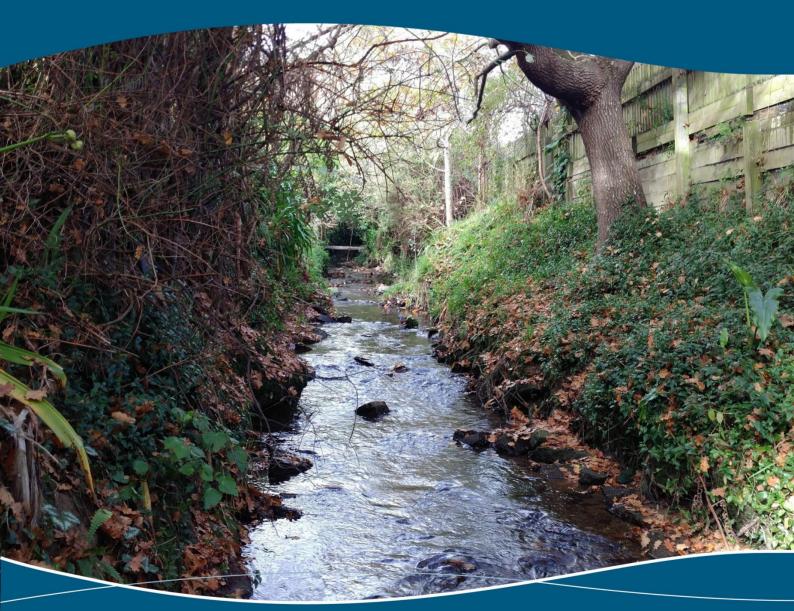


# Pinehaven Stream Improvements Resource Consent Application and Notice of Requirement

September 2019







**Resource Consent Application and Notice of Requirement** 



# **Pinehaven Stream Improvements**

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Revision	Date	Description	Ву	Review	Approved
А		Initial separate NoR and resource consent applications			
В	16 April 2019	Separate NoR and resource consent applications for legal review	МН	KS	
С	24 July 2019	Initial draft of combined NoR and resource consent application	RS	MH/HA	
D	2 August 2019	Revised draft following initial WW and legal review	RS	НА	
E	8 August 2019	Revised draft following WW and legal review	RS	НА	
F	19 September 2019	FINAL	HA	MH	ES

# Document history and status

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# Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to prepare a resource consent application and notice of requirement for the Pinehaven Stream Improvements Project in accordance with the scope of services set out in the contract between Jacobs and Wellington Water (the Client).

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and reevaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

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# Form 20 Notice of territorial authority's requirement for designation or alteration of designation



To: The Chief Executive Upper Hutt City Council 838 – 842 Fergusson Drive Private Bag 907 Upper Hutt 5140

Upper Hutt City Council gives notice of its requirement for a designation for a public work.

### The site to which the requirement applies is as follows:

The bed of the Pinehaven Stream and tributaries and adjacent riparian and land areas from Pinehaven Reserve to the Whitemans Road inlet. See section 5 of the attached report for a full description of the site.

#### The nature of the proposed work is:

Structural flood mitigation works including:

- Creation of naturalised channel sections with suitable riparian planting;
- Construction of vertically sided lined stream sections;
- Securing secondary flow paths;
- Removing existing bridges;
- Replacing existing bridges and constructing new bridges;
- Blockage reduction for inlet structures;
- Construction of a low wall along the boundary of Willow Park and 10a Blue Mountains Road;
- Construction of a private road access to 30, 32, 34 and 36 Blue Mountains Road; and
- Relocation of utilities which cross the stream to avoid blockages.

See section 6 of the attached report for a full description of the proposed works.

#### The nature of the proposed conditions that would apply is:

The proposed conditions relate to the management of potential adverse effects of the construction phase of the proposed works. The conditions proposed for the works and designation are set out in section 11 of the attached report.

# The effects that the public work will have on the environment, and the ways in which any adverse effects will be mitigated, are:

A full assessment of the effects that the public work will have on the environment is provided in section 10 of the attached report.

#### Alternative sites, routes, and methods have been considered to the following extent:

A full description of the alternative sites, routes, and methods that have been considered is provided in section 8 of the attached report.



# The public work and designation are reasonably necessary for achieving the objectives of the territorial authority because:

The proposed works and designation are considered to be reasonably necessary for achieving the objectives of the Upper Hutt City Council as a requiring authority. The reasons for this are set out in section 12.5 of the attached report.

# The following resource consents are needed for the proposed activity and have (or have not) been applied for:

Resource consents are required from the Greater Wellington Regional Council pursuant to sections 9, 13, 14 and 15 of the Resource Management Act 1991. These are applied for through the attached (joint) application. Please refer to section 7.2 of the attached report for a full list of the resource consents needed for the proposed activity.

#### The following consultation has been undertaken:

Consultation on the proposed works began through the development of the Pinehaven Stream Flood Management Plan process. Consultation with various parties and directly affected landowners on the proposed works and designation has occurred subsequent to the preliminary design of the works. The process and outcomes of this consultation are detailed in section 9 of the attached report.

# Upper Hutt City Council attaches the following information required to be included in this notice by the district plan, regional plan, or any regulations made under the Resource Management Act 1991.

Attached is a report providing an assessment of the proposed works and designation against the relevant sections of the Resource Management Act 1991, including Part 2 of that Act, in section 12 of the report.

# Wellington Water Limited on behalf of Upper Hutt City Council

Angela Penfold Senior Planner

A.K. Pafild

Signature
Date: 19 September 2019

# Contact details and address for service

Helen Anderson Principal Planner

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# Form 9 Resource Consent Application



To: Greater Wellington Regional Council

Address: PO Box 11646 Wellington 6142

#### **Consent Application Form**

1 Upper Hutt City Council applies for the following type(s) of resource consent:

- Land use consent pursuant to section 9(2) of the RMA as a discretionary activity under rule 15 of the Regional Freshwater Plan for the construction of "bores" in relation to the construction of the Pinehaven Stream Improvement works where excavations may intercept groundwater;
- Land use consent pursuant to section 9(2) of the RMA as a discretionary activity under rule under rule 49 of the Regional Freshwater Plan and R101 of the proposed Natural Resources Plan for bank stabilisation works / erosion repair and earthworks and vegetation clearance for the construction of the Pinehaven Stream Improvement works;
- Land use consent pursuant to section 13(1) of the RMA as a discretionary activity under rule 49 of the Regional Freshwater Plan and rule R129 of the proposed Natural Resources Plan for bank stabilisation works / erosion repair and structures in and over the stream bed associated with the Pinehaven Stream Improvement works;
- Land use consent pursuant to section 13(1) of the RMA as a discretionary activity under rule 49 of the Regional Freshwater Plan and rule R129 of the proposed Natural Resources Plan for earthworks in the stream bed associated with the Pinehaven Stream Improvement works;
- Land use consent pursuant to section 13(1) of the RMA as a controlled activity under rule 46 of the Regional Freshwater Plan for utility pipelines over the stream bed relocated in association with the Pinehaven Stream Improvement works;
- Water permit pursuant to section 14(2) of the RMA as a discretionary activity under rule 16 of the Regional Freshwater Plan and rules R131 and R142 of the proposed Natural Resources Plan for the temporary take, use, dam or diversion of water in the Pinehaven Stream associated with the construction of the Pinehaven Stream Improvement works;
- Water permit pursuant to section 14(2) of the RMA as a discretionary activity under rule 16 of the Regional Freshwater Plan and rule R131 of the proposed Natural Resources Plan for the diversion of water in the Pinehaven Stream associated with structures erected as part of the Pinehaven Stream Improvement works;
- Water permit pursuant to section 14(2) of the RMA as a discretionary activity under rule 16 of the Regional Freshwater Plan and rule R135 of the proposed Natural Resources Plan for the diversion of flood water outside the bed of the stream for damming and diverting water; and
- Discharge permit pursuant to section 15(1) of the RMA as a discretionary activity under rule 5 of the Regional Freshwater Plan and rule R68 of the proposed Natural Resources Plan for discharge of sediment laden construction phase stormwater and dewatering water associated with the construction of the Pinehaven Stream Improvement works.

2 The activity to which the application relates (the proposed activity) is as follows:

Structural flood mitigation works including:

- Creation of naturalised channel sections with suitable riparian planting;
- Construction of vertically sided lined stream sections;

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- Securing secondary flow paths;
- Removing existing bridges;
- Replacing existing bridges and constructing new bridges;
- Blockage reduction for inlet structures;
- Construction of a low wall along the boundary of Willow Park and 10A Blue Mountains Road;
- Construction of a private road access to 30, 32, 34 and 36 Blue Mountains Road; and
- Relocation of utilities which cross the stream to avoid blockages.

3 The site at which the proposed activity is to occur is as follows:

• The Pinehaven Stream and adjacent private and public properties, as shown on plans contained in Appendix A to the AEE.

4 The address of each site to which the application relates are as follows:

• The affected properties are identified in Appendix G to the AEE.

5 The other activities that are part of the proposal to which the application relates are as follows:

• No other activities are part of the proposal to which the application relates.

**6** The following additional resource consents are needed for the proposal to which this application relates and have been applied for:

• No other resource consents are required. However, Upper Hutt City Council has issued a notice of requirement to authorise the proposed activity insofar as it would otherwise require resource consent under the Upper Hutt City District Plan.

7 Attached is an assessment of the proposed activity's effect on the environment that—

- (a) includes the information required by clause 6 of Schedule 4 of the Resource Management Act 1991; and
- (b) addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991; and
- (c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

**8** Attached is an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.

**9** Attached is an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.



# Wellington Water Limited on behalf of Upper Hutt City Council

Angela Penfold **Senior Planner** 

L.K. Pafdel

Signature

Date: 19 September 2019

### Contact details and address for service

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# **Overview**

The purpose of this report is to present the required information in support of a Notice of Requirement for Designation and associated resource consent application for the construction, operation and maintenance of the structural flood mitigation works identified as the Pinehaven Stream Improvements Project, from the Upper Hutt City Council (UHCC, or the 'requiring authority') to the Upper Hutt City Council and Greater Wellington Regional Council respectively, in accordance with section 168A and Schedule 4 of the Resource Management Act 1991.

Given the level of detail provided in the notice of requirement and associated plans for the proposed works, no outline plan is proposed to be submitted, in accordance with section 176A(2)(b).

# **Site description**

Pinehaven Stream drains a catchment of approximately 450 hectares on the eastern side of the Hutt Valley, to the south of the Hutt River. The catchment is located to the southwest of the main urban area of Upper Hutt, and runs from the Pinehaven Hills down to Hulls Creek. It includes the suburbs of Pinehaven and part of Silverstream, and is bordered by the catchments of the Mangaroa River to the south, Stokes Valley stream to the west, and Trentham to the east.

The Pinehaven Catchment is generally divided into the upper and lower catchments, delineated by the location of the Pinehaven Reserve. The upper Pinehaven Catchment has steeply sided valleys and is largely vegetated with pine forestry, native bush, and some residential development within the valleys, while the lower catchment is flatter and dominated by residential urban development and associated community facilities and recreational reserves.

The Pinehaven Stream flows from the upper catchment in the southern Pinehaven Hills, to its confluence with Hulls Creek in the north. The Stream is fed by three main tributaries in the steeper upper catchment area in the vicinity of Wyndham Road, Pinehaven Road and Elmslie Road, and flows as a single channel from the Pinehaven Reserve to the Whitemans Road / Dowling Grove intersection where the stream is piped to the Hulls Creek discharge point in the vicinity of the Whitemans Road / Gard Street intersection.

Much of the Pinehaven Stream channel is located within private property, particularly in the upper catchment. The channel is generally narrow with vegetated banks, with many structures located within and above the stream, such as private bridges and culverts. Two significant road crossings are also located in the lower catchment, at Pinehaven Road and Sunbrae Drive.

# Why the stream improvements are needed

Pinehaven Stream has a long history of flooding, with significant flood events occurring in December 1976, February 2004, January 2005, and July 2009. The overall problem which is being addressed by the Project is the unacceptable risk of flooding faced by the people and communities in the Pinehaven Catchment, and the subsequent risk to their health, safety and wellbeing.

An assessment of the flooding issues in the Pinehaven Catchment has found that:

- Much of the stream channel has less than a 5 year flow capacity;
- A number of bridges and culverts constrain the stream and contribute to flooding; and
- The narrow vegetated stream channel and the intakes of culverts or bridges have a high potential for blockage which significantly increase the extent of flooding.

As a result of these issues, the Pinehaven Stream and much of the connected stormwater pipe network struggles to convey the runoff generated by heavy rain, causing flooding in the surrounding area.

A Floodplain Management Plan (FMP) has been developed for the Pinehaven Stream through a partnership between the UHCC and GWRC. The Pinehaven Stream FMP sets out methods to respond to the identified



issues. A combination of methods to manage flooding in the Pinehaven Catchment are proposed across three different categories:

- Structural Physical works designed to manage flood risk associated with the stream channel, such as increasing the capacity of the stream, reducing blockages and managing flows on the floodplain;
- Non-structural Planning controls for development in the catchment, community awareness and preparedness, and emergency procedures; and
- River management Maintenance of the stream to avoid blockages, maintain capacity and minimise erosion.

The project to which this joint Notice of Requirement and resource consent application relates addresses many of the physical works as recommended in the Pinehaven Stream FMP (excluding the replacement of the road crossing culverts and upper catchment works). The proposed works are therefore part of a wider integrated set of methods responding to the flood risk in the Pinehaven catchment area, as developed through the floodplain management planning process.

# The outcomes sought (RMA project objectives)

The project objectives are:

- To provide improved capacity and effective and efficient functioning stormwater infrastructure in the stream and its tributaries to a 4% AEP (1 in 25 year return period) flood event level, which will also contribute to the management of flood risk to habitable floor levels up to the predicted peak 100 year flood level.
- To reduce the risk of injury or harm from fast or deep flowing water in Pinehaven Stream and its tributaries;
- To integrate overland flow paths into the wider stormwater network; and
- To enable efficient and effective construction and ongoing maintenance of all structures and stream improvements.

#### The proposed stream improvements

The proposed stream improvement works that make up the project include significant changes to the Pinehaven Stream channel and crossing structures in the lower reaches to provide for a 25-year channel capacity. These include:

- Creation of naturalised channel sections with suitable riparian planting;
- Construction of vertically sided lined stream sections;
- Securing secondary flow paths;
- Replacing private vehicle crossings;
- Blockage reduction for inlet structures;
- A low wall along the southern boundary of Willow Park and 10a Blue Mountains Road;
- Construction of a private road access to 30, 32, 34 and 36 Blue Mountains Road; and
- Relocation of utilities which cross the stream to avoid blockages.

The improvements are to occur in various places along the stream channel length to ensure the overall achievement of the outcomes sought.

In relation to the potential maintenance requirements of the structures, this is considered to be appropriately provided for through the designation in terms of addressing district plan requirements, and permitted activity rules under the relevant regional plans (Rule 22 of the Regional Freshwater Plan and Rule R112 of the Proposed Natural Resources Plan Decisions Version).

As noted above, the proposed works to be authorised by this application exclude the replacement of the road crossing culverts and upper catchment work. These will be consented through separate processes. Nonetheless, the effects of the proposed works to be authorised by this NOR and resource consent applications



have been assessed in combination with the culverts and upper catchment work, to enable cumulative effects to be determined.

### **Alternatives considered**

A range of alternatives were considered in depth through the development of the Pinehaven Stream FMP. This included a multi-criteria analysis (MCA) to determine the best solution factoring in all relevant considerations. The result of this process was the preferred options package as set out in the Pinehaven Stream FMP.

The preliminary design phase of the physical works has also involved the consideration of alternatives, with MCA undertaken again for some specific design option decision making.

### **Consultation undertaken**

Consultation has been undertaken with affected property owners and the wider public and Pinehaven community through the Pinehaven Stream FMP process, which included:

- A letter drop;
- Drop-in sessions;
- An open day session; and
- Direct consultation with relevant iwi groups.

This culminated in submissions and a hearing held on the final FMP.

Consultation on this joint notice of requirement and resource consent application has included consultation with directly affected residents and landowners of affected properties. This has included multiple meetings with each directly affected property owner and consultation with relevant stakeholders. Ongoing engagement with property owners will continue through detailed design and until the physical works and reinstatement is complete.

# **Mitigation**

Mitigation measures will minimise the potential effects of the physical works. Mitigation is proposed primarily in relation to the landscape planting of the riparian area adjacent to the stream, and management of the construction phase of the project.

Mitigation for the construction phase is to be implemented primarily through conditions on the designation and resource consents and management plans, in relation to:

- Landscape and visual effects;
- Ecological effects;
- Construction traffic
- Construction noise, vibration and dust; and
- Sediment and erosion.

The effects on landscape, visual and amenity aspects of the stream and surrounds are to be mitigated by landscape planting which will improve amenity and provide benefits for water quality through filtration of overland stormwater discharges.

It is considered that the actual and potential effects of the proposed works and designation will be minimised as far as practicable.

#### **Effects assessment**

The assessment of environmental effects of the proposed works and designation considered the actual and potential effects during the construction and operational phases as summarised in Table 1 below.



#### Table 1: Summary of effects assessment

NoR / RCA	Assessment Topic	Effects Summary
Notice of	Flood risk	Significant positive effects in terms of the mitigation of flood risk
Requirement and Resource Consent	Social effects	Significant positive social effects during operation associated with the reduction in flood risk
Applications		Significant effects on personal and property rights due to land requirements
	Ecology	Loss of significant trees and impacts of the stream bed during construction. However, both effects will be mitigated through proposed mitigation planting ratios, riparian planting and construction methods.
	Landscape and Visual effects	Moderate short term effects on landscape values, landscape elements and character, with improved amenity of the corridor over time.
		Significant visual effects during construction due to the loss of vegetation and encroachment on to properties. These reduce to minor effects once mitigation vegetation is established.
	Cultural values	Short term limited effects on cultural values due to importance of the mouri of the stream to Tangata Whenua. However, long term improvements to the health and mouri of the stream improve the provide significant positive ecological benefits.
	Air quality	Some temporary construction related adverse effect minimised as far as practicable through the implementation of the CMP.
	Historic Heritage	No anticipated effects on historic heritage resources.
Resource Consent	Stormwater and hydrology	Beneficial but limited effects on stormwater and hydrology.
Applications	Water quality	Temporary adverse effects on water quality during construction, and beneficial but limited effects on water quality during operation.
Notice of Requirement	Traffic and transport	Some temporary construction related adverse effect minimised as far as practicable through the implementation of the CMP.
	Noise and vibration	Noise and vibration effects may be moderate for some adjacent properties. Minimised as far as practicable through the implementation of the CMP.
	Future maintenance activities	Positive effects in providing for future flood management maintenance activities.

Overall, the construction effects of the proposed works are considered to be acceptable, while the operational phase will generally have significant positive effects. However, the most significant adverse effects are those on private property due to the need to encroach on private land to complete the stream improvement works.

# **Statutory Assessment**

The proposed works and designation have been assessed against the relevant sections of the Resource Management Act 1991. The conclusions of this assessment are summarised as:

- Public notification of this joint application is requested due to the effects on landowners, effects on surrounding residents during construction works, and the likely public interest in the project;
- The proposal is consistent with the objectives and policies of relevant national policy statements;



- The proposal is generally consistent with the objectives and policies of the Regional Policy Statement for the Wellington Region;
- The proposal is generally consistent with the objectives and policies of the Upper Hutt City Council District Plan and relevant regional plans;
- The proposed works and designation are considered reasonably necessary for achieving the objectives of the Upper Hut City Council for which the designation is sought;
- There has been adequate consideration of alternative sites, routes, discharges and methods of undertaking the work;
- The proposed works and designation are considered to achieve the purpose of the RMA being the sustainable management of natural and physical resources; and
- The proposal has appropriately recognised and provided for, had regard to, and taken into account, the matters set out in sections 6, 7, and 8 of the RMA.

The notification of this notice of requirement and resource consents provides an opportunity for the community and affected parties to make submissions on the proposed works and designation under section 96, and be heard at a hearing if they wish under section 100 of the Act.

Following consideration of the submissions and the matters in 168A, Upper Hutt City Council may decide to confirm, modify, impose conditions on, or withdraw the notice of requirement under 168A(4). Similarly, the Greater Wellington Regional Council may grant or refuse the resource consent applications under section 104B after consideration under section 104, and if they are granted may impose conditions under section 108.



# 1. Introduction

Pinehaven Stream, located in Upper Hutt, has a history of flooding. A Pinehaven Stream Floodplain Management Plan (FMP) was developed to address the causes and issues associated with flooding in the catchment. The Pinehaven Stream FMP included proposed in-stream structural methods to assist in flood mitigation.

The proposed structural methods require approval under the Resource Management Act 1991 (RMA) to be undertaken. This includes approval in relation to the use of land, use of the beds of river, water, and discharges of contaminants imposed by section 9, 13, 14 and 15 of the RMA respectively. This joint application has been lodged as a:

- Notice of requirement (NoR) to Upper Hutt District Council (UHCC) for a designation for a public work to address the restrictions on the use of land imposed by section 9(3) of the RMA in relation to the Pinehaven Stream Improvements project, under the Upper Hutt City District Plan; and
- Resource consent application to Greater Wellington Regional Council (GW) to authorise those aspects of the proposal under the regional plans in respect of sections 9(2), 13, 14 and 15 of the RMA.

The Pinehaven Stream Floodplain Management Plan includes proposed structural works within the lower reaches of the stream as well as in the upper catchment. The proposed designation is to cover sections of the Pinehaven Stream in the lower reaches from Pinehaven Reserve to the Whitemans Road inlet where the majority of the works will take place, and provide for the construction and maintenance of those structural works designed to achieve increased stream flood capacity within that area in accordance with the Pinehaven Stream Floodplain Management Plan.

The project has been collaboratively developed and jointly funded by the Upper Hutt City Council and Greater Wellington Regional Council with Wellington Water acting as project manager. Upper Hutt City Council will have overall financial responsibility for the project in relation to section 168A of the RMA. The Upper Hutt City Council is the requiring authority for the designation in respect of this application as it will be the owner and operator of the instream assets once completed.

# 1.1 Purpose of this Report

The purpose of this report is to present the required information in support of:

- A Notice of Requirement for Designation by Wellington Water (on behalf of Upper Hutt City Council) to the Upper Hutt City Council (UHCC, or the 'requiring authority') to the Upper Hutt City Council in accordance with section 168A of the RMA; and
- Resource consent applications by Wellington Water (on behalf of Upper Hutt City Council) to Greater Wellington Regional Council in accordance with Schedule 4 of the RMA.

# **1.2** Outline of the Project

The project is the Pinehaven Stream Improvements 2016-2026 (the Project). It is the implementation of the structural options for managing the flood risks in the Pinehaven catchment as recommended in the Pinehaven Stream Floodplain Management Plan (FMP).

The Pinehaven catchment is located on the eastern hills of Upper Hutt City, with the Pinehaven Stream flowing north from the upper catchment in the south through the urban areas of Pinehaven and Silverstream, and discharging to Hulls Creek in the north. Pinehaven Stream has a history of flooding, with a number of recorded events causing extensive damage to property.

UHCC and the Greater Wellington Regional Council (GWRC) jointly manage Pinehaven Stream. Wellington Water Limited manages the stormwater services for the Upper Hutt City Councils and Greater Wellington



Regional Council. The FMP is the result of a flood management planning process undertaken collaboratively by the UHCC and the GWRC. This process incorporated quantification of the flood hazard and key contributing factors, identification of broad management options, and extensive public consultation. This process is documented in the FMP which was endorsed by the Councils in June 2016. The FMP recommended a combination of:

- Structural Physical works designed to manage flood risk associated with the stream channel, such as increasing the capacity of the stream, reducing blockages and managing flows on the floodplain;
- Non-structural Planning controls for development in the catchment, community awareness and preparedness, and emergency procedures; and
- River management Maintenance of the stream to avoid blockages, maintain capacity and minimise erosion.

The significant problem the project is seeking to address is the risk of flooding in the Pinehaven catchment. Analysis of the flooding issues through modelling identified that much of the Pinehaven Stream channel has less than a 5-year flow capacity. Existing bridges and culverts are significant contributors to flooding as they constrain the stream. Blockages are also an issue, as in places they have the potential to significantly increase the extent of flooding. Blockages currently have a high potential to occur in in the narrow vegetated stream channel or the intakes of culverts or private bridges in the catchment. The project works in the catchment have been designed to provide capacity in the channel for a 4% AEP/1-in-25 year return period flood event.<sup>1</sup>

The structural methods set out in the FMP were selected following a multi-criteria analysis (MCA) process. This project then further evaluated the options for managing flood risk through a preliminary and detailed design and early contractor review process. The final design for consenting includes the widening of the stream, with some sections to be lined with vertical retaining walls. Other channel sections will be widened with naturalised banks. Structures in and over the stream will also be replaced to ensure that they allow for the 4% AEP/1-in-25 year return period flood event, including road culverts, private bridges and inlet structures. The works will be focused on key flooding areas around Blue Mountains Road, Sunbrae Drive, Whitemans Road, Pinehaven Road, Birch Grove and Pinehaven Reserve.

# 1.3 Project Objectives

Section 168A(3)(c) of the RMA requires that a territorial authority's consideration of a notice of requirement must give particular regard to:

[W]hether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought

The objectives sought to be achieved the through the project are:

- To provide improved capacity and effective and efficient functioning stormwater infrastructure in the stream and its tributaries to a 4% AEP (1 in 25 year return period) flood event level, which will also contribute to the management of flood risk to habitable floor levels up to the predicted peak 100 year flood level.
- To reduce the risk of injury or harm from fast or deep flowing water in Pinehaven Stream and its tributaries;
- To integrate overland flow paths into the wider stormwater network; and
- To enable efficient and effective construction and ongoing maintenance of all structures and stream improvements.

<sup>&</sup>lt;sup>1</sup> Consistent with the Upper Hutt City Council flood protection policy as stated in the Infrastructure Strategy contained in the Upper Hutt City Council Long Term Plan 2018 – 2028



The first objective recognises that the purpose of the works are to provide capacity in the stream for a 1 in 25 year return period flood event, and that while this will also contribute to a reduction in the risk of flooding in a 1 in 100 year return period flood event, the risk of flooding in a 1 in 100 year event will not be eliminated for all properties.

UHCC considers that the project is the most appropriate way to achieve these objectives.

# **1.4 Summary of Proposed Stream Improvement Works**

The project includes significant changes to the Pinehaven Stream channel and crossing structures in the lower reaches to provide for a 25-year channel capacity. These include:

- Creation of naturalised channel sections with suitable riparian planting;
- Construction of vertically sided lined stream sections;
- Securing secondary flow paths;
- Replacing private vehicle crossings;
- Blockage reduction for inlet structures;
- A low wall is proposed along southern boundary of Willow Park and 10a Blue Mountains Road
- Construction of a private road to access 28 and 32 Mountains Road and 34 and 36 Blue Mountains Road; and
- Relocation of utilities which cross the stream to avoid blockages

The plans attached at Appendix B show the various components of the proposed stream improvement works. The proposed works in Reaches 1 - 3 are discussed in more detail in section 6.1.

#### 1.4.1 Stream channel works

Naturalised channel sections with riparian planting will be created along various lengths of the stream in reaches 1, 2 and 3<sup>2</sup> where the surrounding area has sufficient space. For these sections the existing dry weather channel will be retained to ensure the works do not reduce the stream low flow extent, but the stream banks outside of this area will be reshaped to widen and lower the pitch of the stream bank to provide for the 4% AEP channel capacity.

In addition, vertically sided lined channel sections are to be constructed along lengths of the stream in reaches 1, 2 and 3, where the surrounding area presents constraints due to buildings or other property, and a naturalised channel is not practicable. In some cases vertical wall channel sides will coincide with naturalised channel on the opposite side, or the channel may require low vertical walls in combination with naturalised stream banks. The vertical sided channel sections will include lining in the form of blockwork retaining walls on the stream banks. The stream bed will remain unlined in a natural state to preserve potential ecological values. This allows the required 4% AEP capacity to be achieved while minimising disturbance of private property and retaining the natural values of the stream as far as possible.

# 1.4.2 Secondary flow paths

Development within secondary flow paths is restricted by existing District Plan provisions. Secondary flow paths are to be secured (i.e. ensure they function appropriately) at multiple points along the stream channel and wider catchment by lowering driveways, creating swales, and addressing the grading of the road at various

<sup>&</sup>lt;sup>2</sup> Reach 1: from Whitemans Road inlet to Sunbrae Drive, Reach 2: Sunbrae Drive to Pinehaven Road, Reach 3: Pinehaven Road to Pinehaven Reserve.



intersections. This will allow stormwater to flow to the stream via the secondary flow paths during high rainfall events, rather than being obstructed or pooling in certain areas and exacerbating flooding.

### 1.4.3 Vehicle crossings

Due to the location of the stream within private properties along much of its length, there are a number of private vehicle crossings providing access over the stream. The works will include the replacement of these structures with bridges spanning the widened stream and at a level so to achieve the 4% AEP channel capacity, or alternative road access will be provided.

### 1.4.4 Low wall

A low wall is proposed along southern boundary of Willow Park and 10a Blue Mountains Road (approximately 300 millimeters high, with a 1.8m high timber fence).

### 1.4.5 Utility networks

Utility pipework and lines enter and cross the stream at various points across its length. Relocation of these utilities is required to reduce the risk of stream blockage from debris during high rainfall events and to enable the widening of the stream channel.

### 1.4.6 Other works not authorised

The Pinehaven Stream FMP includes a range of other proposed stream improvement works which will not be authorised through this Notice of Requirement and associated resource consent application.

The two culverts providing road crossings over the stream at Sunbrae Drive and Pinehaven Road are to be replaced. These new culverts are to be consented separately as road upgrade projects due to owner and funding requirements. However, these have been included in the flood modelling for the project and are shown on the General Arrangement plan contained in Appendix B.

Outside of the designation extent area, debris screens are to be provided at inlets to stormwater pipes in the southern extents of Wyndham Road and Chichester Drive, and at the culvert inlet at the Pinehaven Community Hall. Securing of secondary flow paths is also proposed at three intersections, and stormwater network upgrades at Winchester Avenue. Further design work needs to be undertaken for these works, but it is anticipated that these will likely be able to be undertaken as permitted activities under the relevant planning provisions and are therefore not necessary to be included as part of this application. If resource consents are required for these works, either under the district plan or regional plans, then these will be sought separately from the current applications for the Project.

# **1.5** Main Benefits of the Stream Improvement Works

The proposed stream improvement works covered by this joint application will have a range of social, economic and environmental benefits for the Pinehaven community. In particular, there will be a substantial reduction in flood risk. The main benefits of the works include:

- Capacity in the stream channel to convey a 4% AEP (1 in 25 year return period) flood event level;
- A reduction in the potential for blockages cause by stream crossings to exacerbate flooding in high rainfall events;
- A reduction of 67 habitable floors and 31 non-habitable floors within the 1-in-100 year flood plain;
- A reduction in risk of injury or harm from fast or deep flowing water in Pinehaven Stream and its tributaries;

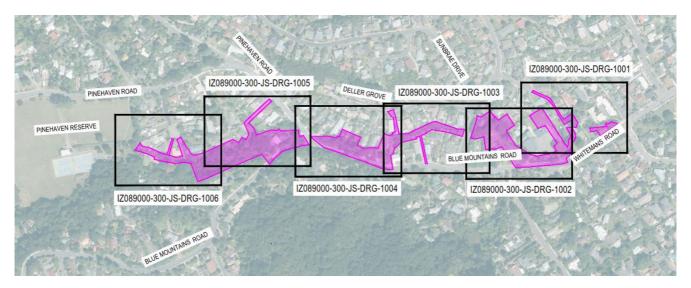


- Overland flow paths will be secured and integrated into the wider stormwater network, ensuring that potential flooding from obstructions in these flows paths is avoided; and
- An improvement to the amenity within the majority of the Pinehaven Stream corridor over time as the proposed landscape planting becomes established.

These benefits are further detailed in the assessment of the effects on the environment in section 10.

# **1.6 Extent of Designation**

The designation applies to the area of the proposed stream improvement works in the lower catchment of the Pinehaven Stream (Reaches 1 - 3) and includes the bed and banks of the Pinehaven Stream for a length of approximately 1,200 metres from the Pinehaven Reserve to the inlet from which the Pinehaven Stream is piped to the Hulls Creek confluence. An overview of the proposed designation extents is shown in Figure 1 below. The extent of the designation is shown in detail on the plans attached at Appendix C. This includes the temporary extent of land required for the completion of the construction of the proposed works. The designation is proposed to be amended under section 182 of the RMA following construction of the project to only include the land that is required for the long-term operation, maintenance and mitigation of effects of the Project in the designation.



#### Figure 1: Designation Extent Overview

The designation plans attached at Appendix C include areas of land required for temporary construction access and activities. The location, width and area of the construction requirements vary over the length of the Pinehaven Stream, depending on the works required to be undertaken and the availability of surrounding land.

As noted above the designation will be revised following construction under section 182 of the RMA to remove the area of land only required for construction and reduce the designation extent to provide for the ongoing operation and maintenance of the project. This will include a buffer area required for the ongoing maintenance and potential repair and replacement of the stream improvement works. The required buffer area is dependent a number of factors. In some cases, a wider buffer is required, while in others such as naturalised channel sections a narrower area or no area at all is required.

# **1.7 Structure of the Report**

This Assessment of Environmental Effects supports the Notice of Requirement for the designation of land for the project and the associated resource consent applications.

Section 2 describes the background of the proposed works, including the history of flooding in the catchment and the Pinehaven Stream FMP.



Section 3 outlines the legislative and policy framework from which this project has been developed.

Section 4 describes the need for the problem being addressed and the proposed solution.

Section 5 describes the existing environment of the project area.

Section 6 describes in detail the various components of the proposed project.

Section 8 describes the alternatives that have been considered.

Section 9 provides a summary of the consultation undertaken.

Section 10 provides the assessment of environmental effects.

Section 11 provides proposed conditions on the designation.

Section 12 summarises the proposed management of environmental effects, and provides an assessment of how the project meets the principles of the RMA, and the objectives and policies of the regional and city statements and plans.

**Section 13** summarises the findings of the assessment of environmental effects and how it is in accordance with the principles and policies of the RMA.



# 2. Background

# 2.1 History of Flooding

Pinehaven Stream has a long history of flooding, with significant flood events occurring in December 1976, February 2004, January 2005, and July 2009.

The event of 1976 is considered to one of the most significant for the community. Severe flooding was experienced in Pinehaven and neighbouring Silverstream in December 1976 as a result of a storm widely considered to be in excess of a 100-year rainfall event. The approximate extent of the flooding was recorded in a report prepared by the Wellington Regional Water Board, shown to the left in Figure 2, along with photos of the flooding experienced in the lower Pinehaven catchment.

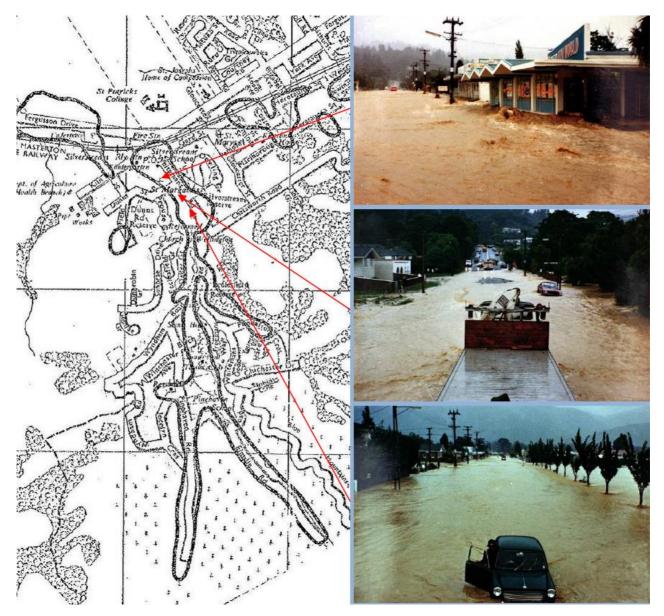


Figure 2: Extent of Flooding in Pinehaven December 1976

This event caused widespread damage throughout the Pinehaven catchment. Many homes and businesses were inundated. Slashings from logging in the upper catchment were identified by witnesses as causing blockages in the stream, potentially exacerbating the flooding. Deforestation is also likely to have increased runoff and sediment loads.



In response to the 1976 event, a 2.1 metre diameter bypass was constructed under Whitemans Road to provide protection against a 50-year event. A smaller 1200 millimetre diameter bypass was also constructed in Pinehaven Road upstream of Pinehaven Reserve. Work was also undertaken on Hulls Creek, into which the Pinehaven stream discharges, including the construction of a detention dam upstream of the Pinehaven/Hulls Creek confluence which controls the Hulls Creek water level.

More recently, the rainfall events in February 2004 and January 2005 resulted in flooding of properties alongside the stream. Significant flooding also occurred in the Pinehaven catchment on 23rd July 2009, coincidently during a period of flood hazard investigation activities. A 10 year event was recorded in the adjacent Mangaroa catchment during this time; however, due to a rain gauge malfunction in the Pinehaven catchment the actual rainfall is unknown. Analysis of rainfall information from neighbouring sites indicated that a 5-10 year event likely occurred in the catchment. Site investigations indicated surface flooding in numerous areas of the Pinehaven catchment. The 2009 event and subsequent modelling demonstrated that the Pinehaven stream channel likely has less than a 5 year flow capacity and therefore does not meet the Upper Hutt City Council policy for flood protection as noted in section 3.2.2.1 below.

# 2.2 Pinehaven Stream Floodplain Management Plan

A Floodplain Management Plan has been developed for the Pinehaven Stream through a partnership between the UHCC and GWRC. The work for the FMP began after the 2004, 2005 and 2009 flooding. The final Pinehaven Stream Floodplain Management Plan was endorsed by the Councils in June 2016. It is the culmination of many years of work by the Councils and the community in defining the problem and establishing an agreed solution.

The management of Pinehaven Stream is currently undertaken jointly by the UHCC and GWRC. City Councils manage smaller urban streams and stormwater channels within the Wellington Region, with only rivers and larger streams of "regional significance" being managed by the GWRC. UHCC has responsibility for the Pinehaven catchment and its upper tributaries upstream of Pinehaven Reserve. GWRC has responsibility for the stream channel from the reserve until its confluence with Hulls Creek.

The GWRC has been developing Floodplain Management Plans for a variety of catchments within the region, with FMPs in place for the Otaki River, Waikanae River and Hutt River. As the Pinehaven Stream is jointly managed, UHCC and GWRC formed a partnership for the development of the FMP for the Pinehaven Stream.

The Pinehaven Stream FMP had three major phases of development. The initial phase (Phase 1) was undertaken in 2009 and 2010 and focussed on assessing the flood hazard in the catchment. The resulting report *Pinehaven Flood Hazard Assessment Report 2010* identified the flooding issues through hydraulic modelling, flood hazard mapping, flood damage assessment, erosion hazard assessment and a planning review. In addition, prior to the endorsement of the FMP, an independent review of the hydraulic modelling assessment are discussed in detail in section 5.6 below.

Phase 2 was completed in 2011 and identified a broad range of structural and non-structural options that could be used to manage the hazard in Pinehaven, and a comparison of these options against each other through a multi-criteria analysis (see section 8.1.4).

Phase 3 included an assessment of the broad options, community consultation, and identification of preferred options which were presented back to the community. Phase 3 culminated in the publication of the final Pinehaven Stream FMP.

The final Pinehaven Stream FMP was released in September 2016. The vision, goals and objectives of the Pinehaven Stream FMP are set out in Table 2 below.



### Table 2. Pinehaven Flood Management Plan Vision, Goals and Objectives

Vision: A prosperous catchment.	and safe community, that proactively manages the risk of flooding in the Pinehaven		
Goals:	:: Objectives:		
1. Reduce the risk of injury or harm from fast or deep flowing water	<ul> <li>Design and maintain flood protection assets so they perform to the UHCC target level of service for streams<sup>3</sup>;</li> <li>Identify, inform and protect the potential secondary overland flowpaths of flood waters;</li> <li>Upgrade the capacity of the stream channel to improve its ability to convey floods;</li> <li>Advise people of the flood risk through the planning and emergency management mechanisms outlined in this FMP;</li> <li>Locate new development away from the flood hazard areas;</li> <li>Help the community and the emergency services to plan effective responses to flooding.</li> </ul>		
2. Ensure use and development of land is compatible with the objectives of reducing flood risk	<ul> <li>Communicate and provide advice on flood risk, so that appropriate decisions are made about land use;</li> <li>Protection of secondary overflow paths;</li> <li>Control future development and land use in the catchment. As a minimum, new development should demonstrate hydraulic neutrality in comparison with existing background peak flow rates;</li> <li>Control future forestry operations in the catchment so that forestry debris do not limit the flood-carrying capacity of streams.</li> </ul>		
3. Inform and empower communities to take appropriate action about flood risk through	<ul> <li>The provision of publicly accessible flood hazard information and advice;</li> <li>The provision of standard stream channel and crossing design capacities for private upgrade works;</li> <li>Provide recommended building levels to reduce the flood risk to residential dwellings.</li> </ul>		
4. Contribute to the economic wellbeing and resilience of the region through flood risk management	<ul> <li>Agree levels of service with the community and confirm responsibilities and extent of stream channel maintenance;</li> <li>Maintain channels and flood mitigation assets;</li> <li>Inform land owners about flood risk management through identification of appropriate building floor levels and how to maintain or improve driveway and structure crossings of the Pinehaven Stream;</li> <li>Consider the potential impacts of climate change in the design of flood management infrastructure.</li> </ul>		
5. Recognise the relationship of tangata whenua with water bodies and the cultural values they attribute to streams in the catchment	<ul> <li>Continue to engage with tangata whenua to understand their interest in future upgrades of the flood protection assets within the Pinehaven Catchment;</li> <li>Enhance the environmental quality of streams in the catchment;</li> <li>Avoid or minimise the damage to the existing ecosystems;</li> <li>Restore habitat that is damaged or destroyed during the construction process;</li> <li>Remove barriers to fish passage where this will not have negative impacts on native fish populations;</li> <li>Maintain and where possible enhance the surrounding environment when undertaking flood protection works. For example, by identifying opportunities to enhance the ecosystems of the catchment when undertaking flood protection works;</li> <li>Raise public awareness of the important ecological and recreational function that streams provide in the catchment, and the community's responsibility in flood protection through:         <ul> <li>Providing education programmes on the values of natural ecosystems in providing hazard protection (through erosion control and through retention/ uptake of surface water;</li> <li>The functioning of stream ecosystems and the species that live there;</li> </ul> </li> </ul>		
	<ul> <li>Guidance on appropriate riparian planting (for community groups).</li> </ul>		

<sup>&</sup>lt;sup>3</sup> The Upper Hutt City Council flood protection policy as stated in the Infrastructure Strategy contained in the Upper Hutt City Council Long Term Plan 2018 – 2028 is to provide flood protection to a design standard of meeting a 1:25 year flood event if there is a secondary flow path and for a 1:100 year event if there is no secondary flow path.



	• Foster a sense of community responsibility for flood protection and the river environment through facilitating/engaging community groups in restoration activities.
6. Recognise and provide for recreation	<ul> <li>Develop design responses that create opportunities for improved recreation use or community accessibility to facilities in the area;</li> </ul>
use within stream corridors in the catchment, where this	• Maintain existing recreation opportunities as part of the implementation of any structural upgrade works within current recreation reserve space;
is appropriate	Look for opportunities for additional community stream access;
	Maximise co-benefits of flood detention/green space;
	Maintain community resilience.

