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HIS WORSHIP THE MAYOR AND COUNCILLORS
LONG TERM COUNCIL COMMUNITY PLAN REVIEW (2006)
(From Drainage Manager)

File:308/05/005
NN:LTCCP Pinehaven SW Study
4th August 2005

Pinehaven Stormwater Management Study

1. PURPOSE

The purpose of this report is to propose the Pinehaven Stormwater Management Study where there is a history of flooding due to the under capacity of stream channel and culverts.

This report describes investigations and study required to look at possible options to mitigate the flood risks from the Pinehaven stream and improvements of stormwater management for Pinehaven Catchments.

2. BACKGROUND

The Pinehaven stream starts from the upper Pinehaven Road and Elmslie Road.

The Wellington Regional Water Board in July 1977 adopted an Administration of Watercourses Agreement which clarified responsibility for the administrative control and the maintenance of watercourses within the region including Pinehaven stream.

The Greater Wellington Regional Council has administration responsibility for maintaining the Pinehaven stream channel from the Western edge of the Pinehaven Reserve to the end of Pinehaven stream, approximately 900 meter in length. The Upper Hutt City Council has administration responsibility for maintaining the Pinehaven stream channel upstream of the Western edge of the Pinehaven Reserve (approximately 300m in the Pinehaven Reserve, 900m in the Pinehaven Road and 800 meter in the Elmslie Road).

The GWRC has expressed a desire to hand the stream section over to UHCC once a Pinehaven Stream Management Plan has been proceeded and the physical works have been completed.

It makes sense for one authority to have responsibility to administer the entire Pinehaven stream due to the reasons as follows:

- the contained nature of the Pinehaven Catchment;
- the community being all residents of Upper Hutt;
- the closely integrated nature of the Pinehaven Stream Catchment area;
- and the UHCC stormwater piped reticulation system.

Flooding Experiences

Pinehaven Area has experienced flooding for many years. The major flood event of the entire Pinehaven Area was experienced due to the storm and heavy rain of 20th December 1976 over the following area of Pinehaven:

- Flooding in lower reaches of Pinehaven Stream;
- Flooding in Pinehaven Reserve;
- Flooding in Upper Reaches of Elmslie Road and Pinehaven Road

There are many other flooding events experienced in Pinehaven Area, such as, September 1995, 7/02/1996, 4/10/1997, 28/10/1998, 17/06/2002, 3/10/2003, 16/02/2004 and recently 5/6 January 2005.

A number of Floodplain studies and reports were implemented before and after the 1976 major flood. As a result of damages due to the storm, improvements were carried out for the Pinehaven stream and stormwater pipe network upgrade was implemented.

Although, no major flooding problem in the entire Pinehaven Area has happened since 1976, some flooding problems have been experienced in a number of properties located at Pinehaven Road, Jocelyn Crescent, Birch Grove, Sunbrae Drive, Blue Mountain Road, and Deller Grove in the Pinehaven area.

There is no information gathered since the 1976 flood on the location and quantum of damages and losses.

The Greater Wellington Regional Council and Upper Hutt City Council have implemented a number of investigations, studies and reports for flood control measures in the Pinehaven Catchments during 1980 to 1994.

2.1 Flooding due to the recent Storm 5/6 January 2005

An investigation has been carried out to find the cause of problems and the Pinehaven local stormwater systems have been reviewed for solution.

The causes of flooding in January 2005 are due to the following reasons:

- Inadequate capacity of stream channel;
- Inadequate capacity of private and public culverts;
- The banks of the stream are too low in some sections;
- Tree leaves, trunks, rubbish, coming from the Forests, Gardens etc. and other barriers that blocked the water way of the stream;
- Debris, silt, weeds, rubbish exists along the natural stream;
- Stormwater outlets surcharged due to the high water level of the stream;
- Stormwater outlets and road sumps blocked with rubbish, tree leaves, debris, silt etc.

2.2 Flooding in Sunbrae Drive

Flooding was experienced at property no. 4 Sunbrae Drive during the 5/6 January 2005 Storm. The flooding was due to the stormwater outlet located at the stream being submerged causing overflow from street sumps and manholes.

