

Stormwater Assessment report 201110 Riversdale Terraces.

December 2020 for Dam 6



Stormwater assessment report, Riversdale Terraces.

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for **AdamsonShaw**



1. Background:

The site has an existing stormwater detention dam constructed to attenuate stormwater runoff from the developed land on the upper terrace. It is proposed to add further residential lots with a subsequent change in stormwater runoff characteristics.

EQOnz Ltd has been engaged to assess the effect of the proposal on the stormwater detention dam.

2. Methodology

We have adopted the following methodology in this assessment:

- Review Cardno stormwater report
- Seek files from Greater Wellington Regional Council
- Review As-Built drawings
- Visit site and compare actual to as-built
- Assess catchment area
- Adopt Cardno design inputs as these have already been approved by Greater Wellington Regional Council and Masterton District Council (runoff coefficients, time of concentration etc). Provide rainfall intensity data based on current knowledge.
- Model stormwater detention dam on existing runoff
- Assess additional runoff from new proposal
- Use model to assess the dam outflow from the revised catchment (proposed increased impermeable area).
- Provide observations on the system as a whole

3. Assumptions

We have used the following assumptions:

- The time of concentration and runoff coefficients are unchanged from the Cardno report
- The NIWA HIRDS data for RCP6.0, 20 minute, 50 year return event is assumed as critical in line with current rainfall data
- The dam storage Vs height data used by Cardno is assumed correct
- All outlet infrastructure is maintained
- Catchment areas are as assumed in diagrams 1&2



Figure 1 Dam 6 catchment

The proposal adds a number of residential sites, which increases the impermeable area and changes the shape and magnitude of the stormwater runoff curve. These areas have been calculated and are reflected in the stormwater runoff calculations.

Peak Inflow to detention dam 6	
Catchment	Peak flow
Pre-development	0.35m ³ /s
Current situation	0.41m ³ /s
Proposed developed area	0.47m ³ /s



Figure 2 Dam 6 increased runoff load from proposal

4. Complications

The Cardno East Leigh Farm Dam 6 report (March 2010) investigates and discusses the stormwater runoff and function of the farm dam, with recommendations as to construction. The actual construction as shown by the as-built and confirmed on site is significantly different: the original design appears to be based on a farm dam with constructed outlet spillway, whereas the actual is a detention dam.

The difference is that in the original report the format of the dam is that it is or could be full to spillway level prior to a rainfall event, with storage occurring as the spillway forms a restriction to the outflow. The actual has a low-level outlet providing about 1.5m of storage before the spillway comes into operation – meanwhile a slow discharge occurs through the small outlet.

The modelled differences are significant, with the actual outperforming the original design by a large margin. Modelling indicates that the capacity of the dam is such that intense, short duration rainfall events produce insufficient volume to cause outflow from the main outlet.

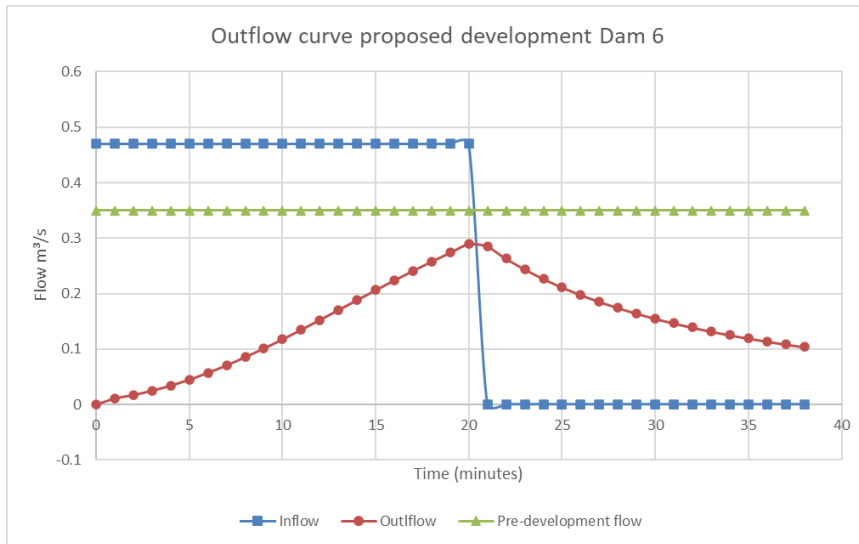


Figure 3 Outflow curve using original Cardno criteria

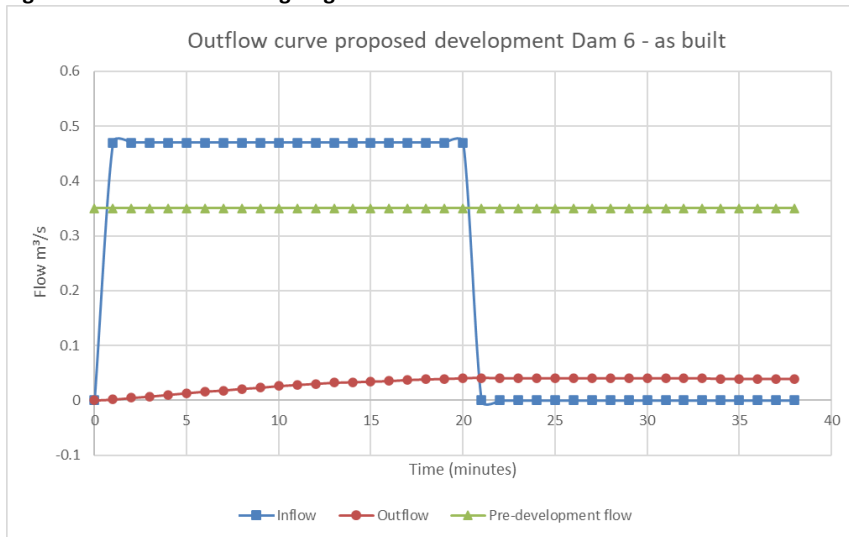


Figure 4 Outflow curve using as-built criteria

5. Site observations

The performance of the dam as a detention structure is reliant on the maintenance of the components.

Figure 5 Vegetation dominating outlet



If the outlet low-level pipe is blocked, the structure's performance would revert to closer to the farm dam. Whilst the outflow would still be less than the undeveloped flow, it would increase risk to downstream infrastructure.

If the outlet channel and culverts block, flows would overspill and form a secondary flowpath. Our assessment on site is that there is no defined/formal secondary flowpath and that there are some assets that could be compromised.



Figure 6 Estimated overland flow path should the outlet channel/culverts block

It seems logical that the detention dam should form part of the Council's infrastructure with subsequent maintenance programming.

6. Conclusions

The increase in peak inflow from the proposed additional development is insignificant compared to the capacity of the dam acting as a detention structure. Outflow will be unaffected in terms of peak flows for almost all predicted scenarios barring maintenance failures.

The outflow infrastructure and channel should be the subject of a maintenance program, and it seems logical that it be added to the existing Council maintenance program for the other dams.

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