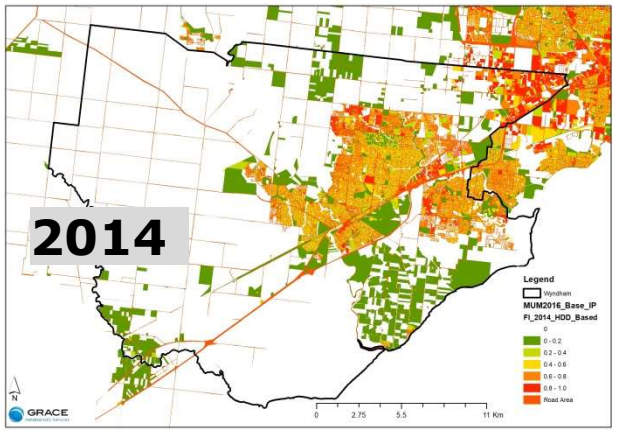
New 50m buffer around all known & partially known parcels

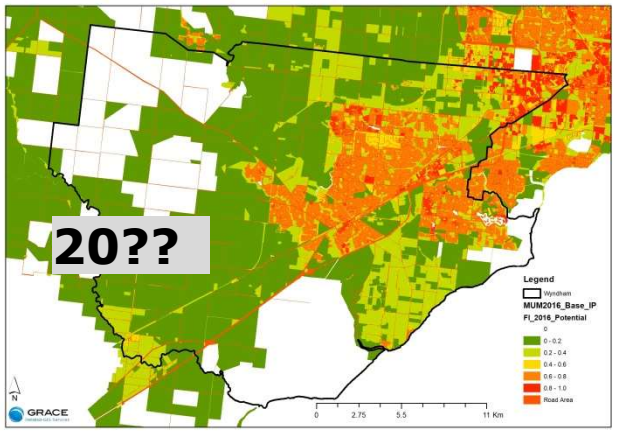
Check eligibility of ‘available’ parcels

Project Status

- Methodology & approach road-tested
- 2011 & interim 2014 layers created
- Cluster methodology is currently being rolled out & tested for 2021. A sample of results is provided below
- All layers 2021, 2031, 2041 & 2051 will be finalised soon!

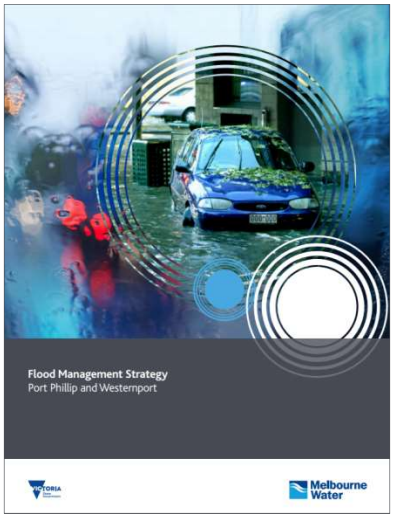






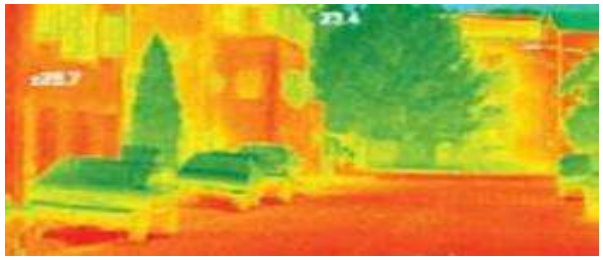
Uses of the Data

- Distributed Storages Project:
  - Prioritising catchment investigations
  - Time dimension to support C/B analysis
- Flood Strategy – Port Phillip & Westernport:
  - Prioritisation tools input
  - Flood mapping & modelling project inputs
- Melbourne Water Healthy Waterways Strategy:
  - Modelling stormwater & pollutant loads to rivers & bays
  - Understanding priority catchments



Uses of the Data

- Land & Livability planning eg Heat island studies
- IWM projects and catchment prioritisation
- Broader asset management – growth planning
- Longer term investment planning



Thank – you!

Thanks from…

Melbourne Water and DELWP!

For more information, please contact:

Andrew Grant: Andrew.Grant@melbournewater.com.au

Brigid Adams: Brigid.Adams@delwp.vic.gov.au