

Stevenson Group Ltd
Private Bag 94000
Manukau 2241
New Zealand

27 June 2011

Attention: Stephen Hughes

Dear Stephen

DSBP Stormwater Management. Report Peer Review

Attached please find a final copy of the above review by Pattle Delamore Partners Ltd (PDP).

In general PDP has agreed with the general approach and results.

In terms of the main issues that PDP has raised, as summarised in their Executive Summary, we offer the following response.

- i. Design rainfall profiles versus Actual rainfall profiles.

The design rainfall profiles are based on TP 108 for a "Chicago Storm" profile in which all maxima rainfall depths for each duration are encapsulated within a 24 hours rainfall event. It is the worst case scenario. It is acknowledged that actual events will vary both temporarily and spatially across a catchment but there is no standardised approach to deal with this. In an attempt to gauge the likely difference, the 1988 rainfall event (estimated to have an Annual Recurrence Interval (ARI) of 40-50 years) was scaled up such that the flood peak flow at the downstream end matched the 100 year ARI event. The result was a significant reduction (340mm) in "1988 scaled" flood levels within the DSBP area and a slight increase (70mm) at the downstream end, compared to the "design" event. If co-occurrence of peak sub-catchment flows were an issue higher flood levels would be expected with the DSBP area.

As PDP state, the hydrological and hydraulic modelling has been conducted using industry standard approach, with acceptable results. We agree with this conclusion.

- ii. Accuracy of Survey Data.

PDP point out that the accuracy of the LIDAR data in rural areas is 0.5m. Relatively speaking this should be an unbiased error for which the overall accuracy is improved with the inclusion of more data points. i.e. the accuracy of 1 data point might be 0.5m but the accuracy of 1000 data points will be significantly better than 0.5m. The floodplain model used points on a 5x5m spacing. To illustrate this point an area containing 2000 actual survey points was compared with the Lidar data over the same area. It was found that the maximum level difference on one point was 0.35m but that the average across the area was 0.004 m.

In addition, the river profiles were surveyed by land survey techniques. An approach that assists in overcoming inaccuracies in level information is to express the flood storage requirements in volume term rather than strictly relying on design levels. It is also noted that 500mm freeboard has been incorporated into setting future development levels.

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iii. More Frequent Flood Events

We concur that the more frequent events (e.g. 2 year, 5 year, 10 year ARI) need to be better quantified. This work will be completed later but is not critical for Plan Change requirements.

iv. Stormwater Quality Provisions

We consider that the approach adopted is the Best Practicable Option. Overall the wetland design area is greater than 2%.

v. Extended Detention

Beca is of the view that full Extended Detention (EDV) may not be required for the DSBP site due to its location in the catchment. We have, however, incorporated it into the overall layout.

We agree with PDP that further analysis of the erosive effects on the downstream river channel is carried out later. This is not a critical issue for the Plan Change.

We trust the review report and our amplification on some of the issues serve your purpose.

Yours sincerely

Stephen Priestley
Technical Director

A handwritten signature in purple ink that reads "Stephen Priestley". The signature is fluid and cursive, with a large loop at the end of the last name.

on behalf of

Beca Infrastructure Ltd

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