DATA COLLECTION FORM

To Gather Costing Information on Urban Stormwater Treatment Measures That Aim to Improve Waterway Health

Introduction

This data collection form provides a framework that breaks down typical cost elements and prompts users to provide all of the basic costing data that is necessary for undertaking a life cycle cost analysis. The form has been designed to be consistent with the intent and terminology of the Australian and New Zealand Standard for Life Cycle Costing (AS/NZS 4536:1999).

It is hoped that Australian stormwater managers will use this form to collect high quality data sets for stormwater treatment measures that represent 'best practice' design. Use of the form will help researchers to easily analyse the data to develop publicly available tools that can be used to estimate costs associated with stormwater treatment measures (e.g. the life cycle costing module in the MUSIC software - see www.toolkit.net.au/music).

Note that high quality costing data on *vegetated treatment measures* is particularly valuable to Australian stormwater managers, given its rarity. Also note that incomplete data sets are still useful to researchers analysing costing data (e.g. information on *just* a measure's capital / acquisition cost and its size can still be used).

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PART A - DESCRIPTION OF THE STORMWATER TREATMENT MEASURE

1. Commonly used name for the treatment measure (e.g. “Hay St. Wetland”):

   . . . . . .

2. Type of stormwater treatment measure (tick one box below; for treatment trains tick all the relevant boxes):
   (For descriptions of these types of measures, refer to ‘Urban Stormwater: Best Practice Environmental Management Guidelines’ [VSC, 1999]. If you are unsure of the ‘type’ but it is a proprietary device, just write down the name of the product.)

   - ❑ On-line wet pond (including forebay to trap coarse sediment)[1]
   - ❑ Off-line wet pond (including forebay to trap coarse sediment)[1]
   - ❑ Dry pond (i.e. fully drains after storm event)[1]
   - ❑ Sediment trap or settling basin
   - ❑ Constructed wetland (retro-fitted)[2]
   - ❑ Constructed wetland (greenfield)[2]
   - ❑ Bioretention system / rain garden (landscaped)
   - ❑ Bioretention system (grassed)
   - ❑ Infiltration system
   - ❑ Vegetated / grassed swale (i.e. with no sub-soil drain)
   - ❑ Vegetated filter / buffer strip
   - ❑ Storm filter
   - ❑ Sand filter
   - ❑ Oil-water separator
   - ❑ Catchpit (Describe the type: . . . . .)
   - ❑ Catchpit inserts (Describe the type / design: . . . . . .)
   - ❑ In ground gross pollutant trap (GPT) (Describe the type / design: . . . . .)
   - ❑ Open gross pollutant trap
   - ❑ Side entry pit traps for litter
   - ❑ Floating litter trap / boom
   - ❑ Fixed trash rack
   - ❑ Porous paving (Describe the type / design: . . . . . .)
   - ❑ Rainwater tank[3] (Describe the type / design: . . . . . .)
   - ❑ Greenroof
   - ❑ Other: . . . . . .
     . . . . . .
     . . . . . .

   Notes:
   1. Please indicate if the pond has extended detention.
   2. This measure is assumed to include a macrophyte zone and upstream sediment basin / forebay / inlet pond.
   3. Please indicate whether the tank is concrete, metal or plastic, above or below ground, and plumbed into the house (e.g. for toilet flushing).

3. The expected life span of the stormwater treatment measure (in years): . . . . . .

   (The ‘life span’ is the time from the date of construction to the date that it is decommissioned. For an in-ground gross pollutant trap this may be 30-50 years. For other measures that are well maintained, the life span may be infinite [e.g. constructed wetlands and ponds].)

4. Describe how the ‘expected life span’ of the stormwater treatment measure was determined (e.g. advice from a product supplier, the design engineer, or the developer investing the asset with the Council):

   . . . . . .
   . . . . . .

5. If available, please attach and describe relevant photographs of the stormwater treatment measure that show the key features of its design:

. . . . . .
. . . . . .
. . . . . .
. . . . . .
. . . . . .

PART B – KEY DESIGN DETAILS OF THE TREATMENT MEASURE

6. Estimate the area of the stormwater treatment measure's catchment (ha).

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. . . . . .
. . . . . .ha

7. Describe the land-use in the stormwater treatment measure's catchment:

- ❑ Urban
  - ❑ High density residential: . . . . . .%
  - ❑ Low density residential: . . . . . %
  - ❑ Commercial: . . . . . %
  - ❑ Industrial: . . . . . %
  - ❑ Open space: . . . . . .%
- ❑ Forestry / forested: . . . . . .%
- ❑ Agriculture: . . . . . .%
- ❑ Other (describe) : . . . . . .% . . . . . .

