

# Measuring Housing Affordability in Greater Perth

UWA Data Analytic Boot Camp Project 1 Presentation

The Ethical Developers:

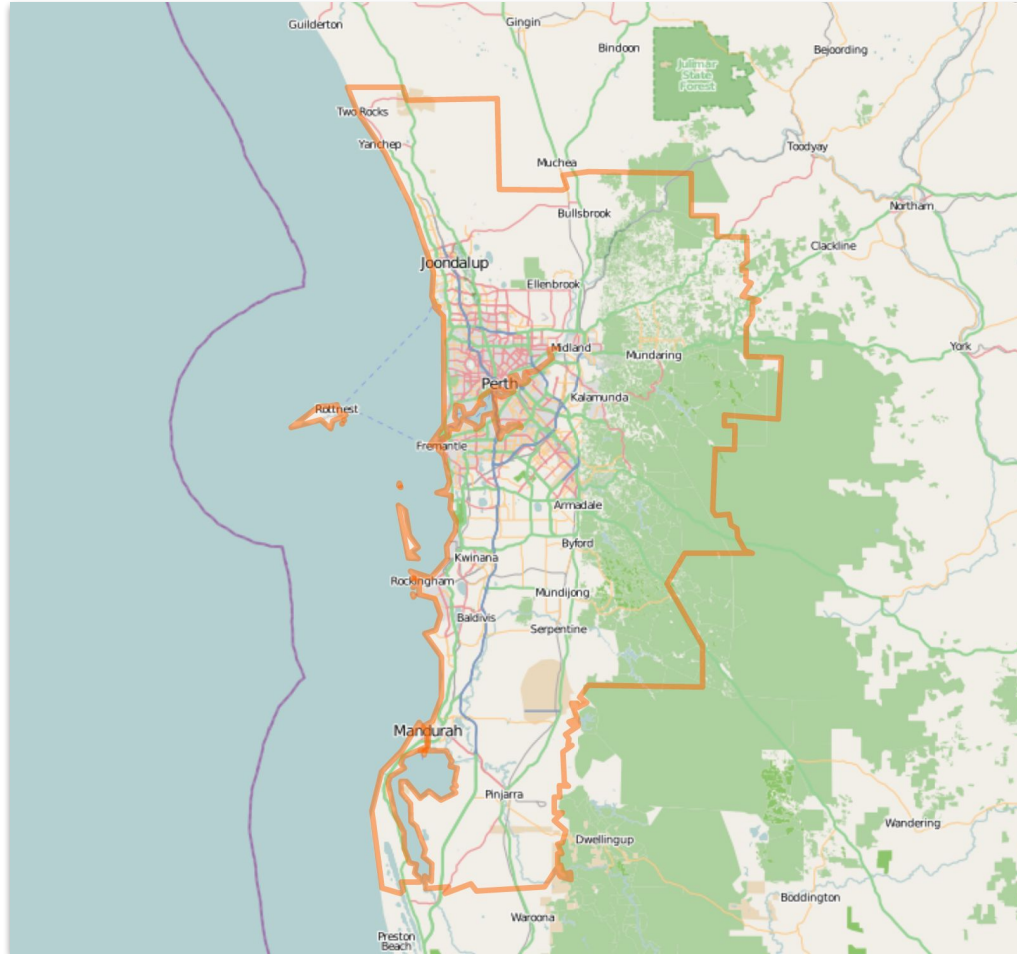
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Parker Wai



Gen Y Housing Project in White Gum Valley, Fremantle



**Study Area : Greater Perth**

**Study Timeframe : Census 2016**

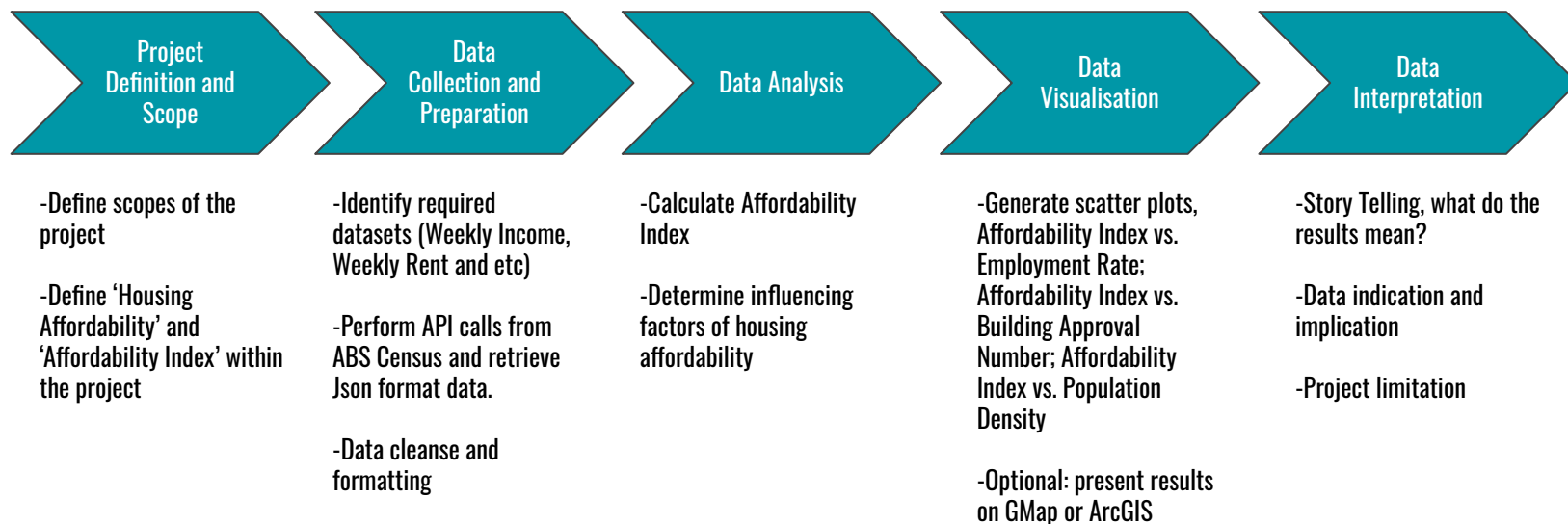
**Research question:**

- What factors attribute to the Affordability Index in suburbs of Greater Perth?

**Research objectives:**

- To utilise available datasets from ABS census
- To calculate the Purchasing and Rental Affordability Index across suburbs of Greater Perth
- To investigate the factors that influence the Affordability Index

# Methodology



So what is housing  
affordability?

“Housing affordability refers to the relationship between expenditure on housing (prices, mortgage payments or rents) and household incomes” (Thomas & Hall 2016).

## Affordability Index:

$$\text{Purchase Affordability Index} = (\text{Median Income} \times 100) / \text{Mortgage Qualifying Income}$$
$$\text{Mortgage Qualifying Income} = \text{Mortgage} / 30\%$$

$$\text{Rental Affordability Index(RAI)} = (\text{Median Income} \times 100) / \text{Rental Qualifying Income}$$
$$\text{Rental Qualifying Income} = \text{Rent} / 30\%$$

When the Affordability Index is exactly 100, it means the household is paying 30 % of income on rent. When it is under 100, it means the household is paying more than 30%.

