STREAMLINING AND STANDARDISING STREETSCAPE WSUD IMPLEMENTATION IN MORELAND CITY COUNCIL

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ABSTRACT (300 WORDS MAXIMUM)

Moreland City Council is located in Melbourne, Australia. They are committed to creating an environmentally sustainable and liveable city by supporting and encouraging the implementation of triple–bottom line solutions to improve the local environment and thus contribute to solving global environmental issues. Best practice stormwater treatment is a central tenet of this commitment, which is partially achieved by encouraging the installation of WSUD elements throughout the municipality.

Council identified that some previous WSUD retrofit projects had been poorly implemented due to a lack of project understanding and inconsistency in WSUD elements. To improve the standard, consistency and maintainability of WSUD projects Moreland Council sought to prepare raingarden and tree pit standard drawings.

However, site constraints relating to existing factors, such as infrastructure, stormwater, and services, can impact the design of WSUD measures. Additionally, aesthetic and safety considerations will vary depending on the location of the asset with respect to busy pedestrian areas, main roads, etc. To tackle these issues GHD connected with Moreland Council's engineers, planners and landscape architects to create a suite of standard design elements that could be combined on a project by project basis to form flexible WSUD designs.

The resulting design package consists of design procedure, illustrative catalogue of configurations and elements, AutoCAD library and documentation templates. The package allows Council to control the quality of design and construction, and develop predictable and consistent maintenance procedures. The flexibility of the design package allows application of the approach to constrained or irregular sites where standard drawings would not be applicable. This design package bolsters Council's ability to achieve stormwater quality targets and provide cost-effective ongoing maintenance of assets.

Opportunities also exist for other local governments to tailor the package to their needs and improve the standards of WSUD projects within their own municipalities.

KEYWORDS

WSUD, Raingardens, Tree Pits, Local Government, Stormwater Treatment, Design Standards, Ease of Maintenance

PRESENTER PROFILE

Matt is an environmental engineer, currently based in GHD's Christchurch office. He turned a childhood passion for exploring Melbourne's urban creeks and rivers into a career working to improve river health. Like many stormwater engineers he can't resist the temptation when it rains heavily to go gawk at the nearest waterway.

1 INTRODUCTION

Moreland City Council is a local government area located in the inner northern suburbs of Melbourne, Australia. The suburbs within the municipality are generally long established, densely populated to the south tending to more single dwellings in the suburbs to the north. Development is mostly infill or redevelopment, with occasional large new developments. The council area is bounded on the west by Moonee Ponds Creek and on the east by Merri Creek. These urban waterways are the receiving waters for the vast majority of stormwater runoff generated in the municipality. Aside from their critical drainage function, they are also significant natural and cultural assets.

Moreland City Council is committed to creating an environmentally sustainable and liveable city by supporting and encouraging the implementation of triple–bottom line solutions to improve the local environment. Best practice stormwater treatment is a central tenet of this commitment, which is partially achieved by encouraging the installation of Water Sensitive Urban Design (WSUD) elements throughout the municipality.

Council identified that some previous WSUD retrofit projects had been poorly implemented due to a lack of project understanding and inconsistency in WSUD elements. To improve the standard, consistency and maintainability of WSUD projects, Council sought to prepare raingarden and tree pit standard drawings. However, site constraints relating to existing factors, such as infrastructure, stormwater, and services, can impact the design of WSUD measures. Additionally, aesthetic and safety considerations will vary depending on the location of the asset with respect to busy pedestrian areas, main roads, etc.

Due to the varying challenges associated with each site it is often difficult, or impossible, to apply standard drawings. This is especially true of raingardens, where Council were finding that the assets being created in their municipality failed to achieve simple objectives with respect to stormwater treatment and practicality of ongoing maintenance (e.g. Figure 1 below). To tackle these issues GHD collaborated with Moreland Council's engineers, planners and landscape architects to create a suite of standard design elements that could be combined on a project by project basis to form flexible WSUD designs.