8. Estimate the percent of the stormwater treatment measure's catchment that is 'directly connected impervious area' and 'impervious area'.
(Where records allow, determine the percentage of directly connected impervious area in the catchment that was assumed during the stormwater treatment measure's design. Where this is available, use this figure in preference to the actual, post-construction figure.)

a) Directly connected impervious area:. . . . . (%)

b) Impervious area:. . . . . .(%)

9. a) For in-ground gross pollutant traps, oil-water separators and rainwater tanks, estimate the total volume (m^3) of the unit (i.e. the volume of water and trapped pollutants when it is operating at full capacity).

. . . . . m^3

b) For types of stormwater treatment measures other than gross pollutant traps, oil-water separators and rainwater tanks, estimate the area where stormwater is treated (m^2):

i) For wetlands, ponds, swales, porous paving, bioretention systems / rain gardens, buffer strips, sediment basins, sand filters and infiltration systems, estimate the total area of the treatment zone (which includes the extended detention area).[1] For example, the 'treatment zone' area of a grassed swale will be the product of its length and its 'top width' in m^2 (see Attachment 1 for a description of the 'top width'). For wetlands and ponds, the 'treatment zone' area should *include* the forebay / inlet pond area as well as the area of the main treatment zone (e.g. the macrophyte cell in a wetland).
ii) For rain gardens / bioretention systems or infiltration systems, separately estimate the area of the filter or infiltration area (m^2).

(i) Treatment zone area: . . . . . m^2

(ii) Filter / infiltration area (where relevant): . . . . . .m^2

(Conceptual and labelled diagrams of several types of stormwater treatment measure are provided in Attachment 1 to assist with this question.)

10. a) For those measures without a detention element (e.g. gross pollutant traps and oil-water separators), estimate the stormwater treatment measure's maximum treatable inflow rate (m^3/sec).

. . . . . .m^3/sec

b) For other types of stormwater treatment measures with a detention function (e.g. ponds, wetlands, rainwater tanks, bioretention systems / rain gardens, sediment basins and infiltration systems), estimate the:

i) Permanent pool volume.[2] [3]
ii) Extended detention volume (e.g. in a bioretention system, this is the 'ponded volume' *above* the filter media).

(Note that permanent pool volume and extended detention are independent of by-pass flows.)

(i) Permanent pool volume: . . . . . .m^3

(ii) Extended detention volume: . . . . . .m^3

(Conceptual and labelled diagrams of several types of stormwater treatment measure are provided in Attachment 1 to assist with this question.)

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[1] But does not include 'above-treatment' flood storage, such as a constructed wetland sitting within a much larger flood retarding basin.

[2] Permanent pool volume should be zero in an infiltration system and is typically zero in a bioretention system (unless there is a permanently inundated zone below the pipe outlet).

[3] For rainwater tanks, this is the volume of water that remains in the tank (if any) when the reuse mechanism (e.g. a pump that extracts water for toilet flushing) has extracted all the water it can from the tank.

PART C – COST OF THE STORMWATER TREATMENT MEASURE

11. Use the following table to document the costs associated with the stormwater treatment measure (where costing information is available). Against each cost entry in the table highlight whether the entries were:
    - Conceptual / rough order of cost (i.e. label the cost entry with a "[C]");
    - Engineer's (bill of quantities + unit rates) estimate (i.e. label the cost entry with a "[E]"); and/or
    - Actual cost (i.e. label the cost entry with a "[A]").

Notes:
- Cost estimates should be for the year they were incurred. For example, if the total construction cost was actually $200,000 in the year 2000 / 2001, then this figure should be used in a column labelled "2000" and not adjusted for inflation / deflation.
- The cost estimates should be *excluding* GST (goods and services tax).
- The cost elements should be organised based on the financial year in which they occurred.
- The land costs should be excluded from the acquisition costs.

