



Claus
Rabe

PERSONAL DETAILS

Date of Birth:	20 October 1980
Languages:	English (Excellent) Afrikaans (Excellent)
Prof. membership:	SACPLAN Pr Pln A/2560/2017
Years' experience:	15 years
Countries worked in:	South Africa, Egypt

CONTACT INFO

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ACADEMIC BACKGROUND

- Cert. of HE in Arch. (*Dist.*), Leicester U., 2021
- MSc Urban Mgmt. (*Dist.*), TU-Berlin, 2011
- M City & Regional Planning, UCT, 2006
- B Policy Studies (with Economics), Stell., 2004

AWARDS

- Leicester Uni. Archaeology Prize (2021)
- Cape Town Service Excellence Award (2016)
- SAPI National Planning Award (2014)
- Ernest Oppenheimer Scholarship (2009)

FIELD OF SPECIALISATION

Claus is a director at PDG and leads its **Urban Economies** practice area.

Claus is an analyst with an interest in urban planning, urban economics and spatial modelling. With fifteen years' experience spanning public and private sectors, Claus has led teams of engineers, data scientists, economists, and municipal finance experts across a wide range of development and institutional contexts. Leading PDG's Data Transition portfolio, Claus is passionate about finding new ways to harness emerging analytical methods to solve complex real-world problems.

He holds majors in Economics and Decision-making from Stellenbosch, a Master's in City and Regional Planning from the University of Cape Town, and – as an Ernest Oppenheimer scholar – a distinction from the Berlin University of Technology for his work on urban safety. Academically engaged, Claus has authored numerous papers on evidence-led approaches to urban policy and guest lectures on the subject of urban economics and public sector innovation. He is currently finalising his research proposal pursuant of a PhD under the supervision of Prof Philip Harrison at Wits University.

WORK EXPERIENCE

Sep 19 – present

PDG, Cape Town, South Africa
Director (Portfolio : Data Transition)
Practice Area Lead: Urban Economies

Mar 17 – Aug 19

PDG, Cape Town, South Africa
Senior Consultant
Practice Area: Urban Systems

June 11 – Feb 17

City of Cape Town
Metro Spatial Planning and Growth Management
Principal Planner

Sep – Dec 10

GTZ South Africa, Pretoria
Local Expert in Urban Management

Apr – Jun 10

GTZ Egypt, Cairo
Participatory Planning Consultant

May 07 – May 11

Silimela Development Services, South Africa
Development Consultant

Jan – May 07

PDG, Cape Town, South Africa
Subcontracted Intern

KEY PROJECTS

2021 Financial Model and Market Assessment for DBSA Municipal Bulk Infrastructure Financing Product. Role: Urban Economist. Claus performed the role of urban economist on a PDG-led team commissioned by the Development Bank of South Africa to develop a financial model to evaluate the viability of catalytic property developments. Claus is responsible for developing a stochastic market risk model which generates a probability distribution of take-up outcomes given a range of macro-economic simulations, historical rates of building development and locational attributes interpreted by means of theoretical urban economic principles.

2021 Western Cape Integrated Drought and Water Resource Plan. Role: Urban Economist. Claus performs the role of urban economist on a Zutari-led team commissioned by the Department of Local Government to develop a suite of interventions to ensure a coordinated response to drought impact planning and management. Claus is responsible for, inter alia, synthesising a wide range of available spatial, administrative, demographic and economic data and knowledge into a credible set of long-term settlement- and sector-level economic and population growth projections across the province. These projections are then used to reconcile future water demand and supply.

2020- Future Cities Technical Assistance Programme. Role: Urban Economist. Claus is part of a three-year programme of technical assistance to the cities of Cape Town, Johannesburg and eThekweni funded by the UK Foreign Office. In Johannesburg, Claus performs the role of economic development expert tasked with developing an area-based development framework for Soweto, including (1) targeted support to small businesses in light of short-, medium- and long-term impacts of COVID, and (2) removing the regulatory barriers to micro-development of rental stock in townships. In Cape Town, Claus' responsibilities include, inter alia, preparing a road map for the City's development and implementation of urban economic models, reviewing the City's key economic and sector strategies for a post-COVID environment and developing a stochastic model to assess the possible medium-term impacts of COVID on Cape Town's long-term population projections.

2020 Development of a Spatial Demographic Model for the City of Cape Town. Role: Project Lead. Claus – working in partnership with PwC - developed a population estimate model which disaggregates citywide population projections to small areas based on the City's land use model. The CPOP2 model draws on synthetic population generation and neural network-based association, to distil relational patterns between dwelling units, households and individuals based on the 2011 baseline data. In doing so, the City is able to place synthetic households and individuals with complete attributes within formal and informal dwelling units of different categories and within different neighbourhood types, from 2016 to 2040.

