greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

| | |
|---|---|
| Report | 2015.359 |
| Date | 2 July 2015 |
| File | N/03/22/04-v1 |
| Committee | Hutt Valley Flood Management Subcommittee |
| Author | Alistair J N Allan, Senior Projects Engineer |

# Pinehaven Flood Mapping Audit

## 1. Purpose

To advise the Subcommittee on the findings of the Independent Audit of the Pinehaven Flood Hazard Mapping and to recommend proceeding with the finalisation of the Pinehaven FMP.

## 2. Background

At the meeting of this Subcommittee on 10th February 2015, the Subcommittee recommended the appointment of Beca Ltd to complete an audit of the Pinehaven Stream Flood Mapping [Report 15.38]. The audit terms of reference were agreed by the Subcommittee at that meeting, and the auditor was appointed shortly after.

This audit has been completed and a comprehensive audit report was received by GWRC at the start of July 2015.

## 3. Audit Report Executive Summary

A copy of the full audit report is included as **Attachment 1** to this report.

Flood hazard maps have been developed for the Pinehaven Stream catchment in the Hutt Valley. The maps are based on the outputs of hydrological and hydraulic modelling carried out from 2008 to 2010, and are being used to inform management of development and flood alleviation options for the catchment.

The scope of the audit described in this report is neatly summarised as follows:

*"The audit builds upon previously completed investigations and peer review work and elevates this to an additional level of scrutiny and analysis. These previous investigations and peer reviews found both the hydrology and hydraulic model fit for purpose. However, some of the community still had concerns that the scope of the reviews done to date was not extensive enough, and, therefore, an additional more comprehensive audit has been requested by*

*the Hutt Valley Floodplain Management Subcommittee, (the governing body for the development of the floodplain management plan). This audit is to contain a review of the hydrology, hydraulic model and the application of freeboard."*[1]

The terms of reference (ToR) for the audit and appointment of the auditor have been subject to community scrutiny. This audit report contains a review of the hydrological and hydraulic modelling, the application of freeboard, and the presentation and interpretation of the flood hazard maps. Meetings have been held with the modellers and with two community groups; Save Our Hills and Pinehaven Progressive Association. The concerns raised, and case studies provided, by the Save Our Hills group are addressed in the audit.

As requested in the RFP ToR, guidance is also provided in the report on how to:

- Set storm water neutrality provisions within the district plan.
- Define the impact of intensification of development on the runoff characteristics of the Pinehaven hills.

A review of the hydrological and hydraulic modelling has been carried out as part of this audit, and is described in the ToR as an audit of:

- The type of software and modelling package used for the hydrology and hydraulic model
- The modelling method used and its appropriateness for both hydrology and the hydraulic model
- The use of freeboard and method by which it was applied
- Representation of the flood hazard through the way in which maps are displayed and information provided.

The review found that the hydrological and hydraulic modelling is fit for purpose. The methods and level of detail reflected the catchment information and modelling methods available in 2008-2010.

While there have been advances in modelling methods and available information since 2009, updating and upgrading the models is not recommended by this audit, and doing so would be unlikely to significantly alter the flood extents and depths for the design flood events and scenarios modelled.

The way that the flood extent and hazard maps are presented in published information obscures the components that have been used to derive the extents. Describing the 'flood extent plus freeboard' maps as Flood Hazard Maps does not adequately describe the complexity of information included in the Maps. These issues lead to confusion and misunderstanding within the community regarding the interpretation and use of the maps. As such, the presentation of flood information in published map form could be modified which may provide greater transparency and understanding.

This may be achieved by distinguishing modelled levels from wider flood sensitive areas, taking freeboard and sensitivity to factors such as debris blockage into account. Currently, this information is available to an individual by request from GWRC. However, these additional details are not included in published maps.

Given that the maps are to be used for planning purposes, the inclusion of an allowance for climate change to a suitable horizon is appropriate, as is the inclusion of freeboard. 2090 is suggested as it is one of the time horizons reported in MfE's 2008 guidance. Similarly, the choice of Annual/Average Recurrence Interval (ARI) for the map could be altered to reflect local consenting requirements.

The modelling underlying the flood maps is now 6-7 years old. Flood maps are periodically updated in line with council long term plans, or in response to significant new data becoming available after a major storm event, or when major changes occur within the catchment. The community should be made aware of this, and understand that mapped flood extents may be refined in future as a result of programmed revision to flood modelling and mapping.

The issue of including stormwater (or hydrological) neutrality into local planning guidelines is complicated. While general principles regarding matching or lowering peak flows at the outlets from developments are widely adopted, the hydrological effect of potential developments should be considered on a case by case basis, as in some cases downstream flood risk may be reduced if runoff from the development is discharged early to the receiving water course before floodwater from upstream arrives. However, this is unlikely to be the case for the Pinehaven catchment, where runoff attenuation is likely to provide the most benefit to reducing downstream flood risk.

With regard to assessing the hydrological effect of potential future development on the Pinehaven Hills, peak flows in the affected sub-catchments could increase by about 18% (if not attenuated) and flood volumes may increase by about 6%. Further down the catchment the relative percentage increases in peak flow and flood volume will be smaller, as the cumulative catchment area is increased by the inclusion of catchments that have not been subject to future development. Further work will be completed to develop suitable controls for future development within the Pinehaven catchment to support a plan change by UHCC.

