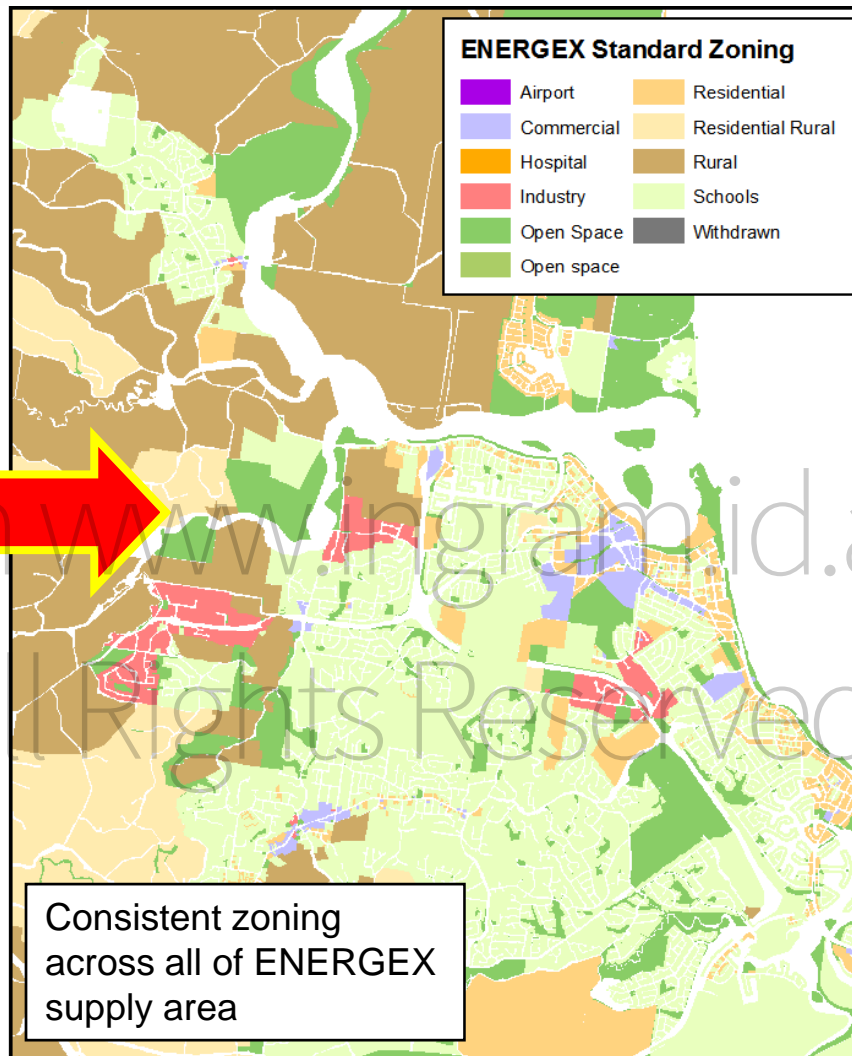
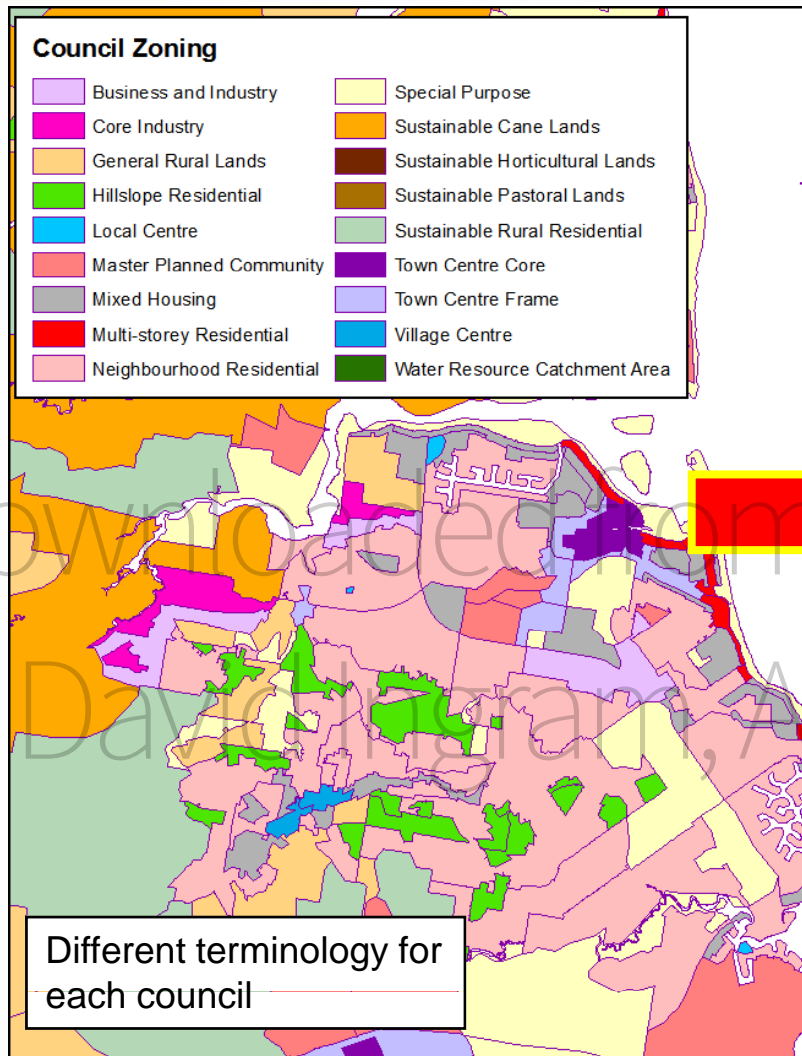