### Scenario example

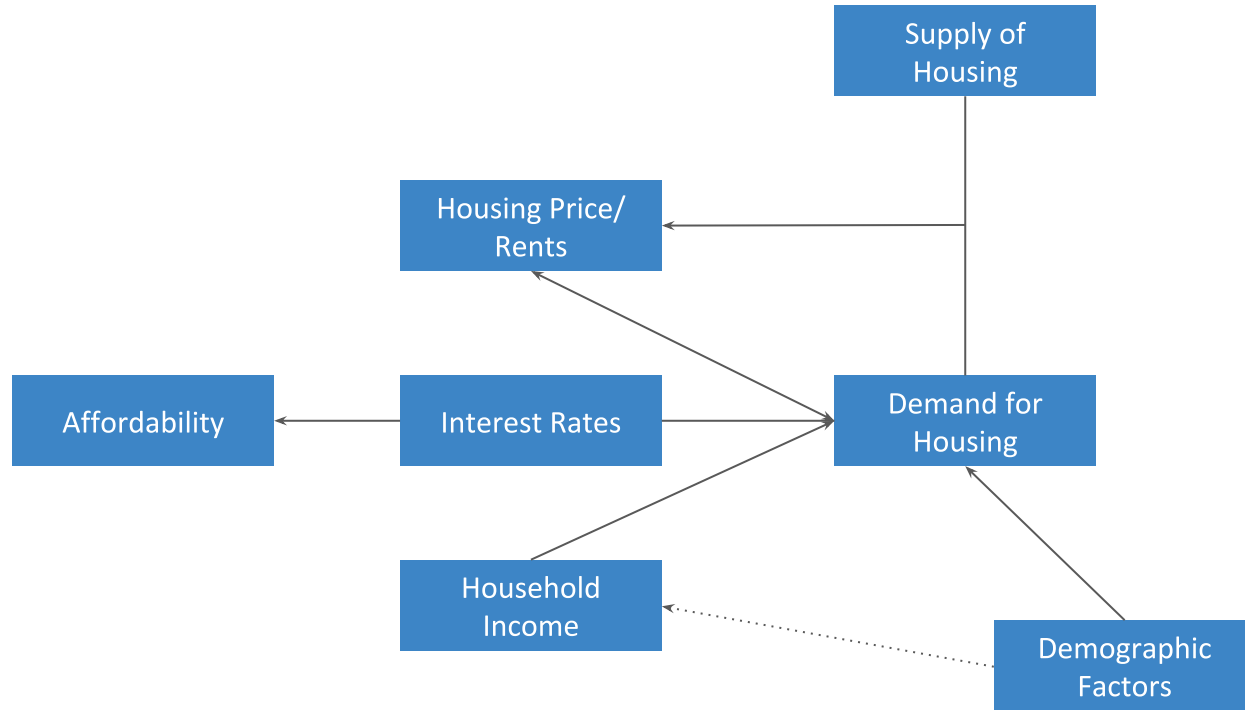
Area B Household Weekly Median Income = \$2000

Area B Weekly Median Rent = \$400

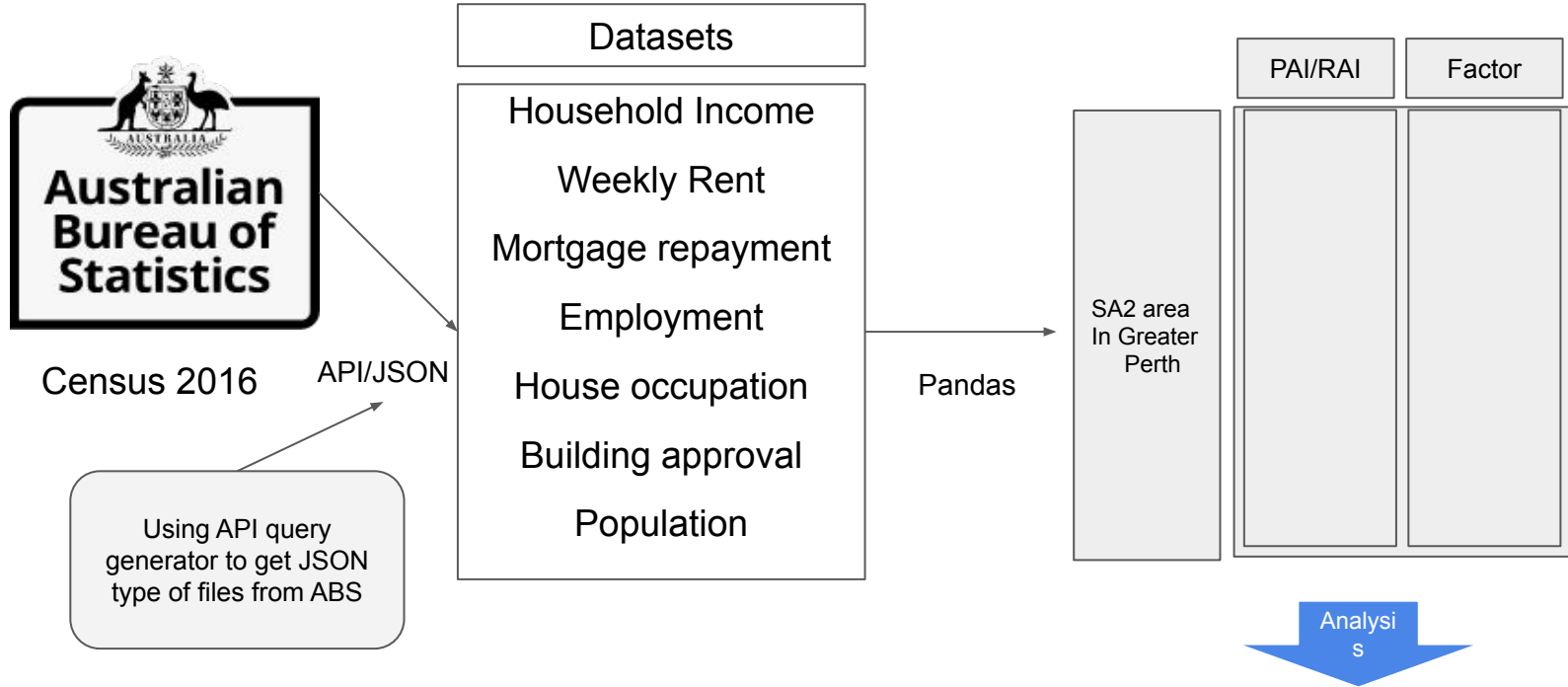
Rental Affordability Index of Area B = 150

Area B is likely affordable.

Figure 1: Factors of Housing Affordability



# Data Collection and Preparation



# Each factor related to PAI, RAI

Purchase Affordability Index = (Median Income x 100) / Mortgage Qualifying Income  
Mortgage Qualifying Income = Mortgage / 30%

Rental Affordability Index(RAI) = (Median Income x 100) / Rental Qualifying Income  
Rental Qualifying Income = Rent / 30%

## PAI, RAI

=> Based on Median Household income of Greater Perth, Calculated PAI and RAI of each suburb using formula

## Median weekly rent, Median weekly mortgage repayment, Median weekly income\*

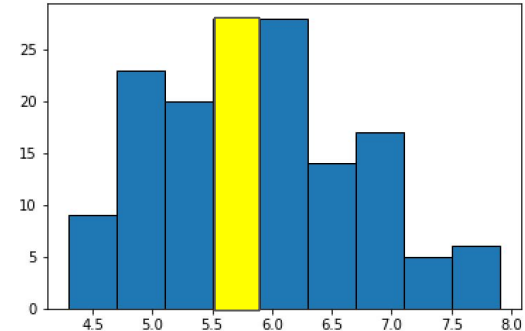
=> Calculate interpolated median rent from already binned datasets.