Cost Element[1]	**Estimated Cost ($)**									
Financial Year Starting:										
Acquisition costs[2]**:**										
▪ Total costs associated with defining the need for the measure (e.g. running site selection processes, feasibility studies, grant application costs): *Note: If these costs were included in a Catchment / Stormwater Management Plan, estimate the cost of the options analysis element only.*										
▪ Total conceptual, preliminary and detailed design costs:										
▪ Total costs associated with environmental assessment, acquisition of consents and public consultation (following, or as part of, the design process):										
▪ Total construction costs (including internal and external project management costs and contract management costs): *Note: Do not include initial maintenance costs that are part of the construction contract.*										
Sub-total: 'Total Acquisition Cost' **=**										

Cost Element[1]	**Estimated Cost ($)**									
Financial Year Starting:										
Routine maintenance costs / Typical annual maintenance costs: *(see also Question 13)*										
▪ Annual costs associated with *routine* maintenance events (e.g. cleaning out a gross pollutant trap or mowing a grassed swale), including costs associated with relevant administration, inspections, staff training and waste disposal:										
Corrective maintenance costs / Renewal and adaptation costs: *(see also Question 13)*										
▪ Costs associated with significant alterations to the measure that should occur infrequently, say > every 10 years (e.g. the addition of safety fencing, new landscaping features, new GPT screen, new access road, recontouring a wetland's macrophyte zone, replacing a rain garden's filtration media, etc.):										
Decommissioning costs[3]**:**										
▪ Costs associated with the complete removal of the measure at the end of its life span due to redundancy or the need for total replacement (e.g. a wetland may be decommissioned in the future due to inadequate maintenance funds, or an in-ground GPT may need to be totally replaced every 50 years):										

Notes:

1. These costs should include staff time (incl. on-costs) as well as project, capital and recurrent expenses but not tax (e.g. GST).
2. These cost elements can be broken down further if required.
3. This cost element should not be confused with the 'corrective maintenance cost' associated with, for example, recontouring and replanting a wetland's macrophyte zone, replacing the filtration media in a bioretention system or rain garden, or replacing the infiltration media in an infiltration system.

12. On a scale of 1 to 10 rate the average quality of all the costing data you have supplied for Question 11, where: 0 = 'unsupported, ball-park estimates'; 5 = 'confident estimates'; and 10 = 'actual costs that were incurred':

. . . . . .

13. If a clear picture is available of how the 'routine maintenance costs' vary over the first few years of the measure's life span, please describe in written and/or graphical form (using the template provided below).

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14. If infrequent 'corrective maintenance costs' / renewal and adaptation costs are anticipated (e.g. desilting a rainwater tank, changing the infiltration media on an infiltration system, or changing the screen of an in-ground GPT), write down the nature of these activities and estimate the associated costs and recurrence period:

Activity	Cost ($Year)	Recurrence period (years)	Estimated (E) or actual (A) data
1.			
2.			
3.			
4.			

15. If relevant, explain any *unusual* cost elements and/or circumstances that occurred in relation to the stormwater treatment measure (e.g. unusually large construction costs due to excavation of bedrock, vandalism, unusual public consultation costs, stringent environmental management requirements, difficult site access, topography, vegetation, retrofitting, etc.):

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16. Was the land for this stormwater treatment measure:
    (a) owned? ☐
    (b) donated? ☐
    (c) purchased? ☐

Please indicate the associated cost (with the date the costs were incurred) of the land.
(If not known, please indicate the relative magnitude with respect to the acquisition cost of the stormwater treatment device.)

Cost: $. . . . . Base date for cost: . . . . . .

Additional Notes / Comments:

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PART D – DOCUMENT CONTROL

17. Name and position of the person entering data into this data recording sheet:

    Name: . . . . . Position: . . . . . .

    Organisation: . . . . . .

    Phone: . . . . . e-mail: . . . . . .

18. Date of data entry: . . . . . .

For assistance with this form, please contact André Taylor, Research Fellow, Cooperative Research Centre for Catchment Hydrology / Institute for Sustainable Water Resources, Monash University, andretaylor@iprimus.com.au.

REFERENCES

Australian Standards (1999). *AS/NZS 4536:1999 Life Cycle Costing – An Application Guide.* Standards Australia, Homebush, NSW.

