

Project Brief

Effects of Land Use Change on the Flood Hydrology of the Waikato River Catchment Between Karapiro and Taupo

1 Background

Increasing pressure is being exerted for conversion of established areas of forest plantation to pasture in the Waikato River Catchment. Such conversion is already well underway in some parts of the catchment.

Environment Waikato has been aware of the gradual conversion within the upper Waikato catchment over the last several years. Due to the scale of land use change, a policy review for the area above Karapiro is proposed. The review process requires specific steps be followed including scientific investigations of the issues and their effects on current policies and targets, available methods to address the issues and effects including justifications for any policy changes. Stakeholder and public consultation is a legal requirement and is part of the whole review process. The initial assessment of the effects of land use change within the catchment above Karapiro included effects on water quality, soil erosion and flood hydrology. This project is concerned only with understanding the effects of forest plantation to pasture conversion on flood hydrology within the Waikato River Catchment downstream of Lake Taupo.

These areas consist of a variety of geological soils, whose hydrological and erosion characteristics vary with changes in land use. In particular the flood hydrology of the pumice soils of the central North Island is known to be particularly sensitive to changes in land use.

Conversion of plantation forested areas to pasture within the Waikato region is currently unregulated by statutory planning instruments and can occur 'as of right'. Currently known areas of forestry conversion are assessed at up to approximately 70,000ha.

2 Aim

This project is aimed at assessing the effect that the anticipated potential changes in land use within the catchment of the Waikato River between Karapiro and Taupo, may have on the flood hydrology of the Waikato River and its tributaries.

In addition it is intended to identify the subsequent effects downstream of Karapiro dam and impacts on the flood protection works of the Lower Waikato Waipa Control Scheme.

A key aspect of the project will involve consultation with key stakeholders and their technical advisors to ensure the outcomes of the technical investigations are based on robust methodology and information, and the results can be used to inform future planning and decision making processes.

3 Objectives

1. To provide a robust assessment of the effect of forest plantation to pasture conversion on the flood hydrology of the tributary catchments to the Waikato Hydro Lakes covering the spectrum of risk/return period events.
2. To determine how changes in the source hydrology of the tributary catchments are transformed as they pass through the Waikato hydro lake system.
3. Following on from 2 above, determine the expected impacts of the changes in land use on the flood risks in the Lower Waikato River including protection standards for the LWWCS flood protection scheme.

4. Prepare a technical report setting out the methodology and results of the investigation that will inform Council's policy decision making and direction.
5. Establish a broad understanding and consensus on hydrological assessment relating to change of land use in the Upper Waikato within relevant sectors of the community.

The proposed process in achieving these objectives includes:

- a. To seek input from a panel of suitably qualified technical experts to ensure that robust methodology and results are achieved, and that key stakeholders support the investigation outcomes. Note: The technical expert panel will include nominees from parties involved in, or potentially significantly effected by, the effects of forest conversion, and also at least one expert independent of the these parties. (Terms of reference for the expert panel role and involvement in the project is attached in Appendix I)
- b. To consult with a range of key stakeholders, in order that those parties have the opportunity to understand, discuss, input, and support the outcomes of this investigation.

4 Project Framework

The project is being undertaken by Environment Waikato for the purposes of establishing a robust understanding of the impact of landuse change on the flood hydrology of the Waikato River system, for input into its future planning and policy decision making, and operational work programmes. Environment Waikato will provide overall leadership and support for the project, and the project ultimately reports to Environment Waikato.

Environment Waikato's Project Watershed Liaison subcommittees, and in particular the Upper Waikato, Middle Waikato, and Lower Waikato Subcommittees, also have a significant interest and responsibility for river and catchment management in this area. The project will report through these subcommittees to Council. The subcommittees have broad representation across key stakeholders and landowners in these areas.

Within this overall framework, the project requires effective project oversight and leadership, project management, appropriate technical and expert input, and liaison with key stakeholders. To achieve these ends, a project structure including several key working groups are proposed as outlined below.