Confirming the main conclusion of the audit; **the hydrological and hydraulic modelling underlying GWRC's flood extent and hazard maps is fit for purpose, but the way that flood information is presented in map form could be modified, which may increase the understanding and acceptance of the maps by the community.**

1 Paragraph 6 of the ***Request for Proposal - Pinehaven Stream Flood Mapping Audit.*** *WGN_DOCS- #1437397-v3-ToR_Pinehaven_Stream_FMP_Audit.doc*

## 4. Comment on the Audit Report

The Audit Report has confirmed that the hydrology and hydraulic modelling used for development of the Pinehaven Stream Floodplain Management Plan is fit for purpose. With this finding we are now recommending progressing the finalisation of the Pinehaven FMP as outlined in Section 5 of this report.

The Audit made comment on a number of aspects related to the hydrology and hydraulic work with two areas requiring specific attention.

4.1 Flood Map Presentation

The report indicated that an understanding of the flood maps could be improved by delineating flood sensitive areas (which include freeboard and sensitivity to factors such as culvert blockages). Given the interest in this work in Pinehaven, we will prepare maps delineating flood sensitive areas and use them in finalising the FMP. More detailed information will be available on request. It needs to be noted that this work will only be specific to the Pinehaven mapping. Further work will need to be done to consider how all mapping across the region is undertaken.

4.2 Hydraulic Neutrality

Officers will work with the Auditor and UHCC to develop for the UHCC district plan how hydraulic neutrality could be achieved under a range of development scenarios.

## 5. Finalisation of the Pinehaven FMP

With the findings of the Independent Audit confirming that the modelling used for the development of the Pinehaven FMP is fit for purpose, it is proposed to recommence the final round of consultation being undertaken to sign off the FMP. This work will include

- Advising all submitters that we are now in a position to consider their initial submissions on the FMP.
- Advise submitters of the outcomes of the independent audit, including providing a copy of the flood maps delineating flood sensitive areas and ask if they wish to amend or add to their submission.
- Advise the wider community of the outcomes of the independent audit and ask if they wish to submit on the measures proposed within the FMP.
- Consider existing and new submissions before finalising the FMP as previously advised.

# 6. Programme and budget

## 6.1 Outline programme

The proposed programme for confirming the FMP is:

| Date | Task |
|---|---|
| July 2015 | Amendments to FMP as suggested by audit |
| August 2015 | Consultation on proposed FMP |
| September 2015 | Finalise FMP document |
| October 2015 | Recommend the Pinehaven FMP to HVFMSc |
| November 2015 | Commencement of design and implementation phase of the Pinehaven Stream FMP |

## 6.2 Budget implications

The cost for completing the audit is estimated to be within $30,000. This was not included when the budgets were set for the 2014/15 financial year. Due to these expenses, no remaining budget was available to be carried forward into the 2015/16 financial year to complete the Pinehaven Stream Floodplain Management Plan.

It is estimated that the total cost to complete the floodplain management plan will be below $50,000. No budget has been allocated to the Pinehaven FMP development project for the 2015/16 financial year. It is, however, anticipated that these costs can be accommodated within the broader Flood Protection Investigations Team capex budget without impacting significantly on other projects.

# 7. The decision-making process and significance

Officers recognise that the matters referenced in this report may have a high degree of importance to affected or interested parties.

The matters requiring decision in this report have been considered by officers against the requirements of Part 6 of the Local Government Act 2002 (the Act). Part 6 sets out the obligations of local authorities in relation to the making of decisions.

## 7.1 Significance of the decision

Part 6 requires Greater Wellington Regional Council to consider the significance of the decision. The term ‘significance’ has a statutory definition set out in the Act.

Officers have considered the significance of the matter, taking the Council's significance and engagement policy and decision-making guidelines into account. Officers recommend that the matter be considered to have low significance.

Officers do not consider that a formal record outlining consideration of the decision-making process is required in this instance.

### 7.2 Engagement

Engagement on the matters contained in this report aligns with the level of significance assessed in accordance with the significance and engagement policy. Engagement on this matter was not considered necessary.

## 8. Recommendations

*That the Committee*:

1. ***Receives*** *the report.*

2. ***Notes*** *the content of the report.*

3. ***Notes*** *the findings of the audit report.*

4. ***Recommends*** *the Pinehaven Floodplain Management Plan is released for a second round of public consultation including publication of maps amended to differentiate freeboard.*

5. ***Recommends*** *that the suggestions of the audit report relating to development of stormwater neutrality and future development controls are included in the work to support a new Plan Change by UHCC.*

6. ***Recommends*** *that a review of best practice methods for the presentation of flood hazard information is carried out and reported back to the Subcommittee.*

| Report prepared by: | Report approved by: | Report approved by: |
|---|---|---|
| Alistair J N Allan<br>Senior Projects Engineer, Flood Protection | Mark Hooker<br>Team Leader Investigations, Strategy, Policy. Flood Protection | Wayne O'Donnell<br>General Manager, Catchment Management |

Attachment One: Pinehaven Audit Report