

CURRICULUM VITAE

Marco van Dijk



December 2016

CURRICULUM VITAE

1. PERSONAL INFORMATION

Surname: Van Dijk
First name: Marco
ID Number: 7406205317086
Citizenship: South African
Title: Mr
Gender: Male
Present employment: Lecturer
Department of Civil Engineering
University of Pretoria
Hillcrest
Pretoria
0002
Director
Green Hippo Innovations
317B Alpine Way
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2. ACADEMIC EDUCATION

Degree: BEng (Civil Engineering)
Field of study: Civil Engineering
Institution: University of Pretoria
Year obtained: 1996

Degree: BEng (Hons)
Field of study: Water Resources Engineering
Institution: University of Pretoria
Country: South Africa
Year obtained: 1998

Degree: MEng (Water Resources Engineering)
Field of study: Water Resources Engineering
Institution: University of Pretoria
Year obtained: 2003

Enrolled for PhD studies

3. PROFESSIONAL EXPERIENCE

WORK EXPERIENCE

Period: 2000/01/01 - present
Employer: University of Pretoria, Department of Civil Engineering
Practical experience:

- Lecturing on under and post graduate levels (Hydraulics and Hydrology)

- Field investigations, experimental work and literature studies for various Water Research Commission research projects:
 - Factors influencing the friction loss in pipelines and the relationship between water quality, operating conditions and performance of liner systems.
 - Quantifying the influence of air on the capacity of large diameter water pipelines and developing provisional guidelines for effective de-aeration.
 - Potential application of genetic algorithms in the water industry: Phase 2
 - Grouted linings for renovating steel pipelines.
 - Development of a South African guide for the design and operation of waterborne sanitation systems
 - Hydraulic capacity of pipelines
 - Conduit hydropower development
 - Low head hydropower development
 - Hydropower development for rural electrification
- Have presented various continuing education courses for practicing professional engineers in Hydraulics and Hydrology (UPFLOOD, UPD, HEC-RAS and Pump station Design, Pipeline Design, EPANET, EPASWMM)
- Private consultation work:
 - *Vela VKE Consulting Engineers* - Inter modal Russel square inverted sewer siphon design
 - *Bombela Civils Joint Venture (Pty) Ltd* - Hydrological & hydraulic study for the Apies river – Pier 7.1.8 (Gautrain)
 - *Newground Projects* - Hydrological & hydraulic study for the MtFletcher housing development
 - *ESKOM* - Hydraulic analyses of the Lethabo power station
 - *Ndodana Consulting Engineers* - Review of various hydraulic designs and analyses (storm water systems).
 - *MVD Consulting Engineers* - Surge analyses, air valve and pipeline analyses (George Le Grand pipelines, Groot Brak Water supply scheme, Murraysburg pipeline, Pacaltsdorp Irrigation Scheme). Storm water network analyses (George Municipality)
 - *Rand Water* – B4, B6 & B10 pipeline systems surge analyses as part of Sinotech CC.
 - *Nyeleti Consulting Engineers* - Pipeline analyses and design reviews (Malematja Water Supply scheme).
 - *Ninham Shand Consulting Engineers* – Air valve sizing and positioning analysis (3 m diameter Gurara Transfer Scheme).
 - *WSP International Sweden AB* – Hydraulic Analysis of the Zambezi River for the construction of the 2.5 km long Caia River Bridge. This included the review of previous studies, setting-up of hydraulic model, assessing various bridge options and scour analyses for the preliminary design report.
 - *HBS Consulting Engineers* – Flood line determination (Carletonville Goldfields Rose project).
 - *VNJ Consulting engineers* – Bospoort flood lines.
 - *BVI Consulting Engineers* – Assisting with Wadeville flood lines and Lehae culvert analysis
 - *Vektor Ingenieurs* – Far East and Oliver Tambo Hospital site water reticulation designs.
 - *NTSU Engineering* - Review of the Hartebeespoort bulk sewer and pump station's design
 - *Ilifa Africa Engineers* – Hydrological and hydraulic study for Folly Gobles Bethlehem Retail and Housing Development
 - *City of Windhoek* - Hydrological and Hydraulic Analyses for the Sam Nujoma Stadium Stormwater System
 - *SANRAL* - Tsitsa Low Level River Bridge (Hydraulic and hydrological aspects)
 - *SANRAL* – Various specialist review work (flood studies)