Figure 1: Example of poor raingarden implementation in Moreland (i.e. no extended detention, railway ballast for mulch)

2 THE PROCESS

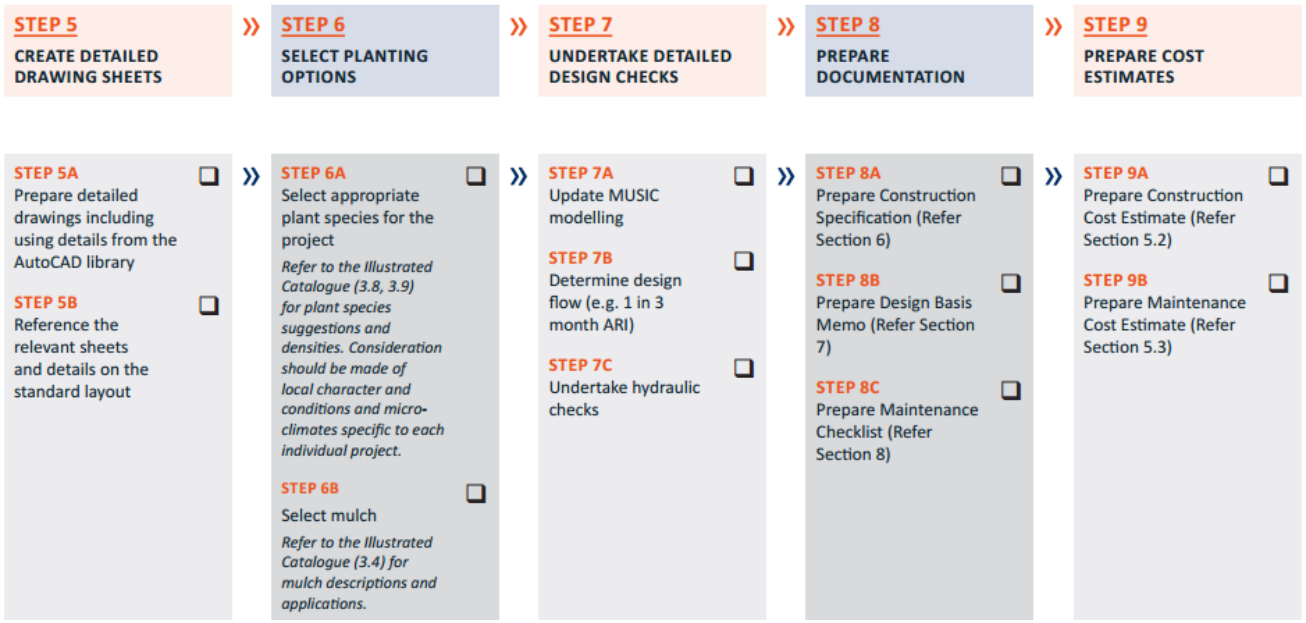
As a starting point it was necessary to determine the suite of variables to be encompassed by the design package. This was workshopped with stakeholders from various council departments to identify their requirements. The types of variables which were considered important fell into a variety of categories. For example, council engineers were keen to maximise the type of sites the be catered for; kerb outstands, nature strips, car parks, sloped sites, etc and considered it important to allow for a range of options for connecting to the existing stormwater network. Meanwhile, council landscape architects were primarily concerned with aesthetic and safety considerations. For example, could the materials palettes be aligned with existing area plans, and what options could be made available to address the risk of falling into a raingarden. Whereas council maintenance staff sought to ensure the WSUD assets were easily maintainable. For example, they promoted the mandatory inclusion of subsurface drain flushing risers and accessible inlet and outlet structures. They also encouraged the creation of a maintenance plan template.

At the conclusion of this process six site types had been identified, nine types of raingarden edges, four options for mulch, four fence types, three inlet and four outlet options, plus a whole range of planting configurations and acceptable plant species.

The challenge then was to create a framework which allowed all of these elements to be combined on a site by site, project by project basis, in a simple and cost effective manner. To achieve this a number of elements were created; a simple design procedure, a catalogue of design options and a library of AutoCAD elements.