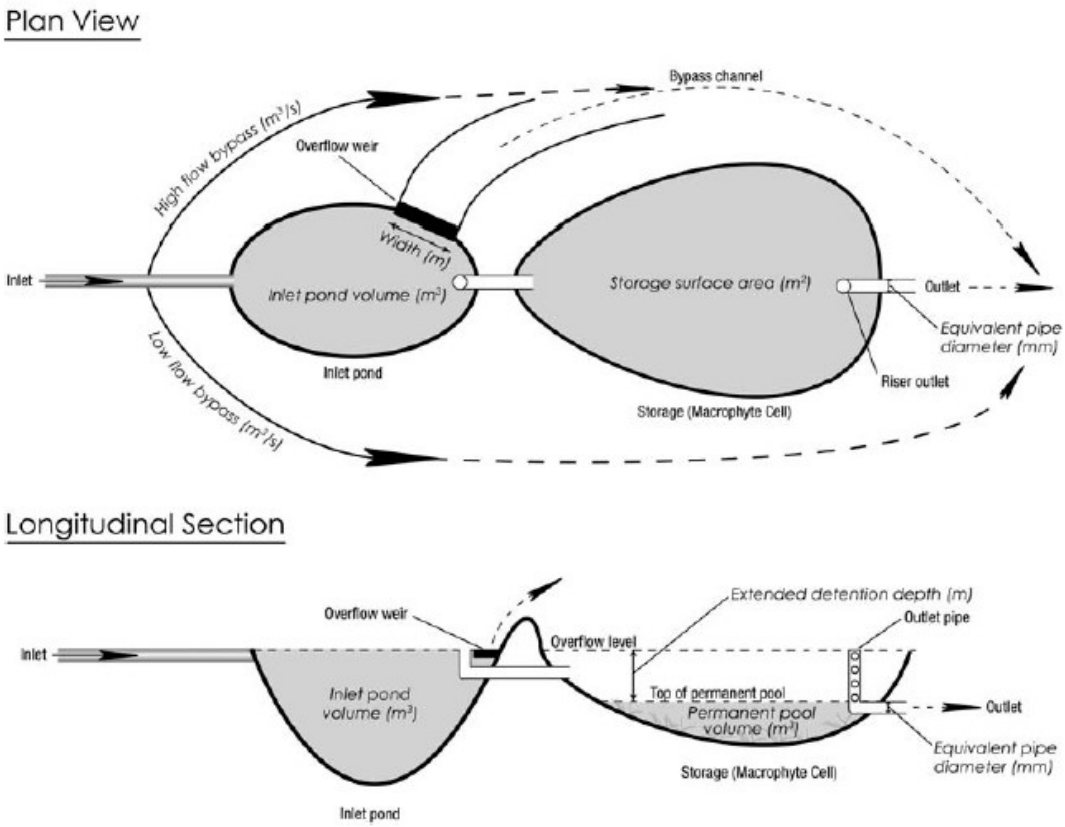
Victorian Stormwater Committee (VSC) (1999). *Urban Stormwater Best Practice Environmental Management Guidelines.* CSIRO Publishing, Melbourne.

Attachment 1

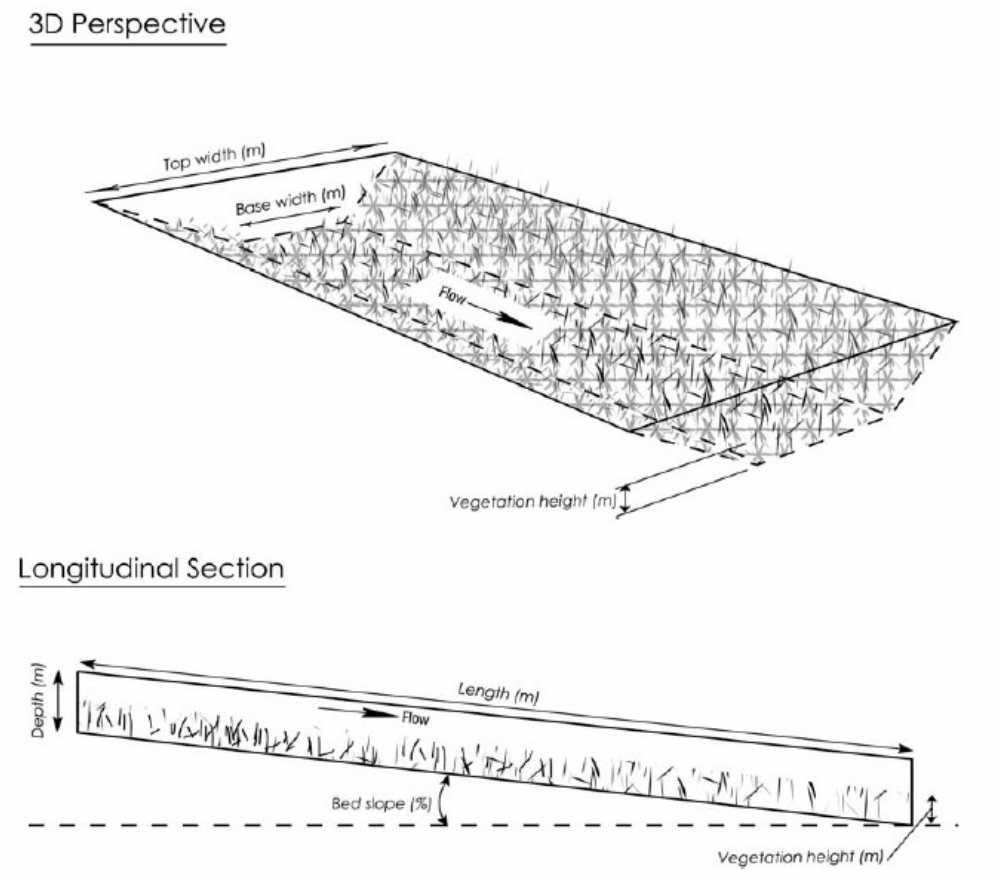
Labelled, Conceptual Diagrams of Four Common Types of Stormwater Treatment Measure