\*Household income = One family with only family members

Median Household income of Greater Perth = 2333 aud/week

## Other Factors

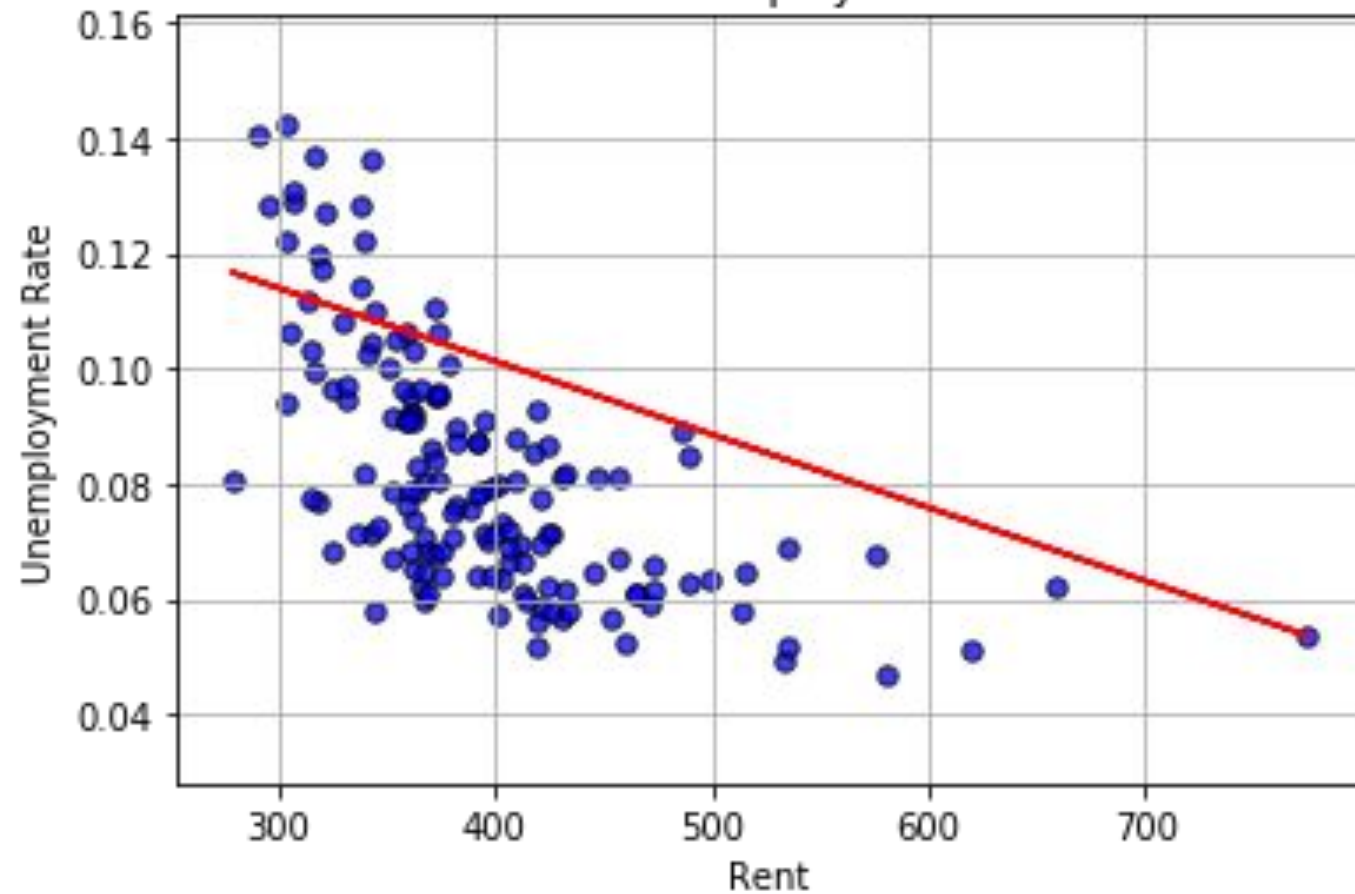
- Unemployment Rate = unemployed / (employed + unemployed)
- Unoccupied Rate = unoccupied residential building / total number of residential building
- Building Approval = Number of residential building approval
- Population
- People born Overseas rate, Increased number of people from 2011, 2016 ...



1. Identify the range which contains median
2. Assuming each data is distributed linearly and equally in the range, calculate the median