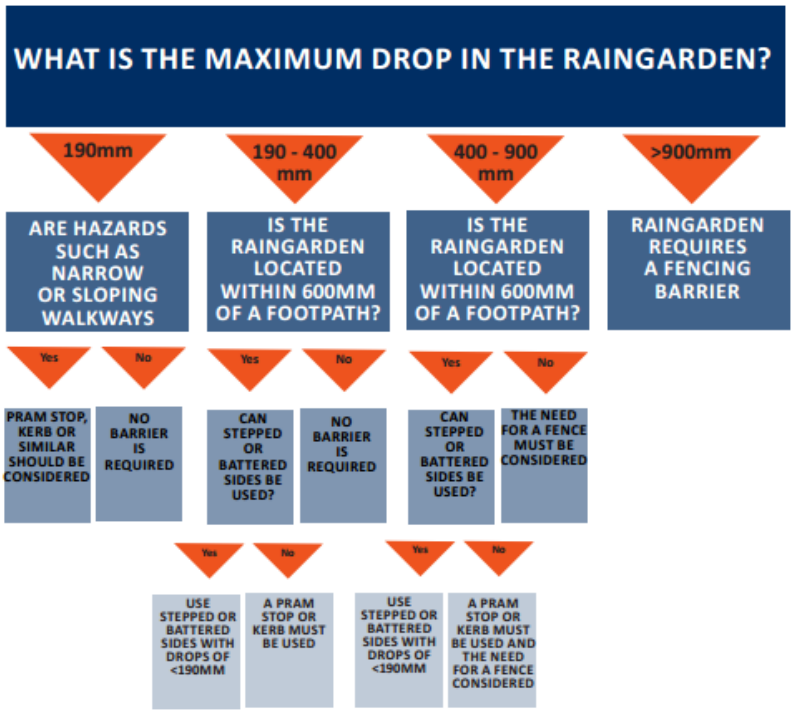
The design procedure provides a step by step guide to designing WSUD elements using the design package. The basic steps are presented in a flow chart, with supplementary information provided to help guide users. The procedure is not intended to teach WSUD design, but rather to allow designers with some experience to produce designs that are consistent with council expectations. An extract from the design flow chart can be found in Figure 2 below.

Figure 2: Design procedure extract



As discussed earlier, council was very keen to minimise the risk of pedestrians falling into raingardens. Extensive consultation was carried out with various council departments with the intent of establishing a consistent set of safety standards which could be applied to all designs. This was considered important in order to avoid the need for designers to have to consult council with respect to the safety aspects of each and every raingarden design. The resulting decision tree is shown in Figure 3 below.

Figure 3: Raingarden safety decision tree



Many practitioners will be familiar with the MUSIC tool, which is widely used in Australia for assessing the efficacy of stormwater treatment trains. It is worth noting that the Moreland design package was designed to work in conjunction with MUSIC, assisting with the detailed design of raingardens and tree pits following treatment train concept design using MUSIC.

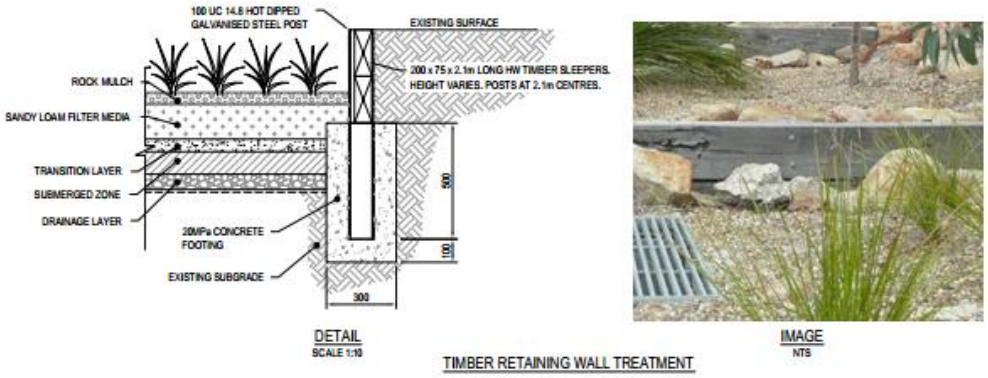
To assist designers with selection of appropriate raingarden elements, an illustrated catalogue of design options was produced. This catalogue also allows designers to work with non-technical stakeholders to make raingarden design decisions. It contains photographs of the various design elements, a written description, a list of "pros" and "cons" and discussion regarding appropriate applications. Where specific raingarden elements are preferred by council within certain precincts this is also noted. For example in the older part of the municipality bluestone edge treatments are preferred as they match with the existing kerbs. An extract from the catalogue can be seen in Figure 4 below.