Spatial Load Forecasting & Substation Location Optimisation

David Ingram (Network Development Planning Dept.)

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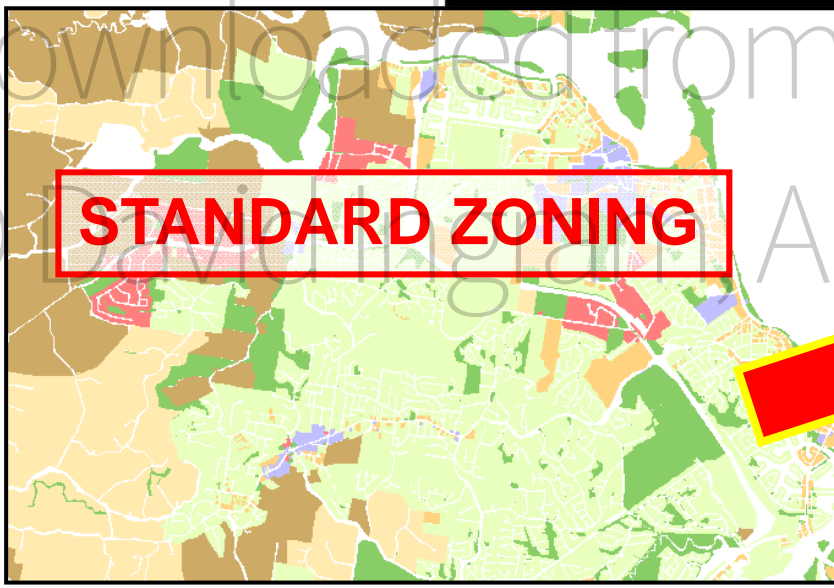
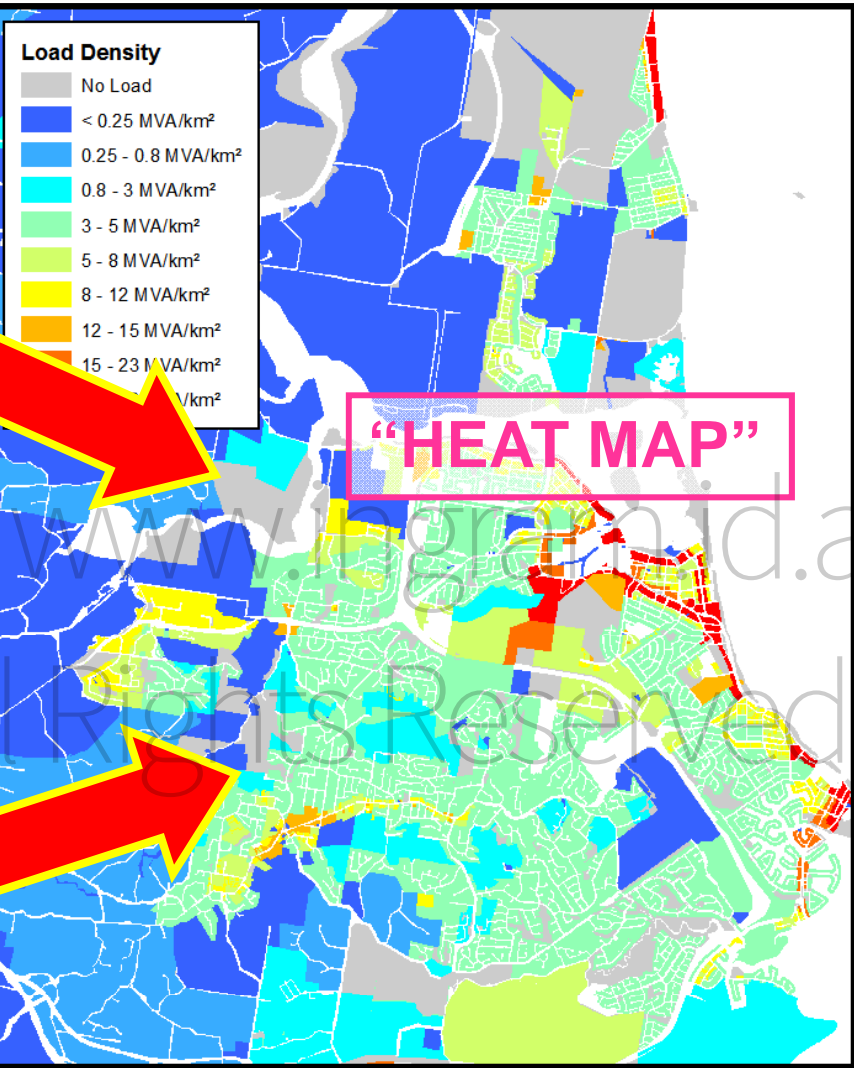


