

Water Sensitive Urban Design in Adelaide

Current Research Supporting WSUD

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University of
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WSUD Research in SA

- **Will discuss research being carried out at the Centre for Water Management & Reuse, University of South Australia and CSIRO Land and Water.**
- **Wish to acknowledge the financial support for this work that has been received from the Goyder Institute for Water Research, the Stormwater Management Fund, the Adelaide and Mount Lofty Ranges NRM Board and six Local Government authorities in Adelaide.**
- **Supports the implementation of WSUD in South Australia**



WSUD Research in SA - Goyder

- **The Goyder Institute for Water Research is a partnership between the South Australian Government through the Department of Environment, Water and Natural Resources, CSIRO, Flinders University, the University of Adelaide and the University of South Australia.**
- **First stage urban water project was titled:**
*Water Sensitive Urban Design Impediments and Potential:
Contributions to the SA Urban Water Blueprint*



WSUD Research in SA - Goyder

Produced three technical reports, available on the Goyder Institute website:

- *The Status of Water Sensitive Urban Design Schemes in South Australia (inventory now on Water Sensitive SA website)*
- *Post-implementation assessment of WSUD features and identification of impediments to WSUD*
- *The Potential Role of WSUD in Urban Service Provision*



WSUD Research in SA - Goyder

Key findings included:

- **WSUD features are predominantly implemented by local government.**
- **Flow management is one of the primary drivers for WSUD uptake in councils, with WSUD elements designed to control flooding and reduce peak flows.**
- **Implementation of WSUD is fragmented, influenced by in-house capacity and commitment.**
- **An increase in knowledge base and capacity is required, supported by a consistent policy and planning framework**



WSUD Research in SA - Goyder

In addition;

- **A methodology was developed using continuous simulation to investigate the effectiveness of WSUD to manage peak flows and runoff volumes in urban areas.**
- **This was applied to 6 case study sites including B pods, rain gardens, and detention and retention applied to two established catchments and one more recent development at Flagstaff Pines.**
- **The effectiveness of these treatments was reported.**



WSUD Research in SA

A stage 2 Goyder project is currently in progress that includes;

- Identification of pathways within the policy and regulatory system for supporting implementation of WSUD measures.**
- Review of WSUD in Stormwater Management Plans.**
- Recommendations for water quality, water conservation, flood flow and frequent flow assessment.**

Infill project;

- Undertaking an assessment of the use of WSUD to address infill development.**



Infill Development

- The 30 year plan for greater Adelaide has a policy regarding the form of development of Adelaide
- Currently, the ratio of infill to fringe development is 50:50, but the Plan stipulates a ratio of 70:30 is to be achieved
- This has a significant impact on runoff and peak flows in existing urban areas



Assessment of effect of infill development on peak flows & runoff volume

- **Frederick Street, Glengowrie catchment has rainfall and flow data from the early 1992 to 1996 and from 2013 to date.**
- **Assess relationship between rainfall volume and runoff volume for both periods of record**
- **Calibrate simple (ILSAX) model for 2013/15 (already calibrated for 1992/96)**
- **Use this model to estimate increase in peak flow**