The Pinehaven Stream FMP sets out the considerations of the issues and opportunities identified in the Pinehaven Catchment, including the physical environment, human environment, cultural values, natural environment, and the identified flood risk.

The Pinehaven Stream FMP then sets out methods to respond to the above considerations, and achieve the vision, goals and objectives. A combination of methods to manage flooding in the Pinehaven Catchment are proposed across three different categories:

- **Structural** Physical works designed to manage flood risk associated with the stream channel, such as increasing the capacity of the stream, reducing blockages and managing flows on the floodplain;
- **Non-structural** Planning controls for development in the catchment, community awareness and preparedness, and emergency procedures; and
- **River management** Maintenance of the stream to avoid blockages, maintain capacity and minimise erosion.

River management is undertaken in part by Council, but is also the responsibility of landowners where the stream crosses their land. Non-structural methods through planning controls have been addressed through a plan change process (Plan Change 42) to the Upper Hutt District Plan.

The project to which this application relates addresses the structural methods as recommended in the Pinehaven Stream FMP. The proposed works are therefore part of a wider integrated set of methods responding to the flood risk in the Pinehaven catchment area, as developed through the floodplain management planning process.



# 3. Legislative and Policy Framework

The proposed works are to be undertaken in accordance with the relevant legislative and national regional and local policy frameworks relating to natural hazards, and more specifically flood protection. The main legislation relating to the proposed works are the Resource Management Act 1991 (RMA), Local Government Act 2002 (LGA), Soil Conservation and Rivers Control Act 1941 (SCRCA) and Land Drainage Act 1908 (LDA).

# 3.1 Resource Management Act 1991

A full assessment of the proposal against the relevant sections of the RMA and subordinate planning documents is provided in section 12 below; however, the provisions relating to natural hazard management, and in particular flood mitigation and management, are identified below to provide an understanding of the broader framework for the management of natural hazards in New Zealand.

The purpose of the Resource Management Act, as set out in section 5, is to promote the sustainable management of natural and physical resources. The definition of sustainable management includes enabling people and communities to provide for their social and economic well-being and for their health and safety.

In achieving this purpose, the matters of national importance set out in section 6 must be recognised and provided for, which relevantly includes "(h) the management of significant risks from natural hazards". This matter was recently included in section 6 through the Resource Legislation Amendment Act 2017.

The functions of regional council set out in section 30 include at (1)(c) the control of the use of land for the purpose of "(iv) the avoidance or mitigation of natural hazards". Territorial authorities have an equivalent function in relation to the control of effects of the use, development, or protection of land (section 31(1)(b)(i)).

The RMA therefore includes a clear requirement for the consideration of natural hazards, including flooding, on people and communities through its purpose and principles, and sets a requirement for local authorities to control the use of land for the avoidance or mitigation of natural hazards. This is achieved through the subordinate planning documents developed and administered by the local authorities. These documents are addressed in the sections below.

# 3.1.1 Regional Policy Statement for the Wellington Region 2013

The Regional Policy Statement for the Wellington Region 2013 (RPS) includes Chapter 3.8 Natural Hazards, which sets out the management issues and objectives for natural hazards in the Wellington Region, and policies and methods to achieve those objectives.

Flooding is identified in the RPS as the most frequently occurring hazard event in the region. The issues identified related to natural hazards include:

- The adverse impacts on people and communities, businesses, property and infrastructure of natural hazard events;
- Increases in the risk and consequences from natural hazards from human actions; and
- Climate change increasing the magnitude and frequency of events.

The objectives for natural hazards as set out in the RPS are:

Objective 20 Hazard mitigation measures, structural works and other activities do not increase the risk and consequences of natural hazard events.

Objective 21 Communities are more resilient to natural hazards, including the impacts of climate change, and people are better prepared for the consequences of natural hazard events.



The policies that implement the objectives as set out in Chapter 3.8 are Policy 29, 51 and 52. Policy 29 relates to district and regional plans including provisions to avoiding inappropriate subdivision and development in areas at high risk from natural hazards.

Policy 51 seeks to minimise the risks and consequences of natural hazards, and provides a range of matters to be given particular regard. These include, relevantly, the potential for climate change to increase the frequency or magnitude of events, and the need for hazard mitigation in moderate risk areas.

Policy 52 seeks to minimise adverse effects of hazard mitigation measures and is of particular relevance to the proposed works:

Policy 52: Minimising adverse effects of hazard mitigation measures – consideration When considering an application for a resource consent, notice of requirement, or a change, variation or review of a district or regional plan, for hazard mitigation measures, particular regard shall be given to:

(a) the need for structural protection works or hard engineering methods;

(b) whether non-structural or soft engineering methods are a more appropriate option;

(c) avoiding structural protection works or hard engineering methods unless it is necessary to protect existing development or property from unacceptable risk and the works form part of a long-term hazard management strategy that represents the best practicable option for the future; (d) the summative effects of isolated structural protection works and

(d) the cumulative effects of isolated structural protection works; and

(e) residual risk remaining after mitigation works are in place,

so that they reduce and do not increase the risks of natural hazards.

Policy 52 therefore sets out a framework to consider hazard mitigation measures with the overall outcome being to not increase risk from natural hazards, with structural protection works being avoided except in specific circumstances.

The RPS therefore provides important policy direction for the consideration of the proposed works, including the impacts of climate change and the circumstances in which structural protection works may be acceptable.

The wider policy framework of the RPS relating to the project including objectives and policies for works within and the protection of the beds of rivers is assessed in Appendix R.

# 3.1.2 Regional Plans

# 3.1.2.1 Regional Freshwater Plan for the Wellington Region

The Regional Freshwater Plan (RFP) addresses flood hazards and mitigation as an issue in the region, and includes provisions to address these, with the relevant objectives being:

4.1.9 The risk of flooding to human life, health, and safety is at an acceptable level.

4.1.10 The adverse effects of flooding on natural values and physical resources, including people's property, are at an acceptable level.

The policies giving effect to these objectives seek to avoid or mitigate flooding effects, ensuring there is sufficient information on flood hazards, raising community awareness, and adopting a precautionary approach where information is incomplete or limited.

# 3.1.2.2 Proposed Natural Resources Plan Decisions Version

The Proposed Natural Resources Plan (PNRP) has been developed to replace the existing separate regional plans with one integrated plan. The Decisions Version of the plan was notified on 31 July 2019. The PNRP Decisions Version includes provisions addressing hazards in a general manner, with the relevant objectives being:



Objective O20 The <u>hazard</u> risk, <u>and</u> residual <u>hazard</u> risk, <del>and adverse effects</del> from natural hazards and <u>adverse effects of</u> climate change, on people, the community and infrastructure are acceptable.

Objective O21 Inappropriate use and development in high hazard risk areas is avoided.

The policies giving effect to these objectives include recognising the benefits of catchment based flood risk management, avoiding use and development in high hazard areas, avoiding hard engineering hazard mitigation measures except in certain situations, and giving particular regard to climate change potential to exacerbate hazard events.

The wider policy framework of the RFP and PNRP relating to the project including objectives and policies for works within and the protection of the beds of rivers is assessed in Appendix R.

# 3.1.3 Upper Hutt City Council District Plan

Territorial authorities are required to have a district plan under RMA section 73 to assist in carrying out their functions to achieve the purpose of the Act. The Upper Hutt City Council District Plan (District Plan) includes objectives and policies for natural hazards in Chapter 14. The objectives in the District Plan related to natural hazards are:

Objective 14.3.1 – The avoidance, remedying or mitigation of the adverse effects of natural hazards on the environment.

Objective 14.3.2 Identify Flood Hazard Extents and Erosion Hazard Areas in order to avoid or mitigate the risk to people and property and provide for the function of the floodplain.

Objective 14.3.3 To control buildings and activities within the upper areas of the Pinehaven Catchment Overlay to ensure that peak stormwater runoff during both a 1 in 10-year and 1 in 100-year event does not exceed the existing run off and therefore minimise the flood risk to people and property within the Flood Hazard Extent.

The policies which support these objectives are:

Policy 14.4.1 – To identify and mitigate the potential adverse effects of natural hazards that are a potentially significant threat within Upper Hutt.

Policy 14.4.2 – In areas of known susceptibility to natural hazards, activities and buildings are to be designed and located to avoid, remedy, or mitigate, where practicable, adverse effects of natural hazards on people, property and the environment.

Policy 14.4.3 Avoid development within high hazard areas of identified Flood Hazard Extents and Erosion Hazard Areas.

Policy 14.4.4 To control development (including buildings) within the lower hazard areas of identified Flood Hazard Extents and Erosion Hazard Areas by requiring mitigation to minimise the risk to people and property.

Policy 14.4.5 Enable planned flood mitigation works within identified Flood Hazard Extents that decrease the flood risk to people and property or maintain the function of the floodplain

Policy 14.4.6 Within the Pinehaven Flood Hazard Extent, reduce blockage potential from fences, buildings and driveways in high hazard areas through design controls on development.

Policy 14.4.7 Development within the Pinehaven Catchment Overlay is designed to ensure that the peak stormwater runoff, during both a 1 in 10-year and 1 in 100-year event, shall be at a rate no greater than when compared to the pre-development situation.



Plan Change 42 (PC42) introduced a range of amendments to the Upper Hutt City Council District Plan to specifically address the risk from flooding within the Mangaroa River and Pinehaven Stream catchments for the 100-year flood event, including objectives 14.3.2 and 14.3.3, and policies 14.4.3 to 14.4.7 above. PC42 was made operative on 14 August 2019.

The plan change gave effect to the proposed non-structural methods set out in the Pinehaven Stream FMP by amending existing provisions and introducing new objectives, policies and rules to manage land use and subdivision activities within the catchment. The plan change was therefore part of the wider response to flood risk in the Pinehaven catchment.

Specifically, in relation to the proposed structural works, the plan change introduced provisions enabling identified activities, such as earthworks as permitted activity within the Pinehaven flood hazard extent that are directly associated with specific and planned flood mitigation works or floodplain management, and included a supporting policy framework for planned flood mitigation works. In this way, the plan change supports the long-term maintenance of the proposed works.

An assessment of the proposed works against the rules of the Upper Hutt City Council District Plan, including PC42, is provided in Appendix P and summarised in section 7.1. An assessment of all relevant objectives and policies of the Upper Hutt City Council District Plan, including PC42, is provided in Appendix R and summarised in section 12.3.5.1.

# 3.2 Local Government Act 2002

The Local Government Act 2002 (LGA) provides the general framework for the operation of local authorities including obligations, restrictions and powers. The Local Government Act sets out in section 101(B) the requirement for a local authority to prepare as part of its long term plan, an instrastructure strategy. Section 101B(3)(e) requires the local authority to outline in the infrastructure strategy how it intends to manage its infrastructure assets taking into account the need to –

(e) provide for the resilience of infrastructure assets by identifying and managing risks relating to natural hazards and by making appropriate financial provision for those risks.

The sections below outline some of the relevant documents of the local authorities that have been considered by the project.

The Pinehaven Stream Floodplain Management Plan is the primary document relevant to the project adopted by the two councils under the LGA. The Pinehaven Stream FMP is discussed in detail in section 2.2. The GWRC formally adopted the Pinehaven FMP at a Council meeting held on 29 June 2016.

# 3.2.1 Greater Wellington Regional Council Documents

# 3.2.1.1 Long Term Plan 2018 - 2028

The GWRC Long Term Plan 2018 – 2028 (LTP) includes a section which addresses flood protection and control works, one of the six major areas of the activities of GWRC. The flood protection and control activities include; understanding flood risk, maintaining flood protection and control works, and improving flood security. The challenges and strategies for flood protection and control are also outlined.

The Pinehaven Floodplain Management Plan is identified as a key project for the GWRC in relation to understanding flood risk and improving flood security. The relevant levels of service set out in the GWRC LTP are:

- Improve information and understanding of flood risk in the community;
- Infrastructure is managed to agreed levels of service;
- Minimise the environmental impact of flood protection works; and



• Improve the community's resilience to flooding.

#### 3.2.1.2 draft Natural Hazards Management Strategy for the Wellington Region

The draft Natural Hazards Management Strategy for the Wellington Region (dNHMS) was released for consultation in September 2016, with the overarching vision of "The communities of the Wellington region work together to understand and reduce risks from natural hazards". The objectives of the dNHMS are:

- Our natural hazards and risks are well understood;
- Our planning takes a long-term risk-based approach;
- Consistent approaches are applied to natural hazard risk reduction; and
- We have an agreed set of priorities to reduce the risks from natural hazards.

These objectives are supported by a number of actions. The dNHMS is focussed on the reduction of risk from natural hazards through providing a framework for consistent responses to natural hazard issues across the Wellington Region. The primary implementation of a final NHMS will therefore be through subsequent planning documents, both statutory and non-statutory, that take into account the approach and understanding gained through the strategy actions.

### 3.2.1.3 draft Environmental Code of Practice and Monitoring Plan for Flood Protection Activities

The draft Environmental Code of Practice and Monitoring Plan for Flood Protection Activities (dEMP) has been prepared primarily to support the renewal of resource consents required for flood protection operations and maintenance works in the region. The overall intent of the document is broader; however, as it is to guide and monitor how all flood protection and erosion control activities are undertaken.

While the UHCC will be the owners and operators of the Pinehaven Stream flood mitigation assets, the dEMP provides a description of what GWRC as a flood controller considers to be good practice for flood protection and erosion control activities, which will be useful for the planning and undertaking of the construction and maintenance of the Pinehaven Stream structural works. In addition, the dEMP provides an overview of the key focus areas for the effects of flood protection activities, which will be a useful point of reference for the assessment of the Pinehaven Stream structural methods.

# 3.2.2 Upper Hutt City Council Documents

#### 3.2.2.1 Long Term Plan 2018 – 2028

The Pinehaven Stream project is identified within the UHCC LTP as a key infrastructure initiative. The project is associated with the Stormwater activity area under the LTP, with a projected UHCC expenditure of \$18.22 million. The overall level of service for the stormwater activity area for UHCC is, "We will effectively manage stormwater to minimize the risk of property damage and preserve public safety and health". The performance measure of the level of service includes the number of flooding events and the number of habitable floors affected for each flooding event.

Importantly, the Infrastructure Strategy contained within the LTP states that the current policy of the UHCC in relation to flood protection is to provide protection to a design standard of meeting a 1:25 year flood event if there is a secondary flow path, and for a 1:100 year event if there is no secondary flow path. The Pinehaven Stream FMP is identified as an example of a project where the Council is working on meeting this stormwater design standard. The relevant target is 1:25 year flood event (4% AEP) because secondary flow paths will be secured through the project, and the wider Pinehaven Stream Improvements structural works. The Infrastructure Strategy is therefore a key driver for the design parameters of the project.



# 3.2.2.2 Land Use Strategy 2016 - 2043

The UHCC Land Use Strategy 2016 – 2043 provides a strategic approach to guiding where and how future development occurs. In relation to Pinehaven, the strategy identifies a large area within and adjacent to the catchment for potential future urban growth. This has implications for the assumptions for stormwater management in the area. This discussed in more detail in section 5.2.4 below.

# 3.3 Building Act 2004

The Building Act 2004 regulates building work and sets performance standards for buildings. This is to a range of matters including the safety of people who use buildings, and the promotion of sustainable development through the design and construction of buildings.

The Building Act 2004 includes provisions relating building on land subject to natural hazards, including inundation. The Building Act is supported by the Building Code, which includes a performance standard which requires surface water from a 1-in-50 year (2% ARI) event not entering a building.

# 3.4 Soil Conservation and Rivers Control Act 1941, Land Drainage Act 1908 and River Boards Act 1908

The Soil Conservation and Rivers Control Act 1941, Land Drainage Act 1908 and River Boards Act 1908 provide local authorities operational powers to protect property from flood damage. In particular, the Soil Conservation and Rivers Control Act 1941 provides the legal mandate to Regional Councils to protect communities from flooding, with the objectives of the Act including the prevention of damage by floods, and the use of land to achieve that objective.



# 4. Reason for the Work and Designation

# 4.1 Need for the project

The project is needed as part of a wider flood management response to the flood risk issues in the Pinehaven Catchment, as documented in the Pinehaven Stream FMP. As identified in the FMP, much of the Pinehaven Stream channel has capacity for less than a 1-in-5-year (20% annual exceedance probability) return period flood event. In order to reduce the potential for flooding of dwellings in the Pinehaven community, the flow capacity of the stream needs to be increased. The Upper Hutt City Council policy is for capacity of up to a 1-in-25-year return period flood event, and as such this is the identified capacity the Pinehaven Stream Improvements Project needs to achieve.

### 4.2 The Problem

The overall problem which is being addressed by the project is the unacceptable risk of flooding faced by the people and communities in the Pinehaven Catchment, and the subsequent risk to their health, safety and wellbeing, and risk to property from flood damage.

#### 4.2.1 Causes of Flooding in Pinehaven Catchment

The Pinehaven Stream FMP identifies three main broad factors that combine to contribute to flooding in the Pinehaven Catchment: rainfall, urban development, and forestry activities in the upper catchment.

The comprehensive response to flood risk issues set out in the Pinehaven Stream FMP, including the proposed structural works, addresses the urban development and forestry activities. The proposed structural works address pre-existing issues in the Pinehaven Stream caused by historic urban development and modification of the stream, both of which contribute to the flooding risk in the catchment.

#### 4.2.2 Extent of Flooding

The analysis undertaken for the Flood Hazard Assessment Report of the flooding issues in the Pinehaven Catchment produced flood hazard maps showing the potential extent of flooding. These were included in the Pinehaven Stream FMP in 2014 and updated following consultation and further review up to 2016. The analysis identified the areas of highest flood risk. These areas include:

- Birch Grove;
- Blue Mountains Road;
- Sunbrae Drive;
- Deller Grove; and
- Properties downstream of the piped sections of the Pinehaven stream under Whitemans Road, including the Silverstream commercial area.

Areas of flood risk are described in greater detail in the Flood Management Plan.

Once the preliminary design for the stream improvements started in 2017, the modelling of the potential flood extent in the Pinehaven catchment was updated for the purposes of the engineering design. The update included topographical information produced by Light Detection and Radar (LiDAR) data collected by GWRC in 2013 and a detailed survey of the stream undertaken in 2015. Further information was provided by obtaining topographical survey data for the stream channel in 50 Blue Mountains Road and updating the length of the weir at the Whitemans Road Bypass Inlet from 5.5m to 6.4m, based on topographical survey data obtained in 2019, to create the Revised Updated Existing Case Model.



The updated model was analysed for the 4% AEP events, which included climate change assumptions to 2090. Figure 3 shows the modelled potential extent of flooding in a 4% AEP event based on the updated model, with the predicted depth of flooding with the extent shown.

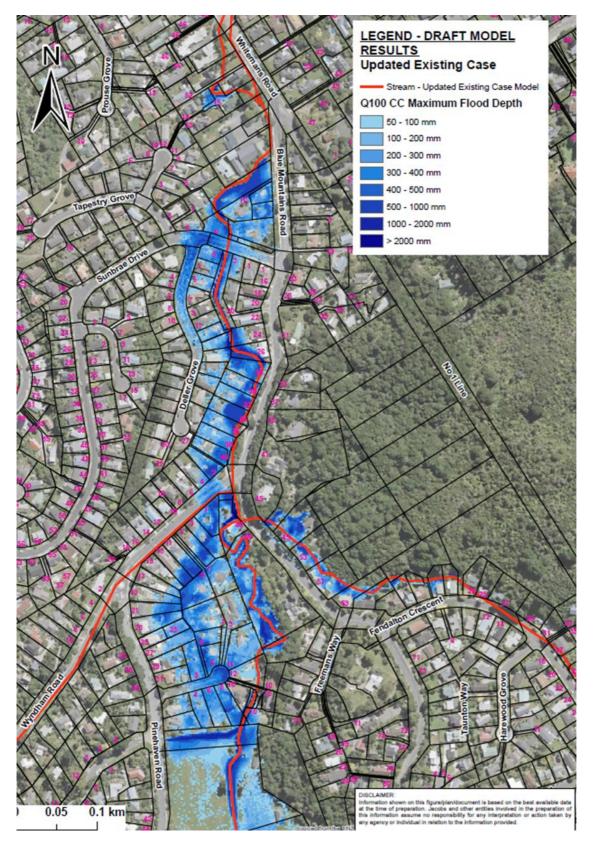


Figure 3: Modelled Flood Extent in the Pinehaven Catchment for a 4% AEP Event



This analysis has confirmed that there is a significant flooding issue in the Pinehaven Catchment, with a significant number of properties affected by flooding in a 4% AEP event.

# 4.3 Proposed Solution for Physical Improvements Scope

The proposed solution for this project which the proposed notice of requirement (NoR) for designation relates covers the construction and maintenance of the structural methods outlined in the Pinehaven Stream FMP. These works were then taken to the next level of design to confirm the scope of the stream improvement project.

The proposed stream improvement works are defined in terms of their location within four reaches along the Pinehaven Stream. The key features of the proposed works are outlined in Table 3 below.

Table 3: Summary of Stream Improvement Works in Reaches 1 – 3
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Reach	Key Features
Reach 1 – Sunbrae Drive to Whitemans Road	<ul> <li>Vertically sided lined section through 4-8 Blue Mountains Road Property (Reformed Church of Silverstream).</li> <li>Existing bridges to be replaced at 50 Whitemans Rd, 15 Clinker Dr and 56 Whitemans Rd.</li> <li>New Willow Park design to provide for flood protection and amenity, including new pedestrian/cycle bridge.</li> <li>Low wall along the boundary between Willow Park and 10a Blue Mountains Road.</li> <li>Naturalised channel with suitable riparian planting within Willow Park.</li> <li>Vertically sided wall channel through 4 Sunbrae, 10a and 14 Blue Mountains Road</li> <li>Upgrade existing Sunbrae Drive culvert (not part of the works to be authorised by NOR and resource consents).</li> <li>Upgrade of piped stream &amp; bypass inlet structures.</li> <li>Securing secondary flow paths through a lowered driveway and easement servicing of 12-15 Clinker Grove.</li> <li>Securing secondary flow paths from Deller Grove through 4 Sunbrae Drive.</li> </ul>
Reach 2 – Pinehaven Road to Sunbrae Drive	<ul> <li>Vertically sided lined section from Pinehaven Road to 28 Blue Mountains Road</li> <li>Naturalised channel with suitable riparian planting for remainder of reach</li> <li>Replacement of private vehicle crossings (25-year capacity) with 3 private bridges and provision of two shared accessways between 30-36 Blue Mountains Road (this design concept continues to be discussed with directly affected property owners)</li> <li>Upgrade existing Pinehaven Road culvert (not part of the works to be authorised by NOR and resource consents)</li> <li>Blockage reduction measures at inlet structures at Wyndham Road</li> <li>Swale to capture secondary flow paths at 2 and 4 Pinehaven Road</li> <li>Design and construction of the relocation of utility services</li> <li>Removal of house owned by Greater Wellington Regional Council at 28 Blue Mountains Road</li> </ul>
Reach 3 – Pinehaven Reserve to Pinehaven Road	<ul> <li>Vertically-sided lined section (25-year capacity) through Birch Grove properties and 2A Freemans Way</li> <li>Remove existing culvert and replace with bridge at 10A, 10B and 10C Birch Grove access</li> <li>Bank stabilisation works/scour protection at various locations along the stream at 2 A Freemans Way and 50 Blue Mountains Rd</li> <li>Vertical wall channel and naturalised channel through 48 Blue Mountains Road. Demolish house at 48 Blue Mountains Rd (property purchased)</li> <li>No work in Pinehaven Reserve</li> <li>Secure secondary flow path by lowering driveway of 11 Birch Grove</li> <li>Design and construction of the relocation of utility services</li> <li>Removal of house owned by Greater Wellington Regional Council at 48 Blue Mountain's Road</li> </ul>

These features have been designed to meet the project objectives. The project is described in greater detail in section 6 below.

# 4.4 Need for the Designation Area

The RMA provides for requiring authorities to issue a Notice of Requirement to be designated for a public work. This NoR relates to a designation proposed to cover the project works within the lower catchment of Pinehaven



Stream (Reaches 1 - 3) and has been made by the UHCC pursuant to section 168A of the RMA. The UHCC is a requiring authority under the definition in section 166 of the RMA. The works are considered to be within the definition of 'public works' as defined in the Public Works Act 1981.

An assessment of the use of the designation process, as opposed to other options such as resource consent, in terms of the requirement of section 168A(3)(c) for consideration of whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought, is provided in section 12.5 below.

Two phases of the proposed designation will be required. Only 1 designation boundary will be provided in the application covering both construction and proposed operational extents. Following construction of the project, the designation extent will be reduced to the final operational boundary for the project through section 182 of the RMA. The proposed designation boundaries are shown in greater detail in the plans attached at Appendix C. As described in section 1.6 above, the designation boundary varies over the length of the stream, due to the differences in construction requirements for the various components of the project.

In general, the operational footprint will be required to provide for maintenance access at the top of bank on either side of the channel.



# 5. Description of the Existing Environment

# 5.1 General site location and description

The proposed designation area encompasses the Pinehaven Stream Improvement Works within the Pinehaven Stream lower catchment, located in Upper Hutt City, New Zealand. The legal descriptions of the properties affected are contained in Appendix G.

#### 5.1.1 Pinehaven Catchment Overview

Pinehaven Stream drains a catchment of approximately 4.5 square kilometres (450 hectares) on the eastern side of the Hutt Valley, to the south of the Hutt River, as shown in Figure 4 below. The catchment is located to the southwest of the main urban area of Upper Hutt, and runs from the Pinehaven Hills down to Hulls Creek. It includes the suburbs of Pinehaven and part of Silverstream, and is bordered by the catchments of the Mangaroa River to the south, Stokes Valley stream to the west, and Trentham to the east.

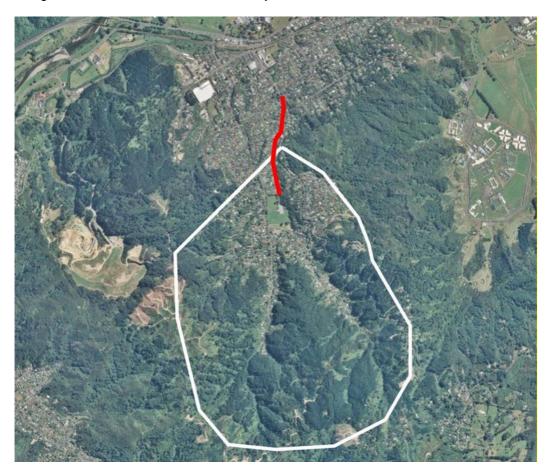


Figure 4: Pinehaven Catchment Area (white polyline) and extent of stream upgrade (red line)

Much of the Pinehaven Stream channel is located within private property, particularly in the upper catchment. In this area the channel is generally narrow with vegetated banks, with many structures such as private bridges and culverts. In the lower catchment there are two significant road crossings, being one at Pinehaven Road and one at Sunbrae Drive. The existing structures in the stream (including both road crossings) exacerbate flooding, and are discussed in detail in section 5.7 below. In addition, the stream does not consistently grade downslope, and the bed is highly mobile and erodible.

Pinehaven Stream is integrated into the wider stormwater network of the catchment, and is piped at various sections along its length. This includes the major section in the northern/downstream part of the catchment, which includes the discharge to Hulls Creek. This downstream section also includes a bypass from the stream



(Whitemans Road Bypass) adjacent to 4 Blue Mountains Road as shown in Figure 5 below, constructed after the significant historic flood events.

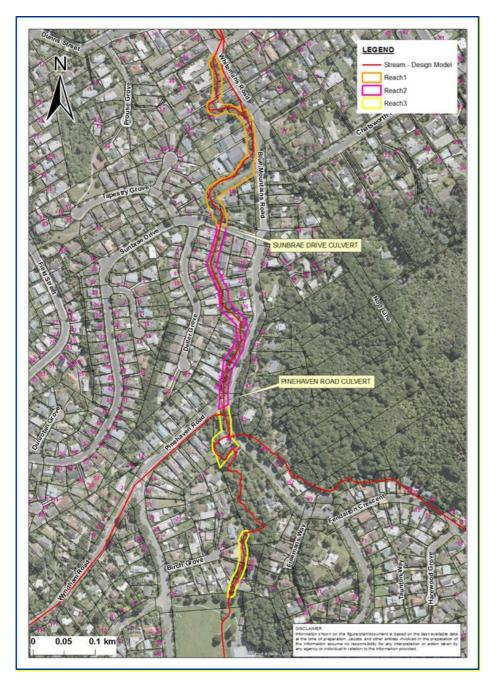


#### Figure 5: Whitemans Road Bypass

Significant piped lengths also connect the upper catchment tributaries to the start of the main open channel located in the Pinehaven Reserve. This includes an overflow bypass in Pinehaven Road. There are also a number of smaller piped sections in the upper catchment, such as where the tributary crosses Pinehaven Road at a number of points. The convergence of the tributaries from the upper catchment in the vicinity of the Pinehaven Reserve means that the stream in the lower catchment is larger with higher flooding potential.

For the purposes of the Pinehaven Stream FMP, the stream was defined into four reaches. Reaches 1 - 3 are located in the lower catchment from the Pinehaven reserve to the entrance of the stream to the piped network, as shown in Figure 6 below. The fourth reach is the area of the upper catchment, which does not contain any physical works to the stream channel. There will however be physical works to inlets in the upper catchment to include blockage reduction (debris screen installation).



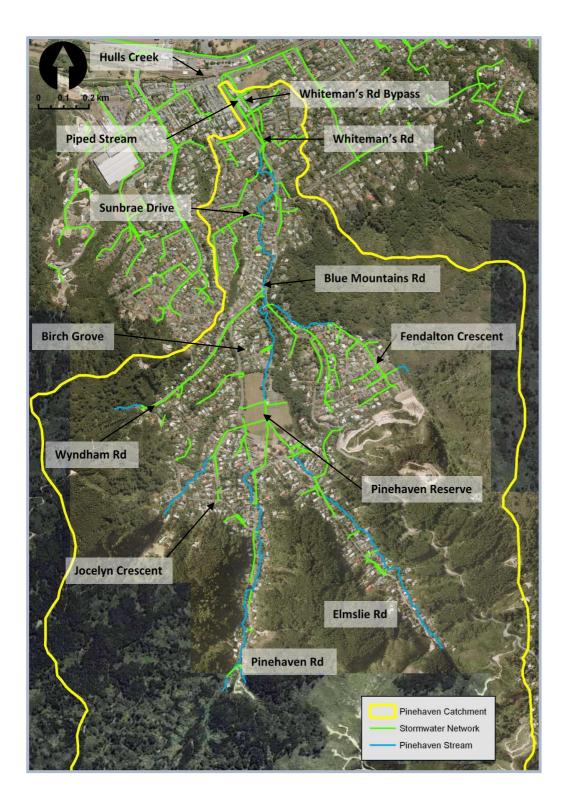


#### Figure 6: Pinehaven Stream Reaches

#### 5.1.2 Pinehaven Stream

The Pinehaven Stream flows from the upper catchment in the southern Pinehaven Hills, to its confluence with Hulls Creek in the north. The Stream is fed by three main tributaries in the steeper upper catchment area in the vicinity of Wyndham Road, Pinehaven Road and Elmslie Road, as shown in Figure 7 below, and flows as a single channel from the Pinehaven Reserve to the Whitemans Road / Dowling Grove intersection where the stream is piped to the Hulls Creek discharge point in the vicinity of the Whitemans Road / Gard Street intersection. Hulls Creek flows westward, converging with the Hutt River.





#### Figure 7: Pinehaven Stream Location

Much of the Pinehaven Stream channel is located within private property, particularly in the upper catchment. In this area the channel is generally narrow with vegetated banks, with many structures such as private bridges and culverts. Two significant road crossing are also located in the lower catchment, at Pinehaven Road and Sunbrae Drive. In addition, the stream does not consistently grade downslope, and the bed is highly mobile and erodible.



#### 5.1.2.1 Reach 1

Reach 1 extends from 48 Whitemans Road to Sunbrae Drive and includes Willow Park, the Silverstream Reformed Church and Silverstream Christian School site, and the Whitemans Road bypass. The reach ends at the headwall to the lower culvert entrance, which flows under Whitemans Road and down to Hulls Creek. The stream meanders through private property and Willow Park until it reaches the church site, where the stream runs adjacent to Whitemans Road. North of the upper bypass weir, the stream is constrained, with some short lengths of retaining walls along with steep planted stream banks. South of the bypass weir, the stream banks are currently a mixture of wooden and concrete block vertical retaining walls.

#### 5.1.2.2 Reach 2

Extending upstream from Sunbrae Drive to Pinehaven Road, the stream through this section runs through a small reserve, located between the properties on Deller Grove and Blue Mountains Road, and then within private property before turning towards Blue Mountains Road at number 28 Blue Mountains Road, which has been purchased by GWRC and will be incorporated in proposed stream improvements in Reach 2. This first section of Reach 2 is formed in a natural stream profile, with small sections of retaining walls.

As the stream runs through 28 Blue Mountains Road, the stream takes two sharp bends, before the channel narrows with an assortment of retaining walls extending up to Pinehaven Road. There are currently three private vehicle bridges and two private pedestrian bridges crossing the narrow vertically sided channel between 28 Blue Mountains Road and the Pinehaven Road crossing.

#### 5.1.2.3 Reach 3

Reach 3 extends from Pinehaven Road through Birch Grove properties to the Pinehaven Reserve. The stream has a mixture of naturalised stream, natural meandering stream and vertically sided channel, as shown in Figure 8 below. The stream has a deep meandering channel through both 48 and 50 Blue Mountains Road. The stream within the Birch Grove properties is more modified and constrained. Concrete blocks provide a vertically sided channel in some sections, which is either vegetated or grassed on the upper stream banks.





Figure 8: Pinehaven Stream photos



A section of stream between proposed works behind Birch Grove properties and the house at 48 Blue Mountains Road is excluded from channel works however some observed stream erosion in this area has been identified for mitigation.

#### 5.1.2.4 Upper Catchment

This area incorporates the catchment upstream of (and including) the Pinehaven Reserve and includes piped sections feeding stream inlets of the smaller meandering creeks which extend up the valleys in the vicinity of Jocelyn Cres, Winchester Ave, Forest Road, and Fendalton Crescent, and the major tributaries which extend up Elmslie Road and Pinehaven Road. The channel is narrow and constrained with vegetation lining the majority of the banks.

### 5.2 Land Use

There are three areas of importance in terms of land use. The upper catchment is dominated by exotic pine plantation. The upper catchment also includes some residential development, predominantly in the vicinity of the stream tributaries. The lower catchment is dominated by residential urban land use. There are areas of remnant indigenous forest in both the upper and lower catchments. In addition, downstream of the Pinehaven catchment, within the Hulls Creek catchment is the Silverstream Village commercial area, which is identified as a key suburban centre for Upper Hutt.

The land use of the catchment is mainly exotic pine plantations. Pine trees were first planted for commercial use in 1928, and provide a distinctive backdrop to the area. The Pinehaven Reserve is also a significant land use within the lower catchment, providing a focal point for the community.

### 5.2.1 Parks and Reserves

There are a number of parks and reserves located within the catchment, as shown in Figure 9 below. The two main parks within the vicinity of the Pinehaven Stream are the Pinehaven Reserve and Willow Park. Other parks in the catchment are significant for ecological purposes, such as the large reserve area in the east of the catchment encompassing Witako Scenic Reserve, Eccelsfield Reserve and Fendalton Reserve.





#### Figure 9: Parks and Reserves in the Pinehaven Catchment Area

#### 5.2.1.1 Pinehaven Reserve

Pinehaven Reserve is a large park approximately 5 hectares in area located in the centre of Pinehaven, providing a focus for community. The Reserve is a large open space with sports fields, tennis courts and a playground. The eastern part of the reserve is covered in vegetation. The park area is highly visible from Pinehaven Road and is easy to access.



The Pinehaven Stream flows through the reserve, with approximately 130 metres of open channel in the northern part of the park, along with some tributary stream sections in the eastern section. Approximately 430 metres of stormwater pipes are located in the southern part of the park conveying water from the upper catchment tributaries to the main Pinehaven Stream channel.

#### 5.2.1.2 Willow Park

Willow Park is a relatively small local park located on Blue Mountains road, with pedestrian access also available from Tapestry Grove via a narrow walkway. Willow Park is approximately 0.22 hectares in area. The Pinehaven Stream runs through the park. A number of large exotic trees provide a high level of amenity in the park. A wooden footbridge provides access over the stream to the walkway connecting with Tapestry Grove.

#### 5.2.2 Zoning

The location of the Pinehaven Stream and tributaries are shown on the Upper Hutt City Council District Plan Map contained in Appendix N in relation to the land use zoning set out in the Upper Hutt District Plan. The lower catchment is largely zoned 'Residential', with large areas of 'Residential Conservation' zone located in the upper catchment and to the east of the stream in the lower catchment. 'Rural Hill' zone surrounds much of the Residential Conservation area in the upper catchment. An area of 'Rural Hill Blue Mountains' is located to the southeast, while a large area of 'Open Space' is located to the east, also identified as within the Southern Hills Overlay area. Smaller areas of 'Open Space' zone are also identified throughout the catchment relating to parks and reserves, including the large central Pinehaven Reserve. 'Business Commercial' zoning is located in the northern part of the lower catchment, to the west of the part of the stream that is piped to Hulls Creek. The stream itself passes through land within the designation boundary zoned Residential, Residential Conservation, and Open Space.

Many of the properties within the Residential Conservation zone are also affected by the Tree Group overlay in the Upper Hutt City Council District Plan, which identifies groups of trees given a greater level of protection under the plan provisions. Individual 'Notable Trees' are also identified within the catchment. The Tree Group Overlay and Notable Trees located within the catchment are shown on the Upper Hutt City Council District Plan Map contained in Appendix N.

It is important to note that the roads within Upper Hutt are subject to the same zone rules of the adjacent zoned properties, as well as the City-wide rules. The centre line of the road defines the boundary of two different zones on either side of a road.

#### 5.2.3 Existing Designations

There are a number of existing designations within the Pinehaven catchment. These are listed in full in Appendix O. The existing designations within the catchment within which the proposed works will occur and which the proposed designation will overlap are set out in Table 4 below. Upper Hutt City Council is the Requiring Authority for these existing designations.

Ref.	Title	Location	Comments
UHC61	Recreation	Pinehaven Road / Blue Mountains Intersection (Pickerills Reserve)	Pinehaven Stream channel partially within reserve boundary.
UHC62	Recreation	Pinehaven Road (Pinehaven Reserve)	Pinehaven Stream runs through reserve, partially piped with some open channel in the northern section.
UHC73	Local Purpose (Drainage Reserve)	Sunbrae Drive	Pinehaven Stream runs through area which is identified as being for the purpose of drainage.
UHC89	Recreation	Blue Mountains Road / Tapestry Grove (Willow Park)	Pinehaven Stream runs through reserve area known as Willow Park.

Table 4: Existing Designations in the Pinehaver	Catchment Relevant to Proposed Works
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Two of the existing designations (UHC62 and UHC89) relate to recreational reserves through which the stream flows.

UHC61 is identified as being for recreational purposes, and is a small parcel of land located adjacent to the road reserve, being approximately 136 square metres in area.

UHC73 is located off Sunbrae Drive between residential lots, along the course of the stream and is relatively long and narrow, being approximately 100 metres long and a maximum of 16 metres wide. UHC73 is already identified as being for drainage purposes.

#### 5.2.4 Future Urban Development

Development of currently undeveloped land, or further intensification of current urban land, can lead to an increase of the proportion of impermeable surfaces and therefore the volume of stormwater entering the drainage network. Potential future development within the catchment is therefore a factor that requires consideration.

New developments with potential for impacts on flooding in the Pinehaven Catchment will be managed through the District Plan, including the new provisions introduced by Plan Change 42, which was the primary nonstructural method proposed by the Pinehaven FMP. This includes requiring stormwater neutrality for new development within the Pinehaven Catchment Overlay area. The hydraulic model used for the Pinehaven Flood Hazard Investigation Report (SKM, 2010) formed the basis for the Flood Hazard Assessment (attached at Appendix U) and included an assessment of future development. Modelling for this project has assessed the existing environment only.

The Upper Hutt Land Use Strategy 2016 identifies the potential for additional urban development within the Pinehaven catchment, including the potential for the expansion of the existing urban area to occur on the hills to the west and south of the existing Silverstream and Pinehaven communities, denoted as the 'Southern Growth Area'. No plan change or resource consent has been lodged for development with this area, and as such this Project's assessment of the existing has not provided for any future urban development through the Southern Growth Area. The upper catchment land use type that has been considered is the current land use of existing forestry.

#### 5.2.5 Potentially contaminated land

The nearest Hazardous Activities and Industries List (HAIL) sites to the works area identified on the Selected Land Use Register (SLUR) for the Wellington Region are the Silverstream Railway clean fill site (SN/04/104/02) located to the northwest of Kiln Street approximately 550 metres downstream from the proposed works area, and the Silverstream Landfill (SN/03/002/02) located to the west of the Pinehaven area approximately one kilometre from the proposed works area.

Given current and historic use of the sites surrounding the Pinehaven Stream for residential and associated community land uses, there not any anticipated risk of works occurring on HAIL sites, and therefore the risk of disturbing potentially contaminated soils is considered to be very low such that the Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) is not considered applicable to this application.

## 5.3 Social Environment

Historic Maori settlement in the area included Ngati Ira who occupied the area in late pre-European times and Ngati Toa who came to the Cook Strait and western Wellington region in the 1820s from the Waikato. Te Atiawa, Ngati Tama and Ngati Mutunga also moved south to Cook Strait and the wider Wellington region during the musket wars in Taranaki. A Ngati Tama chief, Te Kaeaea, may have had a pa in 1837 on the south-east corner of the land that is now St Patricks, Silverstream and appears to have occupied land in the 1830s at what is now Silverstream and was fighting at Lower Hutt in the 1840s.



European settlement of the Pinehaven area began around the 1860s, with more intensive urban development beginning in the 1930s. Initially, Pinehaven developed as a vacation destination for Wellingtonians, providing a rural escape from the city lifestyle.

### 5.3.1 Housing

Based on 2013 census data, there are approximately 900 occupied dwellings within the Pinehaven Catchment.

#### 5.3.2 Community Facilities

The Pinehaven community is well serviced by community facilities, a number of which are co-located on or adjacent to the Pinehaven Reserve, being Pinehaven School, Pinehaven Community Hall, Pinehaven Scout Hall and Pinehaven Tennis Club. In addition to these facilities, Pinehaven is also serviced by a library located in close proximity to the reserve, at 56 Pinehaven Road.

Further north, the Silverstream community also has facilities within or in close proximity to the Pinehaven Catchment area, including Silverstream Reformed Church and associated Christian School located adjacent to Willow Park, and the Silverstream School and the Silverstream shopping centre located near the discharge of the stream to Hulls Creek.

# 5.4 Water Quality

The water quality in Pinehaven Stream is influenced by the differences in land use between the upper and lower catchments. The indigenous and exotic forest of the upper catchment generally results in better water quality, while the urban stormwater discharges of the lower catchment adversely impact on water quality in the stream.

Table 5 provides a range of water quality characteristics of Pinehaven Stream of two sites, one in the upper catchment and one in the lower catchment. The water quality characteristics are derived from data provided in Kingett Mitchell Ltd (2005) and Warr, S. (2007). The data for the upper catchment site detailed in Kingett Mitchell Ltd (2005) was taken from samples collected between March and April 2003. The data presented for the lower catchment site in Warr, S. (2007) was collected over three sampling rounds in December 2006 and January and March 2007, with the figures presented in Table 5 including an average of those data.

