

# Utility Programs for Drainage

## Flood calculations



Sinotech

**Project name:** Erf 3535 Secunda  
**Analysed by:** B.C. Theron  
**Name of river:** Secunda Spruit  
**Description of site:** Erf 3535 Secunda  
**Filename:** E:\Data\Secunda\Erf 3535\Berekening\Erf3535-Secunda.fld  
**Date:** 6 August 2015

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**Flood Frequency Analysis: Rational Method**

**Project** = Erf 3535 Secunda  
**Analysed by** = B.C. Theron  
**Name of river** = Secunda Spruit  
**Description of site** = Erf 3535 Secunda  
**Date** = 2015-08-06  
**Area of catchment** = 12.84 km<sup>2</sup>  
**Dolomitic area** = 20.0 %  
**Mean annual rainfall (MAR)** = 686.00 mm  
**Length of longest watercourse** = 2.34 km  
**Flow of water** = Defined water course  
**Height difference along 10-85 slope** = 12.0 m  
**Rainfall region** = Inland  
**Area distribution** = Rural: 15 %, Urban: 80 %, Lakes: 5 %

**Catchment description - Urban area (%)**

| Lawns                      | Residential and industry |    |               | Business |
|----------------------------|--------------------------|----|---------------|----------|
| Sandy, flat (<2%)      0   | Houses                   | 35 | City centre   | 0        |
| Sandy, steep (>7%)    0    | Flats                    | 5  | Suburban      | 0        |
| Heavy soil, flat (<2%) 40  | Light industry           | 0  | Streets       | 0        |
| Heavy soil, steep (>7%) 20 | Heavy industry           | 0  | Maximum flood | 0        |

**Catchment description - Rural area (%)**

| Surface slopes          | Permeability   |    |                              | Vegetation |
|-------------------------|----------------|----|------------------------------|------------|
| Lakes and pans      0   | Very permeable | 0  | Thick bush & forests         | 0          |
| Flat area            25 | Permeable      | 60 | Light bush & cultivated land | 0          |
| Hilly                75 | Semi-permeable | 40 | Grasslands                   | 100        |
| Steep areas        0    | Impermeable    | 0  | Bare                         | 0          |

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**Average slope** = 0.00684 m/m  
**Time of concentration** = 52.2 min  
**Run-off factor**  
 Rural - C1 = 0.462  
 Urban - C2 = 0.348  
 Lakes - C3 = 0.000  
 Combined - C = 0.338

Rural run-off coefficient C1 above includes dolomitic factors where applicable.  
 The HRU, Report 2/78, Depth-Duration-Frequency diagram was used to determine the point rainfall.

| Return Period (years) | Time of concentration (hours) | Point rainfall (mm) | ARF (%) | Average intensity (mm/h) | Factor Ft | Runoff coefficient (%) | Peak flow (m <sup>3</sup> /s) |
|-----------------------|-------------------------------|---------------------|---------|--------------------------|-----------|------------------------|-------------------------------|
| 1:50                  | 0.87                          | 86.3                | 95.8    | 95.1                     | 0.95      | 33.5                   | 113.63                        |
| 1:100                 | 0.87                          | 106.2               | 94.9    | 115.8                    | 1.00      | 33.8                   | 139.69                        |

Run-off coefficient percentage includes adjustment saturation factors (Ft) for steep and impermeable catchments

Calculated using Utility Programs for Drainage 1.1.0

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