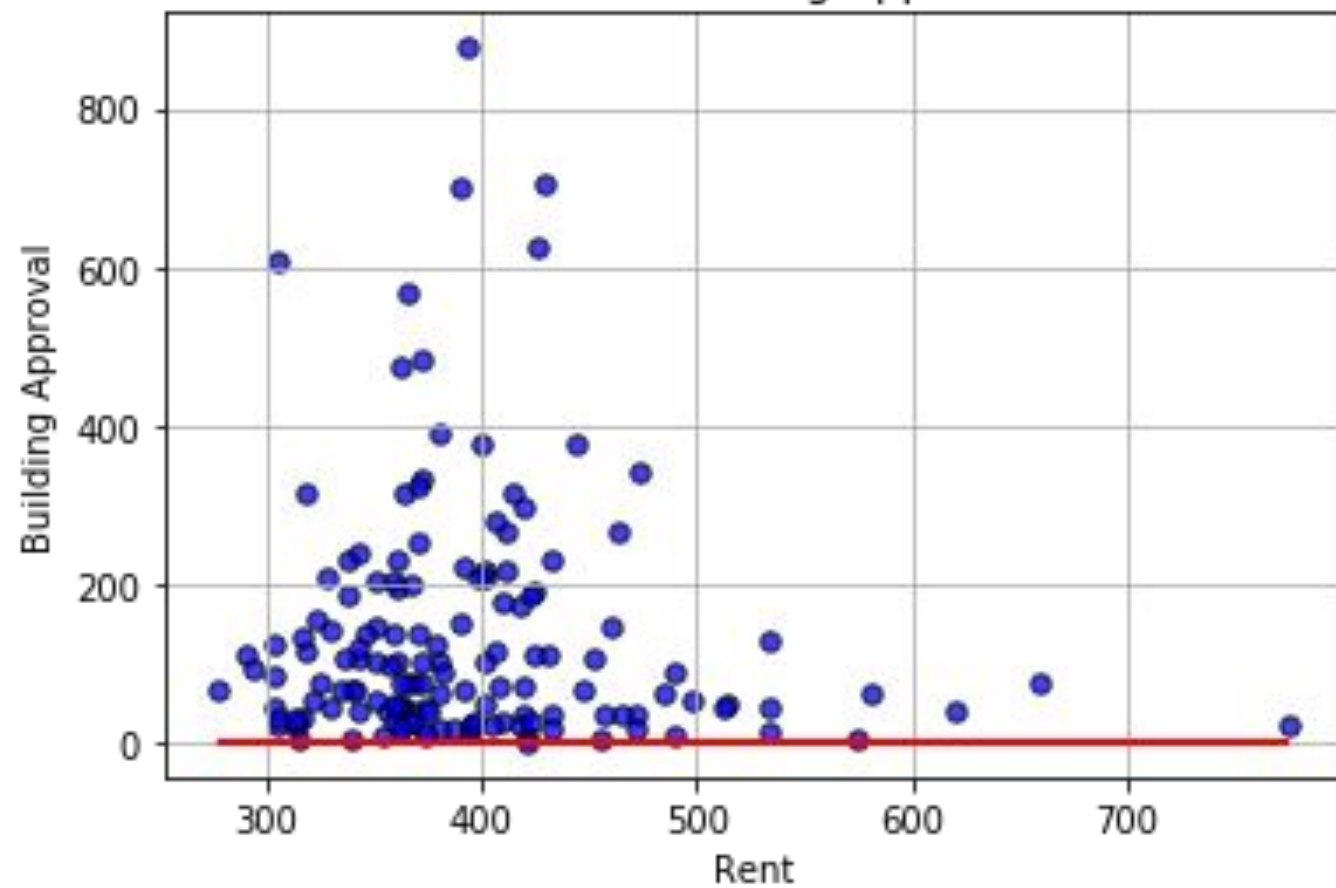


Rent vs. Unemployment Rate



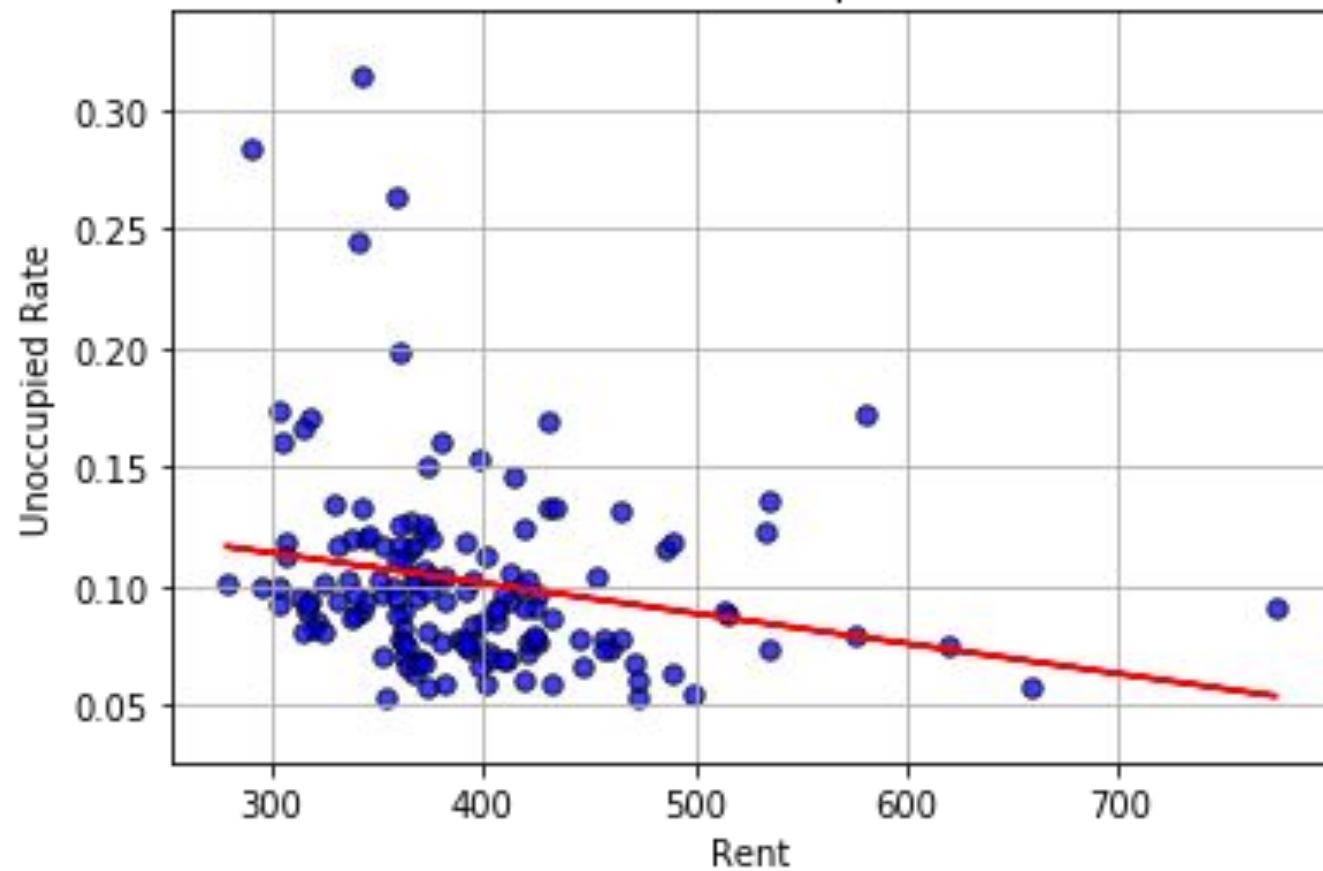
The r-squared is: 0.3717

Rent vs. Building Approval



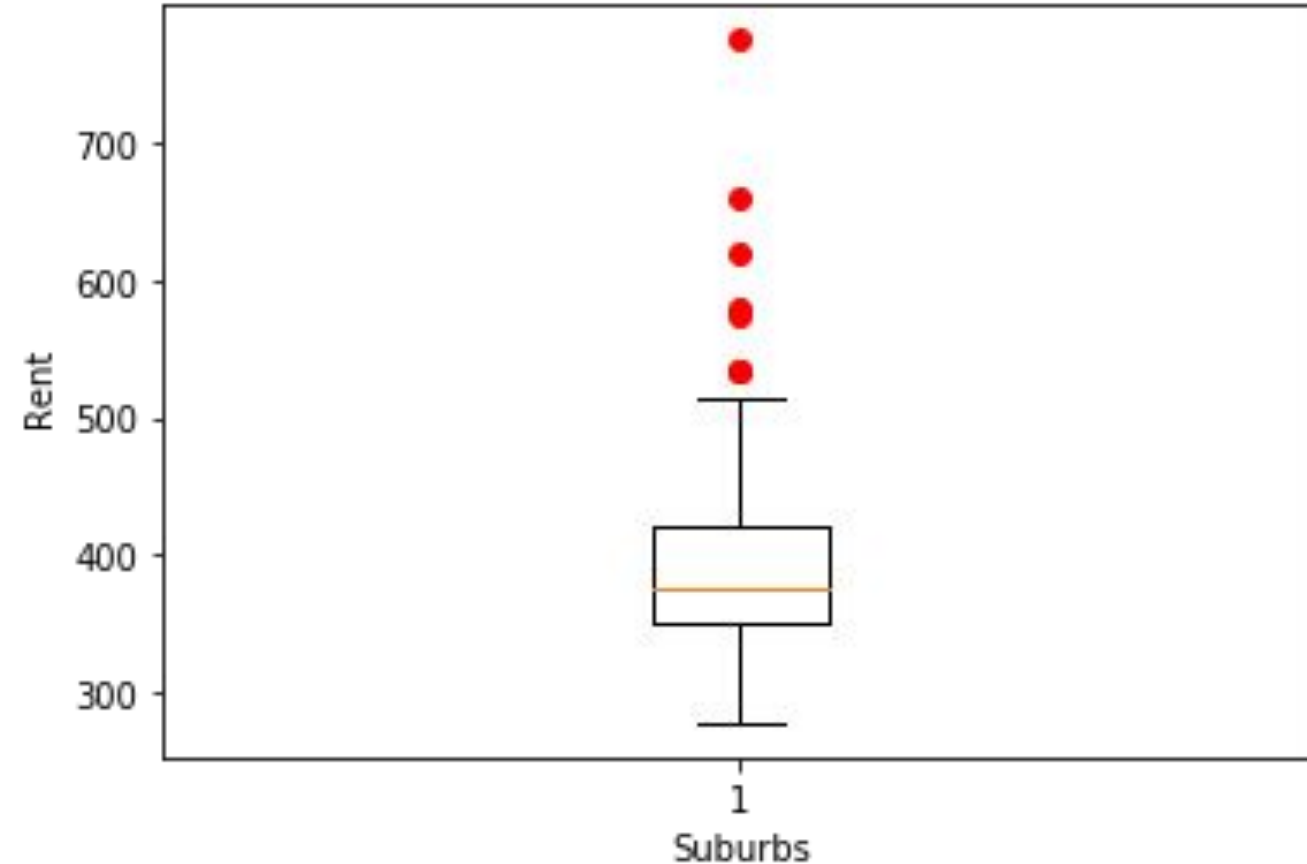
The r-squared is: 0.0524

Rent vs. Unoccupied Rate



The r-squared is: 0.05018

## Median Rent



### Median Rental Statistics

The the median for suburbs is: \$374.93  
The the variance for suburbs is: 5149.19  
The the std dev for suburbs is: \$71.76  
The the SEM for suburbs is: 5.9  
The lower quartile for suburbs is: \$351.56  
The upper quartile for suburbs is: \$420.10  
The interquartile range for suburbs is: \$68.54  
values above \$522.92 could be outliers  
values below \$248.74 could be outliers