Characteristic	Guideline Values and		Upper	Lower Pinehaven <sup>6</sup>		
	Referen	Ce <sup>4</sup>	Pinehaven <sup>5</sup>	19/2/06	31/1/07	13/3/07
Temperature (°C)	<20	Quinn & Hickey (1990)	11.4	15.2	15.9	17.7
Conductivity (us/cm)			148	208	205	190
Dissolved Oxygen (% sat)	≥ 80	RMA1991 Third Schedule	94	101	99.7	98.4
Dissolved Oxygen (mg/L)	>6	ANZECC (2000)	10.30	10.13	9.85	9.35
рН	6.4-8.9	Ausseil, O. (2013)	7.35	7.4	7.5	8.2
E. Coli (cfu/100mL)	≤550	MfE/MoH (2003)	No data	1400	460	1500
Turbidity (NTU)	≤5.6	ANZECC (2000)		4.99	13.1	7.15
Dissolved Copper (mg/L)	0.0025	ANZECC (2000) (80% protection)		0.0011	0.0011	0.0062
Dissolved Zinc (mg/L)	0.031	ANZECC (2000) (80% protection)		0.009	0.008	0.033

<sup>&</sup>lt;sup>4</sup> Taken from Appendix 4 of Warr (2007) with supplementary guidelines added.

<sup>&</sup>lt;sup>5</sup> Site PHU in Kingett Mitchell Ltd (2005)

<sup>&</sup>lt;sup>6</sup> Site HC06 in Warr (2007)



As shown in Table 5 the lower Pinehaven Stream site exceeded the ANZECC (2000) trigger values for protection of 80% of species for copper and zinc on one sampling round. Warr (2007) states that:

Contaminated runoff from urban areas around Pinehaven is likely to be the main source of zinc and copper in the lower reaches of the Pinehaven Stream and mid reaches of Hulls Creek.

In addition, turbidity in the lower catchment also exceeded the ANZECC (2000) trigger values for protection of 80% of species on two sampling rounds. Further water quality sampling has commenced and will continue post lodgement of this application.

Based on the results presented in Table 5, the Pinehaven Stream in the lower catchment is likely to have good water quality characteristics in terms of temperature and dissolved oxygen, and poorer characteristics in terms of dissolved metals and turbidity.

# 5.5 Stormwater and Hydrology

#### 5.5.1 Rainfall

The Pinehaven Catchment has a mean annual rainfall of around 1400 millimetres (Harkness, 2017). The frequency analysis undertaken by MWH (2008) to determine high intensity depth-duration frequency for the Pinehaven catchment recommended that Tasman Vaccine rain gauge data be used to represent the rainfall in the upper Pinehaven catchment, while the Pinehaven/Wallaceville data represent the lower catchment. The depth-duration frequency data provided by the Pinehaven rain gauge are reproduced in Table 6 below.

ARI (Years)	Duration (Hours)					
ARI (Teals)	0.5	1	2	3	4	6
2	12	16	23	30	35	43
5	14	19	29	38	45	53
10	16	23	34	44	51	60
20	18	26	39	50	57	67
50	20	30	46	57	64	76
100	21	33	51	62	70	83

#### Table 6: Pinehaven Depth Duration Frequency Data (mm) (1998 - 2007)

A 100-year event would therefore be around 83 millimetres of rainfall in a period of approximately six hours.

There is a rainfall distribution gradient within the catchment, with lower mean annual rainfall in the lower catchment and higher in the upper catchment.

#### 5.5.2 Hydrology

Montgomery Watson Harza (MWH, now Stantec) completed a hydrological study of the Pinehaven catchment in 2008 (MWH, 2008). The study included an extreme rainfall frequency analysis (described in section 5.5.1, flood frequency analysis and the construction and calibration of a rainfall runoff model. The rainfall runoff model was used to produce design flood hydrographs for input into the hydraulic model. The wider Pinehaven catchment includes 15 sub-catchments, as shown in Figure 10 below. The inflow from each sub-catchment was provided for hydraulic modelling purposes.



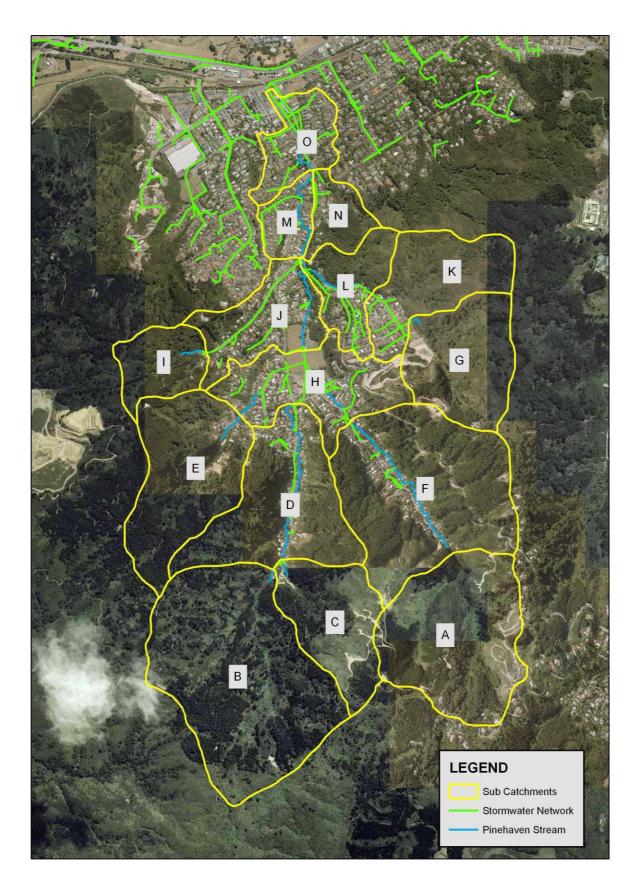


Figure 10: Pinehaven Sub-catchments



The recommended design flood estimates for the sum of the peak flows from the Pinehaven Stream at Chatsworth Road resulting from the analysis undertaken by MWH (2008) are presented in Table 7 below.

Table 7: Design Flood Estimates (MWH, 2008)

ARI (Years)	Flow (m³/s)
2	14
5	15
10	18
20	22
50	25
100	28
PMF <sup>7</sup>	207

Since the 2008 hydrological study by MWH, additional modelling has been undertaken by SKM (now Jacobs) and recommended design flood estimates for the sum of the peak flows from the Pinehaven Stream at Chatsworth Road resulting from the analysis are presented in Table 8.

Table 8: Design Flood Estimates (SKM, 2010)

ARI (Years)	Flow (m³/s)
5	15
10	17
20	19
50	21
100	23
PMF <sup>8</sup>	86

A 100-year rainfall event as identified above is therefore expected to result in a flow of 23 cubic metres per second in the waterway.

### 5.5.3 Climate Change

The current recommendations for addressing the potential impacts of climate change are provided in the Ministry for the Environment (MfE) guidance produced in 2008 (MfE, 2008). A mid-range prediction of 2 degrees global warming by 2080 is predicted to result in a 16% increase in rainfall depths and intensities in the Wellington region. This was included in the modelling undertaken for flooding in the Pinehaven catchment as discussed below, by adding 16% to the 100 year rainfall intensities used as inputs into the hydrological model.

The project has adopted the 2008 MfE climate change recommendation through final design.

# 5.6 Flooding

As discussed in section 2.1, the Pinehaven Catchment has a history of flooding. The predicted extent of flooding within the catchment has been modelled for the 1% AEP events including climate change, as described in section 4.2.2 and shown in Figure 3 and respectively. The sections below provide further detail on the flooding issues within the catchment.

<sup>7</sup> Potential Maximum Flood event

<sup>&</sup>lt;sup>8</sup> Potential Maximum Flood event



#### 5.6.1 Areas of highest flood risk

#### 5.6.1.1 Birch Grove

Birch Grove is located in Reach 3, north of Pinehaven Reserve as shown on sheet 6 of the plans attached at Appendix A. Birch Grove properties were inundated in the 1976, 2004, 2005 and 2009 floods. The 2009 flooding was thought to be between a 5 and 10 ARI (Average Recurrence Interval) year event.

The modelling undertaken in 2010 identified that the steeper true right bank of the stream adjacent to Birch Grove directs overflows through the low lying residential properties located on the true left bank of the stream. The stream is constrained by a private access bridge and fence serving 10A Birch Grove, near where the stream exits the Pinehaven Reserve. These contribute to the stream overtopping its banks. Flood waters overtopping the channel flow through a localised low point, possibly the old stream channel, before partially reconnecting back to the stream near Pinehaven Road. Remaining flows overtop Pinehaven Road to the west of the stream culvert and continue downstream through properties north of Pinehaven Road before returning to the stream.

The updated topographical information provided in 2017 better defined the embankment that runs along the northern end of Pinehaven Reserve and further survey information collected in 2019 provided improved representation of the stream between Birch Grove and Pinehaven Road.

Updated modelling indicated that overland flows entered properties on the south side of Birch Grove contributing to flooding in Birch Grove. Further, the additional survey improved topographic representation of the stream through the property at 50 Blue Mountains Road, which identified overland flow from the stream in analysis of 25 year and 100 year events.

#### 5.6.1.2 Blue Mountains Road

The properties on the true left bank of the stream between 2 Pinehaven Road and 28 Blue Mountains Road are a known flood prone area. Overflows are directed to the true left bank through the low lying residential properties because of the difference in stream bank heights. The stream is also constrained by numerous structures crossing the stream. The Sunbrae Drive culvert is also an existing constraint to flood waters and presents increased blockage risk.

#### 5.6.1.3 Sunbrae Drive and Deller Grove

The culvert under Sunbrae Drive is known to be a significant hydraulic constraint on the Pinehaven Stream and contributes to regular flooding in the area. In 2009 this culvert overtopped resulting in the flooding of the road and a number of surrounding properties. When the culvert overtops, the water flows west along Sunbrae Drive before ponding at the intersection of Sunbrae Drive and Deller Grove.

#### 5.6.1.4 Whitemans Road

Properties downstream of the piped sections of the Pinehaven stream under Whitemans Road, including the Silverstream commercial area, are anticipated to be affected by flooding if blockage of the pipe inlets occur. This is addressed in section 5.6.2 below.

#### 5.6.1.5 Upper Catchment

The upper catchment is steep, and the tributaries are generally narrow and fast flowing. Much of the stream channel is in private property with numerous crossings and constraints, potentially resulting in flooding issues. Most of the houses in the upper catchment are built above the stream channels on the sides of the valleys, and so much of the flooding is to property, sheds and garages, and only threaten floor levels in a few locations.



#### 5.6.2 Inlet Blockages

#### 5.6.2.1 Whitemans Road

The Pinehaven stream is piped from the inlet near 48 Whitemans Road into Hulls Creek. Parallel to the piped stream is the Whitemans Road bypass, with the inlet located near 54 Whitemans Road. This bypass provides flood protection to the lower catchment in events up to a 50-year ARI storm event.

Partial blockage of these two structures has the potential to result in flood extents that could affect residential properties on either side of Whitemans Road, the school on the corner of Whitemans Road and Gard Street, and the commercial area of Silverstream Village. Much of the overflow is expected to spread over the floodplain and be shallow except in localised low points. The shallow depths are unlikely to exceed the floor level in the residential properties; however, a number of commercial properties with floor levels at ground level are likely to incur flood damage.

There has been no observed flooding over the lower Pinehaven catchment from the stream since the construction of the bypass. However, the review of catchment flood history indicates there is risk of blockage at the inlet near Whitemans Road and the Whitemans Road bypass near 54 Whitemans Road. Improvements to debris screens at both inlets are proposed as part of the project works.

#### 5.6.2.2 Chichester Drive

Modelling indicates that the culvert inlet at the top end of Chichester Drive comes very close to overtopping in the 100 ARI year storm. This culvert receives regular maintenance to keep it clear of any debris; however, if blocked modelling predicts overflow down Fendalton Crescent, re-entering the stream channel near 11 and 13 Fendalton Crescent.

#### 5.6.2.3 Wyndham Road

The area of tributary to Wyndham Road is predominantly piped through a 900mm diameter pipe, with the grated intake near 50 Wyndham Road being 750 millimetres in diameter. Modelling predicts that there is sufficient capacity in this tributary for a 100-year ARI event without the inlet overtopping. However, flooding further downstream along Wyndam Road may occur should blockage develop at the inlet. Blockages have occurred here in the past.

Overflows are expected to be fast flowing and shallow. The model predicts that the secondary flowpath is largely contained by the road until flows reach a low point near properties 2 and 4 Pinehaven Road. Water ponding at this location will flow through the low lying properties adjacent to the road and re-enter the stream.

#### 5.6.2.4 Pinehaven Community Hall

The current inlet at 7 Forest Road (where the stream enters the stormwater network running under Pinehaven Reserve) exacerbates flooding in the proximity of the inlet. The hydraulic model predicts that this 1050 millimetre diameter culvert will overtop in a 10 year ARI event resulting in flooding around the Pinehaven Community Hall and the Pinehaven School and Playcentre.

#### 5.6.3 Overland Flowpaths

Overland (secondary) flow paths in the catchment have been identified through analysis of historic events. These may result from blockages as described above, or the natural or modified topography of the area. Significant flow paths are discussed below.

#### 5.6.3.1 Clinker Grove

Clinker Grove is a short cul-de-sac off Tapestry Grove located to the west of the stream. A piped section of the stormwater network runs from the end of Clinker Grove down the shared driveways servicing 12 - 15 Clinker Grove, where it discharges into Pinehaven Stream within 15 Clinker Grove. It is predicted that during high flow



events the stormwater pipe will surcharge and overflow along the shared driveway. Entrances to garages and parking areas are level with the shared driveway, creating a flood risk in the area.

#### 5.6.3.2 Sunbrae Drive and Deller Grove

As identified in section 5.6.1.3 above, the culvert under Sunbrae Drive is known to be a significant hydraulic constraint on the Pinehaven Stream, and is a contributor to regular flooding in the area. Hydraulic modelling indicates that the existing Sunbrae Drive culvert has an approximate capacity of 10 cubic metres per second which is less than the expected flows in a five percent AEP event. When the culvert overtops, water flows west along Sunbrae Drive before ponding in the localised low point at the intersection of Sunbrae Drive and Deller Grove.

### 5.6.3.3 Wyndham Road and Pinehaven Road

An overland flow path runs from the inlet at Wyndham Road down Pinehaven Road. Hydraulic modelling has shown that flooding along this overland flow path occurs when the inlet at Wyndham Road is blocked. The flow causes flooding within a number of private properties at low point on Pinehaven Road.

#### 5.6.3.4 Birch Grove

Birch Grove has a known history of flooding, with flooding of garages, sleep outs and sheds in the area. Hydraulic modelling has indicated that overflows in this location affect the low lying residential properties located on the true left bank of the stream. The stream at this location is also constrained by an access bridge and fence which contribute to the stream overtopping its banks. Residents in the area have also indicated that during heavy rainfall runoff also flows down Winchester Avenue, crossing Pinehaven Road and contributes to flooding in Birch Grove.

#### 5.6.4 Climate Change

Comparisons of predicted flood extents for a one percent AEP event undertaken in 2010 with and without climate change (assuming a 2°C average increase in global temperatures, as discussed above) shows that it does not significantly increase the extent of the flood hazard in the Pinehaven catchment. The steep topography of the upper catchment appears to constrain overflows. Some increase in extent is observed in the lower catchment where the Pinehaven valley opens out onto the floodplain. Inundation depths across the majority of the Pinehaven catchment are predicted to increase by less than 100 millimetres.

### 5.7 Structures in and over the Stream Bed

There are many structures located in and over the Pinehaven Stream bed. These include road bridges, private access bridges, pipe inlets and utility crossings. As discussed above, these structures can constrain the stream, and lead to exacerbation of flooding within the catchment. Retaining walls are also located along stretches of the stream bank.

#### 5.7.1 Road Culverts

Two significant road culverts provide road access over Pinehaven Stream are located within the project area. These are located in the vicinity of the Pinehaven Road / Blue Mountains Road intersection, and at Sunbrae Drive between Deller Grove and Blue Mountains Road.

### 5.7.2 Private Access Bridges

As described above, the Pinehaven Stream is largely located within private properties. A number of private bridges are located over the stream providing access to dwellings on these properties. Table 9 below identifies the location, type and use of these existing bridges. Appendix A shows the location of these bridges.



#### Table 9: Private Bridges Crossing Pinehaven Stream

Address	Туре	Use
10A Birch Grove	Bridge	Pedestrian
10A, 10B and 10C Birch Grove	Culvert	Vehicle
12 Birch Grove	Bridge	Vehicle
48 Blue Mountains Road	Bridge	Pedestrian
36 Blue Mountains Road	Bridge	Vehicle
34 Blue Mountains Road	Bridge	Pedestrian
32 Blue Mountains Road	Bridge	Vehicle
30 Blue Mountains Road	Bridge	Vehicle
28 Blue Mountains Road	Bridge	Pedestrian
8 Blue Mountains Road	Bridge	Vehicle
4 Blue Mountains Road	Bridge	Vehicle
56 Whitemans Road	Bridge	Pedestrian
15 Clinker Grove	Bridge	Pedestrian
52/52A Whitemans Road	Bridge	Vehicle
50 Whitemans Road – South	Bridge	Pedestrian
50 Whitemans Road – North	Bridge	Pedestrian

In addition to this, there is a pedestrian access bridge located in Willow Park.

### 5.7.3 Utilities

As noted above, the Pinehaven Stream is utilised as part of the wider stormwater drainage system, with a number of public and private stormwater pipe outlets to the stream along the channel. In addition, there are a number of public and private utilities that cross the stream. These crossings include those in the vicinity of the road culverts relating to reticulated networks largely located within the road reserve, but also crossings in other areas such as the public wastewater mains crossing in the vicinity of 15 Deller Grove, 56 Whitemans Road and 4 Sunbrae Drive. Private utility crossings occur in many locations along the stream, with an example shown in Figure 11 below.





Figure 11: Private Utility Stream Crossing

The locations of existing services over the stream and outlets into the stream were identified from plans obtained from service providers, previous survey and a stream walkover. There is a mixture of telecom, power, private water supply, wastewater laterals and public wastewater mains.

#### 5.7.4 Inlets

As the stream is piped at a number of locations there are a number of pipe inlets, particularly in the upper catchment. As discussed above, earlier flood modelling work included assessing the impact of blockages at pipe inlets, with five identified as having significant impacts on flood extents. These pipe inlets are:

- Chichester Drive inlet;
- Wyndham Road inlet;
- Pinehaven Community Hall inlet;
- Whiteman's Road Bypass inlet; and
- Pinehaven Stream to Hulls Creek piped section inlet.

The locations of blockages assessed in the 2010 Flood Hazard Assessment are shown in Figure 12 below.



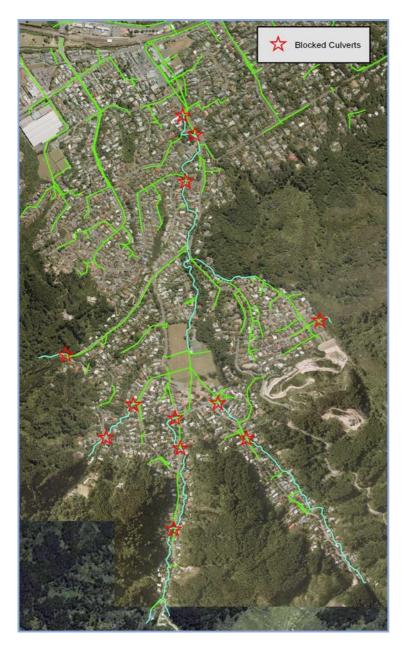


Figure 12: Blockages assessed in the FHA 2010 for the Pinehaven Catchment.

#### 5.7.5 Retaining Walls

The Pinehaven Stream has been constrained by existing retaining walls on its banks. In some cases, these are unconsented privately built walls. Significant stretches of retained stream banks occur in the stream channel in the vicinity of the Reformed Church (4 - 8 Blue Mountains Road), along Blue Mountains Road, and those properties in Birch Grove.

Figure 13 below provides a photographic example of existing retaining walls found along Pinehaven Stream. These include wooden and block type walls.





#### Figure 13: Example of an existing retaining wall along Pinehaven Stream

#### 5.7.6 Other Structures

As noted, the Pinehaven Stream channel is highly modified. This is demonstrated by the other structures that are also found along its length. These include the dwelling located at 48 Blue Mountains Road, which straddles the stream channel. This property has been purchased by GWRC. The property at 12 Birch Grove includes a garage which is located over the stream channel, while the property at 10A Birch Grove includes a shed located over the stream.

### 5.8 Ecology

The variety of landforms within the catchment provides a number of different habitats for fauna and flora. This includes a number of significant trees. The reports attached at Appendix S prepared by Alex James of Eos Ecology (freshwater ecology), Adam Forbes of Forbes Ecology (terrestrial ecology) and Alison Davis of Aristos Consultants Ltd (Avifauna), include a detailed description of the existing ecology, with a summary provided below.

#### 5.8.1 Terrestrial Ecology

#### 5.8.1.1 Flora

The vegetation growing on the stream banks and associated floodplain areas include residential gardens, weedy areas, exotic and native shrubberies, large exotic and native trees and revegetation plantings. Reach 1 is more open, with some residential lawn on the stream banks. Most of the steam is well shaded except for Willow Reserve and 28 Blue Mountains Road. There are native trees identified as significant. The riparian areas of the stream are noted as providing a 'wooded habitat' link from the upper catchment to the Hutt River valley floor.

Weed species are common along the stream, with some widespread and potentially spreading, inhibiting native plant growth and regeneration.



#### 5.8.1.1.1 Significant vegetation

Field work was undertaken to identify significant vegetation in the project area, as described in the report attached at Appendix S. Assessment for significance was undertaken using two sets of criteria, the Tree Groups identified in the District Plan, and the criteria for biodiversity significance in Policy 23 of the RPS. The significant trees identified are set out in the list attached at Appendix S, as well as the General Arrangement Plans attached at Appendix B.

Twelve individual trees, which were mainly Black Beech, were assessed as having representativeness and rarity ecological significance values which may be impacted by the proposed works. These trees were mostly single trees rather than continuous stands. Exceptions to this are several native trees within 48 and 50 Blue Mountains Road. These were the only trees identified as within the Tree Groups in the District Plan.

Other than the significant trees identified, the riparian areas generally were not assessed as having significant indigenous vegetation. Most riparian areas were dominated by introduced vegetation and had little indigenous natural character, and many incorporate significant artificial structures. Riparian sections are likely to contain some useful habitat for macroinvertebrates and other fauna, but not to the extent that they constitute significant indigenous biodiversity in terms of RPS Policy 23.

Similarly, based on the finding of the archaeological assessment (see Appendix T) vegetation was not assessed as likely to have significant values for tangata whenua.

#### 5.8.1.2 Fauna

#### 5.8.1.2.1 Birds

The avifauna report attached at Appendix S notes that a search of published records of birds observed within the Pinehaven catchment, bird surveys and monitoring data indicates that thirty-nine species of birds have been reported or are likely to be present in the Pinehaven catchment.

A field survey was undertaken in 2015 to record the characteristics of bird habitat and bird populations in the project area. The survey included the monitoring of bird count stations. Seven bird count stations were located within the project area, and another in the Wi Tako Reserve located in the eastern part of the catchment. The project area was revisited in mid-2017, with no significant changes observed.

Sixteen species of birds were encountered along the Pinehaven Stream corridor during the field survey. Nine of these were native species. It is very likely that further surveys along the Stream would encounter additional species of birds. Tui and silvereye were the most common native bird species. Blackbird and starling were the most commonly encountered and also widespread exotic species. The Pinehaven Reserve had a relatively high diversity, which is likely due to the remnant native forest located near the count station.

#### 5.8.1.2.2 Lizards

The project area may provide lizard habitat in some places. Some species have the potential to be present, including the Wellington green gecko (Naultinus elegans punctatus), common skink (Oligosoma nigriplantare polychrome), copper skink (Cyclodina aenea), common gecko (Hoplodactylus maculatus) and pacific gecko (Hoplodactylus pacificus). However, the shaded riparian habitat found in the project area is not generally considered to be favourable habitat for lizards.

#### 5.8.2 Freshwater Ecology

#### 5.8.2.1 Overview

Pinehaven Stream is located within an urbanised area and has been highly modified, affecting freshwater ecology values. The culvert connecting the stream to Hulls Creak is expected to reduce ecological connectivity though reduction of fish passage and disruption of macroinvertebrate flight paths. Modification of the open stream includes stream bank retaining walls, canopy cover removal and straightened channel sections. A



number of bridge crossings, both private and public are present with associated bank protection. Culverted sections are also present in the upper catchment.

The Pinehaven Stream is classified as a Class 2 River in the Proposed Natural Resources Plan; however, is not classified in the Regional Freshwater Plan or Proposed Natural Resources Plan as containing any special ecological values. Hulls Creek and the Hutt River, into which the Pinehaven Stream discharges, are both identified in the Regional Freshwater Plan as 'Rivers with Important Trout Habitat'. The Hutt River is identified in the Proposed Natural Resources Plan as 'Threatened or at Risk Fish Habitat and Migratory Fish Habitat'. The New Zealand Freshwater Fish Database identifies species found in the stream as including koura, eel (unidentified) and giant kokopu.

A Stream Ecological Assessment, fish sampling and macroinvertebrate sampling were undertaken for the Pinehaven Stream. The report attached at Appendix S sets out the full methodology and detailed results, while the sections below provide a summary.

#### 5.8.2.2 Stream Ecological Assessment

Three sites were assessed, one in each reach, selected to be spatially spread and representative of the present environment. All three reaches returned SEV results consistent for streams within developed catchments and are considered to be reflective of the current value of Pinehaven Stream within the project area. Results for the three reaches were similar with SEV scores ranging between 0.35 and 0.42.

There were common variables throughout the catchment which reduced the overall scoring. These included modification of the channel from urbanisation, retaining walls in place of natural banks, straightened and armoured channels, reduced or modified riparian cover, inputs of stormwater and additional fish passage barriers such as a culverts and stepped weirs. Reach 1 lower in the catchment had the lowest SEV score of the sites surveyed indicating the lowest stream ecological value of the three project reaches.

#### 5.8.2.3 Fish

Fish sampling was undertaken in each reach. The entire length of each reach was fished. The survey recorded low numbers of 3 fish species (Anguilla australis (Shortfin eel) Anguilla dieffenbachii (Longfin eel), and Gobiomorphus cotidianus (Common Bully) and 1 crustacean species (Koura (Freshwater Crayfish)). Overall relatively low species diversity was found and species present consisted of both migratory and non-migratory species.

#### 5.8.2.4 Macroinvertebrates

Reach 1 has the highest number of invertebrates however all reaches had a similar number of taxa and EPT (Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddis flies)) The highest abundances of species were those with mid-range Macroinvertebrate Community Index (MCI) scores. Overall MCI scores were in the good quality class. Number of taxa and EPT taxa did not differ greatly between reaches; however, the percentage of EPT taxa did reduce in Reach 1 which is largely due to increased numbers of non-EPT taxa.

#### 5.8.2.5 Summary

The ecological value of Pinehaven Stream is representative of streams in an urbanised environment. The stream channel has been highly modified, negatively affecting ecological values. Macroinvertebrates returned scores within the 'good' MCI score indicating organic enrichment is relatively low. There was low fish diversity found within the stream. Overall all three reaches returned similar ecological value but with some slight differences in SEV scores which related to the amount and quality of riparian vegetation. Therefore, the freshwater ecological value of Pinehaven stream can be considered to be moderate within an urbanised catchment context. If compared to a natural stream the Pinehaven Streams ecological value would be considered to have a relatively poor ecological function based on the SEV.



# 5.9 Land Transport

There are several roads running through the wider physical works area. The function of these roads is property access.

#### 5.9.1 Road Network

The road network within the Pinehaven catchment includes a variety of road categories as defined in the District Plan Road Hierarchy. Roads in the catchment are generally approximately 20 metres wide. A summary of Pinehaven catchment roads are summarised in Table 10 below.

#### Table 10: Road Hierarchy

Hierarchy Category	Roads Within Pinehaven Catchment
Secondary (District) Arterial	Gard Street
Collector Routes	<ul><li>Blue Mountains Road (from Whitemans Road to Avro Road)</li><li>Whitemans Road</li></ul>
Local Distributor Routes (Urban)	<ul> <li>Field Street (from Kiln Street to Blue Mountains Road)</li> <li>Pinehaven Road (from Blue Mountains Road to southern end of Jocelyn Crescent)</li> </ul>
Local Distributor Routes (Rural)	Blue Mountains Road (from Avro Road to Johnsons Road)
Local Roads	All other roads

The New Zealand Transport Agency (NZTA) classifies all New Zealand roads using the One Network Road Classification (ONRC) system based on a number of factors including movement of people and goods, and economic and social factors. The ONRC categories of the roads surrounding the site and wider area are shown in Figure 14 below. This shows the surrounding road network as a mix of primary and secondary collector, access, and low volume roads. Blue Mountains Road is identified as a primary collector road. The annual average daily traffic (AADT) for selected surrounding roads is provided in Table 11 below.





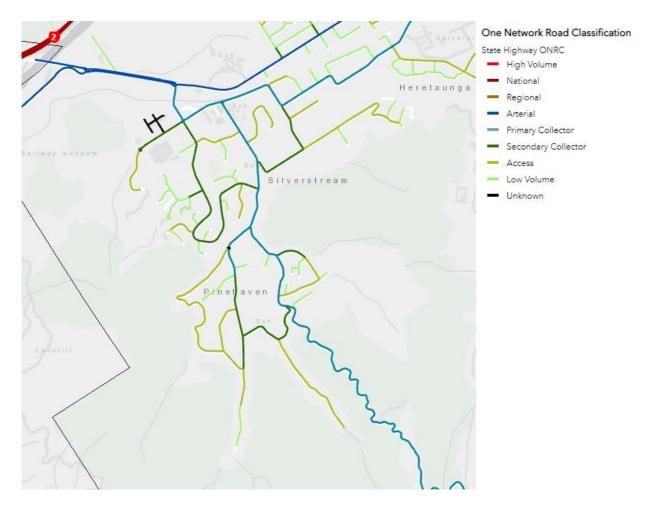


Figure 14: NZTA One Network Road Classification map

### Table 11: AADT for Selected Roads

Road	Classification	AADT <sup>9</sup>
Whitemans Road (Dunns Street to Blue Mountains Road)	Primary Collector	6,400
Blue Mountains Road (Whitemans Road to Sunbrae Drive)	Primary Collector	6,560
Blue Mountains Road (Sunbrae Drive to Pinehaven Road)	Primary Collector	5,631
Blue Mountains Road (Pinehaven Road to Fendalton Crescent)	Primary Collector	2,200
Pinehaven Road (Wyndham Road to Blue Mountains Road)	Primary Collector	2,887
Sunbrae Drive	Secondary Collector	1,029

The road network within the Pinehaven Stream catchment area can largely be divided into two separate catchments, delineated by the Sunbrae Drive / Blue Mountains Road intersection. The area north of the Sunbrae Drive / Blue Mountains Road intersection and to the east of Whitemans Road is generally cul-de-sac type development with Field Street / Sunbrae Drive providing connection to both Field Street and Whitemans Road. The area to the east of Whitemans Road also has connection to Gard Street via Gloucester Street.

<sup>&</sup>lt;sup>9</sup> New Zealand Transport Agency One Network Road Classification,

<sup>&</sup>lt;a href="https://nzta.maps.arcgis.com/apps/webappviewer/index.html?id=95fad5204ad243c39d84c37701f614b0">https://nzta.maps.arcgis.com/apps/webappviewer/index.html?id=95fad5204ad243c39d84c37701f614b0</a>



In contrast, the area to the south of the Sunbrae Drive / Blue Mountains Road intersection, which includes the location of the Pinehaven Road bridge, has access to the north via Blue Mountains Road only. Therefore, the section of Blue Mountains Road from Sunbrae Drive to Pinehaven Road, including those intersections, is considered to be particularly sensitive to any disruptions. As identified in Table 11 above, the section of Blue Mountains Road between Sunbrae Drive and Pinehaven Road is a Primary Collector under the ONRC and carries approximately 5,631 vehicles daily on average.

### 5.9.2 Road Closure

The northbound lane of Blue Mountains Road adjacent to the property at 4 and 8 Blue Mountains Road (the Silverstream Reformed Church site) will be required for construction purposes, and will therefore require a partial road closure during the works. Property access will be maintained throughout the works.

# 5.10 Cultural heritage

A general pre-European history of the area is provided by the archaeological assessment attached at Appendix T. The relevant iwi that have an interest in the wider area are Te Ati Awa, Ngāti Toa Rangatira, and Rangitāne.

Taranaki Whānui have a strong relationship with the Pinehaven Stream as it is a tributary of Te Awa Kairangi and have strong mana whenua over the area. Pinehaven Stream is a tributary of Te Awa Kairanga, creating an intimate connection between each other and their mouri and mana. In a position statement on the proposed stream works, Port Nicholson Block Settlement Trust, on behalf of Te Atiawa Taranaki Whānui, has stated that in relation to the Pinehaven Stream and Te Awa Kairangi:

Alongside their mauri, they have an interconnected kawa. Over time people have trampled on this kawa through building walls, straightening riverbanks and augmenting the true and natural state of our Awa. However there has come a general realisation by some that we must work with our Awa and that it is easier to abide by their kawa then is to apply the traditional conventions of command and control by man.

In applying our relationship with our Awa, we must understand that their Kawa does not have us – the humans at the centre. Our water ways were not created 'for us'. Our waterways, according to our tradition were a gift from our ancestors – 'Ngā Wai Tuku Kiri mai ngā mātua tupuna'. Our obligation as Taranaki Whānui and as ngā tāngata tiaki of these water bodies is to honour that gift.

Therefore, in abiding the kawa of these Awa we must act in a manner that sees us manage people for the benefit of our Awa – this is not about managing our Awa. Our role as tangata tiaki is to develop a renewed collective responsibility for our human impacts on our Awa and respond to the impacts we can foresee.

The Ngāti Toa Rangatira Claims Settlement Act 2014 includes in the Statements of Association the 'Hutt River and its tributaries'. As Pinehaven Stream flows into Hulls Creek, which in turn feeds the Hutt River, Pinehaven Stream is covered by the Statement of Association and therefore is a statutory acknowledgement area. It is noted that the Port Nicholson Block (Taranaki Whānui ki Te Upoko o Te Ika) Claims Settlement Act 2009 also includes the Hutt River under the Statements of Association.

In terms of the relevant resource management documents, the Proposed Natural Resources Plan does not identify any sites with significant mana whenua values within the catchment. There are no heritage features identified within the Pinehaven Catchment on the UHCC District Plan maps. It is noted that there are no iwi management plans relevant to the area.

# 5.11 Landscape and Visual

The landscape character of Pinehaven is typical of low density suburban development in New Zealand, with mainly separate single and two storey dwellings on mid-sized sections and a range of building styles, setbacks and orientation, and little cohesion. Well established vegetation, including many trees over twenty metres high



helps to integrate the disparate elements. The stream is sometimes highly visible, but in most situations is hidden from public view by vegetation, buildings, or topography.

The topography of the receiving environment is typical of a stream valley catchment that has been modified for residential development, with the stream corridor limited to a relatively narrow area and modified in most instances. The Landscape and Visual Impact Assessment report attached at Appendix V notes that the topography has a low sensitivity to change given the suburban character and the degree of modification that has occurred historically.

The vegetation varies along the stream corridor with pockets of well-established native vegetation through to areas of weed dominated sections. Overall, the sensitivity to change of the existing vegetation is medium.

The waterway has stretches where it has a moderate level of natural character with natural processes, patterns and elements clearly visible. In other locations the stream has been channelised with retaining walls. In Willow Park, the banks are soil but have been modified. Overall, the stream is considered to have a medium sensitivity to change.

The built form of the alignment generally consists of individual houses constructed in the 1950-60's onwards with some modern (post-2000) dwellings. Generally, the dwellings are one or two storey standalone detached houses. Material use is mixed, but there are many weatherboard houses with gable roofs. Setbacks vary but are generally five to six metres with a suburban built character. Overall, the built form of the alignment has a low sensitivity to change.

## 5.12 Noise

The area surrounding the proposed works is dominated by low density residential development, with no identified higher noise generating land use activities other than the Silverstream Reformed Church. No noise baseline monitoring has been undertaken.

#### **Table 12: Upper Hutt District Plan Noise Limits**

Rule	Mon to Sat 7:00am - 7:00pm		All other times, Sundays & public holidays	
<b>32.5 Noise from all other activities</b> Maximum noise levels measured at or within the boundary of any site (other than the source site) in the Residential, Rural and Open Space Zones.	50 L <sub>10</sub>	-	40 L <sub>10</sub>	70 L <sub>max</sub>
Maximum noise levels measured at or within the boundary of any site (other than the source site) in the Business and Special Activity Zones.	65 L <sub>10</sub>	-	45 L <sub>10</sub>	75 L <sub>max</sub>

The Upper Hutt District Plan sets permitted noise level limits in Chapter 32, with the noise limits differentiated based on the sensitivity of the receiver (by zone), and temporally, as shown in Table 12 above. The District Plan notes that the noise standards were developed with the advice of acoustic consultants to suit the specific characteristics of the planning zones in Upper Hutt City. As such it is generally anticipated that the noise environment within the project area would not exceed those level set in Rule 32.5 for residential and open space zones ( $50 L_{10}$ ), as the catchment is dominated by these land uses.

# 5.13 Historic Heritage

The Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA) defines 'archaeological site' as including any place that was associated with human activity that occurred before 1900 and may provide evidence relating to the history of New Zealand. The HNZPTA controls the modification or destruction of archaeological sites, with an authority required before this is allowed to occur.



The general geomorphology of a surface waterway such as Pinehaven Stream will result in an outwash plain or fan in the lower catchment, which is where pre-European and 19th century archaeological sites are most likely to be found. A description of the history of the area is provided in Appendix T.

#### 5.13.1 Archaeological Mapping and Records

#### 5.13.1.1 ArchSite

ArchSite is the New Zealand Archaeological Association's Archaeological online site recording scheme. It indicates that there are no recorded sites in the Pinehaven valley. The following sites are in the wider Hutt valley in the vicinity of Pinehaven:

- R27/520 in Wallaceville near Ward Street, known as Dahl's houses, a pre-1900 building complex on Hutt sections 89 and 102 originally given to the Ngati Tama chief Te Kaeaea.
- R27/146 is the Wallaceville Blockhouse (and reduced redoubt), off McHardie Street.
- R27/535 by the Hutt River is the former railway bridge crossing.
- R27/459 at Taita is Christ Church (built 1854) one of Wellington's earliest churches.

The site records show that there is potential for early European sites in the Upper Hutt valley. Pre-European archaeological sites are non-existent in the records but there is a possibility that they may be present.

#### 5.13.1.2 Heritage New Zealand Pouhere Taonga List

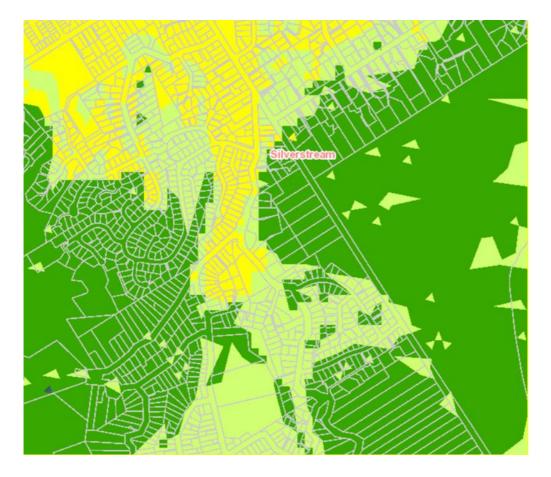
The only Heritage New Zealand Pouhere Taonga listed property near the Pinehaven Stream is 1 Chatsworth Road. This is listed as a Historic Place Category 2 type, and identified as No. 4146. This is a Chapman-Taylor Arts and Crafts style house built in 1939. This house is not located within the Project area.

#### 5.13.1.3 Council Mapping

There are no heritage features identified within the Pinehaven catchment on the relevant Upper Hutt City District Plan maps of the area (see Appendix N).

The Greater Wellington Regional Council online GIS viewer includes the layer 'Likelihood of Uncovering an Archaeological Site', with five categories from low to very high. This indicates the area of the Pinehaven catchment as ranging from low in the steeper upper catchment areas, medium-low in the urban areas of the upper catchment south and east of the Pinehaven Reserve, and medium in the northern urban area, as shown in Figure 15 below.





#### Heritage

Likelihood of Uncovering an Archaeological Site



### Figure 15: GWRC Likelihood of Uncovering an Archaeological Site

# 5.14 Natural Hazards

Other than flood, the main natural hazard to which the area is at risk is earthquakes. The Wellington Fault is located to the northwest, in the vicinity of the Hutt River, while the Whitemans Valley Fault runs through the south east of the catchment.

The GWRC online GIS viewer includes information on the risk from earthquake hazard. This includes geographic categorisation of areas (in five categories from low to high) in terms of slope failure, liquefaction and groundshaking, and a combined hazard categorisation.

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Earthquake Combined Hazard 1 low 2 low-mod 3 moderate 4 mod-high 5 high

#### Figure 16: Combined Earthquake Hazard Risk

In terms of slope failure, the Pinehaven Catchment area is generally low or low-moderate, while there is no liquefaction risk identified. Groundshaking risk is generally low in the upper catchment, and low-moderate in the urbanised area. The combined risk is generally moderate within the catchment, with some low-moderate in parts of the lower catchment and high in southern parts of the upper catchment, as illustrated in Figure 16 above.



# 6. Description of the Project

To address the flooding issues identified by the Pinehaven FMP and to respond to the Project objectives for the stream improvements project the construction and operational phases are described below.

# 6.1 **Project Description (Operation)**

The project will reduce flood risk by physically improving the flood capacity of the stream. The works include the key aspects described in Table 13 below.

The location and typical cross sections of the proposed stream channel, cross-sections of structures and proposed riparian planting plans are provided in Appendix A to Appendix F.

Structural Methods	Description
Vertically sided lined sections of stream channel	Vertically sided channel sections will be provided where the stream channel requires widening to provide greater capacity, but the surrounding area is constrained by development.
	The channel sides will be retained using either contiguous pile walls or a proprietary gravity block wall system. The retaining walls will be benched in areas depending on the overall height of the wall.
	The existing low flow channel is to be maintained, with stream widening only occurring above this channel. The area to the side of the low flow channel will be benched and planted.
	Where required, batter slopes above the vertical sections will be created with a gradient of 2H:1V.
Sections of naturalised channel with riparian planting	Sections of the stream which are not constrained by existing development will be widened to allow for the required four percent AEP capacity with the stream banks shaped to form a naturalised channel.
	The existing low flow channel will be retained, with the widening only occurring above this channel. The area to the side of the low flow channel will be benched and planted.
Inlet structures upgrades	There are a number of inlets to piped sections of the stormwater system. These are to be upgraded where required to ensure they have the necessary flow capacity, or to have secondary inlets to capture excessive flows.
Securing secondary flowpaths	In rainfall events above a four percent AEP which exceed the capacity of the stream, inundation may occur in the surrounding area. Identified secondary flowpaths in the catchment will be modified, for example through lowering of ground levels, to ensure they can convey the flood waters to the stream without impediment.
Replacement of private access crossings	Private access bridges (vehicle and pedestrian bridges) which cross the stream in the lower catchment are to be replaced with raised, standardised bridges to match the new widened channel spans. Freeboard will be provided if the raised approaches do not impact on surrounding overflow paths.
	A flat slab will be used for all pedestrian bridges and vehicle bridges shorter than 7 metres. For the longer span vehicle bridges, a double tee option will be used. Both solutions will sit on abutments with driven timber piles. Vehicle bridges will incorporate a settlement slab to ensure a smooth transition on the approaches.