(***Source:*** *Music v. 3 User Guide for the MUSIC Model – Model for Urban Stormwater Improvement Conceptualisation, April 2005 – see www.toolkit.net.au/music)*

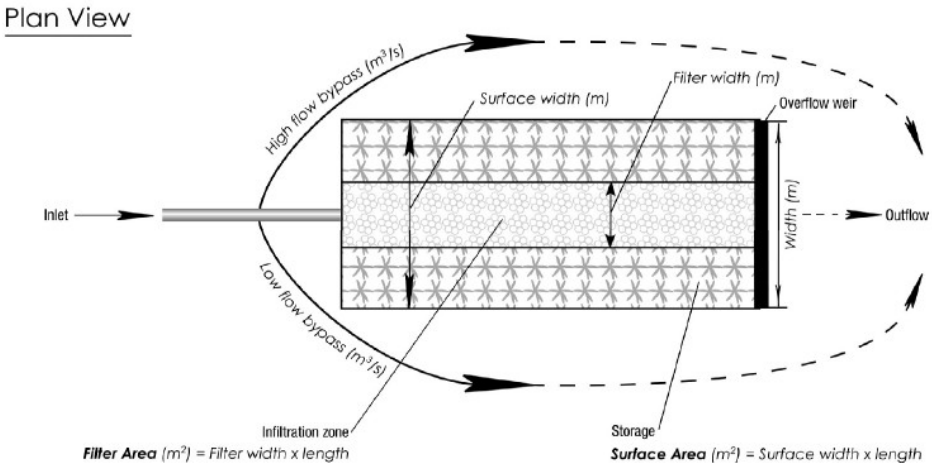
Conceptual diagram of a constructed wetland

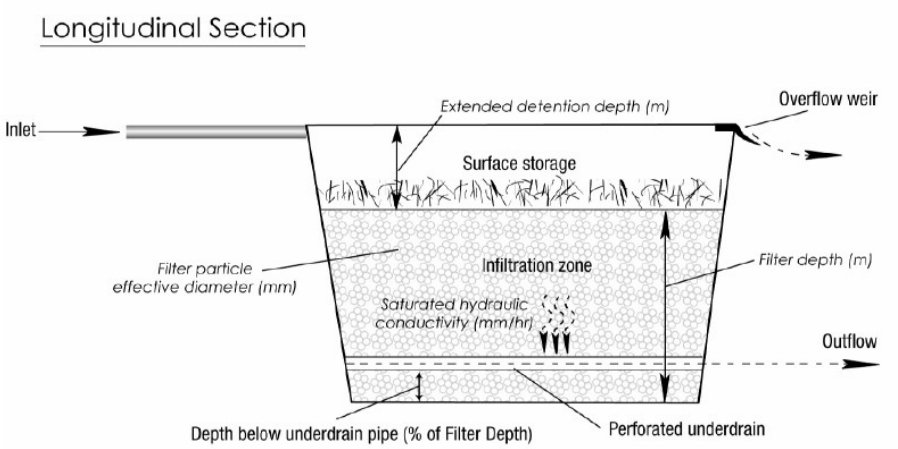


Conceptual diagram of a vegetated swale



Conceptual diagram of a bioretention system





Conceptual diagram of a pond or sediment basin