Possible upper outliers are -

City Beach: \$774.32

Cottesloe: \$580.22

Floreat: \$619.84

Swanbourne - Mount Claremont: \$533.78

Iluka - Burns Beach: \$658.33

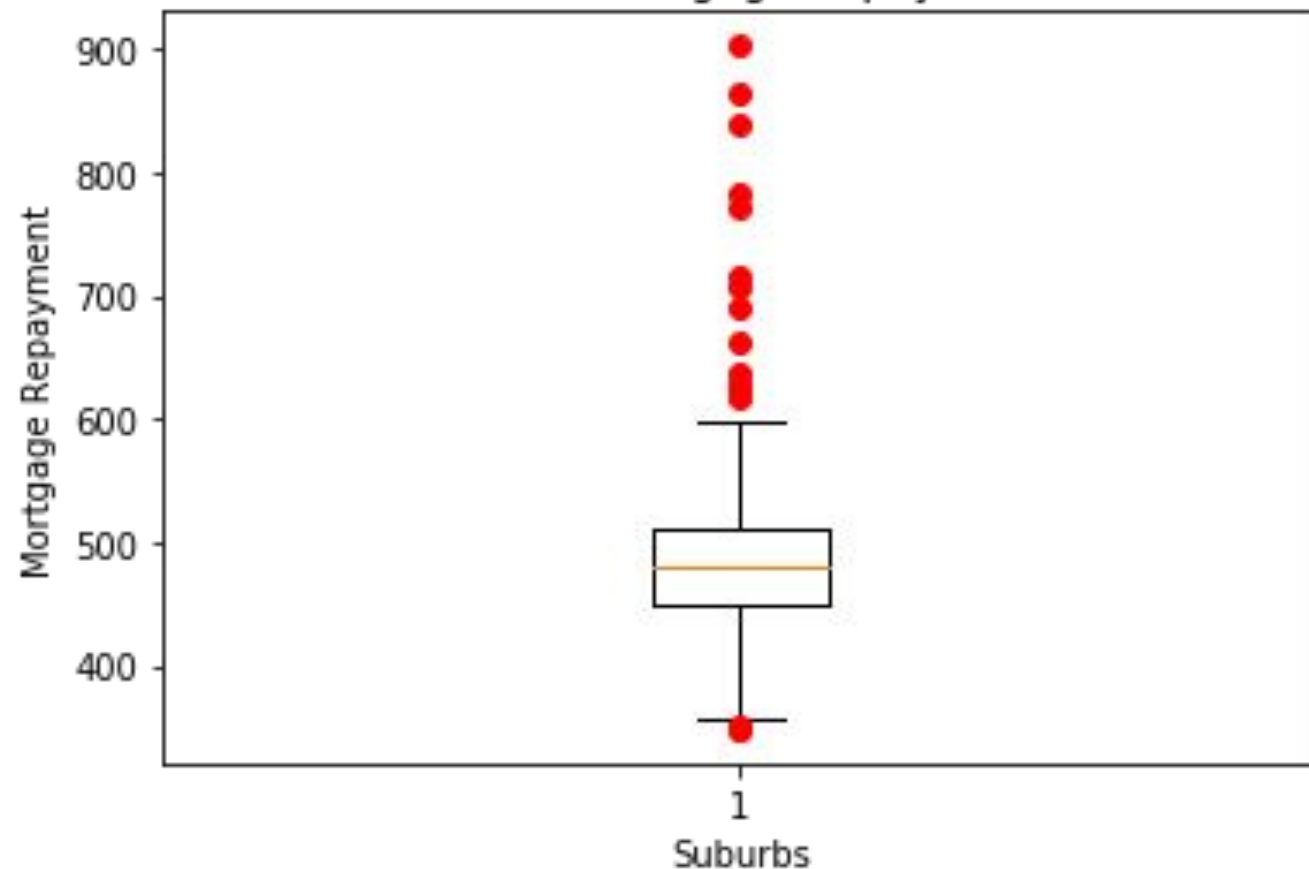
Ocean Reef: \$533.84

North Coogee: \$533.82

Winthrop: \$575.0

There are no possible lower outliers

# Median Mortgage Repayment



## Median Mortgage Repayment Statistics

The the median for suburbs is: \$480.05

The the variance for suburbs is: 8665.46

The the std dev for suburbs is: \$93.09

The the SEM for suburbs is: 7.65

The lower quartile for suburbs is: \$447.96

The interquartile range for suburbs is: \$62.09

The upper quartile for suburbs is: \$510.05