Blockage reduction measures at inlet structures	Inlet structures to the piped sections of the stormwater system are to be fitted with screens designed to reduce the potential for debris to block the inlet, or be transported downstream.
Relocation of utility services	Utility pipework and lines that cross the stream in the area of works will be disturbed during works, and in some cases will require relocation or realignment, in order to reduce the potential to cause blockages and exacerbate flooding.
Low walls	A low wall is proposed along southern boundary of Willow Park and 10a Blue Mountains Road (approximately 300 millimeters high, with a 1.8m high timber fence). It will look like a residential fence.
Scour Protection	Native planting and geotextile fabrics are preferred for scour protection upgrades. Where space is restricted, riprap may be required.

The sections below describe the structural methods for each stream reach (as identified in Figure 6) and the intended operational function of the structures once constructed. Stream widths refer to the width at the top of the banks.

#### 6.1.1 Reach 1

The stream channel from the Whitemans Road inlet, located within 48 Whitemans Road, to 15 Clinker Grove will be maintained in its existing location. This alignment will retain all identified ecologically significant trees which include two Kahikatea. One willow tree at 15 Clinker Grove will be removed and the overland flow path down the driveway to the edge of the stream bank secured.

Retaining walls will be installed upstream through the area of the bypass inlet and the school and church properties at 4-8 Blue Mountains Road to the boundary with Willow Park. The stream width through this section is 8.3 metres upstream of the bypass and 5.3 metres downstream of the bypass. At the bypass the stream is maintained at the existing width to encourage flow into the bypass.

At the Reformed Church of Silverstream, the existing school field will be utilised as a cleanfill site for material for the project. This material will then be able to be used by the school as a base for redeveloping their sports field in the future.

A natural channel profile is retained upstream of the church property through Willow Park, as shown by Crosssection 3 of Appendix E. At the boundary of Willow Park and 1 Tapestry Grove the stream is widened on both sides to provide sufficient width. The garage and sleep out at this location will also likely be removed during construction and reinstatement of a new garage will be provided elsewhere on the property.

The property of 4 Sunbrae Drive is owned by Greater Wellington Regional Council. The stream bed through this section is shallow and has a negative grade. The stream will be widened on both banks, but this will largely occur on the Left Hand Bank to minimise the impacts on 10A and 14 Blue Mountains Road. The dwelling at 4 Sunbrae Drive will be removed to accommodate the stream channel and overland flow path through the north west portion of the property.

#### 6.1.2 Reach 2

From Sunbrae Drive to 28 Blue Mountains Road the stream will be widened on both sides. Through this section the stream widening is maintained within the reserve (covered by existing designation UHC73). The channel will be naturalised and widened through this section, with some small retaining walls at the top of the slopes to provide a stable slope of 2H:1V, as shown by cross-section 4 of Appendix E.

At 26 and 28 Blue Mountains Road the stream will be realigned to remove the existing right angled bend. The proposed alignment through 28 Blue Mountains Road (owned by GWRC) requires removal of the structures at this property. The stream will transition from the 6.8 metres wide retained banks into the naturalised channel through this property.



The retained wall section upstream of 28 Blue Mountains Road to Pinehaven Road will be widened on both the LHB and RHB.

A swale will be created to capture secondary flow paths at 2 and 4 Pinehaven Road.

Between 30 to 36 Blue Mountains Road we have allowed for enough space within the designation to provide for new private vehicle access arrangement where the project is changing access to each property. The access arrangement illustrated in the General Arrangement Plans shows one option that can be implemented. However, consultation with each property owner is ongoing and as a result the access configuration to the site may change during the processing of this notice of requirement application. The proposed designation extent and the resource consents sought will authorise the final agreed access arrangement for these properties.

# 6.1.3 Reach 3

The dwelling constructed over the stream at 48 Blue Mountains Road (owned by GWRC) will be removed. An overflow channel will be constructed in numbers 48 and 50 Blue Mountains Road to allow high flows to bypass the tightly curved section of stream which is not being widened within 50 Blue Mountains Road. The widening through 48 Blue Mountains Road will be a naturalised channel with a width of around 9 metres.

Along the boundary of 50 Blue Mountains Road, regrading of the land may be required to manage overland flow from the Pinehaven stream towards Birch Grove properties. Widening of the channel between 2A Freemans Way and 50 Blue Mountains Road will occur. And localised erosion protection may occur at the driveway of 50 Blue Mountains Road and along the stream channel.

The stream channel through properties on Birch Grove will be widened to approximately 6 metres.

The garage at 12 Birch Grove will be removed and a new garage placed on their property. The overland flow path along the driveway at 11 Birch Grove will be secured.

Some minor works are required in the Pinehaven Reserve where the transitions from natural stream and the existing width to the retaining walls and wider channel width will occur.

# 6.1.4 Maintenance

Maintenance of the existing stream channel will continue post construction in order to maintain stream flow and reduce the chance of blockages occurring. Maintenance of new structures and planting that will be established as part of the project will also be required. Maintenance of structures is expected to be infrequent, compared to more frequent clearing of the channel.

# 6.2 **Project Description (Construction)**

# 6.2.1 Overview and General Philosophy

The project will involve a range of typical construction activities including demolition, earthworks, piling, the placement of structures, and heavy vehicle movements, with associated noise and dust emissions.

The construction phase of the Project will seek to minimise disruption to the stream bed, adjacent properties and property owners and the wider community. This is to be achieved through measures including offsite construction, use of proprietary products, and standardised designs.

It is intended that as much of the project is built off site as is possible. This will allow for construction which may have adverse environmental effects to occur off site in controlled environments, and be brought into the project area as and when required. This will minimise disruption, allow for swift installation and reduce overall potential adverse effects from the project construction phase. In particular, offsite construction will be utilised for private vehicle crossings.



Proprietary products will be used where possible. This will reduce construction timeframes and potential adverse effects as the requirements for integrating these elements into the wider works are well understood. Specifically, proprietary products will be used for culverts and retaining walls.

Standard design types will be used for the various situations (as detailed in the cross-sections attached at Appendix E) rather than detailed design for the entire stream channel.

# 6.2.2 Management Plans

Management plans are to be used to minimise adverse environmental effects during the construction phase of the project. This allows the mitigation (see section 12.1) to be appropriately integrated into the construction methodology and planning.

The contractor's construction methodology will be dependent on a number of factors, including the final design, resources available, and requirements of planning approvals. The construction methodology is to be detailed through the development of a Construction Management Plan (CMP), which will address matters such as construction noise, traffic management, dust and crane lifts. The CMP will be the overarching construction management document, with other management plans such as erosion and sediment control incorporated within it.

The construction of the project will require earthworks within the Pinehaven Stream bed and adjacent riparian area. The earthworks have potential to generate sediment which if not appropriately controlled could be transported via Hulls Creek to the Hutt River. Accordingly, an Erosion and Sediment Control Plan (ESCP) has been developed and will be implemented as part of the Construction Management Plan prior to construction. The ESCP is attached at Appendix W.

The other management plans that are proposed to be developed to sit within the CMP are a Construction Traffic Management Plan, Construction Noise and Vibration Management Plan (CNVMP), Landscape Plan (LP) and Dust Management Plan (DMP). A Pinehaven Kaitiaki Monitoring Strategy (PKMS) is also proposed to address mana whenua considerations.

As detailed in section 11, it is proposed that a condition of the designation is that the full CMP, including the subordinate management plans noted above, are provided to the GWRC for certification prior to commencement of the construction activities.

# 6.2.3 Construction Staging

The proposed works are intended to be completed in stages. The stages may not be sequential, with the possibility that multiple construction crews may be used at any one time to reduce the overall construction timeframes. The number of stages could increase, and the duration of works for each stage will ultimately be a function of detailed design; however, the completion of sections before moving along the stream will be fixed as will the activity based individual teams.

Vegetation planting will occur after the last stage and all aspects of stream bank re-profiling are complete.

The likely timing and sequencing for the staged construction of the project is presented in Table 14 below. However, the staging and sequencing is subject to change. It is anticipated that construction for stream improvement works will occur over 70 weeks but may take up to 2 years, depending on weather and subject to meeting conditions of consent requirements.



# Table 14: Likely Construction Staging

Reach	Stage	Area Description	Proposed Works	Access
3	1	8, 10, 10A, 10C Birch Grove: from Pinehaven Reserve to driveway for 10A, 10B and 10C Birch Grove	Removal of access culvert and install ramp into stream; installation of diversion pipe and upstream/downstream low flow diversion dams; installation of sump pump near down steam dam and treat water through sediment curtain or settlement tank; excavate right bank and install retaining wall from the bank (outside of stream); relocate pipe to the right side (working in the stream); installation of ramp over pipe; excavation of left bank from dry stream bed; installation of wall on left bank; removal of access ramp; completion of wall on right bank; installation dam down stream of 2nd access bridge (and over pump while bridge is being demolished); installation of temporary pipe to avoid 24-hour pump operation; demolish bridge; construction of retaining walls from both sides of the stream; installation of new bridge; removal of materials and machinery; reinstatement of disturbed areas.	Construct diversion dams and install diversion pipe from within the stream, then excavate for right bank improvements and channel widening from outside of the stream. Property owners in this reach have been engaged regarding access requirements. Following construction of right bank, diversion pipe will be moved up against new wall and left bank wall will be constructed from within the stream, with diversion pipe in place.
3	2	12, 11, 10B Birch Grove to 2A Freemans Way	Preparation of construction access including removal of some decking, fences and garden; removal of existing garage and office; removal of existing private access bridge; installation of upstream and downstream diversion dams and diversion pipe on right side of stream; installation of access ramp into stream once low flows diverted; excavate and install retaining wall on left stream bank to location of access ramp; relocate pipe to left bank of stream against new wall and install ramp over pipe; excavate and install wall on right bank of the stream; relocation of diversion pipe to new wall on right side of stream; complete excavation and construct wall on	Access from outside bank on left bank of stream to enable placement of diversion pipe on right side of stream to allow for excavation and construction of wall on left stream bank. Then diversion pipe will be moved against new wall on left bank leaving sufficient room for an excavator to work within the stream (after flows have been diverted into the pipe) to enable



Reach	Stage	Area Description	Proposed Works	Access
			left bank of stream; move diversion pipe and upstream/downstream dams to enable mitigation of existing erosion approximately 20m downstream of stream improvements; remove pipe and dam; install new pedestrian bridge; install new office/shed; reinstatement of gardens and disturbed areas.	construction of the wall on the right bank of the stream. Access for mitigation of existing erosion approximately 20m downstream of proposed improvements not possible from outside of stream; diversion dams/pipes to be extended for erosion mitigation.
3	3	2A Freemans Way through 50 Blue Mountains Road	The section of stream between the house at 48 Blue Mountains Road and the downstream end of improvements behind Birch Grove is excluded from channel works, however some observed stream erosion in this area has been identified for mitigation. Potential grading on properties west of 50 Blue Mountains Road to reinstate access areas, improve local drainage and mitigate overland flow from the Stream (subject to agreement with property owners).	Temporary access from the west of 50 Blue Mountains Road subject to agreement with property owners.
3	4	48 Blue Mountains Road	Construct access ramp into stream; install upstream and downstream diversion dams and diversion pipe on left side of stream; removal of house at 48 Blue Mountains Road; excavation and installation of retaining wall and batter where house removed; move diversion pipe to right side of stream and installation of access ramp over pipe; construction of wall on left bank of stream; lowering of overland flow path near location of removed house; grading to transition channel geometry to the approach of the new culvert at Pinehaven Road; remove pipe and dam; reinstatement of disturbed areas.	Access through 48 Blue Mountains Road
2	5	40 through 34 Blue Mountains Road	Multiple options for vehicular and pedestrian access to 34, 36, 38A and 38B Blue Mountains Road have been explored with property owners. Final design solution is subject to agreement with each property owner. Likely construction	Temporary construction access between Blue Mountains Road and the Pinehaven Stream for construct wall on the right stream bank, construct



Reach	Stage	Area Description	Proposed Works	Access
			methodology and sequence: installation of private road access; installation of construction access along right bank of stream; installation of upstream and downstream diversion dams and pipe; removal of existing bridges; excavation and installation of wall on right bank; relocation of diversion pipe to right hand side of stream against new wall; provide pedestrian access to adjacent homes; excavation and installation of left retaining wall from existing driveway (no resident access during construction); move pipe and dam to downstream reach; reinstatement of disturbed areas.	abutments where bridges will be located and reinstatement. Access on left side of stream to grade driveway approaches, construct wall on the left stream bank, construct abutments where bridges will be located and reinstatement
2	6	32 and 30 Blue Mountains Road	Provision of access to 32 and 34 Blue Mountains Road across the stream and construction of stream improvements. Likely construction sequence: installation of temporary access bridge at 28 Blue Mountains Road; removal/demolition of existing house at 28 Blue Mountains Road (if not already completed); grading of new private driveway for 32 and 34 Blue Mountains Road; installation of upstream and downstream diversion dams (and connect with realigned section at 28 Blue Mountains Road property (if completed prior- see Reach 2, Stage 7); remove existing bridges; installation of temporary pedestrian bridges; installation of construction access over diversion pipe; construction of wall on right bank of stream; relocate diversion pipe against new wall on right bank of stream; excavation and construction of wall on left bank of stream; removal of diversion pipe and diversion dams; reinstatement of disturbed areas.	Access from Blue Mountains Road and from property at 28 Blue Mountains Road. Where access from stream is required, diversion dams and diversion pipes will be implemented.
2	7	28 Blue Mountains Road	Demolition of house at 28 Blue Mountains Road. Stream alignment will be then be improved to avoid two sharp bends and improve stream habitat. Realigned section of stream will be constructed first, then diversion and connection of the existing stream to the realigned section of the stream will occur to enable construction to largely occur outside of stream flows.	Access from temporary and/or new access bridge for 30 and 32 Blue Mountains Road, depending on timing. Where access from stream is required, diversion dams and diversion pipes will be implemented.



Reach	Stage	Area Description	Proposed Works	Access
2	8	26 Blue Mountains Road to Sunbrae Drive culvert	Diversion of sewers prior to commencement of stream works; installation of diversion dams and diversion pipe against the right bank of the stream; construction of ramp over the diversion pipe; excavation and grading of left bank; relocate diversion pipe to the toe of slope of left bank of the stream; construction of access ramp over diversion pipe; excavation and construction of new right stream bank; removal of diversion dams and pipe; reinstatement of disturbed areas.	Access from 28 Blue Mountains Road, and access from driveway at 21A Blue Mountains Road as discussed during engagement. Where access from stream is required, diversion dams and diversion pipes will be implemented.
1	9	Between downstream end of Sunbrae Drive culvert to bend in stream in Willow Park including stream improvement works along 4 Sunbrae, 1 Tapestry Gr, 14 Blue Mountains Road and 10A Blue Mountains Road	Demolition/removal of house at 4 Sunbrae Dr; installation of upstream and downstream diversion dams and diversion pipe. Excavation and construction of walls on right side of stream from within the stream after diversion pipe and dams in place. Relocation of diversion pipe against new wall on right side of the stream; removal of existing fence on left bank to enable construction of stream improvements; excavation and construction of wall on left side of the stream; reinstatement of new fence in location of removed fence on left bank of stream; reinstatement of disturbed areas.	Access from property at 4 Sunbrae Drive (acquired by GWRC for project). Where access from stream is required, diversion dams and diversion pipes will be implemented.
1	10	Willow Park	Installation of upstream and downstream diversion dams and diversion pipe; excavation of Willow park to new formation and stepped (tiered) cross section; construction of Willow Park features including footpath and bridge over stream to extended park area at 4 Sunbrae Dr; completion of new fencing structures where required (boundary modifications); installation of landscape plantings; removal of diversion dams and pipe; reinstatement of disturbed areas. Note an earth bund between the stream and landscaped area is an alternative to stream diversion.	Access from entrance to Willow Park off Blue Mountains Road and access to acquired property at 4 Sunbrae Drive from Sunbrae Drive. Where access from stream is required, diversion dams and diversion pipes will be implemented.



Reach	Stage	Area Description	Proposed Works	Access
1	11	from access bridge at church to Whitemans Road bypass structure in stream	Installation of bund and diversion pipe; construction of walls on both banks of the stream from the top of bank using larger plant; construct new debris structure at existing diversion structure; removal of diversion dams and pipe; reinstatement of disturbed areas. Note if following structural assessment it is determined that it is not appropriate access from required construction activity then left bank will be constructed first from Blue Mountains Road after which the diversion pipe will be relocated against the new wall on the right bank of the stream to enable excavation and construction of the wall on the left bank of the stream; consideration for access to the stream bed will need to be considered under this alternative scenario.	Access for construction required on both sides of the stream. Access for improvements on left bank of stream subject to outcomes of structural assessment of bridge. Access for construction of right bank of stream from Blue Mountains Road where traffic management will be required.
1	12	Between 50 Whitemans Road and Whitemans Road bypass structure	This section of stream will not be upgraded, but three existing pedestrian bridges are to be removed and replaced. Construction methodology to remove and replace each pedestrian bridge will be confirmed once final bridge design detail is completed. Depending on the final bridge design, bridges may be constructed in place (if timber). Because stream widening will not occur in Stage 12, there is not sufficient width in the stream to install a pipe for diversion of flows during construction. It is anticipated that an excavator may be required to remove and replace two of the three bridges. Access locations will be determined to reduce disturbance to the bank and tracking distance within the stream. It is expected that a maximum of four round trips will be required for replacement of both bridges. Due to the short time frame it is proposed to work in the live stream, the sediment will most probably be greater than 30% change but for short term (activity duration only)	Access from individual properties where pedestrian bridges are to be replaced. Where (if) access from stream is required, diversion dams and diversion pipes will be implemented.



### 6.2.4 Enabling Works and Site Establishment

Some enabling works are required prior to commencement of stream improvement works. GWRC has purchased dwellings at 4 Sunbrae Drive, 28 Blue Mountains Road and 48 Blue Mountains Road which will require removal and relocation or demolition however in some cases it is noted if some existing structures can provide purpose during the project and removal is not immediately required to enable construction of proposed works, removal or demolition of structure(s) may scheduled later in the project program as required.

Existing sewer mains crossing the stream downstream of the Sunbrae Drive culvert and from 15 Deller Grove to 24 Blue Mountains Road will need to be realigned.

Site establishment work will include setting up site offices and temporary fencing and providing locations for the storage of materials and working areas for cranes. Potential site office locations include Willow Park and the properties purchased by GWRC. Alternative sites may include location within the road reserve if other options are not viable. Temporary fencing will be installed generally along the designation boundary and entry and exit points to the site for each stage. Fencing will be maintained so all visitors and truck movements to the site are controlled and monitored.

A working area adjacent to each bridge will be required for a crane to remove the existing bridge sections and lift the new bridge sections into place. The required working area is a square of eight metres by eight metres and will likely require use of the public roads. Temporary ground levelling to provide a flat working platform for the crane and its outriggers may be required in some areas.

### 6.2.5 Stream Works

Where possible, works will be undertaken adjacent to the stream with a diversion pipe located in the stream to protect stream flows from adjacent excavations. Upon completion of stream widening and wall construction on one side, the diversion pipe can be shifted adjacent to the new wall, enabling adequate room for construction of improvements on the other bank from within the stream (where access from outside the stream is not possible). Under this scenario, base flows in the stream would be diverted away from construction activities through the diversion pipe.

Diversion dams to channel base stream flow into the diversion pipe would be constructed with sandbags, sheet piles or a combination of both. Earthen dams have been discounted for this application.

Works from within the stream are required in some areas (where there is insufficient room due to existing structures and other obstructions) for constructing stream improvements.

Where works would be constructed from within the stream, the stream bed would be used as a primary access route. This approach has been carefully considered due to the potential for adverse ecological effects, however as set out in section 10.7.2.1, it has the support of Alex James – Freshwater Ecologist, who considers that the effects can be satisfactorily managed.

The methodology of working within the stream when required enables reduction of the total construction footprint and reduction of the total expected construction timeframe from 70 weeks but could be up to two years depending on weather conditions and consent conditions requirements).

The access routes and construction areas required are shown in the plans attached at Appendix D.

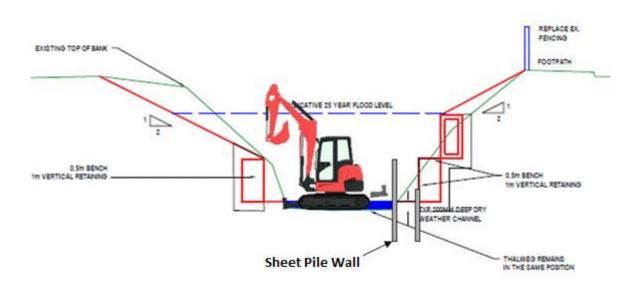
Two options have been identified when working within the stream will be required: Option 1 (instream works sheet piling) and Option 2 (piped diversion). These options are briefly summarised below and detailed in the Erosion and Sediment Control Plan attached at Appendix W.

#### 6.2.5.1 Option 1 – instream works sheet piling

Sheet piles for protection of stream flows from excavation and construction of the banks of the stream from within the stream.

It is acknowledged that this method will require mobile plant working within stream flow and it is highly probable that high levels of suspended sediments will be generated in the stream as a result. The instream works sheet piling option is summarised below however it is noted that piped diversion (Option 2) is the preferred method for construction activities from within the stream.

Figure 17 below conceptually illustrates the positioning of the plant within the stream bed for the construction of the vertical wall sections where a single row or double rows of sheet pile walls would act as a sediment control measure. The construction of the naturalised banks would be similar but would likely only require one row of sheet pile wall for sediment control.



#### Figure 17: General arrangement of plant and equipment within the stream bed

The works within the stream would require diversion of stream flows and will be managed to remove any obstructions, including construction plant and equipment, when a forecast weather event is received.

Tree and vegetation clearance would be undertaken first to establish the construction site. A dry construction zone will be created by installing temporary sheetpiles to divert the flow of the stream and retain any sediment laden water within the construction area, as shown in Figure 17 (Note, the diversion pipe is not shown in Figure 19). Excavation of the stream bank would be over the sheetpiles, with material loaded into small wheeled dumpers. Where permanent retaining structures are to be installed, an additional team would be deployed following the excavation activity. Once the permanent works have been constructed the temporary piles will be removed. Works would then progress up or down the stream alignment from the constructed area. Multiple sites may be constructed at the same time along the alignment, with potentially two to three excavation locations and two retaining operations occurring at any one time.

Sediment laden water that collects behind the sheetpiles will be pumped out and treated through a sediment settlement tank before being released back into the stream downstream of the works area. Sediment discharges from the proposed works will be managed and monitored in accordance with the ESCP attached at Appendix W and to be certified pursuant to conditions. The aim of the ESCP is to maintain a total additional sediment load within the stream to no more than a 30% change upstream to downstream of the works area, as set out in the proposed conditions in section 11. This will require water quality monitoring at upstream and downstream sites, as detailed in the ESCP.

Backloading of loaders will be undertaken to minimise movements along the stream bed. Excavated material will be loaded into small wheeled dumper vehicles as noted above, transported to the identified laydown areas and temporarily stockpiled in specified locations prior to removal off site. Stockpiles will be managed to minimise any entrainment in surface water flows during rainfall event, as detailed in the ESCP. Imported material would

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then be loaded into the wheeled dumper vehicles, transported to the works area and then deposited on site in accordance with the design requirements.

### 6.2.5.2 Option 2 – Piped Diversion

The 'piped diversion' methodology has been developed in recognition of the importance of reducing disturbance to the stream bed during an actively flowing stream which is likely to increase the turbidity and suspended solids in the stream. The methodology will require significantly more land to stage the works, and will be more intrusive to selected landowners, when compared to the 'sheet pile protection methodology.

Available stream gauging data was reviewed and plastic pipe sizes were analysed to determine a manoeuvrable and practical pipe size that can be used to divert low flows in the stream in areas where construction from within the stream is required.

A 630mm OD, Euroflow culvert pipe (or similar) was selected as the diversion pipe suitable to be placed in stream during construction works. At most stream bed slopes where this technique will be used, a flow of 0.5 m<sup>3</sup>/s can be diverted in the 630 OD pipe which corresponds to approximately 95% of stream gauge readings.

Steel plates or sheet piles installed to form inlet and outlet dams to divert flows to the pipe. Sand bags may also be employed. Earthfill dams are not considered to be an acceptable solution for this application.

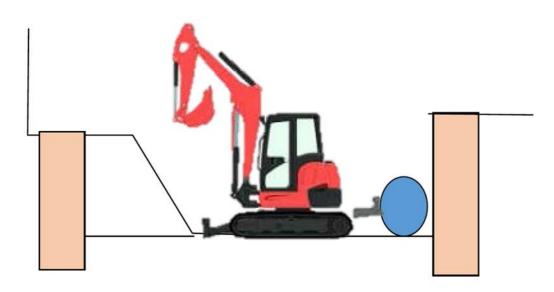
The typical construction sequence is summarised below:

- 1) Construct temporary ramp access to the stream;
- 2) Working from the stream where required, install diversion pipe and inlet/outlet dams (the dams are anticipated to comprise sand bags and/or driven steel sheets);
- Install sump pump near down steam dam to treat accumulated water through sediment curtain or sediment tank (where practical);
- 4) Excavate first bank of the stream and construct the wall from the bank (outside of the stream);
- 5) Relocate pipe up against newly constructed wall (by movement in the 'dry' stream bed);
- 6) Install access ramp over pipe;
- 7) Excavate second bank from 'dry' stream bed and construct wall;
- 8) Complete reinstatement works within and adjacent to stream, exit stream, remove ramp and reinstate and stabilise bank where temporary access ramp was constructed.

The staging and components will be simillar where stream widening comprises a graded and sloped stream bank in place of a wall.

Figure 18 below illustrates the general arrangement of the pipe, excavator and retaining walls either side.





### Figure 18: Piped Diversion General Arrangement

### 6.2.5.3 Willow Park – Earth Bund and Diversion Channels

An earth bund and runoff diversion channel will be utilised during stage 1 of the on-site works at Willow Park. The bund will be located above the vegetated berms on the True Right Bank of the stream and follow along the natural contour of the site. A dirty water diversion channel will be created below this bund, for the purpose of diverting any potential overland flow towards the decanting topsoil bunds and silt fencing. All areas of the earth bund that are not already vegetated will be covered in geotextile cloth to minimise the risk of erosion.

#### 6.2.5.4 Willow Park – Decanting Topsoil Bunds

Two decanting topsoil bunds will be utilised at Willow Park during stage 1 of the on-site works. These bunds will be located next to the two silt fences on the lowest points of the site. The purpose of these decanting topsoil bunds will be to detain the sediment laden runoff conveyed via the earth bund and run off diversion channel.

#### 6.2.6 Private Bridges

Each private bridge is anticipated to take two to three weeks to fully construct. The construction of the bridges includes removal of the existing structure, construction of the piles and abutments, and then placement of the new bridge. The bridges will be lifted into place by a crane, requiring a level platform, which may include road space in some locations. Residents could potentially be without vehicular access for this period, so temporary pedestrian access arrangements will need to be provided. Temporary relocation may also be required in some instances.

In cases where timber pedestrian bridges are considered, approximately two to three weeks is also anticipated to fully construct these, including removal of the existing bridge.



# 7. Planning Assessment

Relevant planning provisions for the proposal under the Upper Hutt City Council District Plan and the Regional Plans for the Wellington Region are outlined in the sections below.

# 7.1 Upper Hutt City Council District Plan

The Upper Hutt City Council District Plan is the relevant resource management plan for the proposed works in relation to section 9(3) of the RMA. The requirements of this plan are analysed in Appendix P in relation to the proposed works. Table 15 below provides a summary of the consents that would be required to authorise the project, should Upper Hutt City Council not seek a Notice of Requirement to designate the site for the purposes of the flood protection works.

### Table 15: Upper Hutt City Council District Plan Rules Summary

Activity	Rule	Activity Status	Comment
Earthworks	Activities Table 23.1: Earthworks on a site identified in Schedule 26.8 or affecting a tree identified in Schedule 27.7 or 27A.14	Discretionary	The proposed earthworks for stream channel reshaping at 11 and 12 Birch Grove, 50 Blue Mountains Road, and the corner of Pinehaven Road and Blue Mountains Road, may affect Urban Tree Groups 99 and 102. This would not be permitted under the rules of Chapter 27A.
	Activities Table 27A.1: The trimming, removal, or any activity within the dripline of an identified tree(s) within an Urban Tree Group listed in Schedule 27A.14, which is not a Permitted Activity, or does not meet the standards specified in Rules 27A.3 to 27A.8.	Discretionary	It is not known whether any trimming, or any activity within the dripline of a tree within Urban Tree Groups 99 and 102, would result in trimming which would detrimentally alter the form of the tree, or pruning of roots which exceed 50mm. As such the permitted activity standards cannot be met and the works would fall under this rule.
New structures	Activities Table 29.1: New buildings and structures (except underground cables and lines) within 20m of the bank of any water body with an average width of 3m or more	Discretionary	Measuring from the existing top of bank for the Pinehaven Stream, it is likely that the Stream has an average width of 3m or more. As such, all of the proposed bridges, vertical walls and other structures would fall under this rule.
Construction noise	Activities Table 32.1: Any activity ([]) which does not comply with the noise and vibration standards in rules 32.3 to 32.6	Non- complying	It is likely that the standards for construction and demolition noise under 32.3 would be exceeded by the proposed construction works.
Bridges	Activities Table 33.1: Driveways and bridges over the Pinehaven Stream	Controlled	All new and replacement bridges would require consent under this rule.

Given the degree of overlap between the effects of different components of the work, particularly in relation to noise generation from construction works, it is considered that it would be appropriate to 'bundle' them together. Therefore, overall the proposed works are considered to be a **non-complying** activity under the Upper Hutt City Council District Plan.

These non-compliances will be authorised in respect of the restrictions of section 9(3) of the RMA through the proposed designation, in accordance with section 176. Given the level of detail provided in the notice of requirement and associated plans for the proposed works, no outline plan is proposed to be submitted, in accordance with section 176A(2)(b).

**Resource Consent Application and Notice of Requirement** 



# 7.2 Regional Plans for the Wellington Region

The regional planning documents containing rules relevant to the proposal are:

- Proposed Natural Resources Plan (Decisions Version) (PNRP);
- Regional Freshwater Plan (RFP);
- Regional Air Quality Management Plan (RAQMP);

For completeness, the Regional Soil Plan and the Regional Plan for Discharges to Land do not contain any rules relevant to the proposed activities. The Regional Air Quality Management Plan, Rule 6 permits any temporary electrical generators required on site during the construction phase.

The most relevant regional plans are therefore the PNRP (Decisions Version) and Regional Freshwater Plan. The requirements of these plans are analysed in relation to the proposed works in Appendix Q. Table 16 below provides a summary of the consents required. For clarity 'stream bed' is taken to be the area between the existing top of bank as shown on the plans attached at Appendix B, consistent with the definition of bed under the RMA.<sup>10</sup>

Consent Type	Relevant Plan	Activity	Rule	Activity Status	Relevant Proposed Structures and Works	Comment
Land use s9(2)	RFP	Bore construction All remaining uses of river and lake beds	15 49	Discretionary	<ul> <li>Vertically sided channel sections (retaining walls)</li> <li>Inlet structures</li> <li>Bank Stabilisation Works/Erosion Repair/Scour Protection</li> </ul>	The definition of 'bore' in the plan includes any hole that intercepts groundwater. As a precaution, it is assumed that the bank stabilisation works / erosion repair will not comply with Rule 48 and therefore the works are considered to be a discretionary activity under Rule 49.
	PNRP	Earthworks and vegetation clearance	R101	Discretionary	<ul> <li>Vertically sided channel sections (retaining walls)</li> <li>Naturalised channel with suitable riparian planting</li> </ul>	Assumed that conditions of R99 cannot be met relating to conspicuous change of colour or visual clarity for earthworks adjacent to the stream.
Land use s13(1)	RFP	Structures in and over the stream bed	49	Discretionary	<ul> <li>Vertically sided channel sections (retaining walls)</li> <li>Inlet structures</li> <li>Private Vehicle Crossings</li> <li>Blockage Reduction</li> </ul>	Rule 49 is a catch-all for activities in river beds. The proposal will not comply with permitted or restricted discretionary rules, therefore the proposed works trigger consent under rule 49.

### Table 16: GWRC PNRP and RFP Rules Summary

<sup>&</sup>lt;sup>10</sup> Section 2 RMA provides that 'bed' relevantly means, in relation to any river (or stream) 'the space of land which the waters of the river cover at its fullest flow without overtopping its banks'



Consent Type	Relevant Plan	Activity	Rule	Activity Status	Relevant Proposed Structures and Works	Comment
Турс		Earthworks in the stream bed	49	Discretionary	<ul> <li>Relocation of Utilities</li> <li>Vertically sided channel sections (retaining walls)</li> <li>Inlet structures</li> <li>Private Vehicle Crossings</li> <li>Blockage Reduction</li> <li>Relocation of Utilities</li> <li>Stream bed reclamation</li> </ul>	
		Pipelines	46	Controlled	Relocation of     Utilities	The relocation of pipelines for utility services will require consent under rule 46.
	PNRP	Structures in and over the stream bed	R129	Discretionary	<ul> <li>Vertically sided channel sections (retaining walls)</li> <li>Inlet structures</li> <li>Private Vehicle Crossings</li> <li>Blockage Reduction</li> <li>Relocation of Utilities</li> </ul>	Rule R129 is a catch-all for activities in river beds. The proposal cannot comply with permitted or restricted discretionary rules, therefore triggering consent under R129.
		Earthworks in the stream bed	R129	Discretionary	<ul> <li>Vertically sided channel sections (retaining walls)</li> <li>Naturalised channel with suitable riparian planting</li> <li>Private Vehicle Crossings</li> <li>Relocation of Utilities</li> <li>Stream bed reclamation</li> </ul>	
Water Permit s14(2)	RFP	Temporarily take, use, dam or divert water	16	Discretionary	<ul> <li>Vertically sided channel sections (retaining walls)</li> <li>Naturalised channel with suitable riparian planting</li> <li>Inlet structures</li> <li>Private Vehicle Crossings</li> <li>Blockage Reduction</li> <li>Relocation of Utilities</li> </ul>	The conditions of Rules 22 or 43 cannot be met, therefore these activities require consent under Rule 16.



Consent Type	Relevant Plan	Activity	Rule	Activity Status	Relevant Proposed Structures and Works	Comment
Турс		Permanently divert water	16	Discretionary	<ul> <li>Vertically sided channel sections (retaining walls)</li> <li>Naturalised channel with suitable riparian planting</li> <li>Inlet structures</li> <li>Blockage Reduction</li> </ul>	
	PNRP	Temporarily dam or divert water	R131	Discretionary	<ul> <li>Vertically sided channel sections (retaining walls)</li> <li>Naturalised channel with suitable riparian planting</li> <li>Inlet structures</li> <li>Private Vehicle Crossings</li> <li>Blockage Reduction</li> <li>Relocation of Utilities</li> </ul>	The proposal cannot comply with permitted activity rules, therefore triggering a requirement for consent under R131. Discharge of diverted water permitted under R43.
		Take and use of water for dewatering	R142	Discretionary	<ul> <li>Vertically sided channel sections (retaining walls)</li> <li>Naturalised channel with suitable riparian planting</li> <li>Inlet structures</li> <li>Blockage reduction</li> <li>Relocation of Utilities</li> </ul>	Rule R140 conditions unlikely to be met in regards to the take not exceeding one month, therefore consent required under R142.
		General rule for damming and diverting water	R135 – discretionary activity	Discretionary	<ul> <li>Low wall - Reach 1         <ul> <li>along the</li> <li>boundary of Willow</li> <li>Park and 10a Blue</li> <li>Mountains Rd</li> </ul> </li> </ul>	As a new structure which will divert flood water outside of the bed of the stream, the low wall requires consent under R135.
		Permanently divert water	R131	Discretionary	<ul> <li>Vertically sided channel sections (retaining walls)</li> <li>Naturalised channel with suitable riparian planting</li> <li>Inlet structures</li> </ul>	The proposal cannot comply with permitted activity rules, therefore triggering consent under R131.
Discharge Permit s15(1)	RFP	Discharge of construction phase stormwater	5	Discretionary	<ul> <li>Vertically sided channel sections (retaining walls)</li> <li>Naturalised channel with</li> </ul>	It is assumed that the conditions of Rules 1 and 2 cannot be met relating to the discharge of dewatering water and



Consent	Relevant	Activity	Rule	Activity	Relevant Proposed	Comment
Туре	Plan			Status	Structures and Workssuitable riparianplantingInlet structuresPrivate VehicleCrossingsSecondaryFlowpathsUpper CatchmentOverlandFlowpathsBlockageReductionRelocation of	construction phase stormwater, and therefore consent is required under Rule 5
		Discharge of dewatering water	5	Discretionary	<ul> <li>Utilities</li> <li>Vertically sided channel sections (retaining walls)</li> <li>Naturalised channel with suitable riparian planting</li> <li>Inlet structures</li> <li>Private Vehicle Crossings</li> <li>Blockage Reduction</li> <li>Relocation of Utilities</li> </ul>	
	PNRP	Discharge of dewatering water	R68	Discretionary	<ul> <li>Vertically sided channel sections (retaining walls)</li> <li>Naturalised channel with suitable riparian planting</li> <li>Inlet structures</li> <li>Private Vehicle Crossings</li> <li>Blockage Reduction</li> <li>Relocation of Utilities</li> </ul>	Discharge of water for site dewatering may not meet conditions for minor discharges (R42), therefore requiring consent under R68.

In relation to the potential maintenance requirements of the structures, this is considered to be appropriately provided for through the designation in terms of addressing district plan requirements, and permitted activity rules under the relevant regional plans (Rule 22 of the Regional Freshwater Plan and Rule R112 of the Proposed Natural Resources Plan Decisions Version).

Therefore, the following consents are required:

• Land use consent pursuant to section 9(2) of the RMA as a discretionary activity under rule 15 of the Regional Freshwater Plan for the construction of "bores" in relation to the construction of the Pinehaven Stream Improvement works where excavations may intercept groundwater;



- Land use consent pursuant to section 9(2) of the RMA as a discretionary activity under rule under rule 49 of the Regional Freshwater Plan and R101 of the proposed Natural Resources Plan for bank stabilisation works / erosion repair and earthworks and vegetation clearance for the construction of the Pinehaven Stream Improvement works;
- Land use consent pursuant to section 13(1) of the RMA as a discretionary activity under rule 49 of the Regional Freshwater Plan and rule R129 of the proposed Natural Resources Plan for bank stabilisation works / erosion repair and structures in and over the stream bed associated with the Pinehaven Stream Improvement works;
- Land use consent pursuant to section 13(1) of the RMA as a discretionary activity under rule 49 of the Regional Freshwater Plan and rule R129 of the proposed Natural Resources Plan for earthworks in the stream bed associated with the Pinehaven Stream Improvement works;
- Land use consent pursuant to section 13(1) of the RMA as a controlled activity under rule 46 of the Regional Freshwater Plan for utility pipelines over the stream bed relocated in association with the Pinehaven Stream Improvement works;
- Water permit pursuant to section 14(2) of the RMA as a discretionary activity under rule 16 of the Regional Freshwater Plan and rules R131 and R142 of the proposed Natural Resources Plan for the temporary take, use, dam or diversion of water in the Pinehaven Stream associated with the construction of the Pinehaven Stream Improvement works;
- Water permit pursuant to section 14(2) of the RMA as a discretionary activity under rule 16 of the Regional Freshwater Plan and rule R131 of the proposed Natural Resources Plan for the diversion of water in the Pinehaven Stream associated with structures erected as part of the Pinehaven Stream Improvement works;
- Water permit pursuant to section 14(2) of the RMA as a discretionary activity under rule 16 of the Regional Freshwater Plan and rule R135 of the proposed Natural Resources Plan for the diversion of flood water outside the bed of the stream for damming and diverting water; and
- Discharge permit pursuant to section 15(1) of the RMA as a discretionary activity under rule 5 of the Regional Freshwater Plan and rule R68 of the proposed Natural Resources Plan for discharge of sediment laden construction phase stormwater and dewatering water associated with the construction of the Pinehaven Stream Improvement works.

Given the degree of overlap between the effects of different components of the work it is considered appropriate to 'bundle' them together. Therefore, overall the proposed works are considered to be a **discretionary** activity.

# 7.3 National Environmental Standards

There are currently six national environmental standards (NES) in effect, relating to air quality, sources of drinking water, telecommunication facilities, electricity transmission activities, assessing and managing contaminants in soil to protect human health, and plantation forestry.

The only NES considered to be potentially relevant to the proposal is the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS). As noted in section 5.2.5 above, there are no sites within the works area identified on the SLUR for the Wellington Region. Given the current and historic use of the land within and surrounding the works are for residential and associated community land uses, it is considered that there is a very low risk of disturbing contaminated soil, and therefore the provisions of the NESCS are not considered to trigger resource consent requirements. Accordingly no resource consents are being sought from Hutt City Council in respect of the NESCS.



# 8. Assessment of Alternatives

Section 168A(3)(b) of the RMA requires that in considering the effects on the environment of a notice of requirement, under certain circumstances a territorial authority must have particular regard to alternatives, specifically:

(b) whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work if—

(i) the requiring authority does not have an interest in the land sufficient for undertaking the work; or

(ii) it is likely that the work will have a significant adverse effect on the environment;

The Pinehaven Stream is located largely within private land, which means that many of the project works are also located within land. The UHCC does not currently have an interest sufficient for undertaking the work. The project therefore triggers the requirement for the consideration of alternative sites, routes, or methods under section 168A(3)(b)(i).

In addition, clause 6 of the Fourth Schedule to the RMA requires that assessments of environmental effects include "*a description of any possible alternative locations or methods for undertaking the activity*" if "*it is likely that the activity will result in any significant adverse effect on the environment.*" The expert assessments suggest that at least some of the effects on the environment will be significantly adverse. Accordingly, this section of the AEE describes alternatives in order to satisfy the requirements of both section 168A and clause 6 of the Fourth Schedule.

This section of the AEE focusses on the alternative sites and methods which were assessed. An in-depth assessment of alternative routes was not necessary, given the relatively fixed geographical nature of the Pinehaven Stream corridor.

The assessment of alternatives occurred in two stages:

- Alternative structural options assessed as part of the development of the Pinehaven Stream FMP; and
- Refinement of options and more detailed assessment of design alternatives for the proposed structural options following the FMP process.

The preferred options for the structural works outlined in the Pinehaven FMP and set out in section 6 of this report were selected through an options identification and multi-criteria analysis process (MCA), followed by selection of a preferred option, and further refinement and community engagement. This process included analysis of specific option combinations for each reach of Pinehaven Stream. The following diagram (Figure 19) provides a summary of that process.



