

## HIGHVELD TYPE 3 STORM PROFILE ADJUSTED FOR CLIMATE CHANGE



fourthelement



Recent climate change related research by Fourth Element produced an adjustment to the Type 3 storm profile that may be applied to the Highveld region of the country. This will assist practitioners and consultants in urban storm design who may want to consider implications of climate change on their designs.

### The Study

Fourth Element Consulting participated as specialist hydrologist in a team lead by the University of Witwatersrand on a Water Research Commission project looking at the impacts of climate change on municipal services. The project (ref: K5/1953) analysed simulated hourly rainfall output for Ekurhuleni, Gauteng, from six global climate models. The analysis was calibrated against recorded data at OR Tambo International Airport.

Details of the analysis are in the process of publication, but were outlined in the WRC project report as follows.

*Piketh, SJ, C Fatti, I Akoon, S Dunsmore, F Engelbrecht & F van Wyk, 2013. The Impact of Climate Change on Water Services Delivery – A case study of Ekurhuleni Metropolitan Municipality. Water Research Commission, WRC Report No. 1953/1/12.*

The report may be downloaded here: [https://dl.dropboxusercontent.com/u/56219602/WRC\\_1953-1-12%282013%29.pdf](https://dl.dropboxusercontent.com/u/56219602/WRC_1953-1-12%282013%29.pdf)

### Services

- Hydrological catchment modelling & management
- Hydraulic modelling – 1D & 2D
- Green stormwater infrastructure solutions
- “Grey engineered” stormwater solutions
- Hydrological calibration
- Flood management (SUDS, LID, WSUDS)
- Climate change risk
- Feasibility studies, concept design, detailed design
- Construction monitoring
- Water quality simulations
- Water Security

### Our international projects

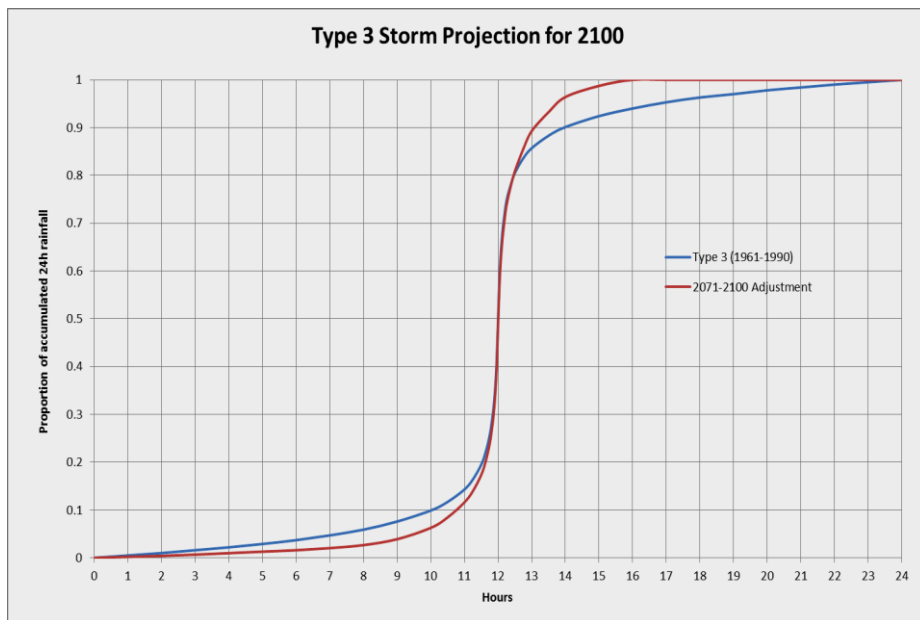
- South Africa
- Botswana
- Swaziland
- Mauritius
- Mozambique
- Cote d'Ivoire
- Gabon
- Swaziland
- DRC
- Armenia
- UK

TN/1/2015  
 HIGHVELD TYPE 3 STORM PROFILE  
 ADJUSTED FOR CLIMATE CHANGE .....

**Type 3 Storm Profile for the Highveld under climate change**

The Type 3 storm profile was adjusted for the “time slab” 2071 – 2100 and is shown with the standard Type 3 profile which is applicable to the calibration “time slab” period from 1961 to 1990. For application of this profile, use the ordinates shown in the table adjacent.

This is one of the first known estimates of climate related storm rainfall changes at municipal scale on the Highveld, and should provide valuable support to design considerations and policy development. The research did not test whether this would be applicable to other Type 3 zones in South Africa.



**Disclaimer...**

This data is offered for use by experienced practitioners at their own discretion. Experience in interpreting climate risk in water resources is important. While this storm profile is not a design standard, it represents an output from an analysis of data from six climate models, the problems associated with downscaling to something suitable for municipal scale applications are well documented and should be acknowledged. Practitioners should refer to the project report for further details.

**Please reference this document...**

Reference to this Technical Note may be made as follows:

Fourth Element, 2015. Highveld Type 3 Storm Profile Adjusted for Climate Change. TN/1/2015. [www.fourthelement.co.za](http://www.fourthelement.co.za)

	Std Type 3	Adj for 2100
Time (h)	Ordinate	Ordinate
0	0.000	0.000
1	0.005	0.004
2	0.010	0.007
3	0.016	0.010
4	0.022	0.013
5	0.029	0.016
6	0.037	0.020
7	0.047	0.027
8	0.059	0.039
9	0.076	0.063
10	0.099	0.085
10.5	0.117	0.116
11	0.143	0.140
11.25	0.164	0.174
11.5	0.195	0.200
11.625	0.220	0.238
11.75	0.256	0.278
11.833	0.295	0.305
11.875	0.322	0.343
11.917	0.359	0.397
11.958	0.413	0.484
12	0.500	0.570
12.042	0.587	0.624
12.083	0.640	0.663
12.125	0.678	0.691
12.167	0.705	0.737
12.25	0.747	0.777
12.375	0.780	0.809
12.5	0.805	0.856
12.75	0.836	0.893
13	0.857	0.932
13.5	0.883	0.964
14	0.901	0.987
15	0.924	1.000
16	0.940	1.000
17	0.953	1.000
18	0.963	1.000
19	0.970	1.000
20	0.978	1.000
21	0.984	1.000
22	0.990	1.000
23	0.995	1.000
24	1.000	1.000

Ordinates for Type 3 and Adjusted Type 3 (2100)