2020 Property Impact Assessment of Gautrain Rapid Rail Extension. Role: Property Economist. Claus was commissioned by Pegasys (Pty) Ltd to assess the impact of the proposed extension of the Gauteng rapid rail network on the surrounding property market. Claus drew on fifteen years of administrative and third-party property market data to evaluate the impact of the existing rail network on different property market segments both at nodal and regional

level, and contrasted these with a control group of unserved business nodes within the urban region. The property rates revenue accruing to the City of Johannesburg as a result of new building development and property price changes was estimated. This workstream concluded with Claus conducting a detailed property feasibility study on alternative TOD development scenarios on the proposed Randburg station site.

2019 Costing Development in Discouraged Growth Areas. Role: Project lead. Claus was commissioned to develop a business plan and extend the geographic extent of its Spatial Costing Tool to include the ability to assess the capital and operational costs of development proposals located beyond the City's prioritised growth areas. The purpose of the tool is to firstly provide City officials charged with evaluating the desirability of development proposals with a comprehensive view of costs, and secondly to inform ongoing policy deliberations on spatially differentiated tariffs and development charges. The model expansion required sophisticated spatial analysis and infrastructure costing approaches to overcome the absence of infrastructure master planning in these areas.

2019 Development of Urban Development Indices for the City of Cape Town. Role: Land Use Expert. Claus was commissioned to develop a suite of land use indices as part of a broader appointment of ITS Global to develop urban development indices to allow the City to track its performance in progressively realising spatial transformation, particularly in relation to affordable housing and public transport interventions. The design of these indices had to establish a balance between scientific rigour, sensitivity to intervention and availability of accurate and regularly updated administrative data. Claus drew on readily available data sources to develop, inter alia, a Land Use Balance Index (to determine job and resident balance per neighbourhood) and a Housing Price Diversity Index (a dissimilarity index which compares the extent to which the spread of neighbourhood-level housing prices approximates citywide patterns). The most ambitious measure, the Location Equity Index, was published academically (see Publications below).

2019 Diagnostic Assessment of Nine Intermediate City Municipalities. Role: Senior Expert. Claus formed part of a team of senior consultants commissioned by the World Bank to undertake a strategic diagnostic assessment of nine South African Intermediate City Municipalities ('ICMs') to inform the ICM Support Programme being developed by the Department of Cooperative Governance and Traditional Affairs as part of their implementation of the Integrated Urban Development Framework. Claus was responsible for evaluating strategic challenges and opportunities from a spatial and economic lens.

2019 Impact Evaluation of the Housing Chapters Programme of the National Department of Human Settlements. Role: Project Lead. Claus was responsible for leading a team of consultants in the evaluation of a ten-year programme by the National Department of Human Settlements. The evaluation commenced with the development of a theory of change, interrogated by means of a mixed method approach. In addition to over 60 interviews and an online survey, planning documents and budgets from a scientifically representative and stratified sample of municipalities were analysed from 2005 onwards.

2018 Diagnostic Modelling of Municipal Viability for National Treasury, Role: Project Manager. Commissioned to undertake a study of 24 local municipalities in Gauteng and North West Province to assess the strength of the municipal revenue base and the ability to generate sufficient revenue from levying property rates and rendering municipal services to communities. Claus was responsible for developing a data-driven diagnostic model to evaluate the root causes of municipal non-viability, ranging from economic and demographic factors and policy choices to fiscal effort and the efficacy of administrative systems.

2018-19 Financial Mechanisms and Models Towards Economic Water Resilience for PGWC. Role: Modeller. PDG was tasked with investigating the contexts under which a hybrid centralised-decentralised municipal water supply system could work in six municipalities. Claus designed the initial model architecture and led the climate and business modelling component to understand whether hybrid systems will benefit or impact businesses and affect municipal revenue. This included ten-year probabilistic modelling of rainfall scenarios on bulk water availability and disruption risk and a sector-by-sector analysis of water consumption elasticity. These model outputs were used to assess the implications of water tariffs and water structures on municipal revenue on the one hand, and business profitability, viability, and decision-making processes on the other.

2018 Western Cape LandCare Programme Evaluation, Role: Evaluator. Commissioned by the Western Cape Department of Agriculture (in partnership with Blue North Sustainability) to conduct an impact-, economic- and design evaluation of the LandCare programme. Claus was responsible for conducting an on-site evaluation of the rural Central

Karoo and Cape Winelands districts, interviewing dozens of farmers, officials, and beneficiaries on the impact of the LandCare programme on economic water resilience. Evaluated interventions included GIS mapping and fencing, farm planning, alien clearing and river protection works.

