Zero Additional Maintenance Water Sensitive Urban Design (ZAM-WSUD) Comparative Grass Species Trial, 2016 – Preliminary Observations Report

S. Brink, Manningham City Council **27/7/16**

The Zero Additional Maintenance Water Sensitive Urban Design (ZAM-WSUD) project is partnership between Melbourne Water, Manningham Council and the Co-operative Research Centre for Water Sensitive Cities.

Introduction

The ZAM-WSUD project is seeking to identify Water Sensitive Urban Design (WSUD) solutions that require little or no maintenance for asset owners.

Initial street scale trials of grassed systems (2014 to 2016) were generally successful, but turf grass survival was an issue at a number of "full sun" sites. Soft leafed buffalo grass (Palmetto cultivar) was used for these trials as previous laboratory testing had confirmed that soft leafed buffalo (i.e. Palmetto and Sapphire cultivars) successfully remove nitrogen and phosphorous from stormwater (Payne et Alia, 2014).

Field observations during initial trials and advice from sportfield turf consultants (Peter Anderson from Sporsturf) suggested that soft leafed buffalo performance and survival could be less than ideal for drier soil conditions as expected for ZAM-WSUD systems in "full sun" or close to "full sun".

A comparative grass species field trial was initiated to determine where other grass types could offer improved initial survival and ongoing robustness for sunny sites compared to soft leafed buffalo.

Note that the purpose of this trial was to assess in-field survival only, and no assessment was made of the nutrient removal abilities of various grass species trialled.

Reference:
Emily G. I. Payne, Tracey Pham, Perran L. M. Cook, Tim D. Fletcher, Belinda E. Hatt & Ana Deletic (2014) *Biofilter design for effective nitrogen removal from stormwater – influence of plant species, inflow hydrology and use of a saturated zone.* Water Science and Technology 69.6.

Background

A ZAM-WSUD site at Ruffey Lake Park, directly adjacent to a highly used car parking area, was selected for the trial. The site is 30m long x 1.5m wide and has five ZAM-WSUD inlets and sediment grooves evenly spaced along its length. The treatment area is divided into three separate saturation cells by two subsurface concrete cutoff walls, but does not have an impermeable liner.

During the initial ZAM-WSUD trials, soft leafed buffalo turf grass planted in March 2015 survived for only a few months. The hot dry conditions around the time of planting are expected to have been a significant contributing factor in the poor establishment performance of the grass.

Ruffy Lake Car Park Trial Site in Late Winter 2015 - Showing Very Poor Survival of Soft Leafed Buffalo Grass

By the 2015/16 summer the turf grass had completely died. As such this site needed replanting and was consequently available for this trial.

Method

Installation took place in early April 2016. The installation incorporated improvements to the ZAM-WSUD design including:

- the use of an establishment fertiliser,
- a reduction in the thickness of the top course sand layer to improve initial root access to the FAWB spec filter media sand that has better water holding capacity (compared to the course sand layer).

The installation involved:

- the removal of approximately 30mm of the top layer of course sand (100mm total thickness) and stockpiling,
- placing and mixing of 5kg of grass fertiliser,
- levelling,
- laying turf,
- topsoiling with approx. 10mm of stockpiled course sand.

Planting was restricted 1.2m width. The remaining 0.3m adjacent to the path left unplanted to allow grass spreading ability to be assessed.

Grass was lightly watered 2 days and 4 days after installation only. After the initial waterings conditions were moist enough that no further waterings were required as light showers fell consistently at least two to three times per week though until the winter wet season.

Grass species and cultivars planted are shown in the table below.

Location	Grass Type	Planted Area	Notes
East	Nara Native Turf Zoysia macrantha 'Mac03'	6m2	Full sun
	Soft leaf Buffalo Turf Palmetto SS100	6m2	Full sun
	Kenda Kikuyu Turf (Male Sterile)	5m2	Full sun
	Empire Zoysia Turf	5m2	Full winter sun Partly within gum tree root zone
West	Soft leaf Buffalo Turf Sapphire B12	6m2	Late afternoon shade Within gum tree root zone

Results

The condition of the grass four months after planting was as follows:

Nara Native Zoysia

Soft leaf Buffalo, Palmetto

Kenda Kikuyu

Empire Zoysia

Soft leaf Buffalo, Sapphire

Grass Type	Condition	Notes
Nara Native Turf Zoysia macrantha 'Mac03'	Fair to good	Some weed infestation
Soft leaf Buffalo Turf Palmetto SS100	Good	Some weed infestation
Kenda Kikuyu Turf (Male Sterile)	Excellent	Vigorous growth
Empire Zoysia Turf	Very good	
Soft leaf Buffalo Turf Sapphire B12	Very poor, limited grass survival	

Discussion

Trials and advice to date confirm that it is likely that different grass types will be more suited to different site conditions. It is unlikely that one single grass type that will be suitable for all site conditions.

Selection of the most appropriate grass type for a ZAM-WSUD installation will depend on site conditions such as shading, soil moisture, pedestrian traffic and environmental considerations.

Recommended grass types for various site conditions are shown in the table below.

Site Characteristics	Suitable Grass Species
Sunny	Kenda Kikuyu (male sterile), Empire Zoysia
High pedestrian traffic	Kenda Kikuyu (male sterile)
Part Shade	Empire Zoysia
Very shady or moist soils	Soft leaf buffalo – Palmetto SS100 (Victoria, Tasmania, Canberra) Soft leaf buffalo – Sapphire B12 (Queensland, Western Australia, NSW – lowland and coastal areas)
Environmentally sensitive areas	Nara Native Zoysia Soft leaf buffalo – Palmetto SS100

Conclusions

Alternative grass species trials have provided a strong indication that grassed ZAM-WSUD systems will be suitable for a wide range of site conditions. Further laboratory testing is still required to confirm the nutrient removal ability of grass species other than soft leafed buffalo.