2.3 Birch Grove Stormwater Problem

The existing Birch Grove stormwater system is sufficient for a 100 year return period. However, the high water level of the Pinehaven Stream caused by its inadequate capacity causes the system to block and sumps to surcharge at Birch Grove.

2.4 Pinehaven Road/Jocelyn Crescent Flooding Problems

A number of cases of flooding in Pinehaven Road have been experienced in recent years. The majority of the causes are due to the inadequate capacity of private culverts. In addition, the stormwater outlets at the Pinehaven stream were blocked due to silt, rubbish and tree leaves coming from the upstream.

The runoff from Pinehaven Road flows along Jocelyn Crescent entering property no. 39 Jocelyn Crescent. During the storm, the water level of the stream rose up and caused flooding at a number of properties located at Jocelyn Crescent.

2.5 Deller Grove/Blue Mountain Road

There are number of houses located in the secondary flow path of the Pinehaven Stream. Whenever the stream level rising and flows over the stream bank, it causes flooding at the property adjacent to the stream, such as, 39 Blue Mountain Road, 15 & 17 Deller Grove etc. In addition, the stream banks have started to erode.

2.6 Sunbrae Drive Culvert

Sunbrae Drive Culvert forms part of the Pinehaven stream channel. The existing culvert underneath Sunbrae Drive is 1.8 m diameter. It is under capacity and can only accommodate the flow of 2 year return period. The investigation and study have been carried out to upgrade the Sunbrae Drive culvert. The report with options and estimated cost are in a separate LTCCP report.

However, Pinehaven stream itself has low capability of carrying floodwater in many sections of the channel. Therefore, it is necessary to carry out the Pinehaven stream management study and define the problems, develop the most effective strategy and planning to mitigate the flooding.

3. PROPOSAL

The purpose of the Pinehaven stream management study is to develop strategy and options to mitigate flooding and improve the stormwater management in the Pinehaven area. It will provide the ways of flood relief to the various flood prone communities adjacent to the Pinehaven stream.

There are substantial amounts of information obtained by the Greater Wellington Regional Council and Upper Hutt City Council from ongoing investigation and studies.

The Greater Wellington Regional Council has administration responsibility for maintaining the Pinehaven Stream Channel downstream of the Pinehaven Reserve and Upper Hutt City Council has responsibility for maintaining the stream channel waterway upstream of the Pinehaven Reserve. The upstream sections of Pinehaven stream, the water courses and flow paths are generally in private lands.

GWRC would be the lead agency responsible for the Pinehaven stream management study as GWRC manages the majority of the stream. UHCC has implemented ongoing investigations and stormwater catchment studies in Pinehaven area and obtained a thorough understanding of the nature of local stream and existing stormwater system performance. In addition, stormwater system model and flood maps have been developed for the entire city. UHCC will continue further investigations and upgrading the model and floodplain study together with GWRC. The basis of cost sharing is described in Financial Implication.

The study will also include watercourses or flow paths that are generally in private land. Public consultation will form part of the study project.

3.1 Proposed Study Project Frame Work

It is proposed to establish a Technical Group participated by both GWRC and UHCC officers whose responsibility is to manage the Pinehaven stream study project and report to the Councillors. The Technical Group will overview all aspects of project management. The views expressed by the community on the various issues will be collated through the Technical Group.

The Technical Group will present and report the community's perspectives to a Joint Committee of GWRC and UHCC Councillors. It is proposed that three Councillors from each Council would participate in the Joint Committee.

The Councillors responsibility will be to consider the reports presented by the Technical Group, conduct hearings resulting from public consultation and report to both Greater Wellington Regional Council and Upper Hutt City Council.

3.2 Proposed study plan

It is proposed to carry out the investigation plan in two phases:

- Phase 1: identifies the details and status of existing system and the flood problems.

- Phase 2: evaluates the alternative options for flood relief, effective management of the stream and stormwater system.

