



# Using the CSIR urban simulation platform to support land use management and public transport investment planning: Nelson Mandela Bay

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## Aims and objectives

The specific case study conducted by the Department of Rural Development and Land Reform in collaboration with CSIR and Nelson Mandela Bay Metro aimed to investigate the value of using Urban Simulation in support of public transport decision-making and land use management. In this case it was applied to investigate what the requirements are in terms of densities and land use along the proposed corridors to support and ensure efficiency and viability of the integrated public transport systems, under certain growth conditions.

## How the urban simulation platform was applied

For NMBM various scenarios were developed through a separate process aimed at ensuring the long term financial sustainability of the metro. Only the preferred outcome scenario aptly named 'Walking together' and a variation of that scenario based on an optimistic growth target for the automobile manufacturing industry based in Uitenhage is considered here. With public transportation being an important factor to consider in the financial sustainability debate, the metro had an interest in land use and densities along the proposed corridors to minimise subsidisation of integrated public transport services.

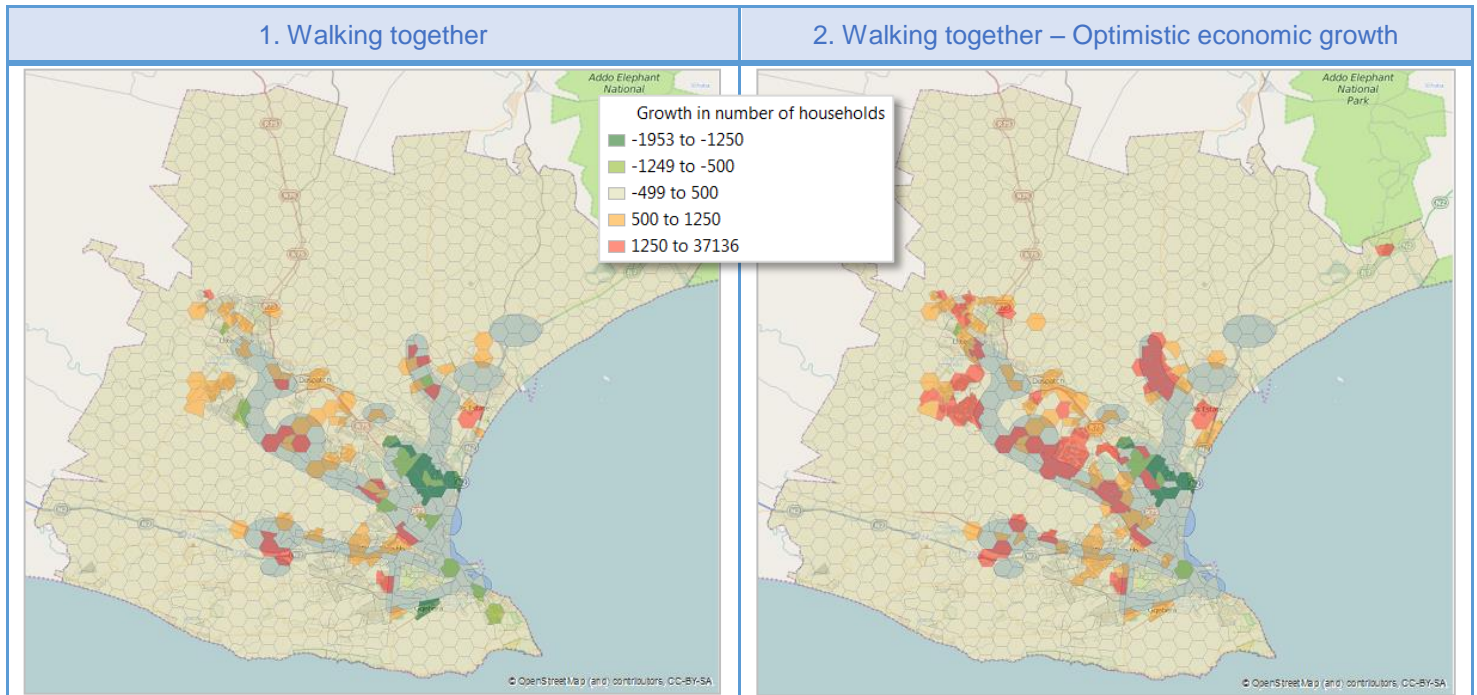
The 'Walking Together' scenario simulated growth in households over 30 years from 2001 with the implementation of the first phase of the integrated public transport system. The 'Walking together – Optimistic economic growth' scenario simulated growth over 30 years from 2001 with all phases of future public transportation system.

## The outcomes and outputs of the exercise

The first simulation correctly predicted areas of decline evident from the 2001 to 2011 census. The second simulation, with appropriate release of land, achieved 23% increase in density within the identified corridors. At 15 du/ha, this is still relatively low, but can be improved by employing better spatial targeting. It was also noted with this scenario that household growth resulting from economic injection in Uitenhage manifests all



over the corridors, a possible unintended consequence of public transportation which would not have been anticipated without simulation.



Using the platform, different land use schemes were simulated for the metro until a scheme was reached where the correct mix of land is released into the market and where enough land is available at the required densities in the right areas to accommodate the expected growth in households and employment, to ultimately facilitate a viable and effective public transport system. The influence of the integrated public transport system on the choices that are made by households and businesses are simulated so that the city can see the impact of the integrated public transport on locational choices of households and businesses. This exercise, especially the fact that even with access to sophisticated modelling tools it took about four attempts to come up with a suitable solution, illustrates that to develop an appropriate land use scheme for a city, it is essential to use a spatial modelling tool, such as the CSIR's Integrated Urban Simulation Platform, to test certain land use scheme scenarios.

### Resources

Coetzee M., Waldeck L. , Le Roux A., Meiklejohn C., Van Niekerk W. & Leuta T. Forthoming. Spatial policy, planning and infrastructure investment: Lessons from urban simulations in three South African cities. *Town and Regional Planning*.

Pieterse, A., Van Huyssteen, E & Waldeck, L. 2015. *Viability study for the development and implementation of a national Land Use Change Monitoring Tool Set: Section 2.2: The value of using urban simulation for land use management and planning – A case study of the Nelson Mandela Bay Metro*. Unpublished CSIR Client Research Report.