values above \$603.19 could be outliers

values below \$354.83 could be outliers

Possible upper outliers are - City Beach: \$838.98

Claremont (WA): \$636.53

Cottesloe: \$902.74

Floreat: \$770.72

Mosman Park - Peppermint Grove: \$715.65

Nedlands - Dalkeith - Crawley: \$863.32

Swanbourne - Mount Claremont: \$782.31

Subiaco - Shenton Park: \$618.02

Iluka - Burns Beach: \$660.95

Trigg - North Beach - Watermans Bay: \$629.04

Wembley Downs - Woodlands: \$625.88

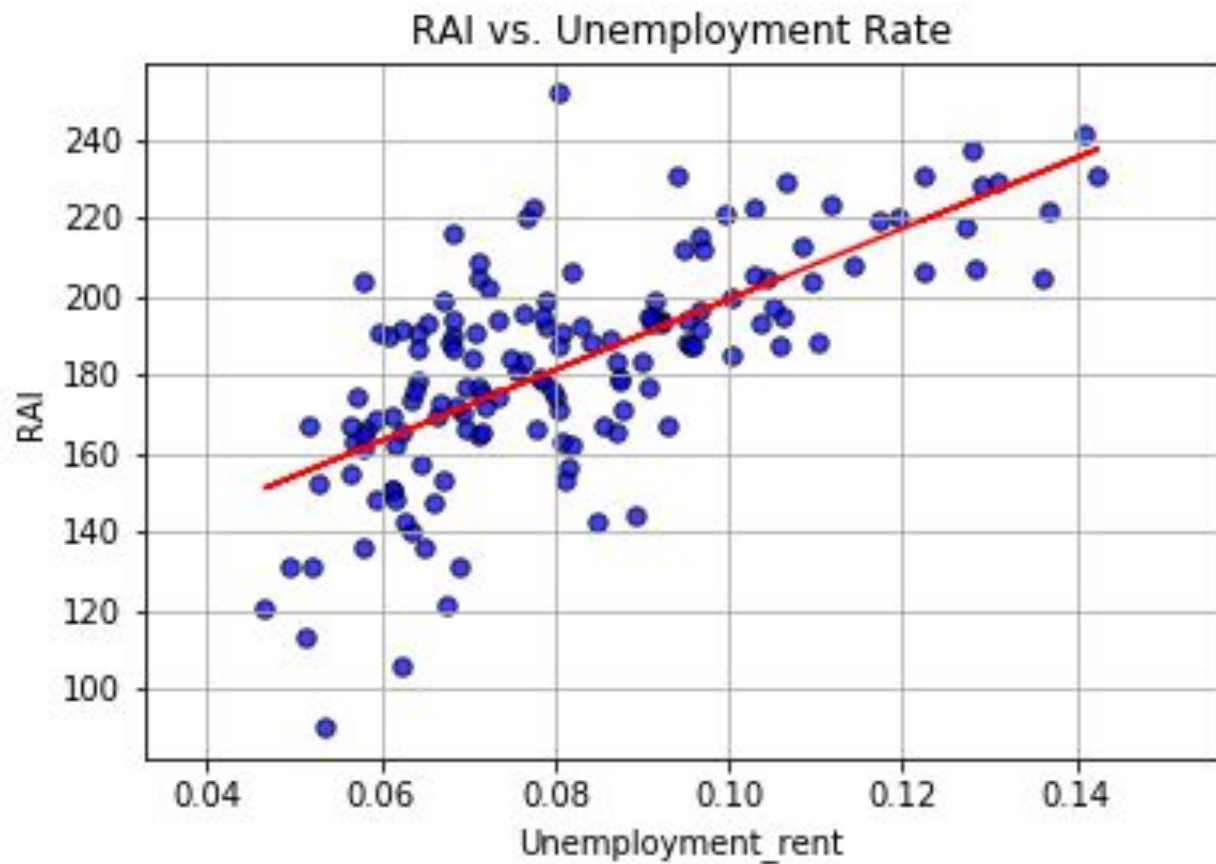
North Coogee: \$706.23

Applecross - Ardross: \$691.02

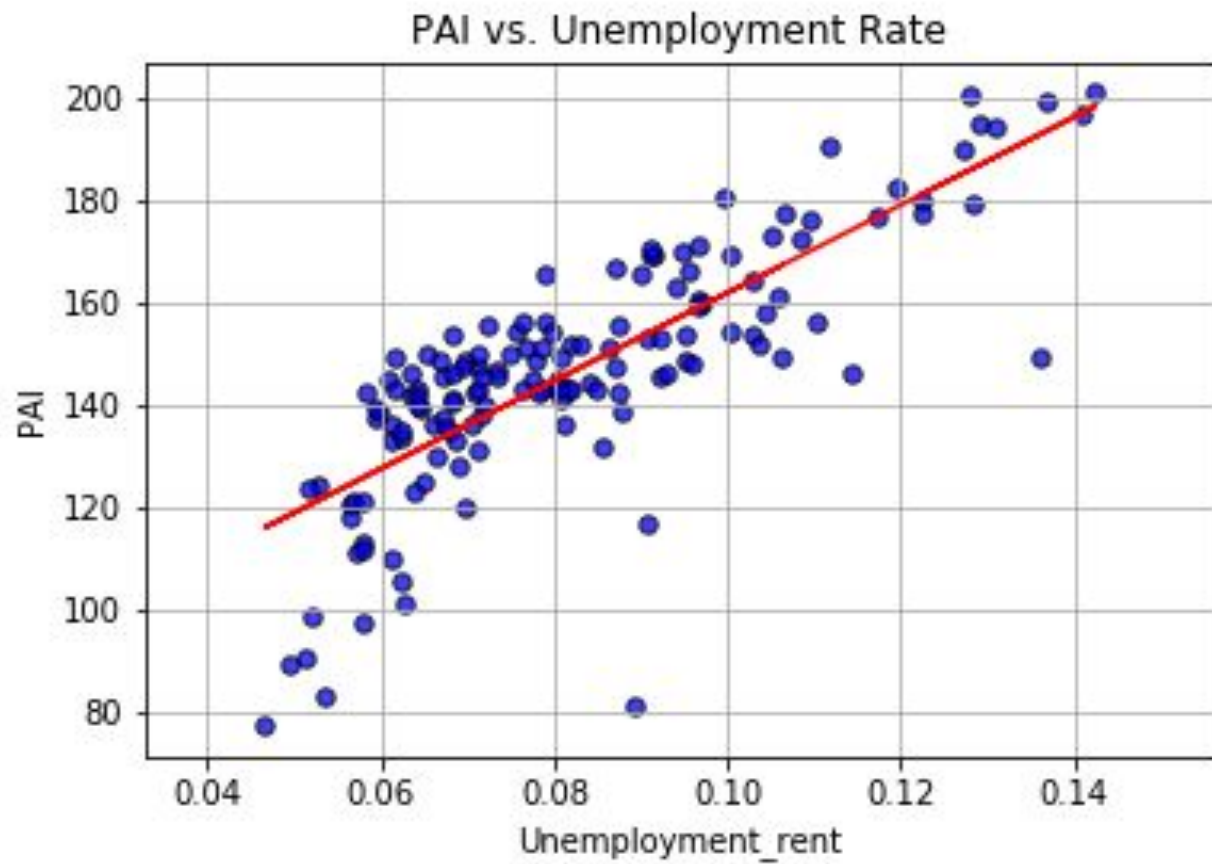
Possible lower outliers are - Calista: \$348.36