4.1 Project Control Group

A Project Control Group has been set up to provide oversight and recommendations on the scope, direction, communication, and delivery of the project. Membership will include staff from Environment Waikato (Project sponsors and project managers), Upper Waikato river representation, Middle Waikato river representation, Lower Waikato river representation, and Mighty River Power (Waikato hydro system) representation. Appointments for the Upper/Middle/Lower Waikato river representatives were made in consultation with the three respective Project Watershed liaison subcommittee chairs. The membership of the PCG is shown in section 4.4 below.

4.2 Technical Expert Panel

It is proposed to establish a technical expert panel to provide input and assist the implementation of the technical investigation, including assisting in confirmation of:

- The appropriate scope of the project.
- The approach taken and methodology followed in the investigation.
- The appropriateness of any assumptions and qualifications associated with the results.

Provisionally, the panel is proposed to include technical expert advisors from Environment Waikato, Mighty River Power, major land developers, and independent expert input (such as from NIWA). This panel needs to be able to provide expert advice and contribute effectively and objectively to the investigation.

4.3 Key Stakeholders

The focus of this Project is a technical investigation of the flood hydrology of a significant part of the Waikato catchment and the impact of landuse change on this flood hydrology.

There are also a number of key stakeholders with a significant interest and/or involvement in the project and its outcomes. It is proposed that a liaison forum of identified key stakeholders be established, to enable development of a collective understanding of the Project and its subsequent outcomes, an open sharing of relevant information and issues, and to enable key stakeholders to be kept informed of progress. Identified key stakeholders include the following:

- Territorial Local Authorities
- Carter Holt Harvey
- Wairakei Pastoral Ltd
- Other Forestry interests
- Environment Waikato's Catchment Liaison Subcommittees of Upper, Middle/Central, and Lower Waikato)
- Federated Farmers
- Iwi
- Mighty River Power
- High interest individuals.

4.4 Project Structure and Resources

Project Sponsor

- Scott Fowlds (EW)

Project Control Group

- Scott Fowlds (EW)
- Dennis Crequer (EW)
- Ghassan Basheer (EW)
- Victor Clark (Chair - Upper Waikato CLSC)
- Stuart Kneebone (Chair - Middle Waikato CLSC)
- Malcolm Lumsden (Chair Lower Waikato CLSC)
- Leroy Leach (Mighty River Power)

Project Management

- Ghassan Basheer (Project Manager and coordinator).

Technical Expert Panel

- Murray Mulholland – Technical Programme Manager- Expert- EW
- Ross Woods – Independent expert advisor – NIWA – Christchurch
- Ian Jowett – Nominated expert for Mighty River Power – NIWA – Hamilton
- Jon Williamson – Nominated expert for WPL – SKM – Auckland
- Rory Nathan – Nominated expert for WPL – SKM – Melbourne
- Alan Pattle – Nominated expert CHH – PD – Auckland.

Investigations

- Murray Mulholland and other internal resources and external contractors as required.

Data Supply and Communications

- Environment Waikato Environmental Information and Monitoring Programme
- Other sources of information (NIWA, CHH, WPL, Mighty River Power etc.)
- Environment Waikato Communications Programme.

5 Potential Scope of Investigation

The scope of the investigation is to be confirmed by Environment Waikato, in conjunction with the Project Control Group, and Technical Expert Panel. It is designed to assess the hydrological implications of proposed forest to pasture conversions on flood flows within the Waikato River catchment between Karapiro and Taupo. The following are a preliminary identification of the investigative tasks which will be carried out to undertake the project. It is proposed that the Technical Expert Panel will consider each task and provide recommendations on the methodology, assumptions and results to ensure a robust outcome is achieved at the end of the investigation.

Investigation Outline

- a) Finalise one or more scenarios defining the spatial and temporal extent of the forest plantation to pasture conversions based on known and expected conversion areas within the Upper/Middle Waikato Zone (The Waikato River Catchment between Lake Taupo and Karapiro) over the next 25 years.
- b) Define the geological make-up of the Waikato River Catchment and interpret rainfall-runoff relationships with respect to the geological, slope and land use differences to show potential effects of geology and land use on the relationships.
- c) Recalculate the hydrological analyses for each of the sub-catchments entering the hydro-lakes to estimate current and expected future flood inflow hydrographs for a range of return periods.
- d) Review the findings of the MRP study, “Forest Conversion - Flow Effects on Hydraulic Structures”, currently underway.
- e) Route the flood inflow hydrographs through each of the hydro lakes based on defined lake levels, to obtain outflows from Lake Karapiro for a range of return periods under both current and expected future scenarios.
- f) Route the flow hydrographs obtained in (e) to the Lower Waikato, using a model agreed to by the Technical Expert Panel, for the Waikato River from Karapiro to Port Waikato. This will require estimates, agreed to by the Technical Expert Panel, of inflows hydrographs from the Waipa and other significant tributaries downstream of Karapiro.

