Geospatial tools to assess environmental impacts of urban regeneration

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Urban planning should seek to mitigate negative environmental impacts of urban regeneration. This not only requires reliable evidence on the likely consequences different urban regeneration options have on the environment; but it also calls for a better understanding of which changes in (environmental) policy are best placed to improve urban outcomes.

We developed two **spatial tools (ENVISION and ESP) to inform urban planning** stakeholders on **where and how urban regeneration is environmentally and socio-economically feasible** within the National Science Challenge 11 "*Building Better Homes, Towns and Cities: Ko ngā wā kāinga hei papakainga*". They can help support decisions on residential, institutional and commercial regeneration.

Where to regenerate?

ENVISION, a spatial tool to
- identify urban areas across the city suitable for specific regeneration strategies, through user-defined **multi-criteria evaluation** (MCE);
- identify land parcels prone for redevelopment, considering a **Redevelopment Potential Index** (RPI), site-specific infrastructure, amenities, and constraints;
- assess **financial viability** of regeneration scenarios (at neighbourhood scale)
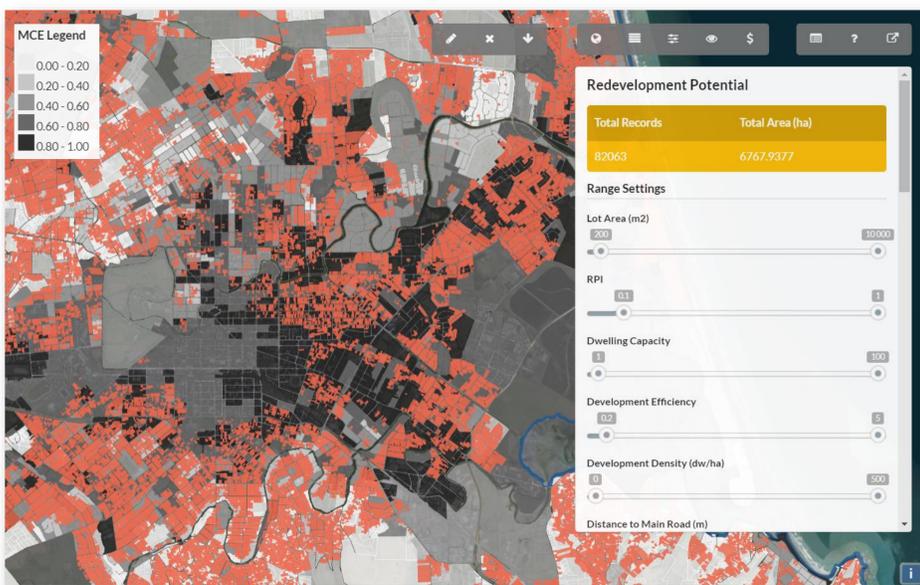
Screenshot of suitable land parcels (in red) for a regeneration scenario identified through ENVISION

How to regenerate?

**ESP**, a spatial tool to   **model**   **visualise**   **assess**

environmental & socio-economic costs and benefits of regeneration scenarios:

Built environment	Environmental impacts	Socio-economic impacts
• Population & dwelling density • GFAs • Site area • # residents & jobs • Open space area • Parking area • Land value etc.	• Energy demand & generation • Water demand & capture • CO_2 impact (embodied, sequestrated, operating)	• Property costs • Operating costs • # jobs created • # residents allocated • # trees allocated • Open space area

Regeneration scenarios can be assessed and compared in ESP based on the above outlined indicators

Example neighbourhood regeneration scenarios:
- **Minimization of a city's carbon foot print** through carbon sequestration by green spaces, cycle-ways and energy- and water-efficient buildings;
- **Balancing environmental and economic costs** through advanced buildings and open spaces enabling water capture and energy generation
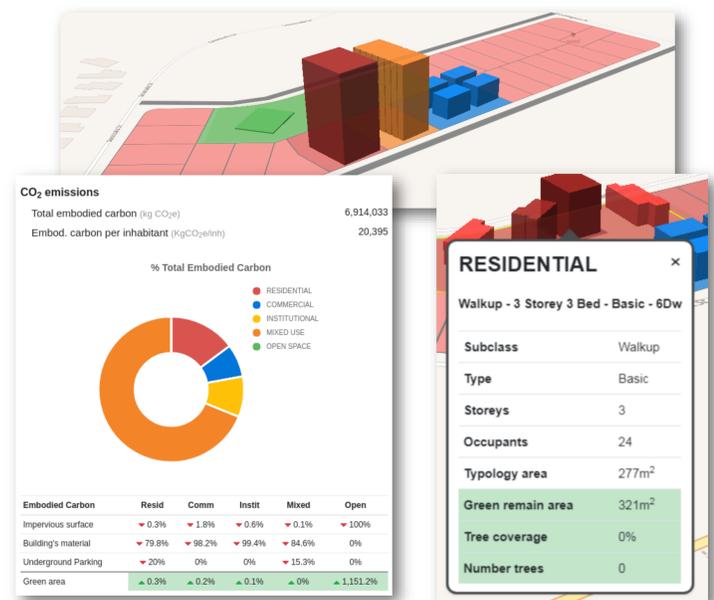
Screenshots of ESP: scenario visualisation and example assessment reports

Key values of ESP/ENVISION to stakeholders

- Easy, **graphical visualisation** of outcomes for engagement
- Translation of strategies into **workable scenarios**
- Modelling interdependencies
- Assessment of **environmental & socio-economic effects**

Key uses of tools in New Zealand's planning

Provision of **evidence**
Testing of new ideas, exploratory analysis
Modelling of **alternative scenarios**
Increasing **transparency**
'Storytelling'

Changes in policy to improve urban outcomes

- tools can flexibly recognize **local variations**
- facilitate **alignment** of tools with regulatory frameworks (e.g. RMA)
- provide **consistency** in planning vision & political expectations
- allow for **flexibility** towards alternatives
- foster **engagement, trust & collaboration**

Conclusion

New Zealand's urban planning decision-support tools so far offer a predominantly market-driven perspective which strongly advocates for developers' interests in 'business as usual' approaches to redevelopment, ENVISION/ESP add value by adding **alternative community responsive outcomes**; these have the potential to **mitigate carbon emissions, water and energy use, and land consumption** etc.

Tools like ENVISION/ESP can **inform conversations** among decision-makers, planning teams and communities **about what needs to be in place** to achieve environmentally feasible urban outcomes. Continuous **engagement** with the help of the tools can advise the planning – policy discourse.

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