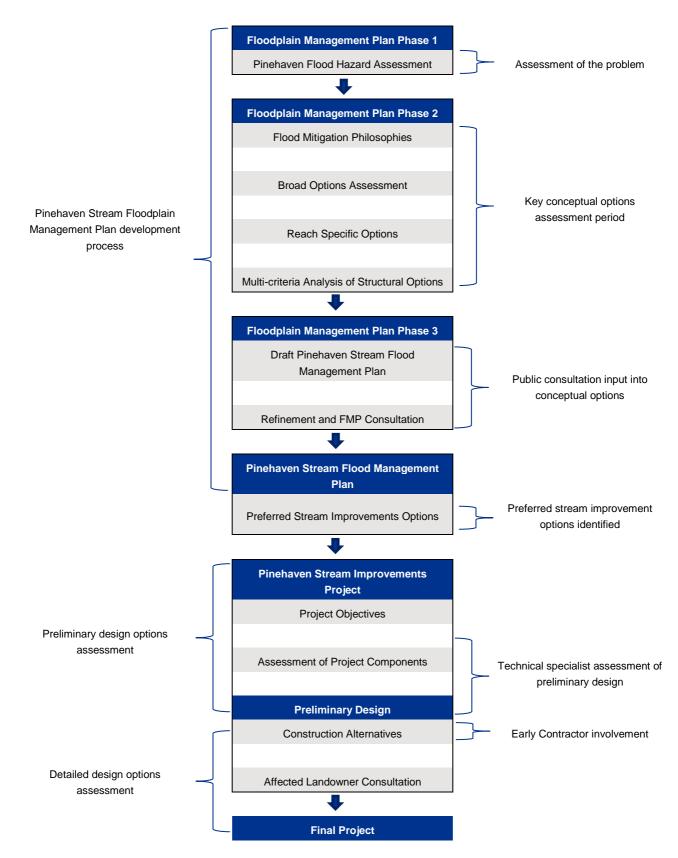


Figure 19: Overview of alternatives assessment process for Pinehaven

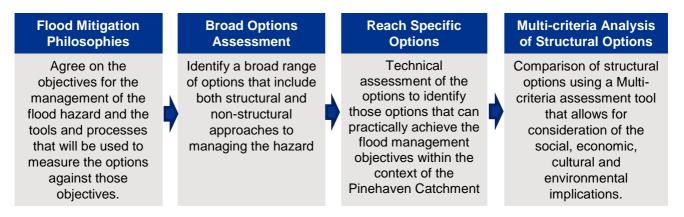


# 8.1 FMP Preferred Options Selection

### 8.1.1 Process and Methodology

The general process undertaken for the development of the FMP for the Pinehaven Stream is set out in Figure 24 above. The FMP process was facilitated by a Project Steering Group comprised of staff from UHCC and GWRC, supported by Capacity Infrastructure Services (now Wellington Water) and SKM (now Jacobs). The identification, assessment and selection of flood management options were included within Phase 2 of the wider FMP process. The options assessment process was undertaken in order to identify the range of available flood mitigation options, and provide sufficient detail on engineering feasibility, cost, risk and benefits to allow the councils, community and its elected representatives to select the right combination of options for the Pinehaven catchment.

A more detailed description of the options assessment process is presented below in Figure 20, which sets out the four broad phases of the process. This shows that the process included the determination of the objectives for management of the flood risk in Pinehaven Catchment, identification of a broad range of options, technical assessment of those for practicality of their use in the Pinehaven context, and finally a multi-criteria analysis of the different options.



#### Figure 20: Alternative Options Assessment Process

The following sections below provide a detailed description of the process and outcomes of each of the phases undertaken for the options assessment process.

#### 8.1.2 Broad Options

#### 8.1.2.1 Options identification

A broad range of structural and non-structural options were initially considered and investigated for their potential use in the Pinehaven catchment.<sup>11</sup> Options were generated based on their contribution to the four philosophies and target levels of service described in the FMP.

The options analysis for structural and non-structural options is set out below.

#### 8.1.2.2 Non-structural options

The range of non-structural and catchment wide management options considered included:

• Planning controls;

<sup>&</sup>lt;sup>11</sup> As set out in the report 'Pinehaven Stream Floodplain Management Plan: Phase 3' (SKM, 2014).



- Facilitated removal of private property obstructions;
- Managed retreat;
- Maintenance measures;
- Source control; and
- Civil Defence and Emergency Management (CDEM).

These non-structural options were refined and all carried forward to the assessment stage, except for source control which was removed though a 'fatal flaw' sieve, due to its high cost and low benefits (SKM, 2014).

#### 8.1.2.3 Structural options

As the majority of potential damage and flood risk is associated with flood waters originating from within the stream channel, identification of structural options focussed on upgrades that increase the capacity of the channel, help reduce blockages or manage flows on the floodplain. The range of structural management options considered included:

- Channel modification;
- Bridge and culvert upgrades;
- Debris control;
- Flood defences;
- Secondary overflow paths;
- Connected stormwater network upgrades; and
- Detention storage.

These options are described in more detail in Appendix L. All options, except for the fatally flawed flood defences and detention storage, were carried forward in the MCA assessment. Flood defences were discounted as in all the high-risk flood areas there are significant secondary flow paths that would be isolated from returning to the stream. Detention storage was discounted as the options investigation agreed with the conclusion of a 1980 Wellington Regional Water Board investigation that storage was not feasible in Pinehaven Reserve.

#### 8.1.3 Reach Specific Options

Reach specific option combinations were developed utilising the broad options (structural and non-structural options described above). Option combinations were developed for three specific reaches in the lower catchment (below Pinehaven Reserve). A suite of options was developed to address the flood risk in the upper catchment, due to the significant difference in flood risk and existing stream channel profile.

The options for each reach are outlined in Appendix L, as described in the Pinehaven Stream Floodplain Management Plan: Phase 3 report.<sup>12</sup>

#### 8.1.4 Options Assessment Stage: MCA of Structural Options

Following the identification of a combination of structural options a multi-criteria analysis (MCA) was undertaken by the Project Steering Group to compare the structural options identified and weigh up the advantages and disadvantages of each. The criteria areas developed are summarised in Table 17 below. The Project Steering

<sup>&</sup>lt;sup>12</sup> Sinclair Knight Merz, 2014, Pinehaven Stream Floodplain Management Plan: Phase 3



Group was comprised of council and consultant engineers, infrastructure specialists and planners with expertise in flood management, as well as knowledge of the community and project site values. The criteria and the weightings of each were tailored by the Project Steering Group to reflect the context of Pinehaven catchment. Each criterion also had sub-criteria developed to provide further depth of analysis, which are presented in Appendix M.

MCA Criteria	Weighting
Flooding (long term flooding impacts)	20%
Social (long term social impacts, including on private property)	15%
Environmental and Cultural (long term cultural impacts)	15%
Economic (cost)	15%
Construction (short term impacts during construction)	15%
Maintenance (long term maintenance impacts)	10%
Sustainability (Adaptability to beyond long-term impacts)	10%

The summary of the weighted results of the MCA process is presented in Appendix M for each reach option and summarised in Table 18 below. The options were scored on a one-to-five scale, with a higher score representing a more positive result for the relevant criterion. The outcome of the MCA process was that the options set out in Table 18 below were preferred.

These preferred options were presented to stakeholders and the community for feedback as part of the FMP development process. The consultation undertaken during the FMP is described in more detail in section 9.2 below. This included presentation to elected representatives and public feedback received during a community open day.

Feedback from the public was positive, with general acceptance of the scale of works proposed. There was no clear community consensus on a preferred level of service (level of acceptable flood risk). The level of impact on individual properties was a concern, with some residents expressing a preference for lined channels within their properties. This was incorporated in the MCA analysis through changes to the scores by project staff to represent the feedback received (as indicated in Appendix M). In particular, this resulted in some changes to the environmental, cultural, social and flooding scores, resulting in minor adjustments and a reordering of the combination rankings in the reach between Sunbrae Drive and Whitemans Road. A summary of the revised MCA scoring is presented in Appendix M and summarised in Table 18.

Option		Pre- Consultation	Post- Consultation	
Reach 1				
Option 1.0	25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level. (Naturalised channel with suitable riparian planting)	3.6	3.6	
Option 1.1	25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level (Concrete lining of channel through constrained sections)	3.5	3.7	
Option 1.2	10 year channel capacity.	3.4	3.4	
Reach 2				
Option 2.0	25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level. (Naturalised channel with suitable riparian planting)	3.5	3.6	

# Table 18: Summary of MCA Scores



Option		Pre- Consultation	Post- Consultation
Option 2.1	25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level. (Vertical sided lined section from Pinehaven Road to 26 Blue Mountains Road)	3.7	3.7
Option 2.2	Reduced channel footprint option (10 year channel capacity) <sup>13</sup>	-	-
Reach 3		1	1
Option 3.0	25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level. (Naturalised channel with suitable riparian planting)	3.6	3.6
Option 3.1	25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level. Reduced footprint channel shape. (Concrete lined section though Birch Grove properties)	3.8	3.6
Option 3.2	10 year channel capacity. Naturalised channel. (Naturalised channel with suitable riparian planting)	3.2	3.2
Option 3.3	10 year channel capacity. Reduced footprint. (Concrete lined section through Birch Grove properties)	3.2	3.2
Option 3.4	Hybrid option of a concrete lined 25 year channel capacity through the space restricted areas adjacent to Birch Grove but with the remainder of the channel upgraded to a naturalised channel with only a 10 year3.2capacity.(25 year capacity concrete lined section through Birch Grove properties)		3.2

The outcome of the MCA following community consultation process was that the following option combinations were preferred:

- **Reach 1:** Option 1.1 25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level (with concrete lining of channel through constrained sections);
- **Reach 2:** Option 2.1 25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level (with vertical sided lined section from Pinehaven Road to 26 Blue Mountains Road); and
- **Reach 3:** Option 3.1 or Option 3.2 25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level (with concrete lined section though Birch Grove properties, or naturalised channel with suitable riparian planting)

# 8.1.5 Options Refinement and FMP Consultation

The preferred options package described above was further refined though a design review carried out in 2013, after additional design investigation and feedback gained from private property owners in the area. The key changes were:

- Revision of vertical sided channel concept design around 28-40 Blue Mountains Road, Birch Grove and the reformed church;
- Further revision of the channel design around 48 Blue Mountains Road; and
- Amending the design at 54 Whitemans road to optimise the channel capacity and provide for a lowered secondary flow path across the rear of the section.

<sup>&</sup>lt;sup>13</sup> In relation to option 2.2, a reduced channel footprint option (10 year channel capacity) was considered but there were insignificant benefits in reduced impacts or cost as well as increased risks. This option was therefore not reported in the Phase 3 report.



These refined preferred options were included within the Draft Pinehaven Stream FMP which was released for public consultation. The final preferred structural options for the Pinehaven Stream are set out in section 6.2 of the FMP (as outlined in Table 3 above) and form the basis for the design of the works to be undertaken and consideration of design options, as discussed below.

# 8.2 Design Alternatives Considered for the Stream Improvement Project

Subsequent to the FMP process and the broad conceptual options assessment undertaken through that process, options for the design of the preferred stream improvements (to achieve the broad outcomes for each Reach identified above in section 8.1.4 and included in the FMP) were considered by the Pinehaven Stream Improvements Project design team. The sections below provide a summary of the options analysis, which focussed on those project components with the potential to generate or reduce significant adverse effects, or with the greatest effect on private property, being:

- Stream banks and channel hierarchy (i.e. whether a naturalised channel or retaining wall should be used for a particular project section);
- Options enabled by the purchase of property;
- Low wall along the boundary of Willow Park and 10a Blue Mountains Road;
- Retaining wall types;
- Private bridges;
- Scour protection; and
- Avoidance of significant trees.

# 8.2.1 Design Options considered

#### 8.2.1.1 Stream Banks and Channel Hierarchy

Two types of stream banks were proposed in the concept design for the Pinehaven Stream improvement works in the Pinehaven Stream FMP, naturalised channels and retaining walls. The preferred options plans contained in the Pinehaven Stream FMP identified the locations of naturalised stream banks and vertical sided lined section (retaining walls), as shown in Figure 21 below.





REACH 2 - OPTION 2.1

#### Figure 21: Pinehaven Stream FMP Reach 2 Preferred Option

During the design phase of the Pinehaven Stream Improvements Project, it was apparent that the design of the stream banks could be optimised and refined beyond the simplistic 'naturalised channel' and 'lined channel' sections identified in the preferred options, to take into account hydraulic, environmental, amenity values, private property and operational maintenance factors while achieving the desired stream capacity, with the following stream bank options identified:

- Naturalised Channel:
  - Naturally battered stream bank;
  - Low slope naturally battered stream bank to facilitate access for maintenance activities; and
  - Naturally battered stream bank with low retaining structures at the top of the bank;
- Vertically lined sections:
  - o Benched retaining walls with a stepped profile; and
  - Vertically sided stream banks.

These options have different benefits and costs in terms of the factors identified above. Generally, naturally battered stream banks provide greater environmental and amenity value benefits, while the vertically sided channel profile reduces potential impact on surround private properties. Similarly, benched retaining walls provide for potential additional environmental enhancement and amenity values over vertically sided stream banks.

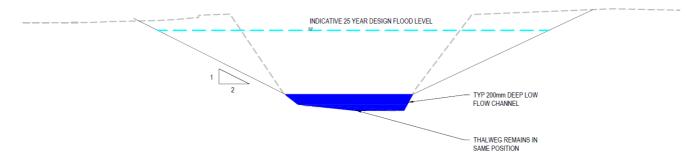
The implementation of these options has considered the different constraints along the stream channel, in order to maximise environmental and amenity values of the Pinehaven Stream Improvements works, while still achieving the required channel capacity within the constraints of the site. In some locations, where space is limited a combination of the two bank types has been considered to optimise the outcomes of the upgrades. The following order of preference has been used in selecting the preferred bank type for each particular channel section:

- 1) Naturally battered stream bank to one stream bank, with a planted, low slope bank on the other side to facilitate access to the stream;
- 2) Naturally battered stream bank to both sides;
- 3) Naturally battered stream bank, with small retaining at top of bank where space is constrained due to existing structures;



- 4) Naturally battered on one stream bank, with benched retaining on the other;
- 5) Benched retaining to both stream banks; and
- 6) Benched retaining to one stream bank, vertically sided wall on the other.

Examples of (2) and (4) are shown in Figure 22 and Figure 23 below respectively.



#### Figure 22: Example of naturally battered stream bank on both sides

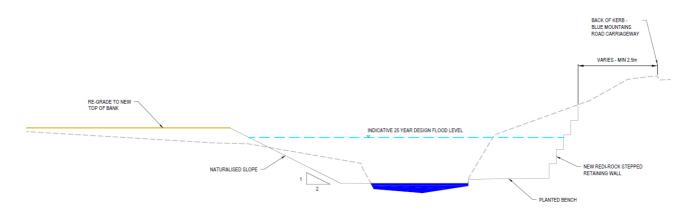


Figure 23: Example of combination of benched retaining walls and naturally battered stream banks

Combinations of these cross-sections were tested within the hydraulic model to determine the optimum channel geometry design for conveying the 4% AEP event. Where specific areas still showed overtopping of the banks with the implementation of the selected design, additional options were considered to contain the 4% AEP flow event within the improved stream channel.

The sections of the stream channel where these different cross-sections are proposed to be implemented are identified in detail in Appendix E.

# 8.2.1.2 Options for full purchase of properties prior to preliminary design commencing

The purchase of three properties (4 Sunbrae Drive, 28 Blue Mountains Road and 48 Blue Mountains Road) by GWRC and has enabled alternative options to be considered in relation to the proposed stream improvements, with the general alternatives being:

- retention of the dwellings in place;
- removal of the dwellings and disposal of the land not used for stream improvements; and



 removal of the dwellings and integration of the properties into the wider stream improvement and other council assets.

Retention of the dwellings in these properties was not preferred as this would hinder construction of the preferred options for the stream improvements. As such removal of the dwellings and either disposal of the land not used for stream improvements, or integration of the properties into the wider stream improvement and other council assets was considered. The primary reason why the following properties were purchased was because they would be inundated under the 1%AEP event, unless further stream widening or structural improvements were proposed. However additional project benefits have been able to be released through the purchase of each property as outlined below.

The existing house at 4 Sunbrae Drive will be removed, which will enable an improved configuration of the Park that improves accessibility, provides connectivity of to Park to Sunbrae Drive and further connects the community with the stream environment. Social and environmental benefits were identified with this option.

At 28 Blue Mountains Road an opportunity has been identified to realign the stream, reduce hydraulic resistance and flooding risk to adjacent properties. This option was identified in the concept design presented in the FMP. The purchase of this property enabled a revised solution by providing a new channel with natural banks that could function as a more natural channel providing additional environmental benefits.

Residual land not required for the stream has also been identified as being able to be used to mitigate impacts from neighbouring properties. For example, 30 Blue Mountains Road requires a garage to be provided after losing its garage from the removal of the private bridge. The use of the neighbouring land provides for access and a new garage.

At 48 Blue Mountains Road, the purchase of this property enabled additional flood storage options to be provided and retention of existing significant trees identified in the area. This option provided additional benefits in terms of flood hazard mitigation. The house at 48 Blue Mountains Road will be removed as part of the project and land is expected to be integrated into stream improvement works.

The property at 10A Blue Mountains Road has identified for purchase to enable the works to occur within Willow Park. The dwelling is expected to be retained and will be a sellable asset at completion of the work if desired by UHCC.

# 8.2.1.3 Retaining Walls

Options for retaining wall types considered by the Pinehaven Stream Improvements Project design team through the preliminary design phase are summarised in Table 19 below.

Options	Summary			
Bored Soldier Pile Wall – Bored piles with timber or concrete lagging	<ul> <li>A simple retaining wall technique that is most commonly used in the construction industry;</li> <li>Smooth vertical facing could be provided with vertical steel H-Sections sunk into the pile excavation, and precast concrete panels slotted between the flanges;</li> <li>A more cost effective but less durable solution;</li> <li>Temporary casing may be required in weak ground conditions or high groundwater flows;</li> <li>A resilient and flexible system under long term static, seismic and flood load cases; and</li> </ul>			
	• Can be designed such that rock rip-rap is not required to prevent excessive scour.			
Sheet Piles	PVC sheet pile walls and steel sheet piles			
Block Wall – large cubic concrete blocks, with rock-rip rap	<ul> <li>Proprietary products include 'Red-Rock' (by Duracrete), 'StoneStrong' (by Stonestrong Systems Ltd) or Anchorbloc (by Humes Pipeline Systems).</li> </ul>			

# Table 19: Retaining Walls Options Summary



<b>Reinforced Concrete Wall</b> – L-shaped wall, with rock	<ul> <li>Quick and simple to build, pre-cast units formed off site, then placed into position directly off the back of a hi-ab/low loader;</li> </ul>		
rip rap	<ul> <li>Wide footprint so difficult to fit in where space is limited;</li> </ul>		
	• Wall stem can be cast insitu if it suits the contractors' methodology/staging; and		
	• Not suitable for weak or variable soil profiles, where ground settlement can result in cracking of the wall stem.		
Mechanically Stabilised	Wide footprint so difficult to fit in where space is limited;		
Earth (MSE) Wall – layers of compacted fill and	<ul> <li>Quick and easy to construct, without requiring to excavate significantly below the stream bed level;</li> </ul>		
geotextile, with rock rip rap	<ul> <li>Can be designed with a vertical or sloping face (up to 70 degrees from the horizontal);</li> </ul>		
	<ul> <li>Adopt either a 'hard facing' comprising concrete panels or blocks, or a 'soft facing' comprising topsoil and vegetation; and</li> </ul>		
	• Performs well under large seismic loads, commonly use on NZTA State Highways.		

Other potential options that were discounted were walls in excess of around 2.5 metres, crib walls and driven soldier pile walls. This was because:

- Walls with retained heights in excess of approximately 2.5 metres would require horizontal ground anchors in order to prevent excessive long term movement and prevent collapse during a large earthquake. The ground anchors would need to be in the order of 4 m to 8 m long, depending on the ground conditions. Therefore, the anchors would require significant construction space within private properties;
- Crib walls are not recommended due to the risks of poor performance under high energy flood conditions, causing damage to the units. There are also concerns in relation to the potential supply of concrete crib units; and
- Driven soldier pile walls exhibit similar advantages and limitations when compared to the bored pile
  option above. However, they have been discounted due to the large noise and vibration generated
  during driving, and difficulties in driving to the final depth due to the large cobbles and boulders within
  the soil profile.

A multi-criteria analysis approach was used for selecting the preferred design options for the vertical retaining walls from the options set out in Table 21. The criteria used from the concept phase were used as a baseline, and refined for the updated preliminary design assessment. The refined MCA Criteria used are present in Table 20 below.

#### Table 20: Revised MCA Criteria Weighting for Design Alternatives

MCA Criteria	Weighting
Flooding (long term flooding impacts)	20%
Social (long term social impacts, primarily related to impacts on private property)	15%
Environment (long term environmental impacts) and Cultural (long term cultural impacts)	15%
Construction (short term impacts during construction)	15%
Economic (cost)	15%
Sustainability (Adaptability to beyond long term impacts)	10%
Maintenance (long term maintenance impacts)	10%

The revised criteria reflect the project goals and objectives, and combine the cultural considerations with the environmental category to reflect the FMP finding that that there are no cultural associations of significance. The



amended weightings mitigate bias that may be present and places economic criteria at the same weighting as community and environment criteria. In addition, the weighting of the construction criteria was increased to reflect the potentially significant construction impacts of the Project on the surrounding community. The scoring reflected the concept phase, with a one-to-five range with a higher score being better performance against that criteria.

Criteria	Concrete Blocks	Timber	L-Shape Section	MSE Wall
Flooding	3.0	3.0	3.0	3.0
Social	3.0	3.0	3.0	3.3
Environmental and Cultural	2.7	2.7	2.7	4.0
Construction	3.0	4.0	3.0	3.0
Economic	3.7	3.3	3.3	3.0
Sustainability	3.0	3.3	3.3	3.0
Maintenance	4.0	4.0	4.0	4.0
Weighted Score	22.4	23.3	22.3	23.3
Weighted Total	3.15	3.28	3.13	3.25

### Table 21: MCA assessment of options for vertically sided channel treatment

Table 21 outlines the preliminary MCA scores as agreed by geotechnical engineering, water engineering and planning experts engaged for the Pinehaven Stream Improvements design, which shows both the timber walls and MSE walls on virtually even scores. As a result of the assessment timber retaining walls were proposed to be implemented.

Following the MCA process, the project contractor suggested an additional option, being block work with a Rockcrete façade. The contractor compared this option to the highest scoring options from the MCA, and considered this option to have similar benefits to the timber and concrete block solutions in terms of ease of construction and economic criteria, while also providing visual amenity benefits. Therefore, this option was progressed through detailed design.

# 8.2.1.4 Private Bridges

Existing private driveway and pedestrian bridges will require replacing as the bridge spans have been increased to match the widened stream banks. Options for the private bridges considered through preliminary design are summarised in Table 22 below.

# Table 22: Road Bridges Options Summary

Option	Span	Superstructure Depth	Foundations
<b>Flat Slab Bridge</b> – maximum 2 m width for pedestrian bridges and maximum 7.0 m for vehicles.	8.0m max	300mm deep (approx.)	Approximately 4m to 6m long driven piles (likely timber, with concrete alternative if high structural loads)
Double Tee Bridge	14.0m max	650mm deep (approx.)	Approximately 4m to 6m long driven piles (likely timber, with concrete alternative if high structural loads)

The flat slab option for all pedestrian bridges has been selected. The vehicle bridges will also use the flat slab option for spans shorter than 7 metres. Other deck profiles are possible, but are deeper, requiring the deck to be set to higher levels, or further compromise the freeboard. Longer spans of vehicle bridges may use the double tee option or hollow core unit options.



The 600 millimetre freeboard allowance is desirable if it can be reasonably achieved. However, for most of these bridges this would mean that the approaches to the bridge would have to be raised significantly to achieve this clearance. Furthermore, if the approaches are much higher than the surrounding ground, this may alter the overland flow paths, and consequently cause flooding to areas not currently flooded. The final design of vehicle bridges has not been completed and the final design option for each bridge will be determined through detailed design.

# 8.2.1.5 Scour Protection

The improvement works include widening the stream which will increase the capacity of the stream and lead to higher velocities. The modelling has indicated that maximum velocities in the stream channel during a 4% AEP event will be above the threshold for scour (localised loss of material, often around a structure) and therefore erosion (more general loss of material over a wider area) and scour protection will be necessary. Scour protection options that were considered for the improvement works were:

- Riprap protection (rock and material placed to armour the bank);
- Geotextile matting (permeable fabrics used to protect the soil surface);
- Native (tussock) grass plantings; and
- Lawn grass (Kikuyu grass).

Riprap is not a preferred option as it can exacerbate scour if not placed correctly, creating localised eddies within the waterway which affect stream geomorphology. Lawn grass is also not preferred due to the ongoing maintenance costs and would require space to be made available for maintenance staff to access the site. The naturalised stream banks are graded to 1V:2H which would be too steep to safety undertake maintenance works.

Native planting and geotextile materials are therefore preferred, given the high velocity resilience of matting, and the riparian habitat advantages of native plantings. Reduced maintenance requirements also mean space for operational maintenance can be reduced. Riprap protection may still be required where space limitations restrict the use of geofabrics and native plants. Riprap would provide toe protection for vertical retaining walls where space restricts a planted bench from being installed.

#### 8.2.1.6 Avoidance of significant trees

Other considerations during the design of the proposed works included the avoidance of identified significant trees, if possible. This was addressed through each MCA process through the inclusion of consideration of the impact on riparian environment with the Environment criteria, but due to the importance of trees to the amenity of the Pinehaven area it has been considered throughout detailed design.

During preliminary design approximately 20 individual trees were proposed to be removed with 4 of these identified as within the Tree Groups overlay of the Upper Hutt City Council District Plan. In relation to the avoidance of significant trees, this is most evident in the avoidance of trees identified in 50 Blue Mountains Road and at properties between 48 through to 56 Blue Mountains Road, where the preferred option set out in the Pinehaven Stream FMP and at the preliminary design stage would have resulted in many trees on these properties being removed.

During the detailed design phase the engineers reconsidered this approach, and proposed a different design to avoid the removal of these trees where possible, while retaining the overall preferred design approach as set in the FMP. The removal of trees has been reduced to approximately 13 trees (down from 20). As identified in the terrestrial ecology report attached at Appendix S, 2 of these trees were identified as within the Tree Groups overlay of the Upper Hutt City Council District Plan.



### 8.2.1.7 Works Downstream of Whitemans Road Bypass

Representation of the Whitemans Road bypass weir in the hydraulic model was updated based on inclusion of additional survey information. In consultation with Wellington Water and following further assessment of the weir, it was concluded from the updated model that peak discharges through the Whitemans Road bypass were higher than previously assessed and as a result peak discharges in the stream downstream of the Bypass (Lower Pinehaven Stream) were reduced.

Results from the updated model showed a decrease in modelled discharge at Lower Pinehaven Stream, so it was determined that channel upgrades to Lower Pinehaven Stream were not required. Based on these results, Jacobs recommends no channel upgrade works for Lower Pinehaven Stream.

Minor re-grading to raise top of bank heights along 14 and 15 Clinker Grove would be needed to achieve design freeboard within this area, however in consultation with Wellington Water (and subsequently property owners), it has been agreed that grading in this area would be disruptive to vegetation with little increased flood protection benefit.

Downstream of the Whitemans Road bypass, the bottom elevations of three existing private pedestrian bridges across the stream are within 25-year flood levels and are proposed for removal and replacement with new pedestrian bridges. Replacement elevations and freeboard requirements will be established in consultation with Wellington Water, to raise bridges above predicted stream levels but minimise obstruction to local drainage and stream flows in excess of stream capacity.

#### 8.2.1.8 Overland flow path and low wall

Flood wall defences were discounted at the FMP Stage 2 broad option assessment stage. While a flood wall was considered for retaining overland flow in the stream corridor between Birch Grove and Pinehaven Road, it has been determined that the wall is not a viable solution for several reasons including:

- Adjacent residents have expressed varying opinions of a proposed floodwall;
- Floodwall can create residual risk due to holding back floodwater potentially increasing consequence of failure;
- Maintenance and management requirements and costs;
- Creation of an asset would likely trigger requirement for easement or designation to provide access for maintenance;
- Floodwall intended to retain overland flows from the stream but may also impede overland drainage paths.

Following discussions with GWRC and WW, it was determined that other solutions may be preferred in place of a floodwall for the Pinehaven Stream Improvements project. No floodwalls are included in proposed improvements.

In order to achieve the objectives of the Project, and the flood mitigation philosophies of the FMP, a small low wall is proposed along southern boundary of Willow Park and 10A Blue Mountains Road (approximately 300 millimeters high, with a 1.8m high timber fence) as shown in Figure 24. The decision to implement the low wall was made by the project steering group. Consultation with the landowner at 10A Blue Mountains Road also occurred. Ongoing engagement with the landowner at 10A Blue Mountains has occurred over multiple meetings and as a result of discussions the project is now in a position to purchase the property.





Figure 24: Low wall at Willow Park & 10A Blue Mountains Road

# 8.3 Landowner considerations

41 properties are directly affected by the project and will experience changes to their property through either changes to the channel and widening of the stream, requirements to provide access to their property for construction within the stream. Some properties will have significant effects occurring on their property, for example for properties from 30-38 Blue Mountains Road, access to each property is affected.

Providing separate replacement bridges for these Blue Mountains Road properties was identified at the concept design phase and preliminary design phase. Once design was more refined it was identified that provision of access using compliant access designs up to Blue Mountains Road (BMR) was going to be difficult to achieve. As a result two alternative access arrangements have been investigated for these properties, including:

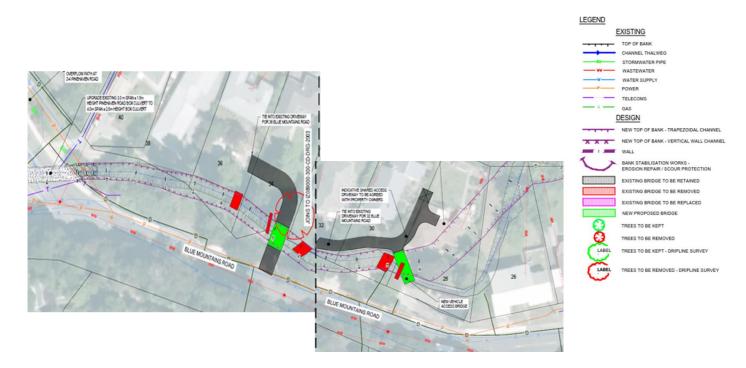
- o Providing a shared driveway along the property boundaries from 28 BMR to 38 BMR
- o Providing a shared driveway along the property boundaries from 28 BMR to 34 BMR and then from 36 to 38 BMR.

The benefits of this approach to providing access, is that it provides a safe regraded access to Blue Mountains Road and it also removes the need for 3 replacement structures to be provided by consolidating access onto two bridges. It also provides for replacement of garages, enabling parking in a more efficient manner for private property owners. It also improves management of the stream channel during flooding as fewer structures are present. Any structure over the stream can increase the risk of debris or blockage occurring in a flood.

Between 30 to 36 Blue Mountains Road we have allowed for enough space within the designation to provide for new private vehicle access arrangement where the project is changing access to each property. The access arrangement illustrated in the General Arrangement Plans, and as illustrated in Figure 25 below, shows one option that can be implemented. However, consultation with each property owner is ongoing and as a result the access configuration to the site may change during the processing of this notice of requirement application.

# **JACOBS**

#### Figure 25: Access option for 28 BMR to 34 BMR and then from 36 to 38 BMR



At 10A Blue Mountains Road, the purchase of this property will enable the works to occur within Willow Park. The dwelling will be retained and at completion of the work, the property will be on sold.

As detailed in section 9.3.3, landowners were consulted on the proposed works, and were provided an opportunity to provide input into the design.

# 8.4 Construction Methodology Alternatives

In relation to construction methodology, two main options were identified being:

- Construction from outside of the stream; or
- Construction from within the stream, using sheet pile protection or piped diversion methodologies.

Construction from outside of the stream would require all construction equipment and plant to be located on the adjacent riparian area during works. Alternatively, construction from within the stream using sheet pile protection or piped diversion methodologies allows for equipment and plant to be located and operated within the area of the stream bed, by creating dry construction zone areas thereby reducing disturbance of the stream bed and minimising sediment discharge to the stream.

The anticipated construction methodology during preliminary design was construction from outside of the stream. As such, this alternative was reasonably well explored and assessed in terms of potential workability and impacts. The alternative of construction from within the stream was explored following further design development, project steering group engagement and early contractor involvement (Downer) for the works with experience in constructing flood mitigation works, including from within a stream bed environment.

The two construction methodologies have been assessed below against the MCA criteria established during preliminary design.



# 8.4.1 Social

The relevant Social sub-criteria are:

- Impacts on community infrastructure
- Impact on landowners;
- Impact on wider community

The primary difference between the two construction methodologies in terms of social impacts is the access requirements over private land and reduction in impacts on riparian vegetation habitat, which is much reduced with the instream methodology. As both methodologies will take place on private property for construction activities

In terms of impacts on community infrastructure, there is not considered to be a significant difference, as Willow Park will have extensive works, and the reticulated networks that cross Pinehaven Stream will also require relocation under both regimes.

In terms of impact on the wider community, there will likely be some reduction in the impact on roading infrastructure from the proposed in-stream construction methodology, for those areas where the stream is adjacent to the road, as construction equipment may not be required to be located on the road.

Therefore, overall the proposed in-stream construction methodology is considered to have reduced social impacts in comparison to the out-of-stream construction methodology in terms of social impacts.

#### 8.4.2 Environmental and Cultural

The relevant Environmental sub-criteria are:

- Impacts on in stream environment (water quality, sedimentation, stream ecology)
- Impact on riparian environment
- Impact on wider environment
- Impact on Iwi
- Impact on interest groups
- Impact on heritage

The environmental and cultural impacts of the two construction methodologies significantly differentiate the two options with the out-of-stream methodology scoring higher than the in-stream methodology.

The in-stream methodology obviously has the potential to have higher impacts on the in-stream environment compared to the out-of-stream methodology, due to the location of machinery within the stream. This could affect the water quality through disturbance of the bed and subsequent entrainment of sediment. In addition, freshwater ecology could be affected through disturbance and death of fish and other freshwater fauna. However, the stream bed is identified as having competent material with the capacity to support the proposed machinery. Because the stream bed has a relatively coarse composition, the suspension of solids is likely to be low and they are likely to settle rapidly. As a result, significant suspension of solids downstream is not anticipated. The proposed works include mitigation of potential ecological effects, through the use of sheet piles or piped diversion to create dry construction zone areas thereby reducing disturbance of the stream bed and minimising sediment discharge to the stream, and the reduced duration of works required with the in-stream methodology, will also mitigate these impacts.

The out-of-stream construction methodology is considered to have higher impacts on the adjacent riparian environment, as there would be an increase in the need for construction equipment to move and be located within the riparian area. The area to be worked in terms of regrading will remain consistent between the two options, however the area required for access to and movement within that area will be reduced for the instream construction methodology.



In terms of the impact on the wider environment, the two construction methodologies are considered to be generally similar, with most effects contained within the stream and riparian environment, and the surrounding properties. The in-stream methodology may have additional risk for the discharge of sediment from the movement of machinery within the stream, and subsequent discharges of sediment laden water to Hulls Creek; however, the out-of-stream methodology would also potentially generate sediment discharges. The works are proposed to be mitigated through the implementation of the ESCP attached at Appendix W and subject to appropriate conditions.

The potential impact on iwi and interest groups may be considered to be higher for the in-stream construction methodology, due to machinery located within the stream and subsequent potential impacts on water quality and ecology. However, the out-of-stream methodology would also have impact on water quality and ecology, particularly through the additional construction areas with the riparian area and requirements for over-pumping in some locations. In addition, the reduced riparian area disturbance, proposed mitigation of potential ecological effects and the reduced duration of works through the in-stream methodology are considered to offset these potential additional impacts.

There are not considered to be any differences between the two construction methodology options in terms of impacts on historic heritage.

Therefore overall, the in-stream methodology is better in terms of impacts on the riparian environment while the out-of-stream construction methodology is better for the in-stream environment and performs slightly better overall on the environmental criteria.

# 8.4.3 Construction

The relevant Construction sub-criteria are:

- Ease of access for construction
- Health & safety risks associated with construction
- Impacts on landowners during construction including noise, dust, truck movements, vibration, etc
- Dealing with flooding during construction
- Consent process resource requirement intensity

The in-stream construction methodology scored better on the Construction criterion primarily due to the constructability of the proposed works in comparison to the out-of-stream methodology, with the involvement of contractors with experience in constructing flood mitigation structural works.

The proposed in-stream construction methodology has significant advantages over the out-of-stream construction methodology in terms of the ease of access for construction. The use of the stream bed at certain locations as the primary access route reduces the need for access over private property and provides direct access to the works area. Public spaces and council owned properties can then be used for additional access, with fewer access routes required over private properties compared to the out-of-stream methodology.

The in-stream methodology contributes to reduced health and safety risk for the public as there will be less private land occupied during the construction works, and therefore a reduced construction area interface that requires active management. Health and safety risks for construction workers within the stream are considered to be able to be appropriately managed to mitigate any additional risk above an out-of-stream methodology.

As noted above, the in-stream construction methodology leads to a reduction in private land used for construction purposes. This in turn has reduced impacts on landowners in terms of noise and vibration, dust, and traffic movements as it reduces:

- the number of heavy vehicle movements adjacent to residential dwellings;
- the requirement to position large equipment on the river bank;
- the need to set up, and subsequently remove, elaborate temporary works structures;
- the need to reinstate the river bank once the works are completed;



• the need to reinstate private land following the works.

In addition, the in-stream methodology is anticipated to require significantly less duration for the works, (reduction of approximately 8 months). Further, works have been proposed over 12 stages, which will also contribute to reduced duration of disruption for impacted landowners and establishment of disturbed areas.

An alternative piped diversion methodology detailed in the Erosion and Sediment Control plan has also been explored over the sheet piling methodology. The use of this alternative instream method also provides further ecological benefits through providing a level of protection from additional sediment discharge during construction. Where it is possible to use this diversion methodology it will be employed.

The proposed in-stream construction methodology presents challenges for dealing with flooding during construction, above those for the out-of-stream methodology. However, as noted above and in ESCP attached at Appendix W, construction management is proposed to include monitoring forecast rainfall events, and removing construction equipment from the stream ahead of events of a certain threshold. It is noted that the proposed out-of-stream methodology includes over-pumping of some areas, which would also create significant challenges in dealing with higher flow events.

In terms of constructability, due to the potential additional environmental impacts of the in-stream construction methodology noted above, this option is considered to potentially require more onerous resource requirements both for consenting and for monitoring during construction compared to the out-of-stream methodology. However, this is considered to likely be offset by the reduced land area and time requirements of the in-stream methodology which would result in a reduction of the adverse effects.

Therefore, overall the proposed in-stream construction methodology is considered by the contractors engaged for the works (Downer) to have significant benefits over the out-of-stream methodology in terms of constructability of the proposed works.

#### 8.4.4 Economic

The relevant Economic sub-criteria is implementation cost. Cost estimates for construction indicate that the methodology for construction of the flood mitigation structures from within the stream would be significantly lower than construction from outside of the stream. It has been previously estimated that this figure is in the order of approximately \$2 million. This represented a savings of approximately 20% compared to prior estimates based on construction from outside of the stream. This is due to the extra complexity of construction management and land requirements for construction from outside of the stream. For example, obtaining the pumping capacity to over-pump the stream, required to enable some works to occur from outsider the stream, is prohibitively expensive.

As such, the alternative for construction from within the stream has significant benefits in terms of costs.

#### 8.4.5 Summary

In summary, the construction methodology option for works from within the stream has social, construction, riparian area, cultural and economic benefits over the methodology for works only occurring from outside of the stream. While works from within the stream present greater challenges in terms of freshwater ecology and water quality, these are considered to be able to be appropriately managed such that the potential impacts are not significantly greater than those likely for the out-of-stream methodology. Therefore, overall the in-stream methodology was considered to be the more appropriate of the two.

# 8.5 Summary

The development of the proposed structural works for the Pinehaven Stream has a long history with extensive technical investigations, community consultation, and refinement of flood protection options over a long period.

The development of the Pinehaven Stream FMP included assessment of broad structural options for the Pinehaven Stream. Identification of reach-specific option combinations then occurred and assessment of these



through MCA analysis and public consultation led to the selection of preferred options. The preferred options were included in the Draft Pinehaven Stream FMP. Further consultation on the draft FMP document was undertaken, and the final Pinehaven Stream FMP was produced with the preferred structural options identified for each reach in the stream.

Refinement of the options and detailed assessment of potential design alternatives for the proposed structural options has been undertaken following the FMP process in order to achieve the objectives as set out in section 1.3.

Design alternatives were considered throughout the preliminary design phase to determine the optimal solutions. Decisions were made on the hierarchy of stream channel and banks to guide the implementation of the options for combinations of naturalised and retained channels. Decisions on the private bridges have been made based on ease of construction and cost, while meeting the required design performance criteria. Retaining walls will consist of block walls with Shotcrete façades as this was considered to achieve better outcomes than the options preferred after a MCA of other retaining wall options.

The two broad options for construction methodology were considered, being works from within the stream, and works occurring from outside the stream. Generally, works from within the stream have benefits in terms of social, construction and economic considerations. Any potential additional environmental impacts are considered able to be appropriately controlled and mitigated. Therefore, the proposal is for works to occur from within the stream.

Land owner consultation has been undertaken, which included input into the desired design outcomes. Ongoing landowner consultation will continue until the physical works project and reinstatement is complete.

The proposed works have therefore been through an extensive and robust assessment of alternatives, with MCA, public consultation, and landowner input, and considered to be sufficient for meeting the requirements of section 168A(3)(b) of the RMA.



# 9. Consultation

Consultation on the proposed works to which the designation relates has been undertaken over a number of years since the Pinehaven Stream flood modelling work was initiated in 2009. Since that time significant consultation processes have been undertaken in relation to the development of the Pinehaven Stream FMP. Direct consultation with affected land owners has also been undertaken in relation to the proposed stream improvement works and the designation which has informed the final proposal. The Pinehaven Stream Improvements Engagement Report is provided at Appendix H.

## 9.1 Parties consulted

Appendix J provides a list of properties/directly affected landowners who have been consulted during the various phases of the project. This list also provides an indication of the proposed works that are currently anticipated to be required on each property. Matters such as construction access and timing of and duration of construction, tree removal, overland flow, the extent of the works and reinstatement have been discussed with property owners. Other parties consulted has included the Pinehaven and Silverstream communities generally, community groups and mana whenua.

## 9.2 Consultation during FMP Development

Consultation with the Pinehaven and Silverstream communities was an important part the development of the Pinehaven Stream FMP following the completion of the draft flood modelling in 2009. The consultation undertaken included a range of methods as outlined below and helped to inform the final FMP document which was adopted by the GWRC Environment Committee on 29 June 2016.

#### 9.2.1 Letter Drop

A letter drop was undertaken in 2009 providing information on the history of flooding in the area, and invited residents of the catchment to share their experience of past flooding. Subsequently, discussions were held with a number of residents, which provided valuable information for modelling output verification and catchment understanding.

#### 9.2.2 Drop-in Sessions

A drop-in session was held on 12 September 2009, providing the community with an opportunity to comment on draft flood hazard maps produced based on modelling results. Over 150 people attended this session. Feedback was utilised in improving the model and flood hazard maps to reflect actual experiences of the community.

## 9.2.3 Open Day

An open day was held on 18 July 2012 to discuss flood management options with the community. Sixty residents attended this event. Discussion included ecological values of the stream, project cost, potential damages, planning controls, and timeframes.

#### 9.2.4 Property Owner Consultation

Property owners directly affected by potential structural options to address flood risk in the catchment were directly consulted through individual meetings. This has included multiple meetings with various landowners over a number of years. Appendix I Appendix J provides a list of properties/directly affected landowners who have been consulted during the various phases of the project.