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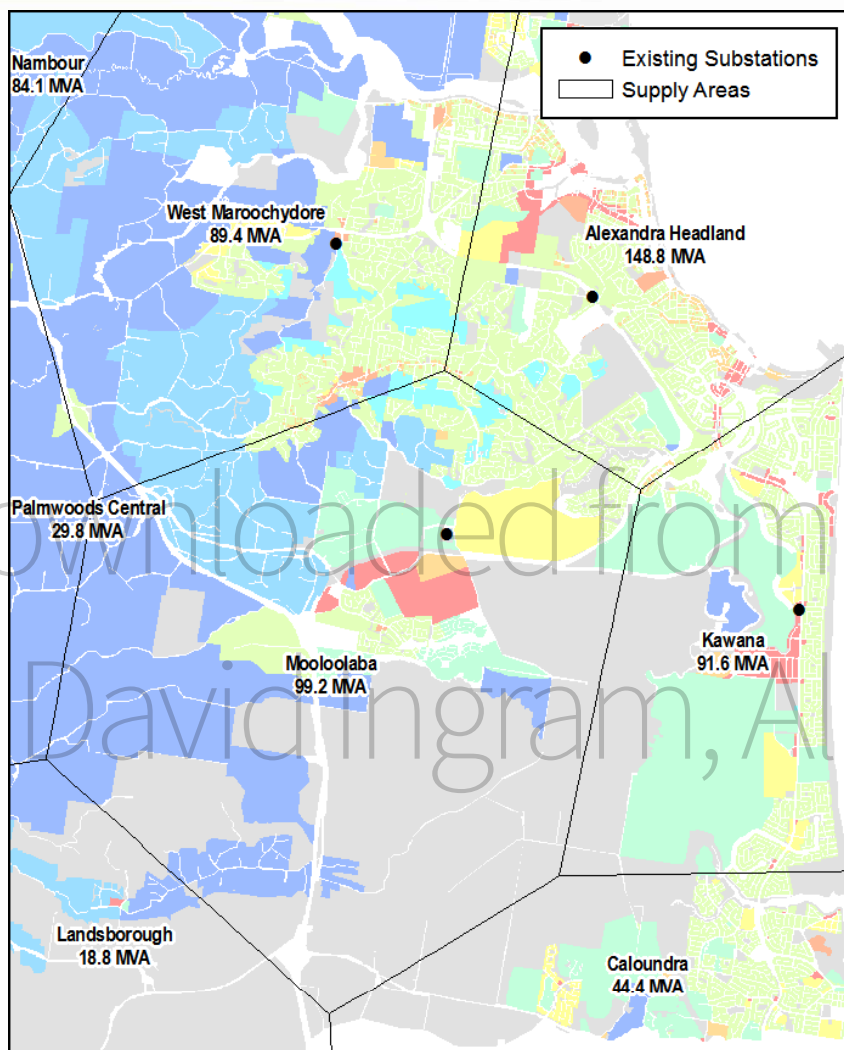
	A	E	F
1	Standard Zoning	New Description	Load Density
20	Commercial 9	Major shopping centre, such as Capalaba Park.	105 MVA/km ²
21	Commercial 10	Major shopping complex.	120 MVA/km ²
22	Commercial 11	Major shopping complex.	135 MVA/km ²
	Commercial 12	Principal activity centre shopping complexes, such as Carindale, Chermside and Indooroopilly.	150 MVA/km ²
23			
24	Residential A 1	Detached residential with 400m ² blocks	1 MVA/km ²
25	Residential A 2	Detached residential with 300m ² blocks	2 MVA/km ²
26	Residential A 3	Detached residential with 200m ² blocks	3 MVA/km ²
27	Residential A 4	Detached residential with 150m ² blocks	4 MVA/km ²
28	Residential A 5	Detached residential with 100m ² blocks	5 MVA/km ²
	Residential A 6	Low density detached residential with 600m ² blocks (eg. BCC LR)	6 MVA/km ²
29			
	Residential A 7	Low/medium density detached residential with 600m ² blocks (eg. BCC LMR)	7 MVA/km ²
30			
	Residential A 8	Medium density detached residential with 400m ² blocks (eg. BCC MR)	8 MVA/km ²
31			
	Residential A 9	Undeveloped future detached residential with 600m ² blocks, with roads and parks yet to be formed.	5 MVA/km ²
32			
	Residential B 1	Medium density unit residential with 330m ² units (75 people per hectare)	9 MVA/km ²
33			