- *Dekker & Gelderblom* - Review of various hydraulic designs and analyses (storm water systems).
- *BKS* - R27 Bridges Across Orange River (Keimoes–Kenhardt) - Hydrological and Hydraulic Assessment
- *MVD Consulting Engineers (Southern Cape)* – Various, hydrological analyses, storm water analyses, flood line determinations and hydraulic assessments.
- *MVD Consulting Engineers (Xariep)* - Hydrological analysis, flood line determination and hydraulic assessment of the Jordaan River and Atbara Spruit in Bethlehem
- *Bloem Water* - Hydraulic Assessment of the Caledon-Bloemfontein Gravity Pipeline
- *Bigen Consulting Engineers* - Hydrological and Hydraulic Study for the Barberspan Outlet Crossing the N14
- *Endecon* - Hydrological and Hydraulic Analyses of the I'langa Mall Main Storm Water System
- *ESKOM* - Prefeasibility study: Reinstatement of the Teebus hydro power project
- *Lepelle Northern Water* – Prefeasibility – Conduit hydropower development
- *SANRAL* – Drainage Manual 6th Edition
- *City of Tshwane* - Development of Conduit Hydropower in the City of Tshwane's Water Distribution System
- *SMEC* - Special maintenance (repair and reseal) of National Road 14 Section 3 between Kakamas and Keimoes - Hydrological and Hydraulic Assessment
- *ESKOM* - Teebus hydro power station phase 2 - Prefeasibility study
- *Gibb Consulting Engineers* - Hydrological and Hydraulic Study of the Old Woman's River Culvert System on Route R72
- Ingérop South Africa - Review of the Hydrological and Hydraulic Analysis of the Mposa Bridge on the N2 National Route
- *Department of Agriculture: Western Cape* - Hydrological and Hydraulic Study of the Meul River in the Western Cape
- *Gibb Consulting Engineers* – Review of Preliminary Designs of Hydropower Opportunities Welbedacht Dam.
- *SANRAL* - Gauteng flash flood investigation - November 2016

Period: 1997/01/06 - 1999/12/31

Employer: Ninham Shand (Bloemfontein) (PTY) Ltd

Practical experience:

- Responsible for the hydraulic design as well as the preparation of tender documents and drawings of the Ladybrand Sewage Treatment Works (3.6 Ml/day).
- Responsible for the hydraulic design as well as the preparation of drawings and contract administration of the following:
 - Theunissen/Masilo Sewage Treatment Works (3.5 Ml/day) (Value R10 million, year 1997/1998).
 - Bainsvlei Sewage Treatment Works (5 Ml/day) (Value R10 million, year 1997/1998).
 - De Aar - Extension of Bulk Water Supply: Boreholes (15 boreholes and booster pump station) (Value R6.5 million, year 1998/1999).
- Responsible for the preparation of construction drawings and the contract administration of the 700 mm diameter, 33 km Lieuw Kop - Bloemfontein pipeline (Value R40 million, year 1998/1999).

4. INTERESTS

Interested in pipeline hydraulics, especially the optimization of systems, complete system design, hydropower development as well as upgrading/improvement of water supply systems.

5. SCHOLARSHIP AND AWARDS

- Achievement bursaries: 1993, 1997 and 1999
- DW de Vos Bronze Medal - 3rd best final year student BEng
- Africon Eng-prize for best Civil Engineering project report in Geotechnical Engineering
- SAICE Water Engineering Award 2002 – For Significant Contribution in Software Development and Technology Transfer in the Water Engineering Field (joint award with Prof SJ van Vuuren)
- Mail & Guardian Greening the Future, Community Renewable Energy Award for the Conduit Hydropower Project (2014).
- WRC Knowledge Tree Award - New Products and Services for Economic Development (2015).