#### 9.2.5 2014 Consultation and Submissions

The draft Pinehaven Stream FMP was notified in October 2014, with 32 submissions received. Submitters were predominantly private property owners within the catchment. The primary concern raised through submissions



was the accuracy of the flood modelling and mapped extents, with an independent audit requested by some submitters. An independent audit was undertaken in response to these concerns, which concluded that the modelling was accurate and fit for purpose.

The potential impact of the proposed structural works on trees and native bird populations in Pinehaven were also raised as concerns through the submission process.

#### 9.2.6 2015-2016 Consultation and Submissions

A revised draft FMP was released for consultation in September 2015. The purpose of this consultation for the FMP process was to outline the independent review of the flood modelling and its influence on the design of the updated FMP and to understand any further views on the proposed structural works.

The consultation was integrated with other concurrent Council consultation processes on similar matters, including through two open days. Forty people attended the open days. Submissions on the FMP were sought, which were considered, and subsequent updates were made to the FMP.

#### 9.2.7 Pinehaven Stream FMP Hearing

The updated Pinehaven Stream FMP was considered by the Hutt Valley Flood Management Subcommittee (HVFMS) at a hearing in April 2016. Submitters were provided an opportunity to present at the hearing. The HVFMS subsequently endorsed the FMP. The endorsement of the HVFMS was conditional on additional information being included to explain the representation of flood risk on the flood maps. As a result, a series of maps showing the flood modelling process were created in discussion with a community focus group and included in the final FMP.

#### 9.2.8 Iwi Consultation

Discussions were held with representatives from Te Atiawa No Runga I Te Rangi on the cultural significance of the Pinehaven Stream catchment.<sup>14</sup> In addition, a 'cultural likelihood of discovery' database held by GWRC was investigated. The outcomes of this were that the Pinehaven catchment was identified as having significance as a waterway, but is not known to be an area of historic cultural significance, or current cultural significance to Māori.

#### 9.2.9 FMP Consultation Outcomes

Key principles were developed from community consultation on the Pinehaven Stream FMP. These principles were considered in developing the proposed structural works and include:

- Minimise impact to private property from any proposed widening works;
- The character of the stream following restoration work should match or enhance the existing character;
- Significant trees are to be retained;
- Protection of habitable floor levels to the 1-in-100 year flood event;
- Low walls and stop banks should be avoided to reduce the risk of cutting off overland flow paths and limiting access to the stream;
- Access to and on private property is to be retained where possible.

<sup>&</sup>lt;sup>1414</sup> Discussions were also held with Rangitane o Wairarapa, however the Proposed Natural Resources Plan confirmed that the Rangitane o Wairarapa Rohe is east of the ridgeline of the Rimutakas



## 9.3 Stream Improvements Works Consultation

#### 9.3.1 Consultation with affected landowners – Pre-engagement July 2018

As outlined in the Pinehaven Stream Improvements Engagement Report (Appendix H), a pre-engagement process commenced in July 2018. The primary purpose of the pre-engagement exercise was to reintroduce the project and establish a connection with property owners.

The objectives of the July 2018 pre-engagement were to:

- · Reintroduce the Pinehaven Stream Improvements project to affected property owners
- Provide an update about what's happened since GWRC engaged with them about the project in 2012 on the Floodplain Management Plan (FMP)
- Invite property owners to share their thoughts about the project objectives and likely impact on their property.

The pre-engagement response was strong with 85% of property owners choosing to meet to talk about the project. The majority of property owners were supportive of the project (74%), and some with concerns (15%) and one property owner with significant project trust issues (2%).

#### 9.3.2 Ongoing Engagement – August 2018 – July 2019

Ongoing engagement with all directly affected property owners has been conducted between August 2018 – July 2019 during the Project's Investigation period. The purpose of this engagement was to introduce the selected contractor (Downer) to the affected property owners and make owners aware that the investigations work was to inform the detailed design of the project. In preparing for detailed design and consenting the project team have conducted survey and geotechnical investigations, stream bed sampling, and ecological stream reviews over the 2018/19 summer period. Some of this investigation work has occurred on private properties. The investigation work undertaken on private properties was enabled by existing property owner relationships.

#### 9.3.3 Iwi Consultation

#### 9.3.3.1 Te Atiawa Taranaki Whānui

In response to ongoing consultation, the Port Nicholson Block Settlement Trust, on behalf of Te Atiawa Taranaki Whānui, developed a position statement on the proposed works. This is included in Appendix I, and includes a list of mana whenua considerations for the project, being:

- The applicant explicitly acknowledges the relationship of Taranaki Whānui with the Pinehaven Stream as a tributary of Te Awa Kairangi in The Project consent and all other relevant documents.
- The applicant explicitly articulates within the resource consent application and other relevant and associated documents how it will support Taranaki Whānui's relationship with the Awa.
- The applicant ensures Taranaki Whānui are involved in the development of all relevant management plans.
- The applicant provides for the development and implementation of a Pinehaven Kaitiaki Monitoring Strategy (KMS) specifically noting:
  - The need by the applicant to meet reasonable costs in preparing the Kaitiaki Monitoring Strategy,
  - Each KMS will include the following, as applicable -



- *identification of tohu (attributes) and methods to monitor them;*
- identification of mahinga kai and Māori customary use and methods to monitor them;
- The applicant will provide for any reasonable costs associated with the development and implementation of the KMS
- The applicant undertakes to ensure that the mana and mouri of the stream is not negatively impacted on by the activities of the applicant
- The applicant ensures that any requirements of mitigation and or offsetting is confined as much as possible to the stream and or wider catchment
- In ensuring that the relationship with the stream and Taranaki Whānui is maintained, the applicant will support all opportunities for water quality enhancement and enabling the local and mana whenua stories of the stream to be shared
- The applicant undertakes to ensure that all conditions of consent relating to the interests of Taranaki Whānui are written with our knowledge and in collaboration.

These matters have been incorporated into the development of this Notice of Requirement and resource consent application where relevant and appropriate. Further consultation with Taranaki Whānui is planned to occur post lodgement of the application, with the provision of the latest design plans and final ecological reports completed which outline how their concerns have been addressed in the project design.

## 9.4 Engagement Outcomes

Working closely with property owners over the last year has enabled owners to gain an understanding of the likely impacts of the project on their property. From a construction impact perspective, most properties will experience minor impacts, such as temporary disruption as improvement works are being completed. However, the duration of the construction impact and exactly what access requirements will be required are shared issues for the affected Pinehaven property owners.

A common outcome of property owner engagement has been the common request for the project to remove large trees near homes, especially the ones that contain deadwood. Many of these trees are close to the stream bank and will need to be removed as part of the project.

The Project has also focused of achieving opportunities for 'betterment' of properties affected where possible, such as opportunities for improving the functionality of back yards by removing or managing overland flow, improving access and reinstating buildings and structures that need to be relocated or removed as a result of the Project.

Ongoing engagement with property owners will continue until the physical works and reinstatement are complete.



## **10.** Assessment of Environmental Effects

Consistent with section 168A(3) and Schedule 4 of the RMA, this section outlines the effects on the environment of the requirement, and how effects will be avoided, remedied and mitigated.

## 10.1 Introduction

The environmental effects of the project can be broadly separated into temporary effects (i.e. those associated with site preparation and construction) and permanent effects (i.e. those associated with the final built environment). The sections below provide an assessment of these effects, with the temporary and permanent effects identified and assessed under each topic.

The effects can also be separated into those to be authorised by the Notice of Requirement, and those authorised by the resource consents. Where it is appropriate to do so, the effects are identified as relating to the relevant authorisation mechanism. However, the project is generally considered holistically given the interrelationship and overlap between the various components of the project and the authorisation mechanisms.

The assessment of effects below considers the proposal in relation to both the notice of requirement and resource consent applications, the assessment topics relate to:

- Flood risk;
- Social effects;
- Ecology;
- Landscape and visual effects;
- Cultural values;
- Air quality; and
- Historic heritage.

In relation to the effects of the resource consents only the matters relate to:

- Stormwater and hydrology
- Erosion and scour risk of new structures; and
- Water quality.

In relation to the effects of the designation only, the matters relate to:

- Traffic and transport; and
- Noise and vibration.

In some cases the sub-topics may relate to either the notice of requirement or resource consent applications. This is noted within the assessment where it is considered relevant.

## **10.2 Positive Effects**

The proposed works have been developed over a number of years, including extensive community consultation, with the aim of assisting the management of flood risk in the catchment. The main positive effect of the project is the overall reduction in flood risk to the Pinehaven and Silverstream communities, and the corresponding benefits to their health and wellbeing. This is comprehensively assessed in section 10.3 below.

Further significant positive effects associated with the proposal include;

- Additional riparian habitat for valued flora and fauna species;
- Better integration and recognition of the Pinehaven Stream in the urban fabric of the Pinehaven area;



- Greater pedestrian connectivity and urban design benefits through changes to the extent and layout of Willow Park;
- Improved access for ongoing maintenance of the stream to manage flood risk; and
- Some stormwater filtration and moderation effects through replanted riparian areas.

Additional positive effects of the project are also identified in the more specific assessment of effects in relation to the topics below.

## 10.3 Flood risk

The project will result in positive effects for the health, safety and wellbeing of people and communities through a significant reduction of the risk of flooding in the Pinehaven catchment area following construction of the project. Following completion of works, the stream will have capacity for a 1-in-25-year flood event. In addition, 67 habitable buildings will no longer be within the modelled 1-in-100 year flood event (1% AEP) anticipated following the completion of the works as shown in Table 23 below. This is consistent with the modelling outcomes proposed in the Flood Management Plan which aimed to manage future development along with providing for the structural works to reduce flood risk of existing properties.

The management of natural hazards is a matter of national importance under section 6(f) of the Resource Management Act 1991. The effects of flood risk are considered to relate to both the Notice of Requirement and the resource consent application, given that the effects as assessed relate to the entirety of the project once constructed.

Reach	Habitable floors			Non-habitable floors <sup>15</sup>				
	Existing	Design	Difference	Existing	Design	Difference		
1-in-100	1-in-100-year (1% AEP) flood event							
1	11	6	-5	4	1	-3		
2	24	0	-24	14	0	-14		
3	45	7	-38	15	1	-14		
Total	80	13	-67	33	2	-31		

#### Table 23: Number of Properties Affected by Flooding Following Completion of the Project

Figure 26 below provides a visual comparison of the flood risk, as it shows the difference in predicted depth of flood waters following the completion of the project, with the yellow/orange areas indicating where a decrease in flood depth is predicted. This shows that most of the lower catchment area would experience a reduction in the depth of flood water during a 1% AEP event, except for the area of 48 and 50 Blue Mountains Road and 2A Freemans Way. The property at 48 Blue Mountains Road (showing >1000mm increase) has been purchased by the Greater Wellington Regional Council. The flooding effects on 50 Blue Mountains Road and 2A Freemans Way are discussed further below.

In terms of the number of properties (including commercial) affected by flooding, Table 23 shows that the project will likely result in a reduction of 98 buildings being located within the floodplain during a 1% AEP event, with 67 of these being habitable (i.e. greater than 40 square metres in area).

<sup>&</sup>lt;sup>15</sup> Buildings with a floor area of less than 40 square metres are referred to as non-habitable and buildings with a floor area of 40 square metres or more are referred to as habitable.

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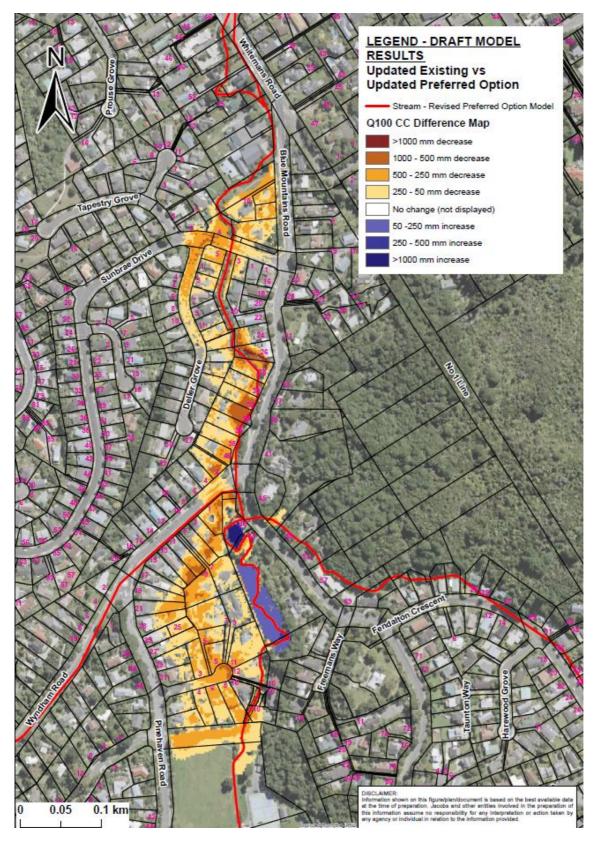


Figure 26: Difference in Flood Depth in a 1% AEP Event Following Completion of the Project

At 50 Blue Mountains Road and 2A Freemans Way, the predicted effects of the Project are an increase in the depth of flood waters within the gardens in a 1% AEP event, as shown in Figure 26 above. The increase in flood depths in the 4% AEP event are outlined in Table 24.



Address	Change in Water	Change in floodplain area		
	Minimum	Maximum	Average	
2A Freemans Way	0.09m increase	0.26m increase	0.21m increase	Nil
50 Blue Mountains Road	0.32m decrease	0.13m increase	0.01m decrease	28m <sup>2</sup> net increase

Table 24: Changes to flood depths and areas at 2A Freemans Wa	av and 50 Blue Mountains Road in the 4% AFP event
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The change in water depth on these properties is only impacting areas of existing vegetation and may change the channel morphology. Where this is occurring, localised erosion protection is being considered as shown on the General Arrangement Drawings in Appendix B.

The flood hazard assessment attached at Appendix U notes that the houses on these two properties are approximately 10 metres above the Pinehaven Stream flood plain and are not at risk of flooding. As such, in terms of the relevant objectives and policies of the RPS, Upper Hutt City Council District Plan and regional plans, the proposed works are not considered to increase the risk and consequences of flood events on these properties.

Overall, there is considered to be significant positive effects from the reduction of 98 buildings being within the 1% AEP event floodplain. This provides for improved health, safety and wellbeing of the people and communities of the Pinehaven area.

#### 10.3.1 Construction Phase

The works are proposed to begin in Reach 1 and work upstream, however final staging of works is yet to be determined. This will realise some flood mitigation benefits in the downstream area prior to completion of the whole project. This will also help to minimise any adverse effects from high rainfall events during the construction phase, as the capacity in the stream will be increased in the downstream reaches before the upstream reaches and will ensure that increased potential flows in the stream after works are completed are not constrained farther downstream resulting in overtopping of banks.

Where the construction methodology requires dry work areas of the stream or over-pumping past construction areas, construction management and mitigation methods will be implemented through construction management to avoid flooding of any adjacent properties. To ensure appropriate management practices and procedures are implemented, a Construction Management Plan is proposed to be developed, and a condition of consent is proposed in relation to this plan.

## 10.4 Stormwater and hydrology

Effects of the proposed stream improvement project on stormwater and hydrology are considered to relate to both the Notice of Requirement and the resource consent, as both the proposed physical works within the stream bed as well as the ongoing land use of the adjacent riparian area within the designation will have some influence on the effects.

The proposed works will only marginally increase the area of impermeable surfaces in the catchment (largely due to proposed changes to access arrangements), and therefore is not considered to affect the volume of flows of stormwater into the network. However; the overall stormwater and hydrology of the catchment will be affected by the increase in the capacity of the stream. As intended, this will lead to more stormwater flow contained within the stream banks during high flows from extreme rainfall events (up to a 4% AEP rainfall event), and a reduction in flooding of adjacent properties. As identified above, this is considered to be a significant positive effect on the health, safety and wellbeing for the residents and property owners within Pinehaven.



The proposed planting of the riparian margins of the Pinehaven Stream as part of the proposed works is shown on Landscape Plans in Appendix F. Riparian planting is known to moderate stormwater overland flow into streams. For the Pinehaven stream this may potentially reduce the amount of stormwater entering the stream and therefore also potentially help to reduce flooding. Given the area and location of riparian planting proposed, this effect is considered to be a minor benefit of the project, but overall is not considered to be significant in the context of the wider catchment land use and stormwater flow volume generation.

## 10.5 Water Quality

#### 10.5.1 Construction phase

The construction phase of the project may have adverse effects on the water quality of the Pinehaven stream through soil disturbance and associated stormwater runoff from earthworks, stream bed disturbance, and the discharge of dewatering water from excavations. The effects of the proposed construction of the physical works on water quality are considered to relate to the resource consent application.

#### 10.5.1.1 Planning Framework Requirements

The relevant regional plans for water quality include the operative Regional Freshwater Plan (RFP), and the Proposed Natural Resource Plan Decisions Version (PNRP). These plans include requirements for fresh water quality and the management of discharges.

The Regional Freshwater Plan includes policies for the management of freshwater for different purposes. As the Pinehaven Stream is not in a natural state, identified as a trout fishery or fish spawning waterbody, or used for contact recreation or water supply, the appropriate management is for aquatic ecosystem purposes in accordance with policy 5.2.6. As such, Appendix 8 of the RFP sets out the following requirements for discharges to the stream:

After reasonable mixing, the contaminant, either by itself or in combination with other contaminants, is not likely to cause any of the following effects:

(1) The production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials.

(2) Any conspicuous change in the colour or visual clarity.

- (3) Any emission of objectionable odour.
- (4) The rendering of freshwater unsuitable for consumption by farm animals.
- (5) Any significant adverse effects on aquatic life.

[...]

- (2) The natural temperature of the water shall not be changed by more than 3° Celsius.
- (3) The following shall not be allowed if they have an adverse effect on aquatic life: (a) Any pH change:
  - (b) Any increase in the deposition of matter on the bed of the water body or coastal water:
  - (c) Any discharge of a contaminant into the water.
- (4) The concentration of dissolved oxygen to fall below 80% of saturation concentration.
- (5) There shall be no undesirable biological growths as a result of any discharge of a contaminant into the water.

The proposed Natural Resource Plan Decisions Version includes requirements for the quality of discharges at Policy P71:

Policy P71: Quality of point source discharges to rivers

Where all of the objectives in Table 3.4 of Objective O25 are met the adverse effects of point source discharges, excluding stormwater and wastewater discharges, to rivers shall be minimised by the use of measures that result in the discharge as a minimum maintaining quality in the receiving water after the zone of reasonable mixing when measured:

(a) below the discharge point compared to above the discharge point, having particular regard to the following indicators of ecosystem health:

- (i) the Quantitative Macroinvertebrate Community Index
- (ii) pH

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(iii) water clarity

(iv) temperature

- (b) 7-day mean minimum dissolved oxygen concentration
- (c) daily minimum dissolved oxygen concentration

As set out in section 12.8 below, the minimum zone of reasonable mixing for the Pinehaven Stream would be at least 50 metres, based on the definition of 'zone of reasonable mixing' included in Chapter 2 Interpretation of the Proposed Natural Resources Plan.

A condition has been proposed for the resource consents that the trigger level for total suspended solids in the Pinehaven Stream during construction works will be assessed against a total change from upstream to downstream monitoring not exceeding a 30 % of the baseline concentration (g/m<sup>3</sup>), at the downstream sample compared to upstream samples. This percentage change is considered to be an appropriate increase limit following review of the proposed erosion and sediment control methodology provided by the project erosion and sediment control and ecology advisors.

#### 10.5.1.2 Sensitivity of the receiving environment

The stream of the lower catchment is impacted by urban land uses with less shading and existing discharges of stormwater runoff resulting in a higher impacted and less sensitive stream environment.

It is noted that the water quality investigation results provided in Warr (2007) show that the temperature of the lower catchment site ranged by 2.5 degree Celsius over the three sampling rounds. The lower catchment ranged by 0.8 pH, 8.1 NTU in terms of turbidity (approximately 162 percent), and 0.78 mg/L in terms of dissolved oxygen (approximately 7.7 percent), over the three sampling rounds in the lower catchment site.

As such, the area of proposed works is not considered to be particularly sensitive in terms of water quality, given the natural range of measured water quality parameters. Section 10.7.2 below assesses the potential effects on stream ecology.

#### 10.5.1.3 Earthworks

During site preparation, earthworks and construction, stormwater from bulk earthworks, such as those proposed for the re-contouring of Willow Park, has the potential to flow into Pinehaven Stream and contaminate surface water with sediment. This could have adverse effects on the water quality of the stream.

The proposed bulk earthworks and the disturbance of soil in riparian margins and surrounding areas will be controlled in accordance with the draft Erosion and Sediment Control Plan (ESCP) attached at Appendix W. This draft ESCP has been developed in accordance with the Erosion and Sediment Control Guidelines for the Wellington Region (GWRC, 2002), to manage and mitigate the effects of soil disturbance and erosion during construction, and minimise and sediment discharged to the Pinehaven Stream. The ESCP sets out the following measures to be implemented during construction to address potential erosion and sediment transportation:

- Temporary sheet piling alongside settlement tanks;
- Earth bunds and diversion channels;
- Decanting topsoil bunds
- Silt fencing;
- Filter socks;
- Temporary stockpiles;
- Stormwater inlet protection;
- Vehicle tracking control within the stream; and



• Site stabilisation.

Maintenance, monitoring and reporting requirements are also set out in the draft ESCP. As noted above, a trigger level for total suspended solids in the Pinehaven Stream during construction works at the downstream monitoring site of 30% change above the concentration measured at the upstream project baseline monitoring site is proposed. If this is exceeded, a stormwater management investigation will be initiated and identification of what remedial response/actions are required.

A condition has been proposed for the resource consents requiring a final ESCP to be submitted as part of the wider Construction Management Plan for the proposed works. With the management practices implemented as identified in the final ESCP, the effects on the water quality of the earthworks will be minimised as far as practicable.

#### 10.5.1.4 Stream bed disturbance and dewatering

The effect of the disturbance of the stream bed and discharges of dewatering water are specific to the resource consent applications. While it is appropriate to consider the effects together with the wider earthworks, these are not effects of the notice of requirement.

The bed of the Pinehaven Stream will be disturbed through construction activities required for the construction of flood mitigation structures located in the stream. The disturbance of the stream bed has the potential to release unconsolidated sediment into the flow of the stream, impacting water quality through increased turbidity. This in turn can impact the ecological values of stream.

The construction methodologies to be employed for the construction of the stream improvement works are to be undertaken so to minimise stream bed disturbance. As the works involve structures in the stream, there will be some necessary stream bed disturbance, and as such mitigation methods will be employed to limit sediment discharges. As identified in section 6.2 above, two construction methodologies are to be utilised to minimise stream bed disturbance, being sheet piling and piped diversion of the stream to create works areas that are separated from the active stream channel. Sediment from the construction area will be held behind the sheet pile barrier and therefore prevented from entering the flow of the stream, limiting the potential discharge of sediment or alternatively the entire active stream flow will be diverted around the works area by the piped diversion.

Any water within the worksite area will be pumped out and passed through a sediment retention device prior to being discharged to the stream. The point of discharge will also be stabilised, to avoid erosion and potential mobilisation of sediment. As such any dewatering of the instream work sites will limit the potential discharge of sediment to the stream to an acceptable level. This construction methodology will minimise as far as practicable any release of sediment from instream works.

The most significant effects of the potential release of sediment is on the ecology of the stream. As assessed in section 10.7.2.1.4 below, the effects on fish and ongoing turbidity are considered to be minor.

#### 10.5.1.5 Overall

The potential effects of the discharge of sediment from earthworks, stream bed disturbance, and the discharge of dewatering water from excavations during the construction phase of the project, will be temporary and mitigated as far as practicable through construction practices and the implementation of the ESCP, and provided mitigation measures are adequately implemented, the adverse effects are considered to be temporary.

While the sediment discharges identified above are not anticipated to be result in more than a 30% change upstream to downstream, there is the potential, particularly in the event of extreme rainfall, when sediment discharges are significant, however, any discharges would be for short durations.

In addition, Pinehaven Stream in the area of the proposed works is impacted by the historic development of the stream and urban stormwater runoff, and as such is likely to experience impacts on the existing water quality with the natural ranges of pH, turbidity and temperature at times exceeding those set out in the relevant plan



requirements for discharges. In particular, the main potential impact of construction is increased turbidity, which the stream can experience during high rainfall events, and hence there is naturally significant variation in water turbidity levels occurring within the stream.

As such the overall effects of the construction phase are considered to be no more than minor.

#### 10.5.2 Operational Phase

As noted in section 10.7.2.2.2 below, the proposed riparian planting will provide increased filtration of overland flows of stormwater into the stream. This filtration will have positive effects on water quality for the Pinehaven Stream. This effect is considered to be a benefit of the proposed works, however given the area of planting and the wider discharge of untreated stormwater from the catchment stormwater network, the overall improvement to the water quality in the stream may be limited.

## **10.6** Social effects

The social effects are considered to relate to both the notice of requirement and the resource consent application.

#### 10.6.1 Framework for Assessment

Social impacts are often referred to as the human experiences of other impacts. The International Association of Impact Assessment (IAIA) provides a range of themes for conceptualising social impacts. Table 25 below outlines the matters to be considered.

Theme	Description
People's Way of Life.	How people live, work, play and interact with one another on a day-to-day basis.
Culture	Shared beliefs, customs, values and language or dialect.
Community	Cohesion, stability, character, services and facilities.
Political Systems	Extent to which people are able to participate in decisions that affect their lives, the level of democratisation that is taking place, and the resources provided for this purpose.
Environment	Quality of the air and water people use; the availability and quality of the food they eat; the level of hazard or risk, dust and noise they are exposed to; the adequacy of sanitation, their physical safety, and their access to and control over resource.
Health and Wellbeing	The state of physical, mental, social and spiritual wellbeing.
Personal and Property Rights	Whether people are economically affected or experience personal disadvantage which may include a violation of their civil liberties.
Fears and Aspirations	Perceptions about their safety, their fears about the future of their community, and their aspirations for their future and the future of their children.

Table 25: IAIA Themes for Social Impact Assessment (Vanclay, 2003)

In terms of the themes for assessment, there are particular impacts of the proposal that because of their anticipated importance to the community and scale in relation to the proposed works, have been assessed by technical reports and summarised in other sections of the AEE. The assessment of social effects provided below therefore refers to these assessments, and where appropriate provides further assessment from a social perspective.

The three main stages when social impacts may be experienced due to the project are planning (consultation and consenting), construction, and operation. There are also a range of stakeholders and affected communities that may have an interest in and be affected by the project, including directly affected land owners, neighbours, the wider Pinehaven and Silverstream communities, and regional or national communities of interest.



The assessment has been informed by reviews of previous work undertaken for the project including the FMP, data available from public sources such as the census, and consultation undertaken with directly affected parties.

#### 10.6.2 Way of Life

The project will have limited adverse effects on the way of life of residents of the Pinehaven and Silverstream communities, as the purpose of the project is to better integrate the stream into the urban environment and reduce the effects of flooding. Some adverse effects may be experienced during the construction phase as the amenity of the area may be affected by noise and vibration, and the normal operation of the road and public transport network will be affected by space requirements. Space requirements of construction will also affect current usage of private property. The ongoing use of Willow Park will also be affected by the proposed works and resulting redevelopment of that public recreational space.

The proposed construction works will emit noise and vibration at times. Noise and vibration may affect the way of life for some residents located in close proximity to the proposed works in relation to their everyday use and enjoyment of their properties. The effects of the construction noise and proposed mitigation are assessed in section 10.12 below. These effects are considered to be a significant impact for some residents where access to property is limited for construction of works and earthworks is undertaken on properties. However the length of time these works will occur will be temporary in nature.

The construction phase of the proposed works will affect the roading network and public transport bus network for a period of time, with the effects of this assessed in section 10.10 below. Overall, these effects are temporary and considered to be acceptable.

The proposed works will result in a significant change to the Willow Park recreational area. Overall, the proposed changes to Willow Park are considered to be positive and will contribute to improved use of the recreational space.

The proposed designation extent will affect the way of life for residents of properties affected in relation to their normal everyday usage of and access to their properties. The effects of the designation are considered to be moderate, during construction and also permanent following completion of construction. The designation extent will be reduced following construction but will remain in place over some private property to allow for ongoing maintenance. The permanent designation extent will affect a landowners ability to carry out works on their land covered by the designation. The effects of the designation on residents' way of life in relation to their access to and usage of their property is addressed by the assessment of personal and property rights in section 10.6.8 below. The effects on the remaining designation boundary that will cover the operational works will likely not be significant on the community's way of life. In many instances the individual properties and wider communities lives will be improved through the provision of improved flood protection.

Overall, the way of life of residents in the Pinehaven and Silverstream communities is considered to be positively affected by the proposed works, as the project will result in a lower risk of flooding for most properties. The potential effects of high rainfall events on peoples' way of life through flooding include temporary or permanent displacement and loss of property. These potential effects will be reduced through the implementation of the proposed works.

#### 10.6.3 Cultural values

The effects of the project on cultural values are assessed in section 10.9 below. Overall, the effects of the project on cultural values is considered to no more than minor.

#### 10.6.4 Community

The proposed works and the associated designation are not considered to significantly adversely impact the cohesion, stability, or character of the community, or the services and facilities available within the community. There will be some temporary restriction of access to Willow Park and Pinehaven reserves and the potential for



the short term relocation of a small number of households during construction works. However, given the anticipated short construction duration, this is not expected to lead to any lasting community effects.

As three GWRC owned dwellings are to be removed, this will reduce the overall availability of rental accommodation and displace the current residents. However, given the number of dwellings in the catchment and the availability of other rental accommodation, this is considered to be acceptable.

The proposed works are not considered to result in any additional severance of the community, as the works will occur within and adjacent to the stream. They will also not remove any public access across the stream that currently exists.

Positive effects for community cohesion may be realised by the redevelopment and expansion of Willow Park, while acknowledging that the trees to be removed from the park do currently add to the overall character of the community. However, the proposed riparian planting will assist to remedy and mitigate this loss.

In the long term, the completion of the project may also positively benefit social cohesion and stability by assisting in the avoidance of the impacts of flood events. Flood events could lead to displacement of affected households with associated economic and lifestyle effects for those people, with the scale of this displacement dependant on the flood event experienced. As noted in section 10.3 above, the proposed works will reduce the number of buildings within in a 1% AEP event floodplain by 67 habitable floors and 31 non-habitable floors, and therefore also reduce the potential number of households affected by displacement during a flood event.

#### 10.6.5 Political Systems

As detailed in section 9.2, the development of the Pinehaven Stream FMP included significant community consultation, including submissions and a hearing. The changes to the District Plan progressed through PC42 also went through a full RMA Schedule 1 public consultation process. These processes have therefore provided opportunities for people within the Pinehaven, Silverstream and wider communities to participate in the decision-making processes leading to, and associated with, the development of the proposed works.

This notice of requirement rand resource consent application requests full public notification in section 12.2. This will allow submissions to be made, and anyone wishing to be heard to attend and present at a hearing, and therefore adequately participate in the decision making process.

#### 10.6.6 Environment

The effects on the natural environment are largely assessed in detail in other sections of this report:

- Air quality and dust section 10.11;
- Water quality section 10.5;
- Level of hazard or risk section 10.3;
- Noise section 10.12.

The adverse social effects of these matters will predominantly be limited to the temporary construction period, with potential noise and dust effects on adjacent property owners. As assessed in the relevant sections, these matters are to be addressed through appropriate management and mitigation measures. With no significant recreational or cultural values associated with the stream, temporary effects on water quality are not considered to have significant social effects.

The effects on physical safety are considered to include the potential effects of flooding, which is addressed in section 10.3. In relation to the physical safety of people during the construction phase, this will be addressed through the CMP. This will include measures to address potential safety concerns such as fencing of the works areas and traffic management. The physical safety of people during the operational phase has been considered through the criteria used for the design of the proposed works.



#### 10.6.7 Health and Wellbeing

The proposed works are considered to positively impact the health and wellbeing of the people and communities of Pinehaven and Silverstream through the reduction in the flood risk in the catchment. There will also be temporary negative health and wellbeing effects generated by construction of the works.

The flood risk currently identified in the Pinehaven catchment has potential effects for the health and wellbeing of people and communities. These risks include the risk of physical harm to people during a flood event, and any consequent primary mental and social wellbeing effects, as well as wider secondary mental and social wellbeing effects flooding could create. The Canterbury Earthquake Sequence (CES) has provided knowledge on the social effects of natural hazard events on the health and wellbeing of people. Natural hazard events, such as flooding, include primary stressors, such as temporary or permanent displacement and loss of property, as well as secondary stressors such as insurance issues. These stressors can significantly negatively impact the wellbeing of people and communities for significant periods of time after the actual event. The reduction in the flood risk in the catchment is therefore considered to positively impact the health and wellbeing of the people and communities of the Pinehaven catchment, through the reduction in potential negative impacts of flooding.

The construction phase of the project may have adverse impacts on the health and wellbeing of people through effects such as noise, vibration and dust. These effects will be temporary, and will be minimised as much as practicable through the construction management plans.

Overall therefore, it is considered that the project, will have positive effects on the health and wellbeing of the Pinehaven and Silverstream communities.

#### 10.6.8 Personal and Property Rights

The effects on personal and property rights relate to the notice of requirement for designation.

The properties affected by the proposed designation are identified in Appendix G, with 41 properties directly affected by the proposed designation extent (and excluding those properties affected by the Sunbrae and Pinehaven culvert upgrades and currently owned by GWRC).

Works are intended to be undertaken on private land under section 181 of the Local Government Act 2002 as set out below:

#### 181 Construction of works on private land

(1) A local authority may construct works on or under private land or under a building on private land that it considers necessary for—

[...]

(d) land drainage and rivers clearance.

(2) A territorial authority may construct works on or under private land or under a building on private land that it considers necessary for sewage and stormwater drainage.

(3) A local authority or a territorial authority, as the case may be, must not exercise the power in subsection (1) or subsection (2) unless it has—

(a) the prior written consent of the owner of the land to the construction of the work; or

(b) complied with the requirements of Schedule 12.

(4) A local authority may enter the land to inspect, alter, renew, repair, or clean any work constructed under this section or under the corresponding provision of a former Act.

(5) The power in subsection (4) must not be exercised without first giving reasonable notice of the intention to enter the land to the owner and occupier (if any).

(6) This section applies subject to the Public Works Act 1981 as to compensation for injurious affection to land.

If required, rights to access designated land and carry out works will be agreed with the landowner wherever possible.



If agreement is not achievable with property owners, property may be accessed using the process under Schedule 12 of the Local Government Act 2002, with compensation for injurious affection being available under the Public Works Act 1981.

#### 10.6.8.1 Temporary construction effects

#### 10.6.8.1.1 Access, use amenity of private property

The area of private properties covered by the designation will be temporarily affected during the construction phase of the project. This will include access to and across the designated area by contractors and equipment. During construction the designation area may require perimeter fencing for health and safety. The relevant property owner (and all other members of the public) will therefore be excluded from the construction designation for the period of works. The period of works will vary for the various components, so the exclusion from the designation area may not be for the total construction period. In addition, as identified in section 10.6.8.1.2 below, there will also be a temporary effect on the amenity of these properties during the construction period.

#### 10.6.8.1.2 Limitation of access to private properties

The properties which have private access bridges across the Pinehaven Stream are identified in Table 9. Access to these properties during the replacement of these private vehicle bridges will be restricted to pedestrian access only. In some cases, special access requirements may be required, or temporary relocation of households while the access is restricted. Private access bridges are each anticipated to take two weeks to replace. Therefore, with special access requirements and temporary relocation of some households where necessary, the effects of this will be limited as far as practicable.

#### 10.6.8.2 Long term operational effects

Following the construction period, the area of the designation will reduce to the operational extent. The designation will be uplifted over the areas that are not required for the long term operation, maintenance and mitigation of effects of the project under section 182 of the RMA, as proposed in the Notice of Requirement conditions in section 11. For some properties there will likely be a significant difference between the original designation extent and the reduced operational designation extent, while for others there will be little or no difference.

Three properties significantly affected by the proposed works have already been purchased by the Regional Council, being 4 Sunbrae Drive, and 28 and 48 Blue Mountains Road.

#### 10.6.9 Fears and Aspirations

The fears and aspirations of the Pinehaven community and the wider Upper Hutt community have been expressed through various consultation processes and subsequently articulated in public documents. The consultation undertaken with land owners affected by the project has also provided relevant information in relation to the project.

#### 10.6.9.1 Pinehaven Stream FMP

The project has been developed through the Pinehaven Stream FMP process which included significant community consultation, including a submissions and hearing process. The proposed works directly respond to the fears of the Pinehaven community in relation to flooding, and the aspirations for a reduction in the risk of flooding from the stream, expressed during the consultation for the Pinehaven Stream FMP.

The key principles drawn from community consultation were outlined in the FMP, with the relevant principles set out in section 2.2 above. The FMP included a vision, supported by goals and objectives (as set out in section 2.2) which respond to these principles.



As the project is giving effect to the structural methods set out in the FMP, it is considered to positively contribute to the achievement of the relevant goals and objectives of that document.

#### 10.6.9.2 Upper Hutt City Vision

The 'City Vision' for Upper Hutt city was developed in 2012 following extensive public consultation, and updated in the Long Term Plan 2015 – 2025 to reflect community values (UHCC, 2015). The City Vision sets out five strategic priority areas and related aspirations, as set out in Figure 27 below.



#### Figure 27: Upper Hutt City Vision

The priority areas of most relevance to the project are Environment and Infrastructure. The Upper Hutt Land Use Strategy 2016 – 2043 (LUS) includes goals related to each City Vision priority area. These priority areas and associated goals are taken as a high level indication of the aspirations of the Upper Hutt community. Table 26 below provides an assessment of the project against these priority areas and associated goals.

Table 26: Assessment of the Pro	piect against relevant communit	v aspirations and challenges
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City Vision Priority	Land Use Strategy Goals	Assessment
Environment	<ul> <li>To preserve and enhance the quality of our natural environment</li> <li>To maintain and enhance our open space network</li> </ul>	The environmental quality of the Pinehaven Stream will be increased overall through the proposed works as the type and design of the works will likely increase ecological values as a result of improved riparian vegetation and canopy cover. The open space network in Pinehaven will be enhanced through the proposed works. In particular, Willow Park will be landscaped, and provide better pedestrian connection and usability.
Infrastructure	<ul> <li>Promote connected and efficient movement networks</li> <li>Support efficient use and development of resilient infrastructure networks.</li> </ul>	The effects of the proposed works on the transport network will be temporary. Works within Willow Park will provide improved pedestrian connectivity. The proposed works will increase the resilience of the stormwater network in the Pinehaven area through replacement of existing assets and increased capacity. In addition, the roading network will be more resilient to high rainfall events.



The proposed project will therefore contribute to the achievement of the aspirations of the community as expressed through the City Vision and LUS goals.

#### 10.6.9.3 District Plan

The Upper Hutt District Plan includes objectives which express aspirations of the community. The relevant objectives are assessed in Appendix R.

#### 10.6.10 Summary

Overall, the social effects of the proposed project are:

- Positive effects on the continuance of the way of life of residents as the proposed works will result in a reduced risk of flooding while having some potential negative effects during construction;
- Negligible effects of the project on cultural values and political aspects;
- Potentially positive benefits for social cohesion and stability through a reduction in properties likely to be impacted in a flood event and subsequent resident displacement or dislocation;
- Significant positive effects on the health and wellbeing of residents in the long term through the provision of an upgraded Council reserve at Willow Park;
- Significant effects on personal and property rights due to the need for access to and use of private property for the proposed works;
- Positive impacts on the achievement of the aspirations of the community in terms of reducing flood risk.

The project is therefore on the whole considered to have positive social effects; however, the effects on personal and property rights are considered to be moderate for the landowners directly affected by the proposed designation to which this notice of requirement relates.

## 10.7 Ecology

Technical reports providing an assessment of the effects of the project on ecological matters is attached at Appendix S. The main findings of this assessment are summarised in the following sections.

#### **10.7.1** Terrestrial Ecology

#### 10.7.1.1 Flora

A number of trees are proposed to be removed due to the stream widening works. These are identified spatially on the maps attached at Appendix C. Table 27 below provides information on the trees to be removed (individual and clusters).

Tree #	Address	Species
14	4 Blue Mountains Road	Kowhai
15	4 Sunbrae Dr	Kowhai (x6)
16	14 Blue Mountains Road	Black Beech
20	13 Deller Gr	Kowhai
23	Reserve on cnr Pinehaven Rd/Blue Mountains Rd	Black Beech

#### Table 27: Trees to be Removed



Tree #	Address	Species
24	48 Blue Mountains Road	Kahikitea and Kowhai
35	12 Birch Grove	Black Beech

13 individual canopy and sub-canopy trees will be removed. Trees identified as numbers 2, 4, 6, 10, and 21 - 29 have been assessed as having 'significant indigenous biodiversity values' in terms of Policy 23 of the RPS. Only two of these trees will be removed. None of the trees to be removed are identified as a Notable Tree in terms of the District Plan.

The options assessment undertaken during preliminary design identified areas where the design of the works could avoid effects on significant trees. The FMP originally proposed improvement works widening the stream through 48 Blue Mountains Road. The proposed channel has now been able to be amended to provide for more storage of water and retention of trees on the property with the proposed removal of the house at 48 Blue Mountains Road. The removal of stream widening from the bypass to 48 Whitemans Road has also enabled a significant number of trees to be retained. Where significant trees do need to be removed an offset mitigation ratio has been recommended. This ratio is:

- Kowhai 3:1
- Black beech 10:1
- Kahikatea 5:1.

Given the relative abundance of trees within Pinehaven and specifically the area of the proposed works, the degree of vegetation loss proposed has been assessed as a minor adverse ecological effect.

In addition, the vegetation loss will be mitigated over time by the proposed landscape planting as set out in Appendix F. This includes a significant number of proposed specimen trees to be planted in the vicinity of the stream. As such the long term effect is considered to be positive.

#### 10.7.1.2 Fauna

#### 10.7.1.2.1 Avifauna

Effects on avifauna are assessed in the avian effects report included within Appendix S. Some vegetation that is useful bird habitat will be removed due to the works. Loss of the mature native trees will lead to the loss of feeding, roosting and possibly breeding habitat for native (and exotic) birds. The removal of willow trees, especially at Willow Park, will result in a reduction of a specific seasonal feeding source for several native bird species.

Gaps created by tree removal in the mostly intact wooded corridor along the Pinehaven Stream are not anticipated to create a barrier to the movement of native birds present in the catchment. There may be some impact on the movement of some native insects and reptiles.

Overall, the degree of bird habitat loss due to the proposed works is assessed as a minor adverse ecological effect. The proposed landscape planting, including a number of specimen trees, is considered to be readily able to mitigate these effects over time.

#### 10.7.1.2.2 Lizards

There are only a small number of lizard records from Pinehaven. Shaded riparian habitat, as found in the project area, is not generally favourable habitat for lizards. The potential adverse ecological effects of the proposed works on lizards is therefore considered to be very minor.



#### 10.7.1.2.3 Bats

There are no records of bat species present within Pinehaven and favourable bat habitat within the Pinehaven catchment is very restricted in extent. The potential adverse ecological impact from the proposed works on bats is therefore considered to be less than minor.

#### 10.7.1.3 Construction Phase

The proposed works including channel widening and secondary flow path construction will significantly disturb the current riparian environment, which will impact on ecosystem functioning in this environment. This disturbance will be temporary and is considered to be a minor adverse effect.

#### 10.7.2 Freshwater Ecology

#### 10.7.2.1 Construction Phase

Construction phase effects on freshwater ecology relate to disturbance of the stream bed and riparian area required for stream widening and demolition and installation of structures. Disturbance to the stream bed during construction will be minimised as far as practicable. Mitigation during construction works which will reduce the effects on ecological values will include:

- Off-site construction of structures where possible;
- Private bridges installed by crane;
- Dry sites established by sheet piling and piped diversion to allow works to occur in the dry; and
- Dry site areas fished out prior to establishment.