Parmelia - Orelia: \$348.45

Cooloongup: \$351.36



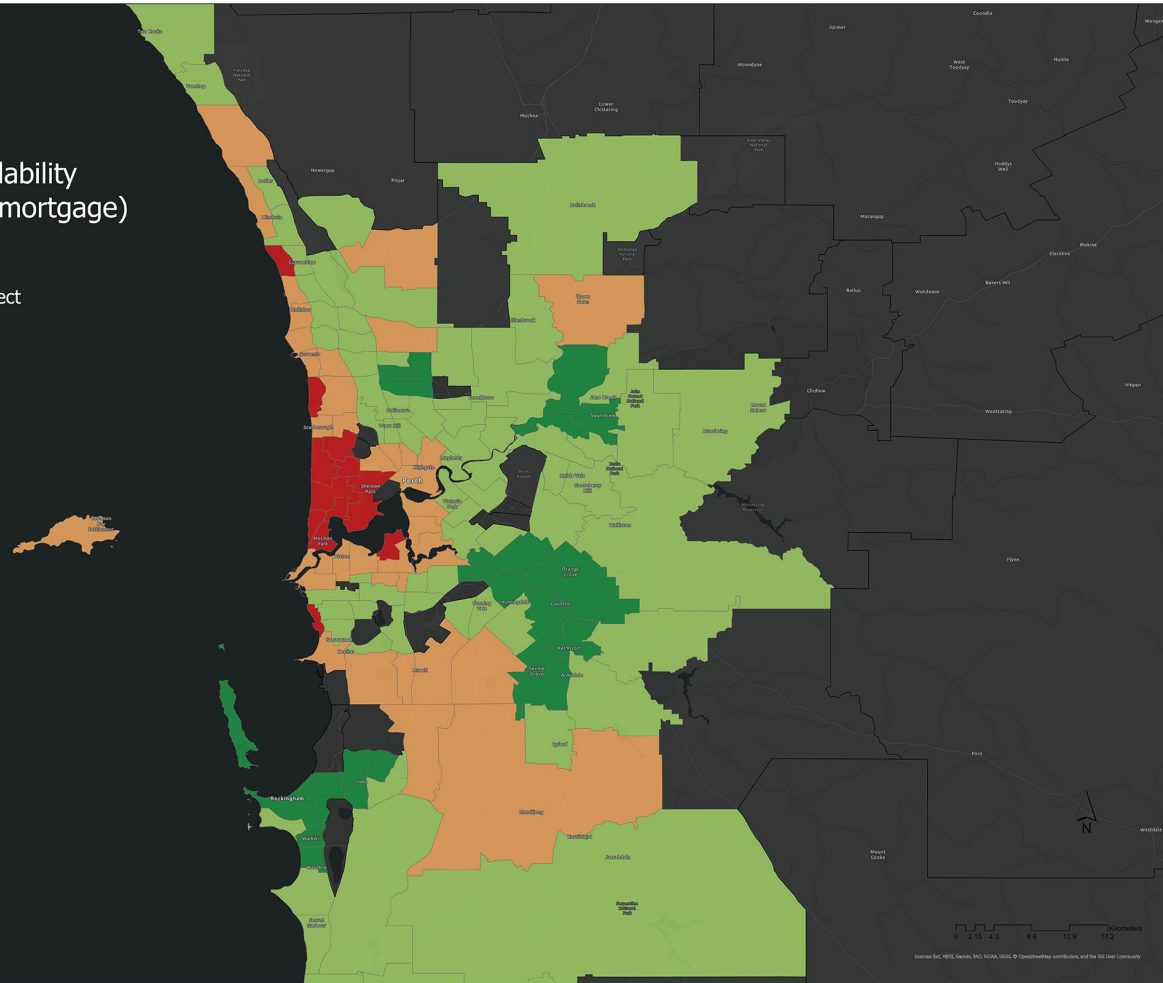
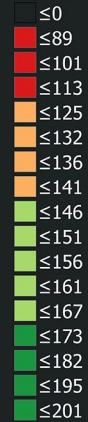
R-squared value = 0.4709



R-squared value = 0.6290

# Greater Perth Purchasing Affordability Index (Based on mortgage) Census 2016

Housing Affordability Project  
Purch\_inde



\*Index is calculated based on median single household income (\$2333)

\*Data used: ABS Census 2016 Median Household Income & Median Mortgage Repayment



# Greater Perth Rental Affordability Index (RAI) Census 2016

Housing Affordability Project  
Rental\_ind

Rental Ind
≤0
≤113
≤136
≤154
≤163
≤167
≤174
≤179
≤185
≤189
≤193
≤197
≤202
≤213
≤223
≤231
≤252

The map displays the Rental Affordability Index (RAI) for various Local Government Areas (LGAs) in Greater Perth. The color scale ranges from dark red (lowest RAI) to dark green (highest RAI). LGAs like Mandurah and South Coast are predominantly red/orange, indicating lower affordability. Central urban areas like Perth City and Peel show a mix of colors, while coastal and rural areas like South West and Great Southern are mostly green, indicating higher affordability. A legend on the left lists the RAI values corresponding to each color. A north arrow and a scale bar (0 to 17.2 km) are located in the bottom right corner.

### Greater Perth Rental Affordability Index (RAI) Census 2016

Housing Affordability Project  
Rental\_ind

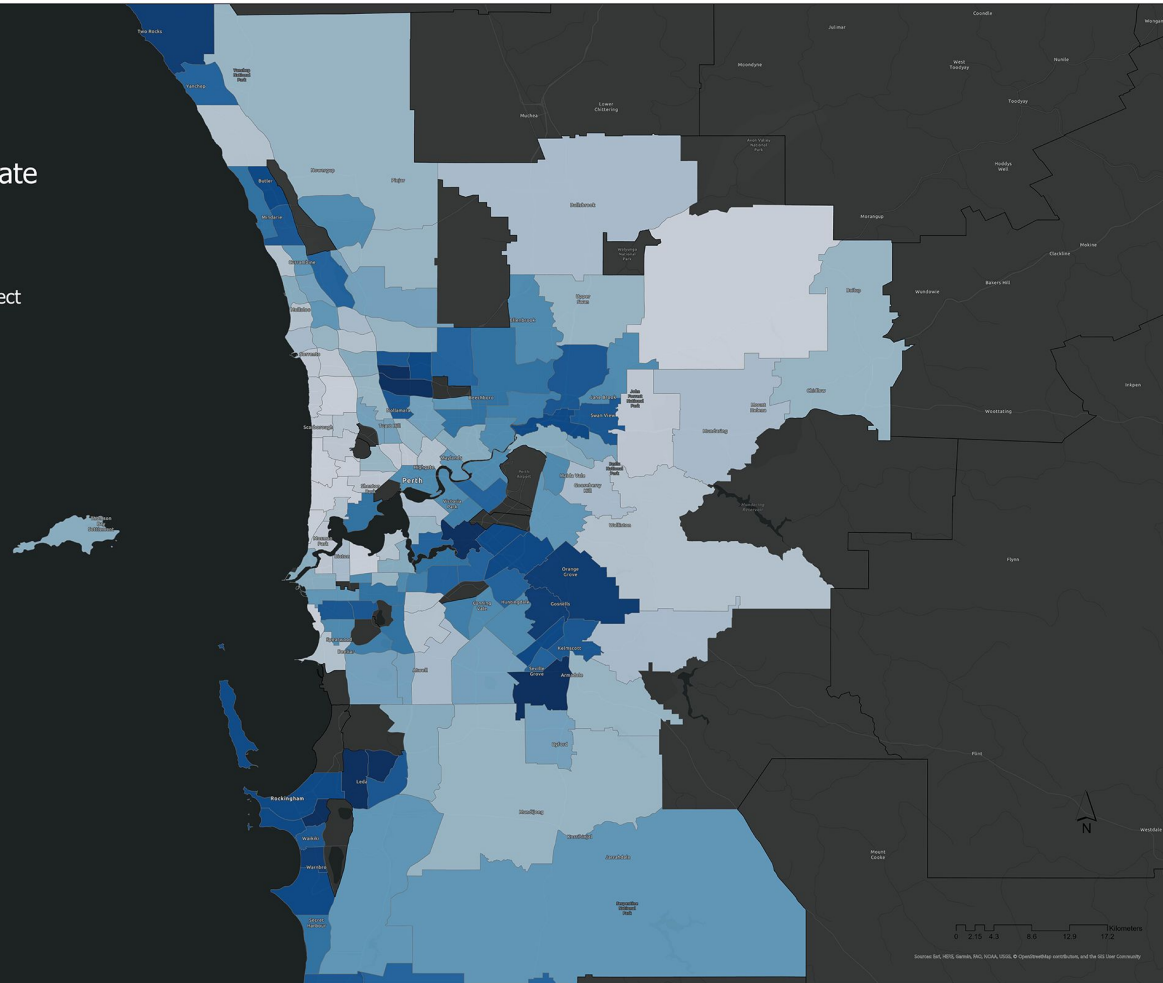
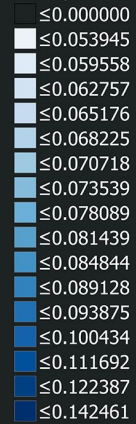
Rental Ind
≤0
≤113
≤136
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≤167
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The map displays the Rental Affordability Index (RAI) for various Local Government Areas (LGAs) in Greater Perth. The color scale ranges from dark red (lowest RAI) to dark green (highest RAI). LGAs like Bayswater, Belmont, and Swan are shown in dark red, indicating lower affordability. LGAs like Shire of Arrowsmith and Shire of Mundaring are shown in dark green, indicating higher affordability. The map includes a north arrow and a scale bar.