Phase 1

- Scoping the study and reporting with brief
- Set up project and Consultation arrangement
- Public Consultations
- Site investigations and survey
- Hydraulic and Hydrological assessments, developing Models and system performance analysis
- Flood hazard assessment including flood mapping, damage assessment, risk assessment and economic evaluations
- Issues Identification including social and environmental issues
- Technical analysis and identify potential flood management options,
- Phase 1 reporting
- Scoping for phase 2 in detail

Phase 2

- Options assessment
  - Non Structural Assessments
  - Structural assessments
  - Environmental Strategy
- Design standards evaluation
- Integrate Pinehaven Stream Improvement Action Plan with cost benefit analysis and recommendations
- Develop future stream management strategy
- Consultations on options
- Phase 2 reporting and documentation

3.3 The Project deliverables

Phase 1

The Phase 1 Report will deliver:

- the community's key issues and priorities identified through the consultation
- the study objectives
- the flood hazard identification including flood maps, actual and potential risks to the community
- the damage assessments including indirect and intangible damages, annualised damages
- the potential flood management options
  - viable options to be implemented without further investigation
  - options to be confirmed with further investigation in phase 2

Phase 2

The Phase 2 Report will deliver:

- Pinehaven Stormwater Management Plan that includes:
  - the recommended non-structural options and structural options for implementation
  - the adopted design standards
  - the estimated cost

- an allocation of implementation responsibilities between GWRC and UHCC

The agreed Pinehaven Stormwater management plan would then be considered for funding in the LTCCP and annual plan process within each council.

3.4 Proposed Consultation Strategy

It is proposed that the community input would be obtained from public meetings and a public consultation process in accordance with the Local Government Act 2002 with submission heard by the joint committee of UHCC and GWRC. GWRC and UHCC officers Technical Group would report the community's perspectives to the Joint Council committee.

The Joint Committee of Councillors would conduct the hearings resulting from the public consultations.

Public meetings and information
The community would be kept informed on project progress through press releases (Leader, Valley News, etc.) and occasional public meetings, at various milestones in the study project.

3.5 Proposed Budget and Cost Sharing

It is proposed that the total project cost is shared equally between GWRC and UHCC. The Greater Wellington Regional Council has been consulted about the proposed cost sharing arrangement.

Cost sharing arrangement is based on the following:

- Administration of Watercourses Agreement dated 17 November 1977: "The Pinehaven stream within the city, that is within the junction .with the Heretaunga drain to the Hutt County boundaries, the Board would meet half the maintenance cost, the Council meeting the other half."
- GWRC administers the stream channel downstream of the Western edge of the Pinehaven reserve to the end of the stream which is slightly less than half of the total main stream length.

The detail cost estimates for the Pinehaven Stormwater Management Study is detailed in Appendix A. Table 3.1 indicates the proposed cost sharing between GWRC and UHCC.

The proposed cost sharing is for the Stormwater Management Study only. The estimated cost for the recommended options and the cost sharing for the physical works would be considered during phase 2 of the study.

Table 3.1 Suggested Project Cost Sharing

Responsible Organisation	GWRC	UHCC
Proposed cost apportionment	50%	50%
Phase 1 (Flood hazard assessment and technical analysis)	$90,000	$90,000
Phase 2 (Options and Stormwater Management Plan)	$80,000	$80,000
Total project costs for Phase 1 & Phase 2	$170,000	$170,000

4. TECHNICAL WORKS SCOPE AND GUIDELINES

4.1 PHASE 1 FLOOD HAZARD ASSESSMENT

Data and Information Requirements

- Environmental and Technical reports related to Pinehaven Stream
- Pinehaven Stream Plans and information
- Historic Flood Information including photos
- File Information and issues
- Land and property information
- Aerial Photography/ Photo Imagery
- Any other information

Surveys

- Stream walkover and Reconnaissance:
- Cross section Survey of Pinehaven stream including culverts, SW outlets, bridges, and other structure
- Additional infill floodplain survey may be required where hydraulic model details need refinement.
- Flood Impact Assessment for recent floods (Residential, commercial, Infrastructure. Transport & other services)
- Encroachment surveys

Project management

- Produce full study scoping report
- On going project management
- Investigations planning, input to work brief, briefing team members, information review, technical management
- Ongoing project management
- Budget management, financial control and reporting
- Liaisons with various work areas on project and technical matters
- Project management meetings and other group meetings
- Project reporting and presentations to Joint Committee

- Review Phase 2 work scope
- Phase 1 Project final reporting, drafts review and release Final report.