The construction phase activities which may reduce ecological values of the stream are summarised below.

#### 10.7.2.1.1 Disturbance during channel widening.

Fish species are expected to leave the area of works. However, prior to works commencing within each stage, fish relocation will occur of the stream. Displacement or mortality of fish may occur during instream and riparian works, which is expected to have localised reduction in ecological value that will recover following the works with sufficient mitigation as proposed in section 10.7.2.1.6 below.

10.7.2.1.2 Short-term interruption of fish passage.

Few fish species were found during the fish study undertaken in Pinehaven Stream; however, three species found in the stream are migratory, so the maintenance of fish passage will be important for any works in the stream.

However, migration and spawning periods of fish and waikoura in the project area cover the entire calendar year (refer to Table 10 of the Freshwater Ecology report in Appendix S). This means that spawning seasons cannot be avoided. To minimise the risk of high flows from rainfall events disrupting construction and potentially mobilising fine sediments from construction, from a freshwater ecology perspective the works should be completed as quickly as possible and to occur during suitable flow levels no matter the timing. This is because the faster the works can be completed, the faster the project area can begin recovering.

For areas of the project where two thirds of the stream width will be maintained fish passage will be adequately provided, with the increased depths and velocities associated with narrowing the channel are not expected to prevent fish passage in these areas.

Where damming of flows is required, this is expected to be short in duration and therefore expected to have negligible impact with respect to fish passage disruption. Opportunities to reduce the duration of the damming



will also be considered and implemented through the CMP. If works are required to occur in periods of migration, manual trap and transfer will be undertaken.

#### 10.7.2.1.3 Flow diversions during channel works to provide a dry site.

Short periods of stream damming and use of diversion pipes and pumping will be required to create dry work sites. Because of the possibility of fish and macroinvertebrates being present, fish relocation will be required to be undertaken. Recovery of macroinvertebrates is expected to occur on completion of the works through migration from unmodified upstream areas and by providing habitat reinstatement, eg. reinstating all pools within the stream bed. The proposed construction sequence from the lower catchment and working upstream, will help to mitigate effects by allowing disturbed species upstream to drift to the lower completed sections.

#### 10.7.2.1.4 Sedimentation and water quality impacts from works.

A number of macroinvertebrate species sensitive to sedimentation are present in the Pinehaven Stream. Sedimentation from construction works has the potential to smother stream substrate habitats and displace sensitive macroinvertebrate species.

Sedimentation may occur during construction, but it is expected to be short duration. During rain events there is a risk of disturbed sediments being washed downstream and smothering habitat. Sediment during such events is expected to disperse quickly because of the steepness of the stream and high velocity flows; however, there is a risk of smothering fauna outside of the works site. As the duration of sedimentation is short, it is expected that effects on fish and ongoing turbidity will be negligible.

The implementation of the Erosion and Sediment Control Plan attached at Appendix W includes procedures to appropriately minimise risk of and effects from sedimentation.

#### 10.7.2.1.5 Loss of riparian vegetation during bank construction.

The current riparian vegetation is not of high ecological value beyond the shading provided to the stream and some filtration of runoff in areas where the margin is wider. Loss of riparian plants during construction will result in exposed soils and reduced shading. Stabilisation to prevent erosion is to be implemented through the ESCP. Shading is anticipated to be provided from remaining trees and topography. The loss of riparian vegetation during construction is therefore not expected to have a significant effect on the stream's ecological value during this time.

The removal of trees required for the implementation of the works does reduce the SEV score during construction. However, planting as proposed in the landscape plans attached at Appendix F will increase tree numbers adjacent to the stream.

#### 10.7.2.1.6 Mitigation

Following the assessment above, it is considered the mitigation required during construction with respect to freshwater ecological values includes:

- Fish relocation from sites disturbed by works;
- Maintaining and improving fish passage;
- Monitoring of fine sediment;
- Habitat reinstatement;
- Sequenced works from downstream to upstream;
- Stockpiling of material out of the stream channel as much as possible;



- Protecting exposed sediments from erosion during rainfall events; and
- Implementation of the ESCP.

#### 10.7.2.1.7 Construction Phase Summary

During construction the key effects which have the potential to reduce ecological value if not managed are associated with disturbance of the stream channel and flow damming or diversions, through displacement of fish and macroinvertebrate species. With the mitigation set out in section 10.7.2.1.6 it is expected that ecological values would be reduced during construction but the adverse effects are considered to be localised and recoverable over a relatively short period of time.

#### 10.7.2.2 Operational Phase

The operational phase of the project will have both positive and negative effects on freshwater ecology in the Pinehaven Stream. These effects are in relation to shading, riparian margins and runoff filtration, flow heterogeneity, and fish barrier removal.

#### 10.7.2.2.1 Reduced shading

The removal of trees to provide for the proposed works is not expected to have measurable adverse effects on stream shading due to the surrounding topography and remaining trees. Shading of the channel will initially be reduced as the replanted riparian areas will require time to establish. Shading will increase as newly planted trees mature and provide canopy cover. Overhanging shade cover will be provided in the interim from the riparian planting. The planting plan attached at Appendix F uses selected riparian species to increase shading over time.

#### 10.7.2.2.2 Increased riparian margin & filtration

It is expected that the landscape planting plan attached at Appendix F and required to be certified pursuant to conditions, will provide increased riparian cover, resulting in greater shading and filtration of overland flows. Leaf matter and debris in the riparian zone is also expected to provided food supply to macroinvertebrates. Where banks are to be constructed with planting in place, bare soils will be present in some areas for a time. A natural stabiliser will be applied to prevent the risk of sediment runoff into the stream.

#### 10.7.2.2.3 Modified riparian area

Modification to the riparian zone will include naturalisation with improved planting on the stream banks. The planting will encourage an increase of ecological values.

The proposed works will result in a reduction in artificial banks along the stream. Where retaining walls are required, methods of providing riparian habitat and shade to the stream channel have been investigated and included which have positive effects for the ecology of the stream. This includes stepped retaining with planting within the terraces, and dry planted banks between the low flow channel and retaining walls to create riparian habitat, increasing filtration and shading. Terrestrial species will be attracted to these areas, benefitting macroinvertebrate and fish fauna within the stream.

#### 10.7.2.2.4 Improved flow heterogeneity

Current flow heterogeneity within the stream has been assessed as moderate, with the straightened sections of channel reducing opportunities for meanders and other hydraulic features.

Detailed design of the works will allow consideration of increasing flow heterogeneity through providing riffle, run and pool habitat types. This would encourage species diversity within the catchment through provision of refuge from predators and favourable habitat for spawning. Overall ecological values would increase with greater flow heterogeneity.



#### 10.7.2.2.5 Removal of fish barriers

A number of possible fish passage barriers currently exist in the stream which are expected to be able to be removed or replaced, including stepped concrete weirs and a large box culvert on Pinehaven Road.

The Pinehaven Road concrete box culvert is a possible barrier as flows are shallow and spread across the base of the culvert. The weirs will be investigated during detailed design as to whether removal or reinstatement preferable in terms of potential adverse effects. Downstream of the project area a partial fish barrier exists at the confluence of Pinehaven Stream and Hulls Creek. To maximise the benefits of the project and compensate to some extent for the ecological disturbance of the project it is proposed that this barrier be remediated.

#### 10.7.2.2.6 Additional Mitigation

The following additional mitigation is suggested to ensure the effects expected are achieved:

- Riparian planting and tree maintenance; and
- A stabiliser for bare sediment should be installed for the period of riparian vegetation to be established, such as coconut matting or other biodegradable product. This mitigation is provided for in the draft Erosion and Sediment Control Plan.

#### 10.7.2.2.7 Operational Phase Summary

Following completion of construction effects are expected to be positive through an increase in ecological value of the watercourse due to the proposed design that will increase riparian cover and naturalise stream banks where possible.

#### 10.7.2.3 Freshwater Ecology Effects Summary

The assessment of effects on freshwater ecology identifies that many of the effects are associated with the construction phase. Mitigation is required to reduce the effects, including fish relocation, timing of works, removal of fish barriers and management of soil disturbance. With the proposed mitigation, the effects are considered to be short term, localised and minor in significance.

Once in operation, ecological values of the stream are expected to increase as a result of improved riparian vegetation and canopy cover, provision of fish passage and riparian habitat reinstatement. Maintenance of the riparian vegetation will be important to prevent weed dominance or undesirable plants from establishing, and to ensure the anticipated positive effects on ecological values are achieved.

#### 10.7.3 Summary

The proposed works are considered to have the following adverse effects on the environment in terms of ecology:

- The removal of trees and other vegetation has been assessed as a minor adverse ecological effect on terrestrial ecology. Bird habitat loss has been assessed as a minor adverse ecological effect, with effects on lizards and bats being less than minor. The vegetation and habitat loss will be mitigated over time by the proposed landscape planting;
- During construction, channel widening and secondary flowpath works will temporarily disturb the current riparian environment which is considered to have minor adverse effects on terrestrial ecology.
- In terms of freshwater ecology, many effects are associated with the construction phase. Mitigation is required to reduce the effects to acceptable levels, including fish relocation, habitat reinstatement and management of soil disturbance. With the proposed mitigation, the effects are considered to be short term, localised and minor in significance.



 Once in operation, ecological values of the stream are expected to increase as a result of improved riparian vegetation and canopy cover.

Overall the proposed works are considered to have positive effects on ecological values of the stream during operation and minor adverse effects during construction.

## **10.8** Visual and Landscape

The effects of the proposed works on urban amenity and design are considered to relate to both the Notice of Requirement and resource consent application.

A technical report providing assessment of the visual and landscape effects of the proposal is attached at Appendix V. The sections below provide a summary of that assessment. The visual and landscape effects relate to both the Notice of Requirement and resource consent applications.

The assessment takes into account the avoidance or mitigation of potential effects proposed as part of the project including the retention of identified significant trees where possible, the proposed riparian planting as set out in the landscape plans attached at Appendix F, and the proposed redevelopment of Willow Park.

Additional mitigation proposed includes the planting to occur at the first available planting season following completion of the works.

#### 10.8.1 Landscape Values and Character

Landscape values and character are defined in the New Zealand Institute of Landscape Architects (NZILA) 'Best Practice Note - Landscape Assessment and Sustainable Management 10.1' as:

- Landscape character is a distinctive combination of landscape attributes that give an area its identity.
- **Landscape value** derives from the importance that people and communities, including tangata whenua, attach to particular landscapes and landscape attributes.

The effects of the proposed works on landscape values are considered to relate primarily to the loss of vegetation. A number of trees are proposed to be removed including some well-established native trees. Due to the scale of the proposed works, the retention of trees where possible, and the proposed riparian planting results in effects that are considered to be short term and therefore minor. These effects will reduce once planting becomes established, to a less than minor level of significance and outlined in Table 28.

The quality of the receiving environment is mixed with areas of well-established native vegetation but also areas where there is a high level of modification and infestation of weeds species. The proposed works will result in some loss of vegetation and modification of stream banks.

Landscape Character / Element	Sensitivity of Change	Magnitude of Change	Effect (before mitigation)	Residual Effect (after mitigation)
Character	Medium	Moderate	Minor	Less than Minor
Topography	Low	Low	Less than Minor	Less than Minor
Vegetation	Medium	Moderate	Moderate adverse	Less than Minor
Waterways	Medium	Moderate	Moderate adverse	Less than Minor
Built Structures	Low	Moderate	Minor	Less than Minor

#### Table 28: Landscape Effects Summary

It is considered that the proposed landscape works combined with the engineering works will improve the amenity of the corridor over time, but there will be short term effects when vegetation is initially removed, and before new plantings become established.



Therefore, as summarised in Table 28 above, the effects on landscape character and landscape elements along the alignment of the stream from localised vegetation clearance, earthworks and removal of three dwellings are considered overall to be minor prior to mitigation measures, and less than minor following mitigation.

#### 10.8.2 Visual Effects

The assessment of visual effects identified nine viewpoints along the alignment of the stream considered to be representative. Visually sensitive receptors (VSRs) were identified in relation to these viewpoints as set out in Table 3 of Appendix V, along with their distance from the proposed works and the type of view (open, partial or screened). The existing view of the stream was described for each. The sensitivity of each VSR was identified, along with the magnitude of the change that will be experienced due to the proposed works.

From this analysis, the magnitude of the effects prior to mitigation was identified, ranging from unacceptable to less than minor. The effects following the proposed mitigation measures were then determined as set out in Table 3 of Appendix V, which concluded the following:

- Moderate adverse effects will be experienced by:
  - some residents of Whitemans Road and Clinker Grove in relation to the viewpoint at 52 Whitemans road looking west;
  - o the residents of 26 Blue Mountains Road at the Sunbrae Drive viewpoint looking west; and
  - o residents at 10 and 12 Birch Grove at the Pinehaven Reserve viewpoint looking north.
- Minor adverse effects will be experienced by the residents of 30-38 Blue Mountains Road;
- All other effects are less than minor or indiscernible.

Therefore, there are expected to be some minor and moderate adverse visual effects of the proposed work on some residents.

#### 10.8.3 Summary

The assessment of landscape and visual effects of the proposed works concludes that the proposal will have less than minor effects. There will be short term effects when vegetation is initially removed; however, the proposed landscape works combined with the engineering works will improve the amenity of the corridor over time.

In terms of visual effects, a number of properties will experience significant adverse effects during construction due to the loss of vegetation and significant encroachment on to the properties. With mitigation, the residual effects will overall reduce to more than minor once vegetation is established, but there will still be some loss of land. All other residual visual effects are minor or less than minor.

## **10.9 Cultural Values**

As noted in sections 2.2 and 9.2.8 above, engagement with relevant iwi groups occurred during the development of the Pinehaven Stream FMP. Further engagement has since occurred, as detailed in Section 9 of this report.

The position statement provided by the Port Nicholson Block Settlement Trust, on behalf of Te Atiawa Taranaki Whānui, on the project states that:

The 'Te Pinehaven Stream Improvements' (The Project) presents a situation where the applicant is making a significant effort to return the Pinehaven Stream back to its more natural state.



# The applicant explicitly articulates within the resource consent application and other relevant documents how it will support Taranaki Whānui's relationship with the Awa

As requested through the position statement, a condition of consent has been proposed in section 11 for the preparation of a Pinehaven Kaitiaki Monitoring Strategy (PKMS) for the construction works, to be implemented during the construction phase of the project. The purpose of the PKMS is to ensure that the potential effects of construction to the mana and mouri of the stream within and downstream of the construction area are appropriately managed and mitigated.

Neither the Regional Freshwater Plan nor the proposed Natural Resources Plan identify any cultural associations with the Pinehaven Stream, or surrounding environment.

The effects of the proposed works on any potential cultural values are considered to be no more than minor.

## 10.10 Traffic and Transport

The potential effects on traffic and transport due to the project are limited to the construction phase, when effects may be generated through increased traffic on the road network, traffic movements into and from the construction site or the use of road space for construction vehicles or equipment. The effects on traffic and transport relate to the Notice of Requirement for the works as this is generally a land use matter.

The potential construction traffic effects of the proposal will be mitigated by traffic management procedures to be included within the CMP through a Traffic Management Plan to be developed for the proposed works. The Traffic Management Plan will be approved by an appropriate person with a Site Traffic Management Supervisor (STMS) qualification and with delegation from UHCC. A condition of consent has been proposed in section 11 to address the inclusion of traffic management in the CMP.

#### 10.10.1 Construction Traffic

Effects of construction traffic may arise from heavy vehicle movements along the road network, and heavy vehicles and other vehicles using construction site entry and exit crossings. Heavy vehicles will be required for earthwork and demolition activities and the delivery and positioning of large structural components and could affect road users, including vehicles (private and public), cyclists and pedestrians.

Given the relatively small scale of many of the individual components of the works, and their dispersed linear nature along the stream corridor, the works are not considered to be particularly large in scale at any one point. In addition, the works are proposed to be undertaken in stages over the course of approximately 70 months to two years, moving up or down the stream as each area is completed. This will limit the level of construction traffic generated by the project at any one time, with the traffic generation being spread out over the course of the proposed works. The works will require access from:

- Whitemans Road: The properties at 50 Whitemans Road;
- Clinker Grove: The property at 15 Clinker Grove;
- Blue Mountains Road: The properties at 8, 20, 28, 38, 48 Blue Mountains Road, Willow Park
- Sunbrae Drive: The property 4 Sunbrae Drive; and
- Birch Grove: The properties at 10A and 12 Birch Grove.

The actual numbers, frequencies, routes and timing of construction traffic movements will be detailed in the CMP for the project as a condition of the notice of requirement.

The surrounding road network provides a potential route that avoids the commercial centre of Silverstream and therefore avoids potential conflicts with the higher traffic volumes in that are generated by the commercial land



uses. The identification of Blue Mountains Road as Collector / Local Distributor Route means that generally this road is expected to carry higher volumes of traffic than the surrounding local roads.

In terms of construction vehicle entry and exit crossings and heavy vehicle routes to and from the site, these will be appropriately controlled through the traffic management planning component of the CMP. A community communication strategy will be developed to ensure the key messages about potential temporary construction effects such as noise and traffic, and the project programme timeline, are well understood. These measures will seek to minimise adverse effects on other road users as much as possible.

For these reasons, the construction traffic effects in terms of heavy vehicle movements on the road network are considered to be no more than minor.

#### 10.10.2 Use of Road Space

Road space will be utilised for the channel works for the area adjacent to Blue Mountains Road within the property at 4 and 8 Blue Mountains Road. This will be subject to the traffic management component of the CTMP, which includes measures to avoid road closures, and to avoid the restriction of vehicle, cycle and pedestrian movements. It is anticipated that the construction will only require the use of the northbound lane. The use of road space is not considered to have any greater impact than normal road work activities that often occur within road reserve areas.

#### 10.10.3 Summary

The traffic and transport effects of the proposed works are considered to be consistent with small scale civil construction works, and while they may pose some inconvenience to residents during the construction period, the effects will generally be considered acceptable given the necessity of the works and the implementation of traffic management practices to minimise effects as far as practicable and to maintain access to private properties.

## 10.11 Air quality

The potential effects on air quality due to the project are limited to the construction phase, when adverse environmental effects may be experienced due to the emission of dust from unconsolidated surfaces during earthworks. As the potential effects on air quality relate to a land use matter (earthworks) controlled by both regional councils and territorial authorities these are considered to relate to both the Notice of Requirement and regional resource consents. This is a potential issue due to the close proximity of the residential land uses to the area of works, and other sensitive receptors such as the school.

Dust from earthworks areas will be controlled through normal dust mitigation methods such as:

- Water cart(s) used to dampen exposed surfaces
- Road sweeper/vacuum loading truck(s) remove dust from site access areas
- Geotechnical fabrics stabilise exposed surfaces
- Straw mulch stabilise exposed surfaces

Construction management practices will also be implemented through the Dust Management Plan (DMP) which will minimise the potential for dust effects to be generated, such as controlling stockpiles, limiting the extent of exposed surfaces, avoiding spillages from vehicles, and taking account of weather conditions. A proposed condition of consent is included at section 11 for dust generated during construction to not cause an offensive or objectionable effect at any point beyond the designation boundary, and the preparation of a dust management plan as part of the wider CMP.



Because of the relatively modest scale of earthworks and exposed surfaces anticipated during the works, it is considered the potential generation of dust will be able to be appropriately controlled through standard dust mitigation measures to be implemented through the CMP and will have less than minor adverse effects.

## 10.12 Noise and vibration

The construction phase of the project will likely have noise effects on the surrounding environment due to the close proximity of residential dwellings to the area of works. The sections below provide an overview of the relevant criteria, noise generating activities, actual and potential effects and proposed mitigation. Noise and vibration are a land use matter controlled by the District Plan, and therefore relate to the Notice of Requirement.

#### 10.12.1 RMA Sections 16 and 17

Section 16 of the RMA is relevant to the assessment of potential noise effects, and states that:

every occupier of land (including any coastal marine area) and every person carrying out an activity in, on, or under a water body... shall adopt the best practicable option to ensure that the emission of noise from that land or water does not exceed a reasonable level.

In addition, section 17(1) states that every person has a duty to avoid, remedy or mitigate any adverse effect on the environment arising from an activity, whether the activity is in accordance with a rule in a plan, a resource consent or relevant sections of the RMA.

There is therefore a clear requirement under sections 16 and 17 to adopt the best practicable option to ensure noise from the proposed works does not exceed a reasonable level.

#### 10.12.2 Assessment Criteria

#### 10.12.2.1 Noise

The relevant noise assessment criteria are considered to be set out in the Upper Hutt District Plan and the New Zealand Standards in NZS 6803: 1999 Acoustics – Construction Noise.

The Upper Hutt District Plan includes a specific rule addressing limits for noise from construction and demolition activities, which applies district wide. The District Plan also includes rules setting out noise limits specific to certain zones for all other activities not associated with construction or demolition activities. These rules set different temporally based limits on noise. The relevant construction noise limits are contained in Chapter 32 and are presented in Table 29 below.

#### Table 29: Upper Hutt District Plan Noise Limits - construction and demolition

Rule	Mon to Sat 7:00am - 7:00pm		All other times, Sundays & public holidays	
<b>32.3 Noise from construction and demolition</b>	75	90	45	75
The maximum noise levels from construction -or demolition activities, measured at or within the boundary of any site (other than the source site) in the Residential and Open Space Zones, and immediately outside dwellings in the Rural Zone, shall not exceed the following levels:	L <sub>eq</sub> dBA	L <sub>max</sub> dBA	L <sub>eq</sub> dBA	L <sub>max</sub> dBA

The limits set in Rule 32.3 of the Upper Hutt District Plan generally coincide with the recommended upper limits in NZS 6803:1999 for construction noise received in residential zones and rural dwelling (summarised in Table 30 below) for construction activities of 'typical duration' (defined in NZS 6803:1999 as construction work at any one location for more than 14 days but less than 20 weeks) for the daily time periods of 0730 – 1800 and 2000 – 0630. The District Plan limits apply regardless of the total duration of the construction work (i.e. the rule does not set different standards for work of less than 14 days or more than 20 weeks).



NZS 6803:1999 also recommend stepped limits for the time periods of 0630 – 0730 and 1800 – 2000 during weekdays, and provides for some construction work on Sundays and public holidays.

Time of	Time period	Duration of Work							
Week		Typical Duration		Short-term duration		Long-term duration			
		L <sub>Aeq(t)</sub>	L <sub>AFmax</sub>	L <sub>Aeq(t)</sub>	L <sub>AFmax</sub>	L <sub>Aeq(t)</sub>	L <sub>AFmax</sub>		
Noise limits	at residential ne	eighbours							
Weekdays	0630-0730	60	75	65	75	55	75		
	0730-1800	75	90	80	95	70	85		
	1800-2000	70	85	75	90	65	80		
	2000-0630	45	75	45	75	45	75		
Saturday	0630-0730	45	75	45	75	45	75		
	0730-1800	75	90	80	95	70	85		
	1800-2000	45	75	45	75	45	75		
	2000-0630	45	75	45	75	45	75		
Sundays	0630-0730	45	75	45	75	45	75		
and public	0730-1800	55	85	55	85	55	85		
holidays	1800-2000	45	75	45	75	45	75		
	2000-0630	45	75	45	75	45	75		

Table 30: Summary of NZS 6803: 1999 Acoustics – Construction Noise Recommendations

In this way, Rule 32.3 allows for a slightly longer daily period of high noise generating construction activities during normal workdays and Saturdays but also a longer period of 'night time' low noise limits, while NZS 6803:1999 recommends a more gradual daily increase and decrease in noise limits during normal work days, while being slightly more restrictive on Saturdays, and less restrictive on Sundays and public holidays.

Rule 32.3 includes a note stating that noise levels relating to construction and demolition activities are to be measured in accordance with the requirements of the standards set out in NZS 6803:1999 Acoustics – Construction Noise. The noise limits are measured one metre from the façade of the neighbouring building, and 1.2-1.5m above floor level. Ordinarily an activity that complies with the noise levels in Rule 32.3 would be a permitted activity, or otherwise require resource consent as a non-complying activity if the standards could not be met. As assessed in section 7.1 the proposal is assessed as not meeting the permitted activity standards, and therefore would be a non-complying activity.

#### 10.12.2.2 Vibration

The District Plan only includes vibration standards relating to blasting. This is not considered to be relevant to the project. There are no relevant New Zealand standards for vibration. The 'German Industrial Standard DIN 4150-3 (1999): Structural vibration – Part 3: Effects of vibration on structures' has generally been adopted in New Zealand to assess building damage. British Standard BS 5228-2:2009 "Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration" has been adopted in some instances in New Zealand to assess human response to construction.

#### 10.12.3 Noise and Vibration Generating Activities

The proposed works for the construction of the stream improvements will be undertaken using standard construction equipment and methodologies common to construction projects in New Zealand. The main sources of potential noise during the construction phase of the project include:



- Demolition of existing structures including concrete breaking;
- Heavy machinery including cranes and excavators;
- Heavy vehicles such as trucks;
- Stationary plant such as mobile generators and pumps;
- Piling for foundation construction; and
- Use of construction tools such as welders and power tools.

General construction noise levels expected from different equipment and activities is provided in NZS 6803:1999 Annex C. Some selected sound level data for common site activities are present in Table 31 below.

Table 31: Selected Sound Level Data for Construction Activities from NZS 6803: 1999

Activity		Sound Power Level (L <sub>wa</sub> ) at source	Activity equivalent continuous sound pressure level at 10m (L <sub>Aeq</sub> )
Demolition	Breaking Concrete (pneumatic breaker)	110 – 120	82 – 92
Clearing Site	Wheeled loader	103 – 108	73 – 80
	Tracked loader	110 – 118	73 – 90
Ground Excavation	Tracked Excavator	106 – 116	78 – 88
Pumping Water	Water Pump	94 – 100	66 – 72
Cutting Timber	Circular saw	103 – 110	75 – 82
Lifting	Wheeled Crane	94 - 112	75 – 84
Heavy Vehicles	Truck movement	98	70
Road Works	Breaking Road Surface	106 – 123	82 – 95
	Removing broken road surface	103	75
	Road surfacing	96 – 121	68 - 93

It is anticipated that the general hours of work for construction activities will be within 7.00am to 7.00pm as anticipated by the District Plan, with some work possible from 6.30am to 8.00pm as anticipated by NZS 6803:1999. This will be defined in more detail through the Construction Noise and Vibration Management Plan (CNVMP) proposed to be prepared under proposed consent conditions set out in section 11.2.

The duration of noise generating activities will be dependent on the particular component of the works being undertaken. Generally, the works at any particular location will fall within the 'typical duration' category, being less than 20 weeks. The exception to this will be the replacement of private crossings, which will likely take approximately two weeks and therefore fall into the 'short-term' duration category.

In terms of vibration, the particular activities that have the potential to generate vibration experienced beyond the boundary of the designation will be the driving of piles for the construction of bridge foundations and the placement of heavy structural components.

The driving of piles for the replacement of the private vehicle crossings, which will be in relatively close proximity to the associated dwellings, will generally be short term. Several piles will be required for each bridge, each taking in the order of 10 minutes to drive into the ground.



As noted in section 6.2.3, the expectation is that the works will begin in Reach 1 and progress upstream. Therefore, the generation of noise and vibration will be concentrated in the area of the works being undertaken at any one time.

#### 10.12.4 Sensitive Receptors

Sensitive noise and vibration receptors include the residential occupiers of residential dwellings adjacent to the designation, the users of the Reformed Church and Christian School, community groups who use the scout hall and tennis club in Pinehaven Reserve, and users of Willow Park.

Because of the location of the stream within private residential properties, residential dwellings are located in close proximity to the construction works to be undertaken. In some cases, the designation boundary has been located directly adjacent to the buildings within the affected properties. The Reformed Church and Christian School is located in relatively close proximity to the construction designation boundary due to the stream location within the adjacent Willow Park and Blue Mountains Road. Regarding users of the scout hall and tennis club their access will not be affected but they will notice construction works occurring during the day when works are underway around the Birch Grove properties.

The effects from the project provide minimal distance buffer between potentially noisy construction activities and sensitive noise receptors in many cases along the length of the designation. As such, in many places the limit of 75 LeqdBA would not be achieved without mitigation. In some cases, the full noise level of the construction would be experienced at the site boundary and could therefore be in excess of 100 LeqdBA. The effect of this noise level would be significant.

#### 10.12.5 Mitigation

Given the close proximity of sensitive receptors to the construction activities, mitigation is required for noise and vibration effects. The below mitigation methods will be implemented.

#### 10.12.5.1 Construction Noise and Vibration Management Plan

A Construction Noise and Vibration Management Plan (CNVMP) will be developed to manage noise and vibration generating activities. A condition is proposed in section 11 which requires certification of this plan. The noise and vibration management plan for construction will address site management, mitigation, monitoring, communication, complaints procedures and associated matters.

The contents of the CNVMP addressing noise will be based on NZS6803:1999 Section 8 and Annex E. The CNVMP will be implemented on site for each specific area of work and for high noise generating activities. It will be kept up to date with details added of actual timing, equipment use and methodologies employed, should these change throughout the construction process.

#### 10.12.5.2 Notification

Consultation and communication with the surrounding community will be one of the primary means of managing the potential impacts of noise and vibration generation during the construction works. A community communication strategy will be developed to ensure the key messages about potential temporary construction effects such as noise and traffic, and the project programme timeline, are well understood

The intention is to directly notify all households in dwellings on properties within or adjacent to construction areas via face-to-face or phone conversations. In addition, wider community notification will occur through a letter drop or similar method prior to the works being carried out. Supplementary information will be provided to residents in proximity to particularly noisy activities, large stationary plant, or works which will be undertaken for longer periods of time.

Additionally, a contact phone number will be available for residents to be able to provide feedback, voice concerns, or seek additional information during the works period.



#### 10.12.5.3 Timing of activities

There may be a significant difference in the level of noise or vibration generated by the various activities to be undertaken for the project, and potentially between the different equipment or plant available to undertake the same work. As such, particularly noisy or vibration inducing activities (such as overpumping) will be timed as far as practicable to be undertaken during times which will have the least impact on the surrounding residents and other sensitive receptors.

#### 10.12.5.4 Acoustic Barriers

Acoustic barriers can be an effective means of reducing the level of sound experienced by surrounding receptors. NZS 6803:1999 Annex C Table B.1 identifies that acoustic screens can have an A-weighted sound reduction of up to 10 decibels. The ability to utilise acoustic screens will depend on the type of work to be undertaken, equipment used, available space and topography of the area. Generally, the project work is not favourable for acoustic screening because of its liner nature and constrained and narrow work areas. However, screening will be considered where the works are to occur for longer durations in one location and where it may involve particularly noise intensive works.

#### 10.12.5.5 Avoidance of unnecessary noise

There are a number of construction practices that may generate noise unnecessarily, such as the use of truck horns, air breaks and reversing alarms. Given the location of the works within a noise sensitive environment, and in close proximity to sensitive receptors, alternatives to these practices will be implemented where safe and practicable to avoid unnecessary noise generation.

#### 10.12.5.6 Temporary relocation

In some cases, due to particular circumstances of the residents and the close proximity of the works to dwellings, temporary relocation may be the best option. The consideration of this option will take into account other effects such as property access impediments. This will be informed by consultation with residents, in particular those affected by the works.

#### 10.12.6 Summary

As noted in section 5.12, the Pinehaven area has a generally quiet residential character. The baseline for the impact of construction activities is taken to be the limits provided in the District Plan for activities in residential areas. There are not considered to be any sources of background noise that need to be taken into account in assessing the potential impact of construction noise.

The proposed works may generate significant temporary construction noise and vibration. There are a number of short term activities such as piling for bridge foundations, or areas of work such as the constrained area south of Sunbrae Drive, where the achievement of the relevant noise limits may not be possible, or vibration may be experienced to an unacceptable degree if not appropriately managed or mitigated. As such a range of mitigation measures are to be implemented to reduce the effects of noise and vibration from the construction phase of the project, including:

- Notification of the works to potentially affected properties and the wider community;
- Timing of activities;
- Use of acoustic barriers where practicable;
- Avoidance of unnecessary construction noise through management practices;
- Temporary relocation of residents significantly affected by construction noise; and



• Implementation of construction noise management practices trough the Construction Noise and Vibration Management Plan.

Overall, while the best practicable options will be implemented to ensure noise is at a reasonable level in accordance with section 16 of the RMA, the potential effects of construction noise and vibration on those residents in close proximity to the area of works are considered likely to have moderate adverse effects. With the mitigation measures implemented as described above the effects will generally be acceptable; however, there may be certain areas or periods of time when the noise limits may not be achieved.

## 10.13 Historic Heritage

An assessment has been undertaken by an appropriately qualified and experienced archaeologist to review the risk of archaeological sites in the vicinity of the works proposed for the Pinehaven Stream, as defined in the Heritage NZ Pouhere Taonga Act 2014. The full report on this assessment is attached at Appendix T.

The assessment includes a review of the geomorphology of the area to determine whether there are older land surfaces that would have been suitable for pre-European or 19<sup>th</sup> century settlement. This concluded that while there are remnant forest trees which indicate several areas of older surfaces, these are low lying and flood prone, and no archaeological sites were identified through field inspections.

No potential archaeological sites were identified through a review of aerial photographs and 19<sup>th</sup> century survey plans. The only historically documented 19<sup>th</sup> century Maori settlement on the Pinehaven Stream fan is outside the area of proposed works.

The potential for archaeological sites associated with earlier forms of infrastructure on the stream such as dams, mills, races, bridges, abutments, and logging and rail infrastructure was also considered and reviewed through the assessment. No such infrastructure works of sufficient age to be classified as archaeological sites were identified within the Pinehaven Stream area.

Overall it was concluded that there is no reasonable cause to suspect that archaeological sites will be disturbed during the proposed works. Therefore, it is considered that no authority is required under the Heritage NZ Pouhere Taonga Act 2014.

## **10.14 Future Maintenance Works**

The operational designation boundary following completion of the project under section 182 of the RMA will provide for the future maintenance, repair, reconstruction, extension, modification and replacement of the structural flood mitigation works. The operational designation will be specifically sized to provide for maintenance activities.

There are considered to be efficiencies for the Upper Hutt City Council in designating the works as this will avoid the potential requirement to seek resource consent pursuant to section 9(3) of the RMA for future maintenance required for the structural works. It also protects the works from activities by landowners pursuant to section 176 RMA.

Some adverse effects of future maintenance works may be experienced by the surrounding residents in terms of noise; however, it is likely that general maintenance activities will have negligible effects as these will be small in scale and of short duration. These will be subject to general maintenance planning by Council staff, which will seek to minimise nuisance effects to the surrounding community. There are already maintenance activities of this nature occurring within the Pinehaven Stream.

Therefore, in relation to future maintenance work, the proposed designation is considered to have positive effects overall on the basis that maintenance activities will only have negligible adverse effects but will allow the substantial benefits of the project to continue to be realised into the future.



## 10.15 Summary

The proposed designation and associated structural flood mitigation works are considered to have the following effects:

- Significant positive effects in terms of the mitigation of flood risk;
- Beneficial but limited effects on stormwater and hydrology;
- Minor adverse effects on **water quality** during construction, and beneficial but limited effects during operation;
- Some significant positive **social effects** during operation associated with the reduction in flood risk during operation of the works, but also moderate adverse effects on personal and property rights due to land requirements;
- Some minor effects on **ecology** during construction, which will be mitigated through proposed riparian planting and construction methods;
- Less than minor short term effects on **landscape values**, landscape elements and character, with improved amenity of the corridor over time;
- Significant **visual** effects during construction due to the loss of vegetation and encroachment on to properties. These reduce to minor effects once mitigation vegetation is established;
- Limited effects on **cultural values** due to construction effects on the stream which are considered to be no more than minor;
- Some temporary construction related adverse effects in terms of traffic and transport, air quality, and noise and vibration which will be minimised as far as practicable through the implementation of the CMP. Noise and vibration effects may be moderately adverse for some adjacent properties;
- No anticipated effects on historic heritage resources; and
- Positive effects in providing for future maintenance activities.

Overall, the construction of the proposed works is considered to have minor adverse effects, while the operational phase will generally have significant positive effects. However, the most significant adverse effects are those on personal and property rights due to private land requirements, which are considered to be moderate.



## 11. Proposed Conditions

## 11.1 Definitions, abbreviations, acronyms and terms

Term	Definition
AEE	Assessment of Environmental Effects for the Pinehaven Stream Improvements Project
СМР	Construction Management Plan
СМО	Upper Hutt City Council Compliance Monitoring Officer
CNVMP	Construction Noise and Vibration Management Plan
СТМР	Construction Traffic Management Plan
Commencement of construction	The time when the Works that are the subject of this designation (including any enabling works, other than removal or demolition of buildings) start
Completion of construction	Completion of stream improvement earthworks, restoration of the stream site, and completion of planting (not including any further planting that may be required as part of the maintenance and monitoring period)
Enabling works	Works that may be carried out in advance of bulk earthworks that include site establishment, vegetation clearance, relocation of utilities and services, fencing, and installation of accesses and erosion and sediment control measures.
ESCP	Erosion and Sediment Control Plan
FIDOL	Frequency, Intensity, Duration, Offensiveness/Character, Location
FMP	Floodplain Management Plan
GWRC	Greater Wellington Regional Council, including any officer of Greater Wellington Regional Council
HNZ	Heritage New Zealand
LP	Landscape Plan
NoR	Notice of Requirement
PKMS	Pinehaven Kaitiaki Monitoring Strategy
Project	The design, construction, maintenance, and operation of the Pinehaven Stream Improvements as in the AEE and these designation conditions
Requiring Authority	Requiring Authority is Upper Hutt City Council
UHCC	Upper Hutt City Council
Work or Works	The construction, maintenance, or operation of the Project, including where relevant any stage or part thereof
Working day	Has the same meaning as under Section 2 of the Resource Management Act 1991

## 11.2 Notice of Requirement Conditions

#### General

- 1. Except as modified by the conditions below, the Project shall be undertaken in general accordance with:
  - a. The Designation Plans, dated [...]
  - b. The General Arrangement plans, dated [...]; noting that the final driveway and private bridge to provide for access and parking at each property from 30-38 Blue Mountains Road will be completed in consultation with each respective land owner.



- c. The cross-sections dated [...];
- d. The Site Access and Laydown Scheme plans, dated [...];and
- e. Landscape planting plans dated [...].
- 2. In the event of conflict between the documents listed above and these designation conditions, these conditions prevail.
- 3. The designation shall lapse if not given effect to within 5 years from the date on which it is included in the Upper Hutt City Council District Plan under section 175 of the RMA.

#### Designation boundary

- 4. As soon as reasonably practicable following the completion of construction of the Project, the Requiring Authority shall:
  - a. Review the area designated for the Project;
  - b. Identify any areas of designated land that are no longer necessary for the on-going operation or maintenance of the Project or for ongoing mitigation measures; and
  - c. Give notice to CMO in accordance with section 182 of the RMA seeking the removal of those parts of the designation identified in 4 b) above.

#### Management Plans

- 5. The following Management Plans shall be submitted to the CMO for certification:
  - a. Construction Traffic Management Plan (CTMP) to certify compliance and consistency with conditions [ ...to ...] of this consent;
  - b. Construction Noise and Vibration Management Plan (CNVMP) to certify compliance and consistency with conditions [...to ...] of this consent; and
  - c. Landscape Plan (LP) to certify compliance and consistency with conditions [ ...to ...] of this consent;
- 6. Works must not commence until certification of the management plans is received in writing.
- 7. Submitted management plans will be deemed to be certified if no correspondence from the CMO has been received on the specific management plan within 15 Working Days.
- 8. The Project shall be carried out in general accordance with the certified management plans required by these conditions.
- 9. The management plans must provide the overarching principles, methodologies, and procedures for managing the effects of the Works to achieve the environmental outcomes and performance standards required by these conditions.
- 10. The management plans must apply to the entire Project (including all Stages) but may be supplemented by site-specific plans to provide the necessary level of detail to address requirements within each of the Stages.
- 11. A copy of the certified management plans shall be made publicly accessible on the Requiring Authority's website.
- 12. During the construction period, a copy of all certified management plans shall be kept on site at all times and be made available to the CMO upon request.
- 13. The certified management plans may be amended if necessary to reflect any changes in design, construction methods, or management of effects. Any amendments are to be discussed with and submitted to the Council for information without the need for a further certification process, unless those amendments once implemented would result in materially different effects to that described in the



original management plans. If the amendments once implemented would result in materially different effects to that described in the original management plans, the amended plans must be re-submitted to the CMO for certification.

#### Work hours

- 14. Normal working hours, except in those circumstances exempted under the CNVMP, shall be:
  - a. For on-site construction activities: 7:00am to 7.00pm Monday to Saturday (excluding public holidays)
  - b. For heavy vehicle movements on public roads: 9:00am 6:00pm Monday to Friday (excluding public holidays).

#### Construction Noise

- 15. Noise arising from construction activities shall be measured and assessed in accordance with New Zealand Standard NZS 6803:1999 'Acoustics Construction Noise' (NZS 6803:1999)
- 16. A CNVMP shall be prepared by a suitably qualified acoustic specialist and certified as per condition [...] as being consistent with NZS 6803:1999 and meeting the requirements of these conditions at least 15 Working Days prior to Commencement of Construction. The purpose of the CNVMP is to provide a framework for the development and implementation of the Best Practicable Option ('BPO') for the management of all construction noise effects, and additionally to define the procedures to be followed when the noise standards in NZS 6803:1999 are not met following the adoption of the BPO. The CNVMP shall be prepared in accordance with the requirements of Annex E2 of NZS 6803:1999 and shall address the following matters as a minimum:
  - a. Description of the works, anticipated equipment/processes and their scheduled durations;
  - b. Hours of operation and duration for the construction activities;
  - c. The construction noise and vibration standards for the Project as set out in NZS 6803:1999 Acoustics Construction Noise and Table 3 of DIN 4150-3: 1999;
  - d. Identification of affected occupied buildings and any other sensitive receivers;
  - e. Management and mitigation options to be adopted for all works during the Project (which shall include prohibition of tonal reverse alarms);
  - f. Minimum separation distances from receivers for plant and machinery where compliance with the construction noise standards are met;
  - g. Methods and frequency for monitoring and reporting on construction noise;
  - h. Procedures for engaging with stakeholders, notification of proposed construction activities and responding to noise complaints consistent with conditions; and
  - i. Contact details for the Project Manager (or nominee) and the Requiring Authority's Project Liaison Person (phone and email addresses).
- 17. The construction noise, where practicable, comply with the following criteria at the nearest residential building or sensitive receiver for the purposes of the CNVMP:

Time of Week	Time period	L <sub>Aeq(t)</sub>	L <sub>AFmax</sub>
Weekdays	0630-0730	60	75
	0730-1800	75	90
	1800-2000	70	85
	2000-0630	45	75
Saturday	0630-0730	45	75
	0730-1800	75	90
	1800-2000	45	75



	2000-0630	45	75
Sundays and public holidays	0630-0730	45	75
	0730-1800	55	85
	1800-2000	45	75
	2000-0630	45	75

Where it is not practicable to achieve those criteria, the CNVMP must describe alternative strategies to achieve the best practicable option to minimise the effects of construction noise on neighbours.

- 18. The vibration criteria set out in Table 3 of DIN 4150-3: 1999 shall be met, where practicable. Where it is not practicable to achieve those criteria, a suitably qualified expert shall be engaged to assess and manage construction vibration during the activity that exceeds the criteria.
- 19. Where on-site construction works and/or heavy vehicle movements need to be undertaken outside of normal working hours (as defined in Condition 14), night time work (7:00pm –7:00am) shall be avoided where practicable. Where avoidance is not practicable, the best practicable option shall be adopted to minimise or mitigate noise and vibration effects.