2018 Long-term Population Projections for Area-based Service Delivery Regions for City of Cape Town, Role: Project Lead. Responsible for leading a team of actuarial demographers in developing a population projection model for each area-based service delivery area in Cape Town from 2016-2040. Beyond leading the team, Claus conceptualised and developed a spatial adjustment module to account for the effect of path dependencies (e.g. housing pipeline), local capacities (e.g. land availability) and interdependencies (e.g. land markets and boundary effects) on demographic processes.

2017 Role of Development Finance in Contributing to Integrated Urban Development, Role: Urban Economist. The purpose of this research was to understand the extent to which the work currently undertaken by the Development Bank of South Africa supports the objectives of the Integrated Urban Development Framework. The research recommended project identification, on- and off-balance sheet financing, and the extension of DBSA's trade-off model to include spatial effects, as new ways in which the Bank can stimulate urban development. The findings of this work informed the DBSA's corporate planning processes.

2017 Economic Impact Study of Klappmuts Industrial Hub for Distell, Role: Urban Economist. Responsible for conducting impact evaluation of a 50 hectare, multi-billion Rand industrial hub in a strategically complex site in Klappmuts located on the municipal boundaries of Stellenbosch, Drakenstein and Cape Town. Claus' role was to provide an evaluation based on likely regional local and economic impacts, sector impacts and knock-on impacts on the overall urban system.

2017 Impact Evaluation of the Foreshore Freeway Proposal for V&A, Role: Urban Economist. Conducted an evaluation of direct, indirect and induced economic and indirect effects of a R10bln development proposal by the Waterfront Company. Claus was responsible for setting up and running several impact models, including a Social Accounting Matrix, PDG's Spatial Costing Tool and alternative City of Cape Town Land Use Scenarios.

2016- Land Use and Transport Interaction Model for the World Bank, South Africa. Role: Local Expert. Ongoing collaboration with the World Bank Research Group and the Paris-based Centre for International Research on the Environment and Development (CIRED) to design, develop, validate and embed the NEDUM 2D Land Use and Transport Interaction Model for implementation as a policy simulation and decision-making tool for Cape Town's strategic planning function. The collaboration has recently received additional funding from Johns Hopkins University to extend the model to include the impact of flooding on informal settlements in Cape Town.

2015-16 Review of the Cape Town Spatial Development Framework, Role: Principal Planner. Led an extensive 10-year review of demographic, housing, economic, infrastructure, fiscal and resource trends across Cape Town to frame the City's main spatial priorities over the medium-term. By systematically harnessing vast sets of highly disaggregated administrative data and sector models, this ambitious project provided both a depth and breadth of analysis hitherto unprecedented in cross-sectoral and multi-scalar spatial analysis of a South African city.

2014-17 Medium Term Infrastructure Investment Framework for the City of Cape Town, Role: Project Lead. Successfully devised and implemented the largest professional consulting tender issued by the City of Cape Town forward planning function, leading a team of engineers and municipal finance experts in the development of a spatial decision-making tool comparing lifecycle impacts of alternative citywide land use scenarios, and to develop an evidence base to inform the Cape Town's growth management plans.

2011-15 Economic Areas Management Programme ('ECAMP') for City of Cape Town. Role: Programme Lead. Claus conceptualised, developed, and embedded a suite of data-driven spatial diagnostic tools which has tracked over a hundred indicators of market performance and location potential across each of 72 industrial, office and mixed-use nodes across Cape Town for a ten-year period. Market performance variables, which include inter alia rentals, vacancy, sales, building plan applications and completions, are regressed against a range of location potential indices such as agglomeration and complexity, land and infrastructure availability, 'crime and grime' and time-distance to regional economic gateways and labour markets. The ECAMP model performs a moving diagnostic of the node in terms of its development lifecycle in order to guide both public and private investment decision-making across business nodes.

Claus received a National Planning Award, a Certificate of Recognition for Service Excellence, and an opportunity to present the work at an international MISTRA conference in Gothenburg, Sweden.

2012 Economic Feasibility Assessment of Wescape Development Proposal for City of Cape Town; Role: Urban Economist: Responsible for assessing the economic feasibility of the R140 billion Wescape development proposal, which included 200 000 dwellings. Conducted extensive analysis of locational behaviour of firms in Cape Town in relation to the locational assets and constraints associated with site, with the aim of ascertaining the reasonable economic prospects of the proposed development.