Phase 1 Consultation

- Review and refine consultation strategy and review of interested and affected parties
- Advertise and prepare for public meetings
- Contact, advise and liase with interested parties
- Issues identification from Public meetings,
- Produce expanded draft floodplain management objectives, consult and finalise and maintain consultation database
- Publicity: produce newsletters, press release

Phase 1 Technical Investigation and Tasks

- Produce Stream Management Summary refer to historic alignments, GW and UHCC maintenance and administration responsibilities
- Hydrology Assessment: that include Site frequency analysis, Regional frequency analysis and hydrologic modelling
- Hydraulic Modelling: review and update the existing MIKE 11 Model. Upgrade the model to 2D Model (MIKE Flood) for Pinehaven Catchments, calibrate and verify the Model. Determine boundary conditions for design floods and simulate the Model.
- Hydraulic Assessments: identify principal hydraulic restrictions in the channels modelled and net effect of their removal. Implement assessment of channel improvement opportunities.
- Produce Flood Maps
- Damage and Loss Assessment
- Risk and Economic Assessments
- District Plan Provision: Review current District Plan provision for eliminating or minimising potential flood damages.
- Phase 2 Options preparation and Phase 2 Scoping

4.2 PHASE 2 OPTIONS ASSESSMENT AND STORMWATER MANAGEMENT PLAN

Project Management

The overall project management tasks will be similar to Phase 1 in general. However, some tasks will not be relevant, some tasks will require less and some tasks will require more than Phase 1.

Phase 2 Project management will include the planning for investigation of various possible options.

Phase 2 reporting will include:

- estimated cost for Plan Implementation.
- producing floodplain management plan and its review by public consultation.
- report to both Councils for LTCCP and Annual Plan

Phase 2 : Technical Investigation and Tasks

1 Planning and Technical Options Input
- Scoping the individual work strategy
- Technical investigation input
- Hydraulic/technical assessment
- Preliminary design of the options and their cost
- Effectiveness assessments
- Costs/benefit analysis

2 Possible Strategy for non-structural measures:
- District Plan objectives
- Policies and rules over landuse (zoning)
- Subdivision, building and development
- The stormwater management policy
- The stream corridor

3 Possible options for structural measures:
- Retention ponds
- Flood gates
- Stream channel improvement works
- Floodway/overflow
- Stopbanks, floodwalls, inflatable and demountable barriers
- Floodways/overflow/pumping
- Remove services and obstructions
- House raising
- Structural upgrades (culverts, bridges, pipes)
- Edge protections
- Implement with pipe options
- Other miscellaneous options

Stream Management Strategy
Develop and document the recommended stream management strategy including responsibilities, operational/maintenance requirements and financial allocations

Stormwater Management Plan
The Stormwater Management Plan will document the long-term strategy for mitigating flooding and providing an efficient stormwater management system for the Pinehaven stream. It will include:
- Design standards adopted by the Councils
- Summary of investigation carried out
- Combination of possible options and projects, and cost benefit analysis for the options
- Recommended options adopted by both councils
- An agreed priority list for staging and implementing the combination of options
- Recommended Plan implementation and Funding
- The expected outcomes from the plan, monitoring of the plan, measuring outcomes and review the plan
- Assets management and system management responsibilities

Public Consultation
The project management tasks for Phase 2 public consultation would be similar to Phase 1.

The draft plan would be released for public comment. Public meetings would be held as necessary to explain the plan. Hearing would be held by the Joint Committee to consider submissions.

Implementation Plan
The approved funding, timing and implementation of selected options would be included in the Council's Stormwater Infrastructural Asset Management Plan.

5. COMMUNITY VIEW

The proposal to carry out the Pinehaven Stormwater Management Study is consistent with the community ambition of developing effective stormwater management options for the City and care for our water ways.

6. IDENTIFICATION OF RELEVENT PLANS AND POLICIES

- **LTCCP**
  Providing stormwater infrastructure that will be safe and healthy for people and will minimise risks to property is consistent with the LTCCP.