Figure 4: Edge treatment option examples from the illustrated catalogue

Sheet 1 of 2 – *Standard Drawing SK013 and SK008*		DESCRIPTION	PROS	CONS	APPLICATIONS	SAFETY PARAMETERS*
PLANTED BUFFER		Planted buffers offer a physical barrier and visual cue to warn pedestrians of step-downs into raingardens. Planted buffers are typically 600mm wide.	• Soft barrier alternative • Offers an opportunity to incorporate accent planting	• Requires relatively large footprint to implement • Failed planting can look unsightly and become weed infested	• Areas with high pedestrian traffic • Typically adjacent to raingardens in corners and at kerb outstand where there is usually a larger available footprint	• Drop heights into raingardens adjacent to planted buffers may be up to 400mm without the need for further barrier requirements • Drops of up to 900mm may be considered with no fencing depending on the individual characteristics of the site
PRAM STOP / KERBS		Pram stops are designed to stop wheelchairs, visually impaired people, prams, etc. from inadvertently finding their way into the raingarden. Pram stops can either be separate features or vertical extensions of edge treatment forming a barrier.	• Easily Retrofitted • Can be landscape features when material ties in with surrounds	• Could be a tripping hazard • Drainage of adjacent paths need to be considered	• Raingardens immediately adjacent to footpaths with high pedestrian traffic • Raingardens adjacent to narrow paths • Raingardens adjacent to paths with steep cross fall	• Drop heights greater than 190mm require the use of a pram stop or kerb barrier • For drop heights less than 190mm pram stops or kerb barriers are not required as this may be reasonably expected in a pedestrian area, however,may be applied at the discretion of the project team

The last substantial part of the design package is a library of AutoCAD details, aligned with the design elements shown in the illustrated catalogue. Contained in the design procedure are guidelines for use of this AutoCAD library to produce construction drawings. The general procedures involve tailoring the relevant type of plan view drawing (i.e. kerb outstand, car park, etc.) to the actual site, then making reference to the applicable details for edge type, inlet/outlet configurations, etc. An example of one of the edge treatment details is shown in Figure 5 below.

Figure 5: Example edge treatment AutoCAD detail



The design package also contains a number of optional items to assist with realisation of streetscape WSUD projects. A range of standard document templates are provided, including a design basis report, construction specification and maintenance plan. Also provided is a construction cost estimate spreadsheet, which has been set up to allow Moreland to track ongoing WSUD construction costs and improve future cost estimates.

The complete design package was made available by Moreland City Council on their website, with all elements available in fully editable format.

3 THE OUTCOME

The design package has been adopted as the Moreland City Council standard for raingarden and tree pit design. It has now been used on several projects which have progressed through construction and have been operational for up to 12 months. Council stormwater engineers are very satisfied with the improvement in outcomes achieved, observing that the design package "worked amazingly."

In particular council has noted that the design package excels where WSUD is a small component of a larger project. In these cases the designers and contractors are generally selected based on a range of criteria, and as a result their WSUD design and construction capabilities may be limited. This was particularly apparent recently when council completed streetscape upgrades to a local shopping strip. The design consultant had completed WSUD designs as part of a larger project in the past, with the stormwater treatment outcomes being far from ideal. For the most recent project Council instructed the consultant to use the design package for the WSUD component of the works. The constructed end product exceeded council's expectations, being vastly superior to the stormwater treatment assets constructed from the same design consultant's drawings only a couple of years earlier. A photograph of the finished product can be found in Figure 6 below.

Figure 6: Raingarden designed using the Moreland City Council Design Package

4 CONCLUSIONS

Moreland City Council were faced with the challenge of providing guidance to internal design staff, developers and consultants, to achieve WSUD design and construction standards which were consistent with council's objectives. To meet this challenge council have created a design package which has proven to improve the functionality and maintainability of the resulting WSUD assets. These outcomes are of value to council not only in helping to achieve stormwater treatment objectives, but also in ultimately reducing the cost of maintenance once these assets are vested in council.

ACKNOWLEDGEMENTS

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