

Researchers design industrial estate using sustainability principles

February 20 2014, by Geoff Vivian



Geraldton was used as the case study to show how sustainability principals can easily be applied to industrial zone planning. Credit: Don Pugh

An engineer and an environmental scientist have designed an industrial estate using sustainability principles.

It is intended for land adjacent to the proposed Oakajee [iron ore](#) port,

north of Geraldton in WA's Mid West.

PhD candidate and sustainability designer David Galloway says the philosophy of [industrial ecology](#) embodies two principles: linking industries for mutual benefit, like organisms in an ecosystem; and placing industry benignly within existing bio-geophysical and social systems.

He says the first was a challenge, as they did not know which industries would develop over the estate's projected 50-year development.

They therefore developed what he describes as "metaphors" to help imagine the requirements of certain types of industry.

One such metaphor was "hot, wet and heavy".

"An example for that would be most iron ore processing facilities," he says.

"They're heavy in the sense that they're moving a lot of heavy material, hot because they involve some type of mineralogical processing, and they're wet because they use a lot of water."

They allocated 200 hectares for this purpose, as a worldwide survey of iron ore smelters showed they require this much land.

They located "hot wet and heavy" industry near land allocated for a power plant, so heat generated by a smelter could be used to help generate electricity—it would create an opportunity for industrial "symbiosis".

They also placed it near the proposed port, to minimise transport costs.

While applying the second principle, strategically placing the estate within other systems, they considered Geraldton's future growth.

The city is expected to expand northwards, so they planned a [sewage plant](#) at the estate's southern boundary, or the northern boundary of the city's planned extent.

This could create several options.

It could supply a planned water factory that could pipe potable water back to the city or make water available to industry.

The water factory could also incorporate a seawater desalination plant.

If a sewage plant employs anaerobic treatment technology it would create the opportunity to generate methane gas for use by other industries.

Suitable corridors of reserved land, wide enough to accommodate water pipes, electrical cables and gas lines, keeps options for such opportunities open.

"Part of the exercise that we did was to tell the engineering story that demonstrated it is legitimate and quite do-able," Mr Galloway says.

"Engineers, they're fantastic 'machines'.

"If you give them a set of 'rails', they're going to 'run' on those rails quite happily."

More information: David Galloway, Peter Newman, "How to design a sustainable heavy industrial estate," *Renewable Energy*, Available online 4 January 2014, ISSN 0960-1481,

[dx.doi.org/10.1016/j.renene.2013.11.018](https://doi.org/10.1016/j.renene.2013.11.018).

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