6. PROFESSIONAL AFFILIATIONS AND ACTIVITIES

- The South African Institution of Civil Engineering (Associate Member)
- Engineering Council of South Africa (Professional Engineer) - 20160807
- SAICE magazine Editorial Committee (2003 –2016)
- Member of SANCOLD
- Affiliate member of ASCE
- Engineering Institution of Zambia (Professional Engineer)

7. RESEARCH AND SOFTWARE DEVELOPMENT

Research:

Currently involved in a number of Water Research Commission research projects. The research projects include a literature study, field- and experimental work. Special focus on various types of hydropower development.

Software development:

Computer software programs have been developed for the water industry:

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|-----------------------------------|--|
| Vent-O-Mat Utility programs | - Program for the sizing and location of air valves on a pipeline as well economic evaluation of effective deaeration. |
| Everite AC Pipes Utility Programs | - Network, Surge, Structural and Hydraulic Analysis suite of programs for Fibre Cement pipeline design |
| GAPOP | - Genetic Algorithm Pipeline Optimization Program developed for the Water Research Commission |
| AQUA Hydraulics Utilities | - Program that performs a Life Cycle Analysis of a pipeline system. |
| GANEO | - Genetic Algorithm optimization program for water distribution systems |
| Utility Programs for Drainage | - A suite of programs that will assist in the hydraulic design and analyses of drainage structures (Economic calculations, flood calculations, water surface profiles, basic hydraulic calculations and surface drainage). |
| UPThrust | - Thrust block calculation program. |
| UPSurge | - Surge analysis software package based on the Surge3 analysis engine. |

8. PUBLICATIONS

8.1 Technical reports and books

Van Vuuren, S.J., Van Dijk, M. and Steenkamp J.N. (2004). *Quantifying the influence of air on the capacity of large diameter water pipelines and developing provisional guidelines for effective de-aeration*. Volume 1. WRC report no. 1177/1/04. Water Research Commission. Pretoria, South Africa.

Van Vuuren, S.J., Van Dijk, M. and Steenkamp J.N. (2004). *Quantifying the influence of air on the capacity of large diameter water pipelines and developing provisional guidelines for effective de-aeration: Provisional guidelines for the effective de-aeration of large diameter water pipelines*. Volume 2. WRC report no. 1177/2/04. Water Research Commission. Pretoria, South Africa.

Van Vuuren, S.J., Van Rooyen, P.G., Van Zyl, J.E. and Van Dijk, M. (2005). *Application and conceptual development of genetic algorithms for optimization in the water industry*. WRC Report No 1388/1/05. Water Research Commission. Pretoria, South Africa.

Van Vuuren, S.J. and Van Dijk, M. (2006). *Factors influencing the friction loss in pipelines and the relationship between water quality, operating conditions and performance of liner systems*. WRC Report No 1269/01/06. Water Research Commission. Pretoria, South Africa.

Van Vuuren, S.J. and Van Dijk, M. (2006). *Life Cycle Costing Analyses for Pipeline Design and Supporting Software*. WRC Report No TT278/06. Water Research Commission. Pretoria, South Africa.

Kruger, E.J. (Editor), Gomes, N., Rooseboom, A., Van Vuuren, S.J., Van Dijk, M., Jansen van Vuuren, A.M., Pienaar, W.J., Pienaar, P.A., James, G.M., Maastricht, J. and Stipp, D.W. (2006). *Drainage Manual*. 5th Fully revised. The South African National Roads Agency Ltd (SANRAL).

Kruger, E.J. (Editor), Gomes, N., Rooseboom, A., Van Vuuren, S.J., Van Dijk, M., Jansen van Vuuren, A.M., Smithers, J.C., Pienaar, W.J., Pienaar, P.A., James, G.M., Maastricht, J. and Stipp, D.W. (2013). *Drainage Manual*. 6th Edition. The South African National Roads Agency SOC Ltd (SANRAL).

Van Vuuren, S.J. and Van Dijk, M. (2011). *Waterborne Sanitation Design Guide*. WRC Report No TT481/11. Water Research Commission. Pretoria, South Africa.

Van Vuuren, S.J. and Van Dijk, M. (2011). *Waterborne Sanitation Operation and Maintenance Guide*. WRC Report No TT482/11. Water Research Commission. Pretoria, South Africa.