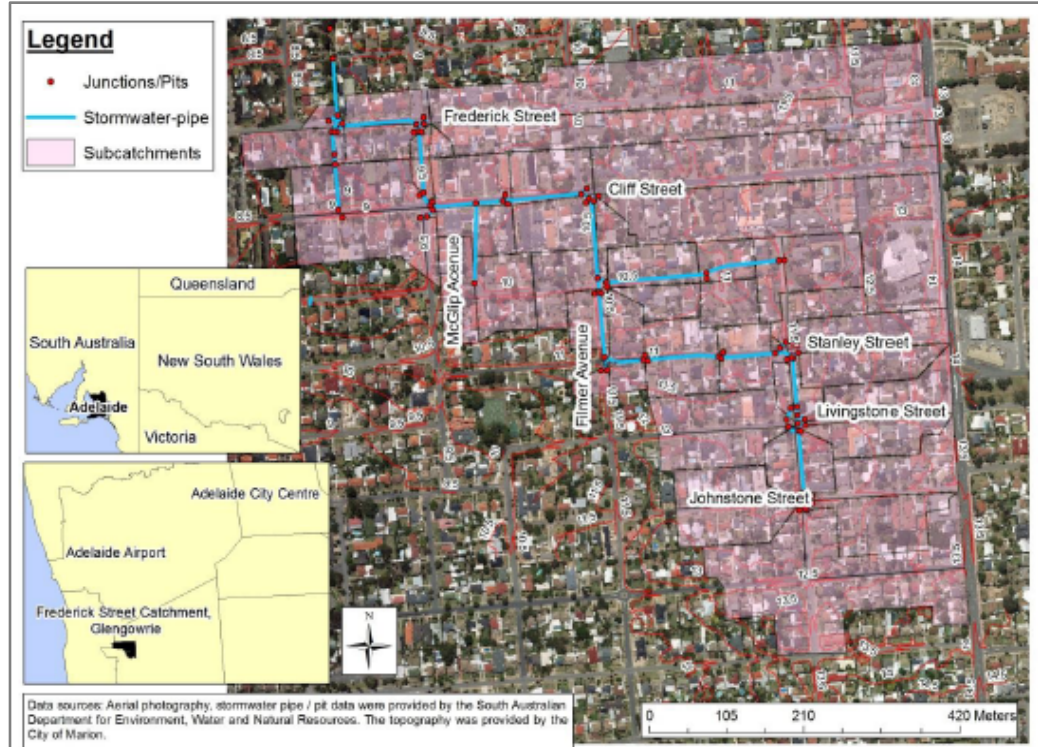
Frederick Street Catchment

Details

- 48.7 Ha mainly residential
- 0.2% to 0.5% grade

Rainfall and flow data

- July 1992 to January 1996
- August 2013 to date



Frederick Street Catchment - changes

1993

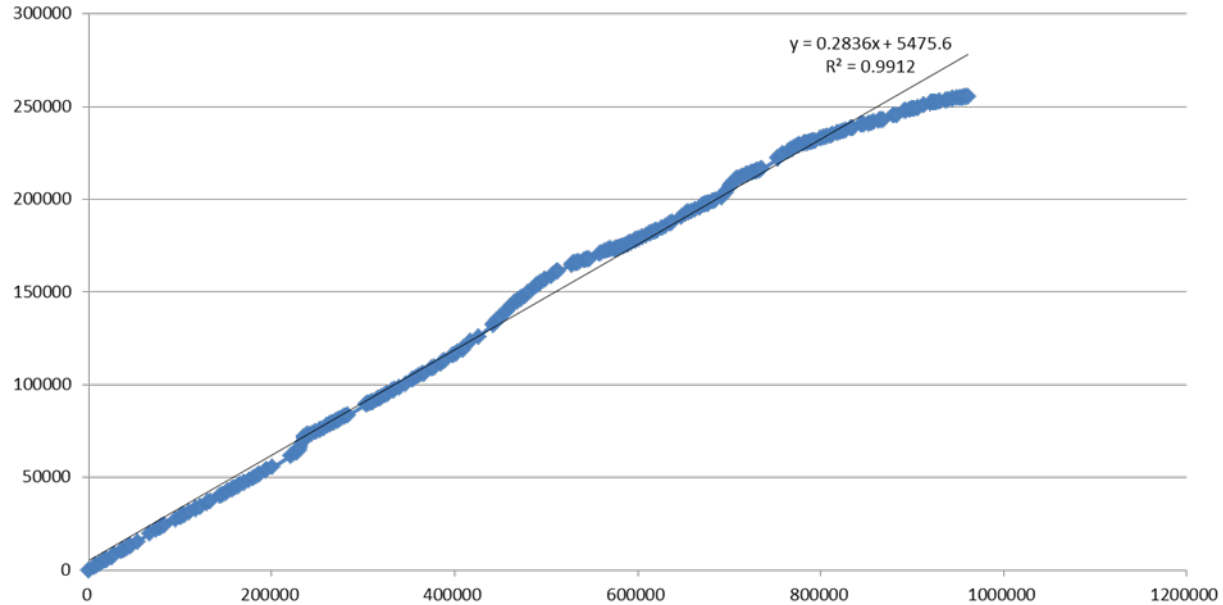


2013

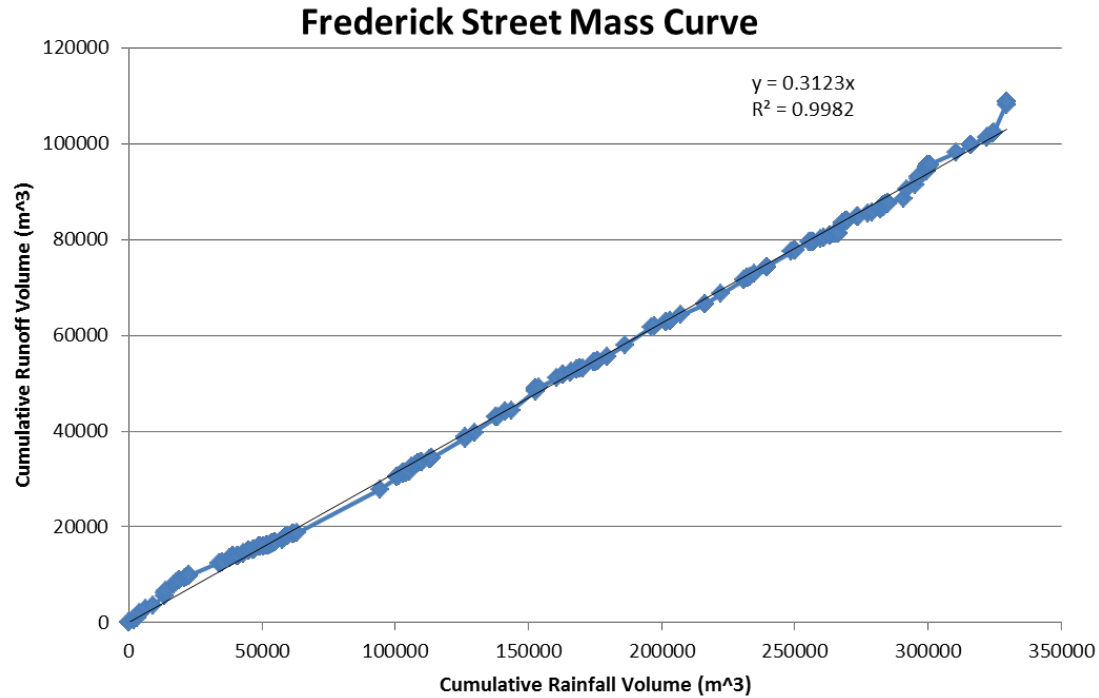


1992 to 1996 Mass Curve

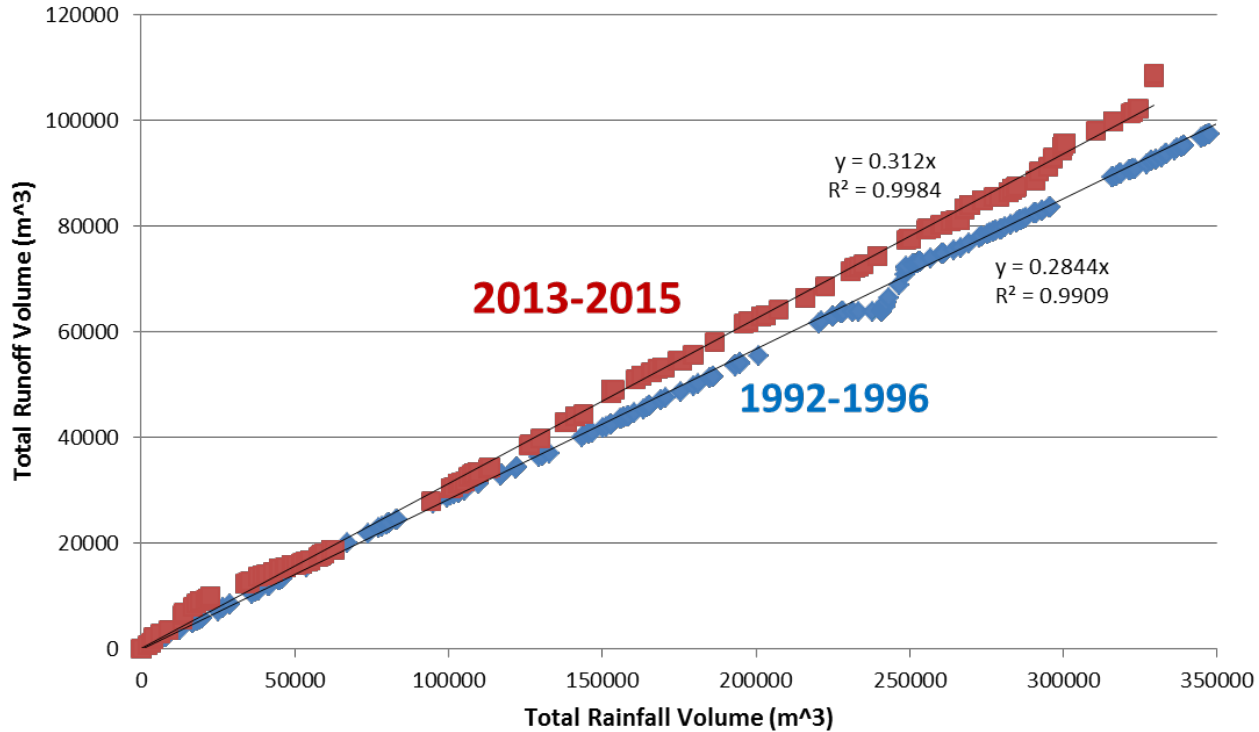
Frederick Street Mass Curve 1992-96



2013 to 2015 Mass Curve



Frederick Street Mass Curve Comparison



ILSAX Calibration

- **Total area 48.7ha**
- **% directly connected adjusted to match peak flows, volumes**
- **1992/96 - 13.2ha (27.1% of total area)**
- **2013/14 - 15.4ha (31.6% of total area)**
- **An increase of 16.6%**
- **Similar to increase in total runoff volumes**



ILSAX assessment of peak flow increase

- **Run all storms calibrated in 1992/93 and 2013/15 with both amounts of directly connected impervious area.**
- **Indicated for all but the two largest events that there was an increase in peak flow of about 16%**
- **This was less for the two largest events, probably due to the limited capacity of the pipe system.**



Infill Implications

- **By 2040 there is potentially a 31% increase in peak flows and runoff volume over the period of the 30 year plan (without management)**
- **Increased flow volumes to gulf. (note ACWQIP)**
- **Increased flow widths, flooding (particularly at trapped low points) This is significant in the Marion Holdfast area.**
- **Increased duration of flooding.**



Infill implications & further work

- **Will continue to review monitoring data, also monitor water quality.**
- **Also looking at the nature of the changes in directly connected impervious areas.**
- **Looking at ways of using WSUD to address the issue.**
- **Detention and retention, on site and in street**
- **End of pipe schemes do not have so much benefit**
- **Need ways to manage development**



Summary

- **Research is being carried out in South Australia to support the implementation of WSUD**
- **By the Centre for Water Management & Reuse, and the CSIRO**
- **Supported by state and local government**
- **The impact of infill development has been assessed, and further work is being carried out to find ways to manage the impact**