- **ASSET MANAGEMENT PLANS**
  Pinehaven Stormwater Management Study for developing the strategy to overcome the risks of flooding in the Pinehaven area is covered in the Asset Management Plan.

- **COMMUNITY OUTCOMES**
  Community outcome 3 states " Provide an efficient, reliable stormwater system".

  Community outcome 4 states " Provide a quality stormwater system and plan for sustainable development ".

  Community outcome 5 states " Provide infrastructure that will be safe and healthy for people and minimised risks to property".

  Community outcome 5 states " Provide infrastructure that will not be unduly disrupted by disaster ".

7. IDENTIFICATION OF INCONSISTENT DECISION

The current status of the Stormwater system for the Pinehaven area, especially Pinehaven Stream does not meet the requirements of Councils Code of Practice for Civil Engineering Works i.e, "Stormwater drainage shall be considered as a total system protecting people, land infrastructure and improvement against flooding".

The proposed study programme will develop a strategy and options to mitigate the flood risks and to improve the stormwater system in accordance with the community out comes and requirements of the Code of Practice.

Approval of the Pinehaven Stormwater Management Study would not be inconsistent with any of the Council's Plans or Policies.

8. FINANCIAL IMPLICATION

The total project cost would be shared equally between GWRC and UHCC.

Cost sharing arrangement is based on the Administration of Watercourses Agreement dated 17 November 1977 and also based on the stream length administered by GWRC and total channel length of the Pinehaven stream to be investigated.

Phase 1 study at an estimated cost of $180,000 with UHCC cost share of $90,000 should be implemented in 2006/07 and Phase 2 study at an estimated cost of $160,000 with UHCC cost share of $80,000 should be implemented in 2007/08 financial year.

Summary of project estimated costs and proposed cost sharing for Phase 1 and Phase 2 of the project is shown in Table 8.1.

Table 8.1 Summary of Project Cost and Council Share

Item Description	Total Cost	UHCC share	GWRC share
Phase 1 - Flood hazard assessment and technical analysis	$180,000	$90,000	$90,000
Phase 2 - Options and Stormwater Management Plan	$160,000	$80,000	$80,000
Total project costs for Phase 1 & Phase 2	$340,000	$170,000	$170,000

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9. LEGAL IMPLICATIONS

There are no legal implications for the Stormwater Management Study.
A Resource Consent will be required for any works in the Pinehaven Stream.

10. CONCLUSION

Pinehaven Catchments that contribute flow to the Pinehaven stream are approximately 452.6 ha. The capacity of the Pinehaven stream is relatively small to accommodate stormwater run off from this size Catchment. Stormwater system Model review and system performance analysis have revealed that the capacity of the Pinehaven stream varies and some sections of stream can only accommodate approximately a 2 year return period storm. The Council standard suggested for the Pinehaven Stream is 50 year.

Flooding has been experienced in the Pinehaven area for many years. Many properties located nearby the stream are at risk of flooding in each year. In addition, Council's Roads such as, Pinehaven Road, Jocelyn Crescent, Dowling Grove, Birch Grove, Sunbrae Drive, etc. have been affected by the flooding during heavy rain and road access were limited due to the heavy runoff flowing on to these roads.

The current status of the Stormwater system, especially Pinehaven stream does not meet the requirements of the Code of Practice for Civil Engineering Works " Stormwater drainage for residential area shall cope with the design storms of at least 25 year return period

It is essential to improve the capacity and management of the stormwater system, improve the structures and clear the waterway to comply with Resident's expectation and UHCC Code of Practice for Civil Engineering.

UHCC local stormwater network system model has been developed and model simulations were carried out for 10, 25, 50 and 100 year return period. The model simulation results and system performance review have indicated that the majority of the local systems discharging to the Pinehaven stream meet the requirements of the UHCC Code of Practice. However, the local pipe network systems are strongly influenced by the high water level in the Pinehaven stream during heavy rain that cause stormwater to surcharge from manholes and street sumps. In addition, flood mapping has shown the area at risk from floods. The investigation and system model has revealed that further investigations, flood risks assessments and study are required to efficiently manage the Pinehaven stream and provide options for increasing the capacity of the stream.