- g) Examine the impacts of increased flows in the lower Waikato on design standards for the Lower Waikato Scheme stopbanks and structures, and Lower Waikato river system.
- h) Examine the impacts of increased flows in key tributary stream and associated infrastructural assets within the Upper Waikato catchment.

6 Programme

A target programme for the project is set out in the attached Gantt chart. Key milestones are identified as follows:

Milestone	Date
1) Confirm Project Brief	April 07
2) Establish project control group, and confirm scope and objectives of project	May 07
3) Establish technical expert panel and prepare scope of investigation	June 07
4) Final confirmation of scope	July 07
5) Technical Investigations <ul style="list-style-type: none"> a) Spatial and temporal extent of forest to pasture conversions b) Review of MRP study of effects on extreme events c) Source hydrology and inflows to hydro system d) Hydro system routing e) Kapapiro to Lower Waikato Hydraulic Modelling f) Lower Waikato Scheme Impacts g) Local (on site) effects 	July 07 to Dec 07
6) Draft Report	Dec 07
7) Peer Review of Draft Report by the Expert Panel	Jan 08
8) Final Report	March 08

7 Reporting

Reporting will be monthly from the Project Manager to the Project Control Group.

Briefings to Environment Waikato and key stakeholders at commencement and end of project, and at key stages during the project will occur as appropriate.

The Environment Waikato web site will include up to date information on the project including PCG minutes and progress to date.

8 Project Costs

To be confirmed following confirmation of project scope and investigation programme.

9 Relationship to Other Projects

This project has synergies with and important implications for the Waikato River above Karapiro Policy Review Project.

APPENDIX I

Terms of Reference Technical Expert Panel

Introduction

The Technical Expert Panel for this hydrological investigation project is formed to advise the Project Control Group in ensuring that the objectives of the project (as defined in section 3 of the project brief) are achieved.

The Panel includes experts representing Environment Waikato, and representatives from Mighty River Power and the major forestry companies in the catchment. It is acknowledged that the experts have been nominated by different organisations and bring a broad range of experience and knowledge relevant to the study, as well as the interests of their nomination organisations to test the transparency of the process and ensure the robustness of outcomes. The PCG expects the expert panel to act as “consultants to the process”, and to act in a professional and collective manner to ensure robust outcomes are achieved.

The purpose of the technical expert panel is to provide recommendations on technical aspects of the project to the Project Control Group. The hydrological investigation is complex in nature and the Project Control Group has responsibility for managing project budgets and timeframes. Some aspects might not be able to be fully covered within the initial scope of the project and the panel may recommend further work if considered desirable.

Terms of Reference

- 1) The investigation is to provide support to an Environment Waikato policy review project for the Waikato River Catchment downstream of Lake Taupo.
- 2) The technical expert panel shall provide advice and recommendations to the project control group on the scope and nature of technical work involved in the project, including preparing and or commenting on work briefs and specifications. The panel shall also provide
 - a) Project briefs and specifications for technical work.
 - b) Review and recommendations on the technical aspects of proposals received from external contractors.
 - c) Review and comment on the technical investigations undertaken, and ensure that outcomes are soundly based and defensible in respect of accepted scientific practice.
- 3) The technical expert panel shall provide the available base information, knowledge and experience that their clients/employers hold relevant to the investigation to ensure robust outcomes. Such information shall be treated as confidential by the Panel and shall not be used or interpreted outside the scope of the investigation. However, the final report will be made available to the general public.
- 4) The expert panel will act in a responsible, professional and ethical manner at all times to ensure that robust outcomes are delivered.