Van Vuuren, S.J. and Van Dijk, M. (2012). *Determination of the change in Hydraulic Capacity in Pipelines*. WRC Report No 1820/1/12. Water Research Commission. Pretoria, South Africa.

Van Vuuren, S.J., Loots, I., Van Dijk, M. And Barta, B. (2013). *Scoping study: Energy generation using low head technologies*. WRC Report no. KV323/13. Water Research Commission. South Africa.

Van Vuuren, S.J. Van Dijk, M. and Coetzee, G.L. (2013). *Status Review and Requirements of Overhauling Flood Determination Methods in South Africa*. WRC Report no. TT563/13. Water Research Commission. South Africa.

Van Vuuren, S.J., Van Dijk, M. and Loots, I. (2014). *Conduit Hydropower Pilot Plants*. WRC Report No TT596/14. Water Research Commission. Pretoria, South Africa.

Van Vuuren, S.J., Van Dijk, M., Loots, I., Barta, B. and Scharfetter, B.G. (2014). *Conduit Hydropower Development Guide*. WRC Report No TT597/14. Water Research Commission. Pretoria, South Africa.

Two chapters in the book: *The Role of Micro-Hydel for Developing Countries*. Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre). 2015.

- *A Decision Support System for Energy Generation from Water Supply and Distribution Systems in South Africa* by Loots I, Van Dijk M, Van Vuuren SJ and Bhagwan JN.
- *Tapping into Hydropower Potential in Urban Water Distribution System – Developments in South Africa* by Van Dijk M, Bhagwan JN and Van Vuuren SJ.

8.2 Conference papers/posters

Van Dijk, M. and Van Vuuren S.J. *Optimizing Water Distribution Systems using Genetic Algorithms*. 1st Water Research Showcase, Annual Symposium at University of the Witwatersrand (2005).

Van Dijk, M. and Van Vuuren S.J. *Reduction of evaporation from reservoirs*. WISA 2008, Sun City.

Jacobs, H.E. and Van Dijk, M. *Conceptual description of a novel three-tiered philosophy for sewer network master planning in South Africa*. CCWI September 2009, University of Sheffield (2009).

Barta, B., Van Dijk, M. and Van Vuuren, S.J. *Energy generation from current water supply and distribution systems*. 4th annual Hydropower Africa conference, Sandton, South Africa. 19-23 September 2011.

Bhagwan J.N., Van Dijk, M. Kurtz, A. Van Vuuren, S.J. and Loots, I. *Conduit Hydropower Potential in the City of Tshwane Metropolitan Municipality's (South Africa) Water Distribution System*. Singapore International Water Week, 1-5 July 2012.

Van Dijk, M., Van Vuuren, S.J. and Bhagwan, J.N. *Conduit hydropower potential in a city's water distribution system*. IMESA 2012 conference. George, South Africa. 24-26 October 2012.

Van Dijk, M., Van Vuuren, S.J. and Bhagwan, J.N. *New waterborne sanitation guidelines*. IMESA 2012 conference. George, South Africa. 24-26 October 2012.

Coetzee, G.L. and Van Dijk, M. *Comparing the secondary losses at a spigot outlet when pumping chrome low density slurry, relate to a HDPE pipeline vs. a steel HDPE line pipeline*. Water Research Showcase 2012.

Van Dijk, M., Van Vuuren S.J. and Barta, B. *Optimization of Energy Generation from Water Supply and Distribution Systems*. HYDRO 2012 conference. Bilbao, Spain. 29 to 31 October 2012.

Van Dijk, M., Loots, I., Bhagwan, J.N. and Van Vuuren, S.J. *A Decision Support System for Energy Generation from Water Supply and Distribution Systems in SA*. International workshop on the role of micro-hydel for developing countries. Kathmandu, Nepal, 19-22 April 2013.

Loots, I., Van Dijk, M. and Van Vuuren, S.J. *A Decision Support System for Conduit Hydropower Development*. 3rd Regional Conference of the Southern African Young Water Professionals, 16-18 July 2013.