The Greater Wellington Regional Council and Upper Hutt City Council administer the Pinehaven stream. Both GWRC and UHCC propose the Pinehaven stream management study.

The proposed study programme will develop a strategy and options to mitigate the flood risks and to improve the stormwater system in accordance with the community outcomes and requirements of the UHCC Code of Practice for Civil Engineering Works.

11. RECOMMENDATION

1. **THAT funding of $90,000 in 2006/07 and $80,000 in 2007/08 financial year for a Pinehaven Stormwater Management Study (Phase 1 : flood hazard assessment and technical analysis and Phase 2 : options and Pinehaven Stormwater Management Plan) be included for consideration in the 2006 LTCCP.**

Nwe Nwe Nyo
DRAINAGE MANAGER

Approved for submission

Lachlan Wallach
DIRECTOR, INFRASTRUCTURE SERVICES

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Appendix A

Pinehaven Stormwater Management Study
Cost Estimate (Phase 1)

Item	Description	Estimated Cost NZ $
1	Scoping the Study and reporting with brief	15,000
2	Project Management • Ongoing project management • Information review, investigation planning • Liaison, meeting, discussion, direction, etc. • Financial management, • Phase 1 final reporting	35,000
3	Surveys • Stream walkover and reconnaissance • Survey for Stream inverts, Cross section, Culverts, SW outlets and any other required • Producing longitudinal section	12,000
4	Hydraulic assessment and Hydraulic Model • Upgrade the existing model with new structures & survey data and upgrade to 2 D model • System analysis, hydraulic assessment, flood maps and report	25,000
5	Hydrological assessment and Hydrological Model • Obtain hydrological data , Model built • Hydrological Assessments ,	15,000
6	Consultation • Develop & review consultation strategy, • Public meeting, • Consultation with land owners, property owners, etc. • Publicity (newsletters & press release) • Review options against objectives	25,000
7	Other Assessment related to the study • Damage and loss assessment • Risk and economic assessment	10,000
8	Publishing the documents for future records	10,000
	Sub-Total	147,000
	Allow Contingency 20%	29,400
	Total	176,400
	Phase 1 Total project cost including contingency Say	**$180,000**