LOAD DENSITY TABLE



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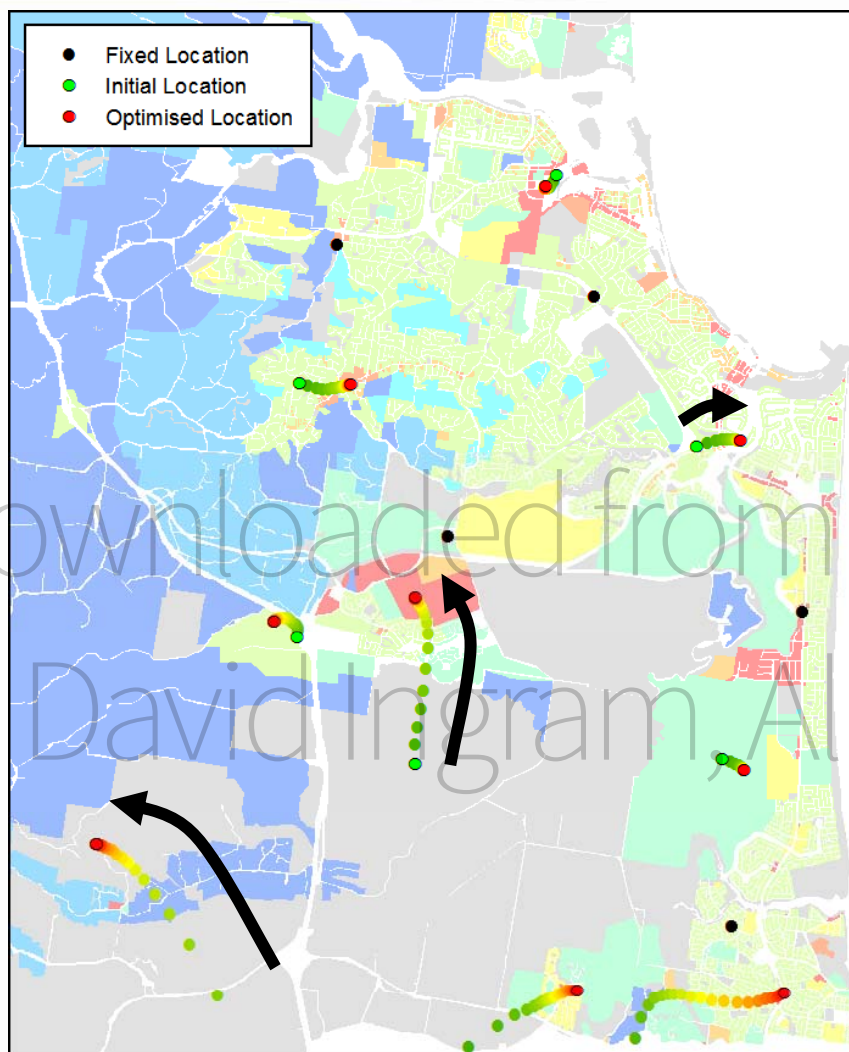
“Fully Developed” load existing substations



