

## ***Interactive comment on “Staged cost optimization of urban storm drainage systems based on hydraulic performance in a changing environment” by M. Maharjan et al.***

### **Anonymous Referee #2**

Received and published: 26 August 2008

#### General Comments

This paper is an interesting addition to previous work published on whole life costing in urban drainage. However, I am not convinced that this journal is a suitable target for this paper because 1) I am unfamiliar with the journal, suggesting it does not tend to publish many papers in the urban drainage area and 2) an online search revealed almost no other papers on urban drainage published in this journal. The quality of the written English is variable - while it is generally understandable, it is not always technically correct or formal. The conclusions are excessively verbose and should be

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separated into a more focussed discussion section and a concise conclusions section.

### Specific comments

The hydraulic model used seems to be a skeletal planning model with about 2 nodes per thousand population, this level of model simplicity is likely to result in large uncertainties of the flood volumes, which should merit some consideration. Furthermore, there is only very brief comment given to the fact that these flood volumes are spread over the entire (large) sub-catchment area, leading to further uncertainties as to the flood damage costs. While the modelling may be suitable as a proof of this whole life costing concept, there should be more discussion on these potential inaccuracies.

I have not made any significant consideration of the use of genetic algorithms as I am not sufficiently familiar with them, however I would suggest the listing of the parameters on page 1488 should be more fully justified and/or referenced.

The introduction to section 4 is confusing - the case study is introduced as an 11.7 km<sup>2</sup> sub-area of the basin, but then in section 4.1 we are told that we are only considering a small amount of this sub-area the consideration of what area is being studied should be brought together into one sub-section.

Figure 5 is not necessary as the five zones and pipe references it shows are not used in the paper.

Figure 6 warrants a more detailed discussion as it is not at all obvious what S1 etc represent (This would make the explanation of Table 1 clearer) and whether the yellow colour of S1 is in any way significant.

Section 4.1 states 12 nodes and 17 sub-catchments this appears in-correct as hydraulic models usually have a separate node for each subcatchment.

The sensitivity study in 4.2.2 does not consider the accuracy of flood volumes predicted by the model - obviously these are defined by numerous parameters (whose sensitivity is not considered), but this could be used to consider the general influence of the model

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and its parameters on the methodology.

Technical corrections:

Page 1483 line 15 states 'The hydraulic performance of the network model is analysed to find out the specific locations where flooding occurs for 1 h 50 years design storm.' This suggests that it is the model's performance which is being analysed, rather than that of the sewer network. Also 'specific locations' is mis-leading as the simplification of the model means it can only tell whether flooding occurs in a sub-catchment, not specifically where it occurs.

Page 1484 line 7 'Further instead of the continues integral above,' should be 'continuous integral'

Page 1486 Section 3.1 considers land-use and climate change, but section 3.2 considers rainfall. It would be more logical to consider climate change in the rainfall section.

Page 1486 line 19 'The change in precipitation data with time is estimated based on the climate studies, which provides the rate of rainfall increase. The current rainfall time series data is multiplied by the rainfall increase rate of corresponding time step to get the time series data for that time step.' Needs a reference to what 'the climate studies' are, and it would be interesting to know the multipliers used. Reference to Figures, Equations and Sections should not use the abbreviations Fig., Eq., Sect..

Page 1487 Line 6 - the population data should be given a proper reference (e.g. full web page link in the references section)

Page 1487 Line 13 - the alternative block method should be referenced.

Page 1487 Line 21 - the abbreviation CN needs to be defined - presumably it is curve number, thus earlier in the paragraph state 'curve number (CN)'

Page 1490 Line 13 - 'Four of these tests are described below. The uppermost line shows the cost in do nothing case, the other solid lines show the costs in staged 15

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option and the dotted lines show the corresponding costs in static option in all the tests.' These two sentences should be linked to improve readability (e.g. '.... below and in Figures 10 to 13 where the uppermost ....')

Page 1490 line 15 - the static option is not previously considered, nor are any values given for the size of storage this represents. Consideration should be given to including the static option in Figure 8 and it should be referred to much earlier in the text.

Page 1490 Line 22 - '.... is higher in higher flood cast.' does not read correctly, consider '...higher when the unit flood cost is higher.' Page 1492 Line 2 Nascimento et al, 2006 does not appear in the list of references.

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