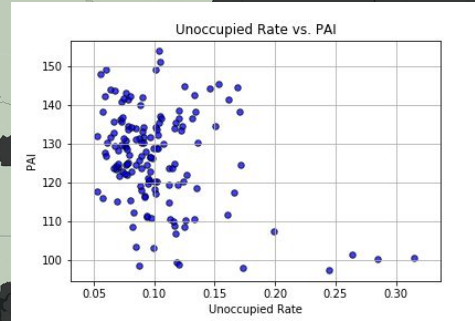
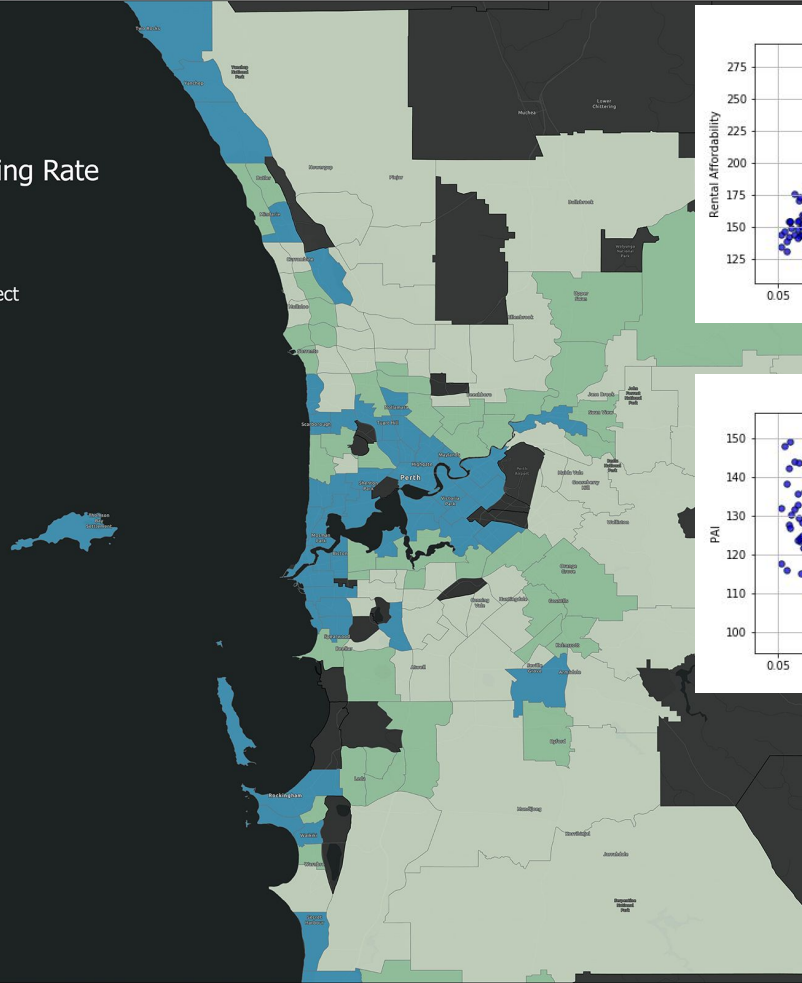
Source: ABS, HES, Bureau of Health, NCHS, NCHS, NCHS, & Queensland's contribution, and the 10-year Community

# Greater Perth Unemployment Rate Census 2016

Housing Affordability Project  
Unemplo



Housing Affordability Project  
Unoccu

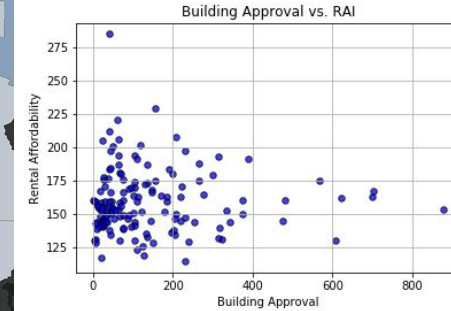
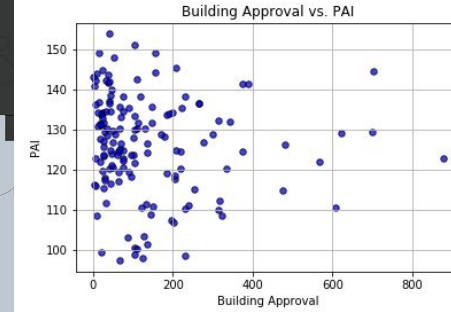


# Greater Perth Building Approval Numbers (Residential development) Census 2016

Housing Affordability Project

Buil\_app

- ≤3
- ≤8
- ≤20
- ≤29
- ≤37
- ≤46
- ≤54
- ≤76
- ≤96
- ≤117
- ≤136
- ≤171
- ≤222
- ≤278
- ≤389
- ≤623
- ≤877



# Greater Perth Change in Population Census 2011-2016

SA2\_2016\_AUST  
population\_entire\_change

- ≤ -2631.000000
- ≤ 16.000000
- ≤ 99.000000
- ≤ 206.000000
- ≤ 323.000000
- ≤ 424.000000
- ≤ 495.000000
- ≤ 569.000000
- ≤ 652.000000
- ≤ 864.000000
- ≤ 1121.000000
- ≤ 1351.000000
- ≤ 1683.000000
- ≤ 2265.000000
- ≤ 4144.000000
- ≤ 8141.000000
- ≤ 16913.000000