Loots, I., Van Dijk, M., Van Vuuren, S.J. and Bhagwan, J.N. *A decision support system for energy generation from water supply and distribution systems applied to two sites in Tshwane, South Africa*. HydroVision International Conference. 22 – 25 July 2014 in Nashville, Tennessee, USA.

Van Dijk, M., Loots, I., Van Vuuren, S.J., Bhagwan, J.N. and Barta, B. *A review of low head hydropower technologies and applications in South Africa*. HYDRO 2014 conference. Como, Italy. 14 – 16 October 2014.

Kurtz, A., Van Dijk, M., Van Vuuren, S.J. and Loots, I. *The development of conduit hydropower in a city's water distribution system – Case Study at the City of Tshwane's Annlin Reservoir*. HYDRO 2014 conference. Como, Italy. 14 – 16 October 2014.

Van Dijk, M., Bhagwan, J.N. and Kgwale, D.M. *Bloemwater head-office is becoming energy independent with its own conduit hydropower generation plant*. Africa Utility Week Conference. Cape Town. 12 – 14 May 2015.

Van Dijk, M., Van Vuuren, S.J. and Loots, I. *Municipalities working with industry to advance sustainable water practices*. CoT Sustainability Week Conference. City of Tshwane. 22 – 26 June 2015.

Van Dijk, M. *City of Tshwane's development of 2.3 MW conduit hydropower - It makes economic sense*. Tshwane's Research and Innovation Symposium. City of Tshwane. – 24-25 May 2016.

Van Dijk, M. *The potential of Conduit Hydro Power as a source of renewable energy for cities*. CoT Sustainability Week Conference. City of Tshwane. – 1-2 June 2016.

8.3 Publications in peer-reviewed or refereed journals

Van Dijk, M., Van Vuuren, S.J. and Van Zyl, J.E. (2008). *Optimising Water Distribution Systems using a weighted penalty in a Genetic Algorithm*. Water SA. Vol 34, No 5 pp 537-548.

Van Dijk, M. & van Vuuren, S.J. (2009). *Destratification induced by bubble plumes as a means to reduce evaporation from open impoundments*. Water SA Vol 35, No 2 (Special WISA 2008 edition). pp 158 – 167.

Van Vuuren, S.J., Blersch, C.L. and Van Dijk, M. (2011). *Modelling the feasibility of retrofitting hydropower to existing South African dams*. Water SA Vol 37 No. 5, WRC 40-Year Celebration Special Edition 2011. pp 679 – 692.

Van Vuuren, S.J. and Van Dijk, M. (2012). *The discontinuity required at an air valve or vent or for effective pipeline de-aeration*. South African Journal of Civil Engineers. Vol 54, No 2. pp94-100.

Loots, I., Van Dijk, M., Van Vuuren, S.J., Bhagwan, J.N. and Kurtz, A. (2014). *Conduit-hydropower potential in the City of Tshwane water distribution system*. South African Journal of Civil Engineers. Vol 58. October 2014.

Loots, I., Van Dijk, M., Barta, B., Van Vuuren, S.J. and Bhagwan, J.N. (2015). *A Review of low head hydropower technologies and applications in a South African context*. Renewable and Sustainable Energy Reviews. Elsevier. pp 1254-1268.

Bonthuys, G.J., Van Dijk, M. & Bhagwan, J.N. (2016). *A Feasibility and Implementation Model of Small-scale Hydropower Development for Rural Electrification in South Africa - Case study: Kwa Madiba SSHP Plant*. Water SA Vol. 42 No. 4 pp 528 - 541.

9. TEACHING

Undergraduate and postgraduate course:

- Have presented all undergraduate subjects in Hydraulics 3rd and 4th year
- Have been supervisor for more than a hundred students for their final year project reports
- Have presented the postgraduate subjects in Water Resources Engineering
- Developed a new Master degree subject namely *Computer Applications for Civil Engineers* and incorporated this into the curriculum during 2004.

Postgraduate supervisor:

Supervisor for a MEng student, I. Loots, with title *Decision support system for conduit hydropower development*, University of Pretoria (2013).

Supervisor for a MEng student, PK Rossnagel, with title *Prioritization Model for Pipeline Improvements to Limit Increasing Operational Costs*, University of Pretoria (2014).