2012 Property Feasibility Appraisal of Valhalla Business Park for City of Cape Town, Role: Urban Economist. Conducted market feasibility analysis on City-led precinct-level interventions to determine best and highest use, bulk and alternative spatial configurations.

2011 Extension of Urban Development Zone for the City of Cape Town, Role: Urban Economist. Responsible for extending the spatial extent of the Urban Development Zone on the back of a rigorous analytical and consultative framework. Successfully motivated for this extension in line with the eligibility and delineation criteria established by National Treasury and received sign-off by Council and the Minister.

2011-2012 Cape Town Integrated Planning Portal for the City of Cape Town, Role: Process Manager: Responsible for integrating sector-based legacy websites into a single spatial information portal.

2010 Participatory Development Programme for GTZ and Cairo Governorate, Egypt, Role: Participatory Planner. Developed and published an evaluation of local slum conditions and formulated an appropriate upgrading programme in partnership with the Cairo Governorate.

2010 Expert Appraisal Mission for Violence and Crime Prevention Programme for German Agency for Technical Cooperation, Role: Local Expert: Local counterpart to an international mission to determine feasibility of rolling-out a violence prevention programme in South Africa.

2009 OECD Territorial Review of Southern Free State for the Presidency, Role: Project Manager. Applied the OECD Territorial Review methodology to the Xhariep District Municipality and its alignment with the National Spatial Development Framework.

2008-2009 OECD Territorial Review of Kimberley and Surrounds, for The Presidency, Role: Project Manager. Applied the OECD Territorial Review methodology to the Frances Baard District Municipality and its alignment with the National Spatial Development Framework.

2008-2009 Gauteng 2055 Development Strategy for Gauteng Provincial Department Economic Development and Planning, Role: Futures Researcher: Responsible for conducting futures research into alternative economic, environmental, social and technological scenarios linking global, regional and local trajectories and relevance for policy.

2007-2008 Review of Urban Renewal Programme Anchor Projects for DPLG, Role: Project Manager. Quantified impacts of several flagship URP projects across South Africa, and, having quantified and compared cost-benefit ratios, identified and documented success factors across different institutional and urban contexts.

2007-2008 Impact and Effectiveness of Urban Development Incentives for SACN, Role: Project Manager, Quantified impacts of several area-based incentives across South Africa, and, having quantified and compared cost-benefit ratios, identified and documented success factors across different institutional and urban contexts.

2007 Public Investment Strategy for Cape Winelands District Municipality, Role: Project Manager. Developed a regional investment strategy to guide spatial intervention across various local municipalities on the back of economic analysis and extensive face-to-face interviews with stakeholders and officials across the region.

PUBLICATIONS

BRUECKNER, J.K., RABE, C., SELOD, H., 2019. Backyarding: Theory and evidence for South Africa. *Regional Science and Urban Economics* 79, 103486. <https://doi.org/10.1016/j.regsciurbeco.2019.103486>.

PFEIFFER B., RABE C., SELOD H. and VIGUIE V. (2019). Assessing Urban Policies Using a Simulation Model with Formal and Informal Housing : Application to Cape Town, South Africa. Policy Research working paper; no. WPS 8921; Paper is funded by the Strategic Research Program (SRP). Washington, D.C. : World Bank Group.

RABE, C. (2019). Measuring Spatial Transformation in South African Cities: a Location Equity Approach. The Journey to Transform Local Government. Cape Town. Juta (ISBN 978-485-133056).

RABE, C. & ROUSSEAU, E. (2016): Turning Data into Actionable Intelligence: Cape Town's ECAMP tool. Planning Law Reform in the Western Cape: The Road to Transformation (ISBN 978-0-621-44991-4).

RABE, C., MCGAFFIN, R. and CRANKSHAW, O. (2015). A Diagnostic Approach to Intra-Metropolitan Spatial Targeting: evidence from Cape Town, South Africa. Development Southern Africa. DOI 10.1080/0376835X.2015.1063988.

BELTRAN del RIO GARCIA, L., and RABE, C. (2010). Case study: Ezzbet Al Nasr. In Fokdal, J. & Zehner, C. (Eds.), *Improving Informal Areas in Greater Cairo. The cases of Ezzbet Al Nasr and Dayer El Nahia* (pp. 34-60). TU Berlin.

PREFERRED ANALYTICAL TOOLS

Data modelling, statistical analysis and visualisation: Excel, R Studio, R Markdown

Spatial analysis and spatial statistics: QGIS3, ArcMap 10.6, R Studio, R Markdown

Data mining and machine learning: Python, Jupyter Notebook