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Appendix A

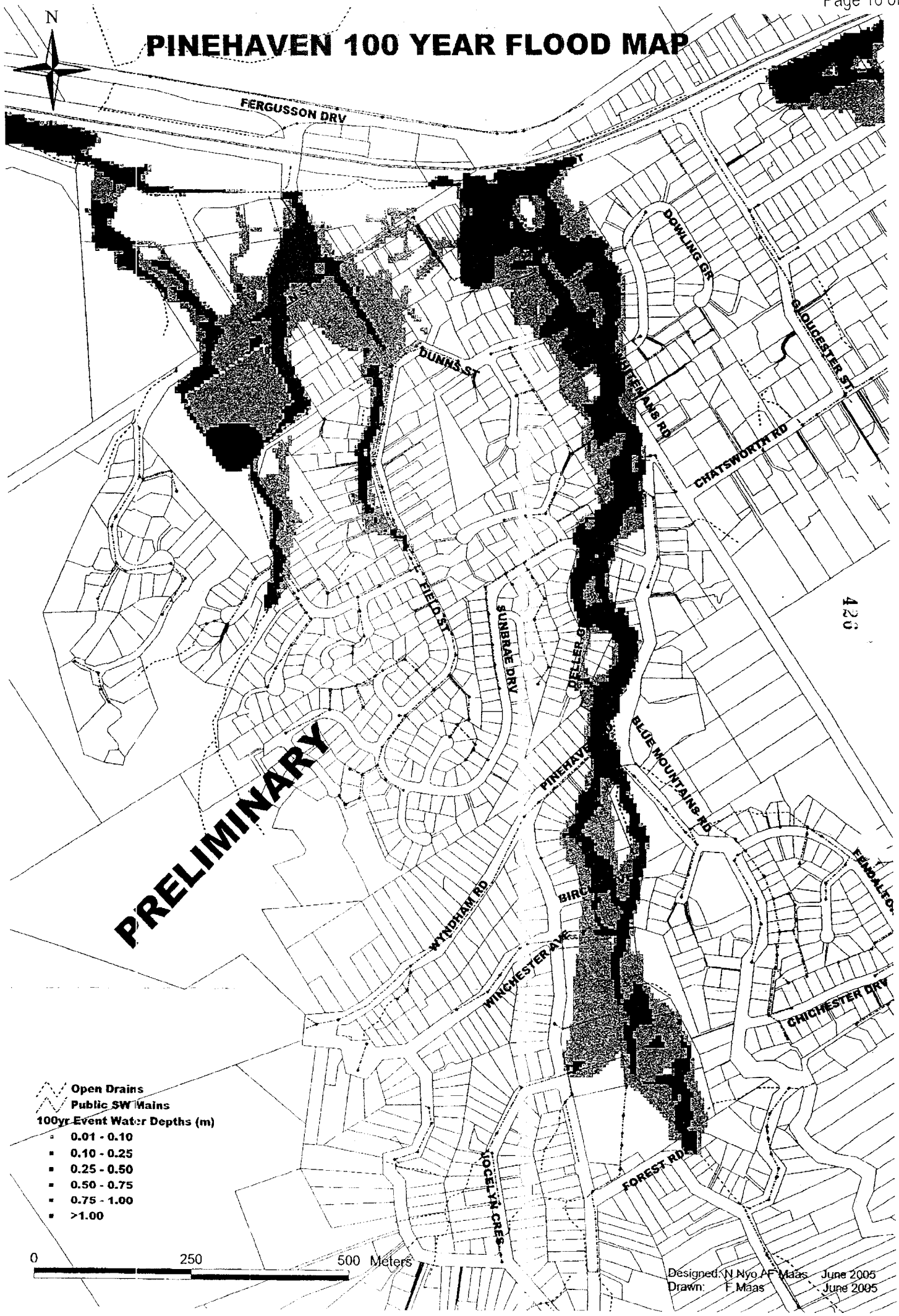
Pinehaven Stormwater Management Study
Cost Estimate (Phase 2)

Item	Description	Estimated Cost NZ $
	Project Management • Ongoing project management • Information review, investigation planning, • Liaison, meetings, discussions, directions, etc. • Financial management, • Phase 2 final reporting including alternative options	15,000
	Consultation • On going consultation from phase 1	25,000
	Technical Investigation for the various option • Non-structural options • Structural Options o Retention pond o Channel works improvement o Stopbanks, floodwalls, inflatable or demountable barriers, etc. o Floodways/overflows/pumping o Remove obstructions o House raising o Structural upgrades (culverts, bridges etc.) o Implement with Pipe options o Miscellaneous options	60,000
	Developing Stream Management Strategy	8,000
	Developing strategy with alternative options, Cost/benefit analysis, recommendation and final reporting for phase 2	25,000
	Sub-Total	133,000
	Allow Contingency 20%	26,600
	Total	159,600
	Phase 2 Total project cost including contingency Say	**$160,000**

Estimated Total Project Cost for Pinehaven Stormwater Management Study:

Phase 1 Total Project Cost including contingency	$180,000
Phase 2 Total Project Cost including contingency	$160,000
Total Project Cost including contingency	**$340,000**

Note: **1.Poject duration 2 years**


PINEHAVEN 100 YEAR FLOOD MAP
N
FERGUSSON DRV
DOWLING GR
GLOUCESTER ST
DUNNS ST
CHATSWORTH RD
FIELD ST
SUNBRAE DRV
DELLER D
BLUE MOUNTAINS RD
WYNDHAM RD
WINCHESTER AVE
CHICHESTER DRV
FOREST RD
JOCELYN CRES
PRELIMINARY
Open Drains
Public SW Mains
100yr Event Water Depths (m)
0.01 - 0.10
0.10 - 0.25
0.25 - 0.50
0.50 - 0.75
0.75 - 1.00
>1.00
0
250
500 Meters
Designed: N Nyo AF Maas June 2005
Drawn: F Maas June 2005