- “Fully developed” load is determined for existing substations.
 - Assumption is that no new substations are built.
 - Loads will be too high for existing substations, but gives an indication of number of future substations that will be required.
- ‘Supply area’ is the boundary of land that is closest to any given substation.

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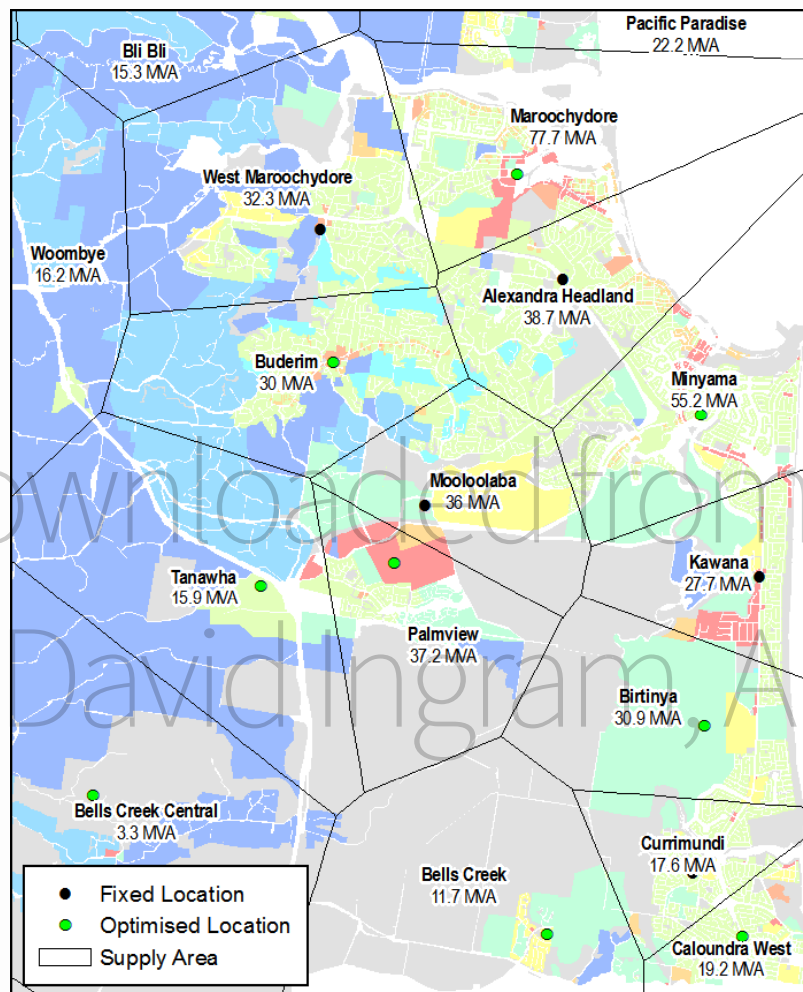
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- Additional substations are added.
 - Some will be fixed in known locations if a site has been purchased.
- “Variable” substations have location optimised to minimise the load-substation distance.
 - Minimises voltage drop.
- Each iteration moves the substation a small amount.
- Stop when the maximum shift is within a given tolerance.

“Fully developed” load with additional substations

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- Check loads again after optimisation.
- Loads on each substation have reduced.
- Some substations are lightly loaded.

may not be required.

- Loads on some may still be too high.
 - Add additional sites.
 - Run optimisation again.

positive energy

- Contact me:

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Network Development Planning Department

Phone

Email

- Two papers (oldies but goodies):
 - K.O. Mitchell, “Use of Load Density Techniques in Power System Load Forecasting and Zone Substation Site Selection”, *Electrical Engineering Transactions (IEAust)*, Vol. EE9, Nos. 1&2, pp 6-12, 1973.
 - H.L. Willis and J.E.D. Northcote-Green, “Spatial Electric Load Forecasting: A Tutorial Review”, *Proc. IEEE*, Vol. 71, No. 2, pp 232-253, 1983.