Supervisor for MEng students (2015):

GJ Bonthuys, with title *Small-scale hydropower development for rural electrification in South Africa*.

BG Scharfetter, with title *Unravelling the institutional complexities of implementing small-scale hydropower projects for rural electrification in South Africa*.

AA Kurtz, with title *Pico hydropower development for the Municipal Environment*.

External examiner:

External examiner for a MEng student, H.A Kretzmann, with title *Stochastic Analysis of water supply systems including system hydraulics*, at Rand Afrikaans University (2004).

External examiner for a MScEng student, S.M. Pan, with title *Improving water and sanitation services in informal settlements in Cape Town: Finding the balance between “hard” and “soft” approaches*, at University of Cape Town (2011).

External examiner for a MEng student, GL Coetzee, with title *Investigating the bottom free surface nappe (Ogee profile) across a sharp crested weir influenced by the flow in an asymmetrical approach channel.*, at University of Pretoria (2013).

External examiner for a MEng student, RM Mahaffey, with title *Review and Optimisation of Pump Suction Reducer Selection*, at University of Pretoria (2014).

External examiner for a MEng student, S van Eeden, with title *Electricity generation as a beneficial post closure land use option for dormant tailings storage*, at University of Pretoria (2014).

Short courses:

Have presented various continuing education courses for practicing professional engineers in Hydraulics and Hydrology:

- Flood Risk Reduction Measures, 2001
- Flood calculations and routing, 14-15 July 2003 (48 attendees)
- Pipeline design course, 8-12 November 2004 (± 100 attendees)
- Pumping station design, 23 January – 25 January 2008 (± 45 attendees)
- Pipeline design, 30 January - 1 February 2008 (± 50 attendees)
- Flood estimation and storm water drainage for roads - 2007-2008 (± 750 attendees)
- Flood hydrology and free surface flow (HEC-RAS), 4-7 February 2008 (± 45 attendees)
- Water supply and borne sanitation, 8-11 July 2008 (± 50 attendees)
- 1-day Pipeline Design, 2008/2009 (± 500 attendees)
- Analyses of Transient pressures in pipelines, 19-22 January 2009 (± 50 attendees)
- Pump Station Design, 26-28 January 2009 (± 50 attendees)
- Free Surface Flow (UPD & HEC-RAS). 20-22 July 2009 (± 60 attendees)
- Flood hydrology and Urban Runoff Modeling (EPASWMM), 8-10 February 2010 (± 60 attendees)
- 2-day Network Analysis and Introduction to Surge Analysis Course, 2011 (± 100 attendees)
- Pipeline optimization and design, 15-19 February 2010 (± 70 attendees)
- Flood hydrology and climate change impacts, 31 January - 3 February 2012 (± 35 attendees)
- Modeling of Free Surface Flow and Dam Break Analysis, 7 – 10 February 2012 (± 50 attendees)
- Pipeline Design and Conduit Hydropower, 2 – 6 July 2012 (± 45 attendees)
- One-day Pipeline Design Courses – 2013 (± 250 attendees country wide)
- Hydropower training course – 2013 (± 70 attendees)
- Hydrological and Hydraulic Assessment + HEC-RAS – 2014 (± 250 attendees country wide)
- 2D - Free Surface Flow Modeling (New HEC-RAS version 5) – 2015 (± 100 attendees)
- Municipal Hydropower Development Opportunities Workshop – 2015 (± 60 attendees)
- Hydropower Training Course – 2016 (± 30 attendees)
- Free Surface Flow (2D New HEC-RAS version 5.0) – 2016 (± 50 attendees)

10. REFERENCES

Prof Wynand Steyn (Head of the Department)
Department of Civil Engineering, University of Pretoria
Tel: (012) 420 2171

Prof SJ van Vuuren (Head of the Water Division)
Department of Civil Engineering, University of Pretoria
Tel: (012) 420 2438

Declaration:

I confirm that the above information contained in the CV is an accurate description of my experience and qualifications and that, at the time of signature, I am available and willing to serve in the position indicated for me in the proposal for this contract, for the durations and at the locations indicated therein.

Name: Marco van Dijk

Signature:



Date: 30 December 2016