#### Construction Traffic

- 20. A CTMP shall be prepared by a suitably qualified and experienced person and shall be submitted to the CMO for certification that that it meets the requirements of these conditions at least 15 Working Days prior to Commencement of Construction.
- 21. The purpose of the CTMP is to avoid or mitigate adverse effects on traffic safety and efficiency resulting from the construction works, in order to:
  - a. Protect public safety, including the safe passage of pedestrians and cyclists;
  - Minimise delays to road users, pedestrians and cyclists, and particularly public transport at all times, especially bus travel times at peak traffic periods during weekdays (06:30 to 09:30 and 16:00 to 19:00); and
  - c. Inform the public about any potential impacts on the road network.
- 22. The CTMP shall describe the methods for avoiding, remedying or mitigating the local and network wide transportation effects resulting from the Project works, and shall address the following matters:
  - a. Methods to avoid, remedy or mitigate the local and network wide effects of the construction of individual elements of the Project;
  - b. Methods to manage the effects of the delivery of construction material, plant and machinery (including oversized trucks);
  - c. The numbers, frequencies, routes and timing of construction traffic movements;
  - d. Traffic management measures to address and maintain traffic capacity and minimise adverse effects;
  - e. Measures to maintain existing vehicle access to private properties, or where the existing property access is to be replaced, measures to provide alternative access arrangements in consultation the affected landowner;
  - f. Measures to maintain pedestrian and cycle access with thoroughfare to be maintained on all roads and footpaths adjacent to the construction works, (e.g. unless provision of such access is severed by the works or such access will become unsafe as a result of the construction works). Such access shall be safe, clearly identifiable, provide permanent surfacing and seek to minimise significant detours; and
  - g. Include measures to avoid road closures, and the restriction of vehicle, cycle and pedestrian movements.



#### Landscape Plan

- 23. A Landscape Plan ('LP') shall be prepared by a suitably qualified and experienced person and shall be submitted to the CMO for certification that it meets the requirements of these conditions at least 15 Working Days prior to Commencement of Construction. The purpose of the LP is to outline the requirements for the Project's permanent landscape mitigation works.
- 24. The Requiring Authority shall undertake mitigation and enhancement planting in general accordance with the LP. The LP shall include details of proposed mitigation planting including as follows:
  - a. Identification of vegetation to be retained, protection measures, and planting to be established along cleared edges, the riparian zone and new floodplain areas;
  - b. Proposed planting including plant species, plant/grass mixes, spacing/densities, sizes (at the time of planting) and layout and planting methods;
  - c. The proposed staging of planting in relation to the construction programme, including provision for planting within each planting season following completion of works in each stage of the Project and detailed specifications relating to (but not limited to) the following:
    - i. Weed control and clearance;
    - ii. Pest animal management;
    - iii. Ground preparation (topsoiling and decompaction);
    - iv. Mulching;
    - v. Plant sourcing and planting, including hydroseeding and grassing;
    - vi. Successional/replacement planting; and
    - vii. Details of a proposed maintenance and monitoring programme.
- 25. The LP shall include a Reserve Reinstatement Plan for Willow Park. The Reserve Reinstatement Plan shall be prepared in consultation with Council and shall include the following details (as appropriate):
  - a. Removal of structures, plant and materials associated with construction;
  - b. Replacement of any boundary fences that require removal;
  - c. Reinstatement of grassed areas;
  - d. Replacement of trees and other planting;
  - e. Any structures proposed to be constructed; and
  - f. Details of way finding interpretation signage within and adjacent to the reserve.
- 26. The Requiring Authority shall maintain and monitor the mitigation and enhancement planting for a minimum of 5 years following the planting being undertaken.

#### Stakeholder and Communications

- 27. The Requiring Authority shall appoint a community liaison person for the duration of the construction phase of the Project to be the main point of contact for persons affected by the Project.
- 28. A community communication strategy will be developed to ensure the key messages about potential temporary construction effects such as noise and traffic, and the project programme timeline, are well understood.

#### Complaints process

- 29. At all times during construction work, the Requiring Authority shall maintain a permanent register of any complaints received relating to the construction works, including the full details of the complainant and the nature of the complaint. The complaints register shall contain the following information:
  - d. The details of the complainant;
  - e. The nature of the complaint;
  - f. The investigations undertaken into the complaint; and
  - g. Any remedial actions undertaken to address the complaint.



- 30. The Requiring Authority shall respond to any complaint within 24 hours of receipt of the complaint, except where an immediate hazard is present or where the complaint relates to construction noise, in which case the Requiring Authority shall use its best endeavours to respond immediately. A formal written response shall be provided to the complainant and the Council within 10 days of complaint receipt.
- 31. The Requiring Authority shall keep a copy of the complaints register on site and shall provide a copy to the Council upon request.

#### Accidental discovery

- 32. At least 15 Working Days prior to Commencement of Construction the Requiring Authority shall, in consultation with Port Nicholson Block Trust and Te Rūnanga o Toa Rangātira Inc, prepare an accidental discovery protocol and provide a copy to the CMO and GWRC for information. The protocol shall be implemented in the event of accidental discovery of cultural or archaeological artefacts or features during construction of the Project. The protocol shall include, but not be limited to:
  - a. Identification of parties to be notified in the event of an accidental discovery, who shall include, but need not be limited to Port Nicholson Block Trust, Te Rūnanga o Toa Rangātira Inc, HNZ, UHCC, GWRC, and, if koiwi are discovered, the New Zealand Police;
  - b. Setting out of procedures to be undertaken in the event of an accidental discovery (these shall include immediate ceasing of all construction in the vicinity of the discovery until authorised to proceed); and
  - c. Training procedures for all contractors regarding the possible presence of cultural or archaeological sites or material, what these sites or material may look like, and the relevant procedures if any sites or material are discovered.

#### Terrestrial Ecology

- 33. Where ecologically significant trees have been identified and are proposed to be removed the following planting mitigation ratios will be used:
  - a. Kowhai replacement ratio of 3:1
  - b. Black beech replacement ratio of 10:1
  - c. Kahikatea replacement ratio of 5:1
- 34. Seedlings used for replacement plantings must be sourced from the same Ecological District.
- 35. All seedlings for replacement planting should be of an advanced grade (>60cm height at planting) and planted into appropriate soil and microclimate conditions.
- 36. Planting locations should be as close to the point of loss as practicable. Group plantings at Willow Park or Pinehaven Reserve would also be appropriate.
- 37. A procedure shall be provided prior to construction commencing for the management or relocation of any native birds found nesting within the construction areas during the construction period.

Advice Note: All conditions, except for conditions 23-26, relate to construction only, and will not apply to any works which take place after partial withdrawal of the designation pursuant to condition 4.

## 11.3 Resource Consent Conditions

## General

- 1. Except as modified by the conditions below, the Project shall be undertaken in general accordance with:
  - a. The General Arrangement plans, dated [...]; noting that the final driveway and private bridge to provide for access and parking at each property from 30-38 Blue Mountains Road will be completed in consultation with each respective land owner.
  - b. The cross-sections dated [...]; and



- c. Landscape planting plans dated [...].
- 2. In the event of contradiction or inconsistencies between the application and further information provided by the applicant, the most recent information applies. In addition, where there may be inconsistencies between information provided by the applicant and conditions of the consent, the conditions apply.
- 3. Pursuant to section 125 of the Act the consents [...] shall lapse if not given effect to within 5 years from the date of commencement of the resource consent pursuant to Section 116 (1A) (b) of the Act.
- 4. Pursuant to section 123 of the Act the consents [...] shall expire 5 years from the date of commencement of construction.

#### Management Plans

- 5. Works must not commence until certification that appropriate construction management techniques have been provided in the following management plans:
  - a. Construction Management Plan (CMP);
  - b. Erosion and Sediment Control Plan (ESCP).
- 6. All construction of the Project shall be carried out in general accordance with the certified management plans required by these conditions.
- 7. The management plans apply to the entire Project (including where it is constructed in Stages) and, for some matters, are sufficient to address construction management without the need for more specific plans. For other matters, there may be a need for site-specific plans to provide the necessary level of detail to address requirements within each of the Stages.
- 8. The management plans shall be in general accordance with any draft management plan included as part of the AEE.
- 9. During the construction period, a copy of all certified management plans shall be kept on site at all times, and be made available to the GWRC upon request.
- 10. The Construction Erosion and Sediment Control Plan(s) and Construction Management Plan (CMP) certified by the Greater Wellington Regional Council shall be provided to Upper Hutt City Council for their information.
- 11. The certified management plans may be amended if necessary to reflect any changes in design, construction methods, or management of effects. Any amendments are to be discussed with and submitted to the GWRC for information without the need for a further certification process, unless those amendments once implemented would result in materially different effects to that described in the original management plans. If the amendments once implemented would result in materially different effects to that described in the original management plans. If the original management plans, the amended plans must be re-submitted to the GWRC for certification.
- 12. Submitted management plans will be deemed to be certified if no correspondence from the CMO has been received on the specific management plan within 15 Working Days.

#### Incidents

- 13. The Consent Holder shall maintain a permanent record of any incidents that occur at the site which result in any adverse effects from, or related to, the exercise of this permit. The record shall include:
  - a. The type and nature of the incident
  - b. Date and time of the incident
  - c. Weather conditions at the time of the incident (as far as practicable)
  - d. Measures taken to remedy the effects of the incident; and
  - e. Measures put in place to prevent the incident from re-occurring



- 14. This record shall be maintained at the site and shall be made available to the Manager on request.
- 15. The Consent Holder shall notify the Manager of any such incident, within twenty-four hours of the incident being brought to the attention of the consent holder, or the next working day.
- 16. The Consent Holder shall forward an incident report to the Manager within seven working days of the incident occurring. This report shall describe reasons for the incident, measures taken to mitigate the incident and measures to prevent recurrence.

#### Hydraulic design

- 17. At least 15 Working Days prior to works commencing, the Consent Holder shall submit a final detailed hydraulic design to GWRC. The purpose of the final detailed hydraulic design is to confirm compliance and consistency with the information provided with the application and the conditions of the consent. The final hydraulic design shall be prepared by a suitably qualified hydrologist or hydraulic modelling specialist to ensure the Q25 flows are contained within the designed stream channel and flood hazard depths and velocities are maintained for Q100 design events.
- 18. No construction works shall commence until the hydraulic design has been certified, in writing, by the Manager.

#### Construction Management Plan ('CMP')

- 19. At least 15 working days prior to the commencement of the construction works authorised by these consents, the Consent Holder shall submit a CMP to the GWRC, to certify compliance and consistency with conditions [...to ...] of this consent.
- 20. The Consent Holder must also provide staged or site-specific CMPs where these are required by the CMP certified in accordance with condition [...] above. The Consent Holder shall provide any required site-specific or staged CMPs to the Council to certify compliance and consistency with the conditions of this consent at least 15 working days prior to commencement of the specific stage or site works.
- 21. The purpose of the CMP is to set out the management procedures and construction methods to be undertaken in order to avoid, remedy or mitigate potential adverse effects arising from construction activities.
- 22. Where minor enabling works or isolated works are to be undertaken prior to commencement of the main construction works, a site-specific CMP commensurate with the scale and effects of the proposed works, may be submitted for certification by the GWRC.
- 23. All CMP(s) shall include:
  - a. The roles and responsibilities of construction management staff, including the manager responsible for the erosion and sediment control;
  - b. The name of the Consent Holder's representative on the Project;
  - c. General site layout;
  - d. An outline of the Project's construction programme, including construction hours of operation which shall generally be 7:00am to 7.00pm Monday to Saturday (excluding public holidays);
  - e. Methods for ensuring that earthworks are designed and undertaken in a manner that ensures the safety of the public and the stability of surrounding land, buildings, and structures;
  - f. Vehicle/machinery maintenance and cleaning procedures, particularly for machinery entering the stream channel;
  - g. Measures for addressing spills, including fuels, oils, grease, hydraulic fluids, cementitious products, and location of spill kits;



- h. Methods for amending and updating the CMP as required;
- i. Details of appropriate site security measures to be maintained to neighbouring properties during construction in consultation with affected owners;
- j. The design of temporary lighting for construction works and construction support areas;
- k. An appropriate Accidental Discovery Protocol for the discovery of unrecorded archaeological sites.

#### Dust Management

- 24. Dust arising from the construction phase of the Project shall not cause an offensive or objectionable effect at any point beyond the designation boundary, as assessed using the FIDOL factors (as defined in the Good Practice Guide for Assessing and Managing Dust, Ministry for Environment, 2016).
- 25. As part of the CMP prepared in accordance with condition [...], the Consent Holder shall prepare a Dust Management Plan (DMP). The DMP shall be prepared by a suitably qualified and experienced person with the purpose of avoiding offensive and objectionable dust, and shall include the following matters:
  - a. A description of the works, anticipated equipment/processes, time periods and duration which may generate dust;
  - b. Identification of highly sensitive receivers as defined in the Ministry for the Environment's Good Practice Guide for Assessing Discharges to Air from Industry (MfE 2016);
  - c. Procedures to record and respond to any complaints;
  - d. Methods for monitoring and assessing dust during construction;
  - e. Mitigation measures that are to be undertaken if dust discharges cause offensive or objectionable effects at any point beyond the designation boundary; and
  - f. Measures to remedy adverse effects of objectionable and/or offensive dust deposits resulting from the Project's construction activities.

#### Earthworks

- 26. All earthworks shall be designed and undertaken in a manner that ensures the stability and safety of surrounding land, buildings and structures.
- 27. During the Project earthworks the Consent Holder shall take all practicable measures to minimise erosion and minimise the discharge of sediment beyond the boundaries of the site.
- 28. Prior to the commencement of the earthworks activity or vegetation clearance (either for the whole site or for each stage of works), the Consent Holder shall hold a pre-start meeting that:
  - a. Is located on the subject site;
  - b. Is scheduled not less than five days before the anticipated commencement of earthworks;
  - c. Includes Council representatives; and
  - d. Includes representation from the contractors who will undertake the works and the supervising engineers.
  - e. The purpose of the pre-start meeting shall be to discuss the erosion and sediment control measures, the earthworks methodology and shall ensure all relevant parties are aware of, and familiar with, the necessary conditions of this consent.

#### Erosion and Sediment Control Plan(s)

29. A final ESCP shall be prepared by a suitably qualified and experienced person and shall be submitted as part of the CMP to certify compliance and consistency with the conditions of the consent. The final ESCP shall be in general accordance with the draft ESCP submitted with the resource consent application. Any significant changes will be for the purpose of consistency with resource consent conditions. Any significant changes shall be those that would result in materially different effects to that described in the original management plans. A separate ESCP may be submitted for each area of work or activity for certification by the Council prior to works commencing for that specific ESCP.



- 30. The purpose of the ESCP is to set out the measures to be implemented during the construction period to minimise erosion and the discharge of sediment.
- 31. The ESCP shall include the following matters:
  - a. Identification of the construction zones and construction support areas;
  - b. Identification of proposed works to be undertaken within the Pinehaven Stream bed, and details regarding which of the two construction methodologies are to be utilised to minimise stream bed disturbance; being sheet piling or piped diversion of the stream to create works areas that are separated from the active stream channel.
  - c. Details of the specific erosion and sediment control measures that will be implemented (including, where appropriate, location, dimensions and capacity);
  - d. A plan showing the boundaries of the works and the control measures;
  - e. Timing and duration of construction and operation of control works (in relation to the staging and sequencing of earthworks);
  - f. Details relating to the management of exposed areas (e.g. grassing, mulching);
  - g. Details of the erosion and sediment control monitoring to be implemented, in accordance with condition [....] below; and
  - h. Methods for ensuring contracting staff are aware of the erosion and sediment controls employed and do not remove them without seeking appropriate approval.
- 32. Erosion and sediment control monitoring shall include, as applicable:
  - a. Pre-construction monitoring;
  - b. Rainfall monitoring;
  - c. Routine device monitoring;
  - d. Trigger device monitoring;
  - e. Flocculent treatment monitoring;
  - f. Receiving environment water quality monitoring at the Project upstream baseline monitoring site(s) and downstream site(s). Monitoring parameters for analysis shall include:

Turbidity	NTU
Total Suspended Solids	g/m3
рН	рН

- g. Identified trigger levels for each of the above parameters. These trigger levels shall be developed with reference to the ANZECC Guidelines for water quality where applicable;
- 33. Notwithstanding the ability to set trigger levels under condition [....], the trigger level for total suspended solids in the Pinehaven Stream during construction works will be assessed against a total change from upstream to downstream monitoring not exceeding a 30 percent increase of the baseline concentration (g/m<sup>3</sup>), at the downstream sample compared to upstream samples.
- 34. A review of the erosion and sediment control methods and work methods within the Pinehaven Stream bed shall be undertaken following any exceedance of monitoring trigger levels set under condition [...] and responses to address the exceedance put in place as soon as practicable.
- 35. The responses to be adopted in relation to any exceedance of monitoring trigger levels and outcomes which includes, but is not limited to consideration of:
  - i. Further staging of earthworks;
  - ii. Stabilisation of key risk locations;
  - iii. Amendment to existing erosion and sediment controls;
  - iv. Installation of further erosion and sediment controls;



- v. Consideration of alternative construction methodologies for works occurring within the stream bed;
- vi. Consideration of flocculation alternatives; and
- vii. The methods and procedures for investigating and reporting sediment (water quality) discharge monitoring results to the Council.
- 36. The operational effectiveness and efficiency of all erosion and sediment control measures set out in the ESCP for each area of work shall be maintained throughout the duration of earthworks activity, or until the site is stabilised against erosion.
- 37. Prior to earthworks commencing, a certificate signed by a qualified and experienced person shall be submitted to the Council, to certify that the erosion and sediment controls have been constructed in accordance with the certified ESCP(s) as required by Condition [...] of this consent.
- 38. Each area of earthworks shall be progressively stabilised against erosion, and earthworks shall be sequenced to minimise the discharge of contaminants to surface water. A stabiliser for bare sediment such as coconut matting or other biodegradable product, should be installed for the period prior to riparian vegetation being planted.
- 39. If areas of exposed soil are not subject to earthworks for a 10 day period, the area of exposed soil shall be stabilised until such a time as further earthworks occurs in that specific area.

#### Freshwater Ecology

- 40. Prior to the commencement of works within Pinehaven Stream, the Consent Holder shall:
  - a. Appoint a suitably qualified and experienced freshwater ecologist to conduct native fish recovery and relocation;
  - b. Install fish movement barriers in the watercourse at the lower and upper extents of required stream works to prevent fish from recolonising within the stream works area.
  - c. Undertake any other works described below in conditions [... to ...]
- 41. Native fish recovery and relocation shall be carried out prior to commencement of any works in the Pinehaven Stream.
- 42. Once the appropriate fish movement barriers are installed for any given waterbody, the recovery of native fish shall occur over a two day period and shall use the following methods:
  - a. Gee-minnow traps and fyke nets, where sufficient water is present, placed at appropriate intervals over the length of the watercourse. These shall be left overnight and checked and cleared the following morning;
  - b. Using an electric fishing machine (EFM300), several electric fishing runs of the watercourse shall occur each day; and
  - c. During any dewatering processes, any remaining freshwater fish shall be captured and relocated.
- 43. The following methodologies shall be employed during native fish relocation:
  - a. All captured native fish shall be relocated on the same day to a suitable, similar habitat immediately downstream of the works area within the same catchment;
  - b. Native fish shall be transferred into closed containers, kept cool and transported to the relocation site; and
  - c. Any exotic fish capture shall be humanely euthanised and disposed of appropriately.
- 44. The Consent Holder shall provide the Council with a report outlining the number and species of native fish that were recovered and relocated prior to and during stream weeks within 20 working days of the final fish recovery and relocation being completed.



- 45. Bank habitat complexity shall be recreated through the use of embedded pipes, installation of stable undercuts, and placement of marginal boulders to provide fish cover. The determination of suitable locations shall be undertaken prior to construction commencing by the project freshwater ecologist.
- 46. Following completion of bank works, revegetation of the riparian zone and new floodplain areas shall be undertaken in accordance with the approved landscape plan(s).
- 47. The design of the diversion channel at 28 Blue Mountains Road shall be undertaken in consultation with the project freshwater ecologist to ensure ecological benefits of this channel are maximised.
- 48. Prior to construction commencing the project freshwater ecologist shall survey all pools within the project area. Pools that are infilled as a result of the works, shall be reinstated to their original dimension in a suitable location, determined in consultation with the project freshwater ecologist.
- 49. A visual, qualitative assessment of compaction of the stream bed substrates shall be undertaken by a suitably experienced person. If any compaction is identified then remediation actions shall be developed, in consultation with the project freshwater ecologist, and implement prior to exiting the work areas of the Pinehaven Stream.
- 50. Any grade control weirs that are removed during construction should only be reinstated if absolutely necessary, and in consultation with the project freshwater ecologist.
- 51. The existing fish passage barrier at the confluence of Pinehaven Stream and Hulls Creek shall be remediated to remove the perched drop and baffles on the concrete ramp to slow water velocities and increase water depths. This work shall be undertaken in consultation with the project freshwater ecologist.

#### Pinehaven Kaitiaki Monitoring Strategy

- 52. A Pinehaven Kaitiaki Monitoring Strategy (PKMS) shall be prepared by a suitably qualified and experienced person in consultation with appropriate iwi representatives and shall be submitted as part of the CMP. The purpose of the PKMS is to ensure that the potential effects of construction to the mana and mauri of the stream within and downstream of the construction area are appropriately managed and mitigated. The PKMS shall include:
  - a. identification of tohu (attributes) of the Pinehaven Stream;
  - b. dentification of mahinga kai and Māori customary use of the Pinehaven Stream;
  - c. methods to monitor effects on tohu and mahinga kai and Māori customary use; and
  - d. management and mitigation of effects on tohu and mahinga kai and Māori customary use.

#### Network Utilities

53. The Consent Holder shall ensure that construction work does not adversely impact on the safe and efficient operation of network utilities. The scope and timing of necessary utility relocation and protection works shall be developed and agreed between the Consent Holder and network utility providers to mitigate any safety hazards for the required works.



## 12. Statutory Assessment

The following sections provide consideration of the relevant provisions of the Resource Management Act 1991 (RMA) and the associated statutory documents in accordance with section 168A of that Act.

## 12.1 Management of Environmental Effects

Section 10 above provides an assessment of effects and a discussion of the proposed mitigation measures to be implemented to address the relevant effects on the environment. Section 11 above sets out the proposed conditions for the designation and resource consents to ensure mitigation measures are undertaken. The consideration of the relevant provisions of the RMA and associated statutory document provided in the sections below assumes the mitigation measures and associated conditions are accepted by the Council. The following sections provide a summary of the mitigation measures proposed.

## 12.1.1 Visual

The mitigation of the visual effects is largely based on the proposed riparian planting to be established, as shown in the landscape plans attached at Appendix F following the completion of the works, and the retention of existing vegetation where possible. In order to ensure this mitigation is in place as soon as possible, planting is to be undertaken during the first available planting season.

## 12.1.2 Ecological

Management of ecological environmental effects will involve construction sequencing from downstream to upstream, implementation of ecological mitigation practices in the CMP, and implementation of the ESCP. Ecological mitigation practices in the CMP will include:

- Fish relocation from sites disturbed by works;
- Avoiding stockpiling of material in the stream channel.

Operational maintenance practices will include appropriate riparian planting and tree maintenance, and installation of an appropriate stabiliser for bare sediment for the establishment period of the riparian vegetation.

## 12.1.3 Construction Noise, Vibration, Traffic and Dust

Management of construction activities will be implemented through the CMP and associated management plans:

- Construction Noise and Vibration Management Plan (CNVMP);
- Construction Traffic Management Plan (CTMP);
- Dust Management Plan (DMP);

Construction traffic will be managed through the CTMP which will describe the methods for avoiding, remedying or mitigating the local and network wide transportation effects.

Mitigation measures for noise and vibration will include notification of noisy activities to the surrounding community, timing of activities to reduce potential impacts, use of acoustic barriers if required in appropriate situations, avoidance of unnecessary noise, and if required the temporary relocation of particularly affects residents where the effects cannot be appropriately mitigated to an acceptable level.

Management of dust during construction activities will also be implemented through management practices incorporated into the DMP.



#### 12.1.4 Sediment and Erosion

Potential sediment and erosion effects will be managed and mitigated through the implementation of the ESCP attached at Appendix W.

## 12.2 Notification

#### 12.2.1 Notice of Requirement

Section 168A(1A) of the RMA states that:

- (1A) The territorial authority must decide whether to notify the notice of requirement under-
- (a) subsection (1AA); or

(b) sections 149ZCB(1) to (4), 149ZCC(1) to (4), 149ZCE, and 149ZCF, which apply with all necessary modifications and as if—

(i) a reference to an application or notice were a reference to the notice of requirement; and

(ii) a reference to an applicant, the Minister, or the EPA were a reference to the territorial authority; and

(iii) a reference to an activity were a reference to the designation.

Sub-section (1AA) requires public notification in certain circumstances relating to requests for further information or the commissioning of a report, while (1AB) ensures that the requirement under (1AA) applies despite any rule or national environmental standard that precludes public or limited notification of the notice of requirement.

In accordance with sections 168A(1A)(b) and 149ZCB(2)(b), the public notification of this notice of requirement is requested. Public notification is requested because the public interest in this project is likely to be significant, and proposed works directly affect a relatively large number of properties in terms of land requirements.

#### 12.2.2 Resource consents

Section 95A of the RMA sets out the process for public notification to determine whether to publicly notify an application for a resource consent. This section sets out steps to be followed by a consent authority to determine whether to publicly notify an application for a resource consent.

Section 95A (2) 'Step 1: Mandatory public notification in certain circumstances' sets out that if the applicant has requested that the application be publicly notified, the consent authority must publicly notify the application. In this case, public notification is requested for the reasons listed above.

## 12.3 Relevant RMA Policies and Plans

Section 168A(3)(a) of the RMA requires that when considering a requirement and any submissions received, a territorial authority must, subject to Part 2, consider the effects on the environment of allowing the requirement, having particular regard to:

- (a) any relevant provisions of-
- (i) a national policy statement:
- (ii) a New Zealand coastal policy statement:

(iii) a regional policy statement or proposed regional policy statement:



## (iv) a plan or proposed plan; and

Similarly, section 104(b) of the RMA sets out the requirements that must be given regard to:

- (b) any relevant provisions of-
- (i) a national environmental standard:
- (ii) other regulations:
- (iii) a national policy statement:
- (iv) a New Zealand coastal policy statement:
- (v) a regional policy statement or proposed regional policy statement:
- (vi) a plan or proposed plan; and

These matters are assessed below. In relation to matters in section 168A(3)(a)(ii) and 104(b)(iv), the New Zealand Coastal Policy Statement 2010 is not considered to be relevant to the proposal, as it does not affect the coastal environment.

## 12.3.1 National Environmental Standards

Section 104(1)(b)(i) of the Act requires that regard is given to any relevant provisions of a national environmental standard (NES). No national environmental standards are considered relevant to the proposed works. Specifically, in relation to the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health as identified in section 5.2.5 above, the risk of disturbing any contaminated soil is considered to be very low.

#### 12.3.2 Other Regulations

Section 104(1)(b)(ii) of the Act requires that regard is given to any relevant provisions of any other regulations. It is confirmed that regard has been given regard to any relevant provisions of any other regulations.

It is considered that the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 are not relevant as the proposed water take is temporary for construction dewatering purposes and will be discharged back to the same waterbody.

#### 12.3.3 National Policy Statements

There are four national policy statement (NPS) currently in place, of which the NPS for Freshwater Management (NPSFM) is considered relevant to this application.

The NPSFM sets out objectives and policies that direct regional councils to manage water in an integrated and sustainable way, while providing for economic growth within set water quantity and quality limits. The matters relevant to the proposal include water quality and quantity, which are addressed by the resource consents to the GWRC for the Project. The effects of the proposal in relation to water quality have been assessed and it is considered it is consistent with the overall outcomes sought by the NPS for Freshwater Management.

For these reasons the proposed works and designation are considered to have had appropriate regard to the relevant national policy statements.

## 12.3.4 Regional Policy Statement for the Wellington Region

The Regional Policy Statement for the Wellington Region 2013 (RPS) is a document prepared under the Resource Management Act 1991 (RMA) that identifies the major resource management issues for the



Wellington region. Objectives and policies in the RPS set out the direction for the sustainable management of the region's natural and physical resources to address identified issues. The objectives and policies in the RPS relate to the following matters:

- Air quality;
- Coastal environment, including public access;
- Energy, infrastructure and waste;
- Fresh water, including public access;
- Historic heritage;
- Indigenous ecosystems;
- Landscape;
- Natural hazards;
- Regional form, design and function;
- Resource management with tangata whenua; and
- Soils and minerals.

The policies of the RPS are differentiated between directions to subordinate planning documents (such as district and regional plans) (Policies 1 - 34), and policies as matters for consideration for RMA processes including when assessing and deciding on notices of requirement (Policies 35 - 69).

The relevant objectives and policies of the RPS are assessed in Appendix R.1. The objectives and policies considered particularly relevant to the proposed works are set out in Chapter 3.8 Natural Hazards and detailed in Table 32 below.

## Table 32: Regional Policy Statement for the Wellington Region - Natural Hazards

Objective / Policy	Assessment
Objective 20 Hazard mitigation measures, structural works and other activities do not increase the risk and consequences of natural hazard events.	The proposal is for the implementation of structural methods for flood hazard mitigation as identified in the Pinehaven Stream FMP. Generally, the works will provide greater capacity in the stream to a 4% AEP event level, and decrease the risk and consequences of flood hazard in the area.
	There are some areas identified through modelling results where the depth of flood waters during certain rainfall event levels may increase as a result of the works, particularly around 48 and 50 Blue Mountains Road and 2A Freemans Way. The property at 48 Blue Mountains Road has been purchased by Greater Wellington Regional Council. The Flood Hazard Report concluded that the houses on 50 Blue Mountains Road and 2A Freemans Way are approximately 10 metres above the Pinehaven Stream flood plain on their properties and are not at risk of flooding. The proposed works are therefore considered to be consistent with this objective.



Objective 21 Communities are more resilient to natural hazards, including the impacts of climate change, and people are better prepared for the consequences of natural hazard events.	The resilience of the community to flood hazard has been considered through the Pinehaven Stream FMP process. The proposal is considered to increase the resilience of the surrounding community. The design of the proposed works in terms of required flow capacity has been undertaken with the appropriate consideration of climate change. The FMP process itself has increased public awareness of the risks, and also led to a plan change process to control future development in the catchment.
<ul> <li>Policy 51: Minimising the risks and consequences of natural hazards – consideration</li> <li>When considering an application for a resource consent, notice of requirement, or a change, variation or review to a district or regional plan, the risk and consequences of natural hazards on people, communities, their property and infrastructure shall be minimised, and/or in determining whether an activity is inappropriate particular regard shall be given to: <ul> <li>(a) the frequency and magnitude of the range of natural hazards that may adversely affect the proposal or development, including residual risk;</li> <li>(b) the potential for climate change and sea level rise to increase the frequency or magnitude of a hazard event;</li> <li>(c) whether the location of the development will foreseeably require hazard mitigation works in the future;</li> <li>(d) the potential for injury or loss of life, social disruption and emergency management and civil defence implications – such as access routes to and from the site;</li> <li>(e) any risks and consequences beyond the development should not interfere with their ability to reduce the risks of natural hazards;</li> <li>(g) avoiding inappropriate subdivision and development in areas at high risk from natural hazards;</li> <li>(h) the potential need for hazard adaptation and mitigation measures in moderate risk areas; and</li> <li>(i) the need to locate habitable floor areas and access routes above the 1:100 year flood level, in identified flood hazard areas.</li> </ul> </li> </ul>	In relation to clause (a), the proposed works address the capacity in the stream to a 4% AEP event. The structures have been appropriately designed to meet required standards for other potential hazards. The MCA for the Pinehaven Stream FMP included residual risk. In relation to clause (b), the current advice on the potential effects of climate change has been incorporated in the modelling of the anticipated flood levels and subsequent design of the proposed works. In relation to clause (c), (g), (h), and (i), the proposed development is hazard mitigation for the existing surrounding Pinehaven community. In relation to clause (d), the risk or injury, loss of life, social disruption and emergency management and civil defence implications during construction of the proposed works will be appropriately considered through construction management requirements. In relation to clause (e), the proposed works upstream of 50 Mountains Road (where channel works are not proposed) has increased the potential flood depth during high rainfall events on 48 and 50 Blue Mountains Road and 2A Freemans Way. The property at 48 Blue Mountains Road has been purchased by GWRC. The Flood Hazard Report concluded that the houses on 50 Blue Mountains Road and 2A Freemans Way are approximately 10 metres above the Pinehaven Stream flood plain on their properties and are not at risk of flooding, and therefore the risk and consequences are not considered to increase due to the proposed works. In relation to clause (f), the proposed channel design has, where available space allows, incorporated naturalised channels to provide for the required stream capacity to a 4% AEP event. Overall, as the proposed works are to be undertaken specifically to reduce the risk and consequences of flood event in the Pinehaven Catchment, they are considered to be consistent with this policy.
<ul> <li>Policy 52: Minimising adverse effects of hazard mitigation measures – consideration</li> <li>When considering an application for a resource consent, notice of requirement, or a change, variation or review of a district or regional plan, for hazard mitigation measures, particular regard shall be given to: <ul> <li>(a) the need for structural protection works or hard engineering methods;</li> <li>(b) whether non-structural or soft engineering methods are a more appropriate option;</li> </ul> </li> </ul>	In relation to clause (a), (b), (c) and (d), the proposed structural works have been considered through a long term integrated and collaborative process through the development of the Pinehaven Stream FMP, which addresses significant flood risk in an established urban area. The proposed works forming the structural methods as part of a wider response which also includes non-structural and stream management methods. In relation to clause (e), the anticipated residual flood risk during a 4% and 1% AEP events have been modelled, with the proposed works resulting in a

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<ul> <li>(c) avoiding structural protection works or hard engineering methods unless it is necessary to protect existing development or property from unacceptable risk and the works form part of a long-term hazard management strategy that represents the best practicable option for the future;</li> <li>(d) the cumulative effects of isolated structural protection</li> </ul>	reduction of the overall extent of potential flooding, and generally lower flood depths for most properties. The proposed works are anticipated to result in 48 and 50 Blue Mountains Road and 2A Freemans Way experiencing greater depths of flooding in a 1% AEP events. However, 48 Blue Mountains Road has been purchased by the GWRC and the dwelling is to be
works; and	removed. The Flood Hazard Report concluded that the houses on 50 Blue Mountains Road and 2A
(e) residual risk remaining after mitigation works are in place, so that they reduce and do not increase the risks of natural hazards.	Freemans Way are approximately 10 metres above the Pinehaven Stream flood plain on their properties and are not at risk of flooding, and therefore the risk and consequences are not considered to increase due to the proposed works.
	As such, the proposed works are generally considered to be consistent with this policy.

In addition to the objectives and policies for natural hazards, the assessment attached at Appendix R.1 also addresses the relevant provisions in relation to the RPS matters listed above (other than coastal environment). As set out in the assessment, the proposed works are generally consistent with, and in some cases directly give effect to the objectives and policies.

Having considered the relevant provisions, it is considered that designation and resource consents sought are generally consistent with the relevant objectives and policies of the RPS.

#### 12.3.5 Operative Plan Provisions

#### 12.3.5.1 Upper Hutt City Council District Plan

The relevant objectives and policies of the District Plan are assessed in Appendix R.2. The objectives and policies of the District Plan which relate to the proposal are considered to be contained in the following chapters:

- Residential Zone;
- Open Space Zone;
- Subdivision and Earthworks;
- Landscape and Ecology;
- Water Resources;
- Natural Hazards;
- Environmental Quality; and
- Network Utilities.

The objectives of these chapters and the associated assessment are presented in Table 33 below.

#### Table 33. Consideration of UHCC District Plan Objectives and Policies

Objective / Policy	Analysis
Objective 4.3.1 The promotion of a high quality residential environment which maintains and enhances the physical character of the residential areas, provides a choice of living styles and a high level of residential amenity.	The quality of the residential environment will be enhanced through the reduction in flood risk, and the benefits to the amenity from the proposed riparian planting is considered to enhance the physical character of the area. Overall the proposal is therefore considered consistent with this objective.



Objective 4.3.2 The maintenance and enhancement of the special landscape and natural values of the Conservation and Hill Areas.	While some significant <sup>16</sup> trees will be lost, these are not identified as notable trees or as within urban tree groups, and the proposed riparian planting is considered to enhance the landscape and natural values of the adjacent Residential Conservation areas. The proposal is considered consistent with this objective.
Objective 7.3.1 The promotion of a range of open spaces, maintained and enhanced to meet the present and future recreation, conservation, visual amenity and hazard management needs of the City.	The proposal affects Willow Park and the Pinehaven Reserve. Pinehaven Reserve will be subject to only small and temporary effects. The proposed redeveloped and expanded Willow Park will provide enhanced recreational, visual amenity and hazard management values in the open space, and is therefore consistent with this objective.
Objective 7.3.2 The protection of the life supporting capacity of the environment and amenity values by avoiding, remedying or mitigating the adverse effects of activities in the City's open spaces.	The adverse effects of the proposed works on the life supporting capacity of the environment and amenity values within the open space areas are considered to be minor during construction, and mitigated and enhanced long-term by the proposed riparian planting.
Objective 9.3.1 The promotion of subdivision and development that is appropriate to the natural characteristics, landforms, and visual amenity of the City, significant areas of indigenous vegetation and habitats of indigenous fauna, is consistent with the sustainable use of land, and has regard for walking, cycling and public transport.	The proposed works are considered to be appropriate for the natural characteristics, landform and visual amenity of the area. The stream corridor is highly modified. The proposed works have been assessed through a LVIA which considered these matters. Effects will be experienced during construction, but overall with the proposed mitigation planting, the long-term effects are considered to be positive, with much of the already highly modified stream to be naturalised. The proposed works are therefore consistent with this objective.
Objective 9.3.3 To control earthworks within identified Flood Hazard Extents and Erosion Hazard Areas to ensure that the function of the floodplain is not reduced and unacceptable flood risk to people and property is avoided or mitigated.	The proposed works are within the Flood Hazard Extent and have been specifically designed to reduce flood risk in accordance with the Pinehaven Stream FMP. The proposed works are therefore critical to achieving this objective.
Objective 12.3.2 The protection, maintenance or enhancement of essential natural landscape elements that determine Upper Hutt's landscape and geological structure and identity and contribute to the amenity values of the City.	A Landscape and Visual Impact Assessment has been undertaken, which concluded that the effects on the natural landscape elements along the Pinehaven Stream alignment will be less than minor taking into account the proposed landscape planting. Therefore, the proposed works are considered to be consistent with this policy.
Objective 12.3.4 Control development and vegetation removal within identified Urban Tree Groups to ensure their respective high amenity, landscape and/or ecological values are protected.	Trees within the works area were assessed for amenity and ecological significance. No trees identified on the designation plans as within the District Plan Tree Groups are proposed to be removed.
	The removal of significant trees was assessed overall as a moderate adverse effect, and will be mitigated by the proposed riparian planting.
	The tree removal will be undertaken in a manner that protects the surrounding vegetation values.
	Therefore, the proposed works are considered to be consistent with this objective and supporting policies.
Objective 13.3.1 The protection and enhancement of the high water quality and diversity of aquatic habitats in the City's water bodies.	While the construction period will have minor adverse effects on water quality, the proposed riparian planting will have long-term positive effects on water quality in the Pinehaven Stream.
Objective 13.3.2 The provision of access to water bodies and the management of activities on water bodies in a manner that does not result in undue adverse effects on the environment and which avoids conflict between users and with adjoining land uses.	The proposed expansion and redevelopment of Willow Park will provide enhanced public access to Pinehaven Stream. The operational designation will provide enhanced access to the stream for management purposes. The proposed works are therefore considered to be consistent with this objective.

<sup>&</sup>lt;sup>16</sup> As identified in te terrestrial ecology report for the project. The trees to be removed are not identified in the Upper Hutt City Council Distrcit Plan as Notable Trees or within an Urban Tree Group.



Objective 15.3.1 The promotion of a high level of environmental quality in the City by protecting amenity values.	The proposed works are considered to be consistent with this objective as the proposed naturalisation of some stream sections and the riparian planting along the Pinehaven Stream corridor will result in enhanced amenity values and higher level of environmental quality of the corridor.
Objective 16.3.3 To recognise and provide for the sustainable, secure and efficient use, operation, maintenance and upgrading and development of network utilities within the City.	Territorial authority stormwater networks are defined as regionally significant infrastructure. The proposed works include the upgrading and development of the existing stream channel and associated structures to ensure the levels of service for stormwater infrastructure are met. The proposed designation of the stream channel and associated riparian areas will ensure the secure and efficient use, operation, maintenance of the stormwater infrastructure. The designation and associated works are therefore considered to give effect to this objective and associated policies.
Objective 16.3.4 To manage any adverse effects on the environment resulting from the design, location, construction, operation, upgrading and maintenance of network utilities.	The potential adverse effects of the proposed works have been assessed, with the construction of the works potentially resulting in significant adverse effects on adjacent residents, occupiers and land owners. These are to be managed through an appropriate Construction Management Plan, and will be temporary in nature. The long term effects of the operation of the works are considered to be positive, particularly in relation to flood hazard. Maintenance works already occur at the stream and will continue in a similar scale following completion of the construction. The proposed works are therefore considered to be consistent with this objective.
Objective 16.3.5 To ensure the continued operation of network utilities, and the development and operation of new network utilities, in flood hazard extents and to maintain the function of the floodplain to convey flood waters.	Network utility pipes and cables are to be relocated to ensure they do not unacceptably impede flood flow. The proposed works are therefore considered to be consistent with this objective and associated policies.

In addition to the relevant objectives identified above PC42 also introduced the following policy:

# Policy 14.4.5 Enable planned flood mitigation works within identified Flood Hazard Extents that decrease the flood risk to people and property or maintain the function of the floodplain.

The proposed works are the result of the preferred structural flood mitigation options as set out in the Pinehaven Stream FMP, and therefore Policy 14.4.5 provides a clear policy directive to be enabling in relation to these works. Given the directive nature of the wording, this policy should carry weight in the considerations of the Councils.

Having considered the relevant provisions, it is considered that the works authorised by the proposed designation and resource consents are consistent with the relevant objectives and policies of the District Plan.

## 12.3.5.2 Regional Freshwater Plan

The Regional Freshwater Plan for the Wellington Region (RFP) is the operative plan in the Wellington region addressing freshwater issues. The RFP includes a range of provisions relevant to the project including in relation to natural hazard mitigation. The relevant objectives and policies of the RFP are assessed in Appendix R.3, with particularly relevant provisions relating to natural hazard mitigation are presented in Table 34 below.



#### Table 34. Consideration of RFP Objectives and Policies

Objective / Policy	Assessment	
Objective 4.1.9 The risk of flooding to human life, health, and safety is at an acceptable level.	The proposal is for the implementation of structural methods to achieve capacity in the stream for a 4% AEP flood event, consistent with UHCC's stormwater infrastructure level of service, which is considered to be the 'acceptable' level. Therefore, it is considered the proposal is consistent these objectives.	
Objective 4.1.10 The adverse effects of flooding on natural values and physical resources, including people's property, are at an acceptable level.		
Policy 4.2.18 To promote the avoidance or mitigation of the potential adverse effects associated with flooding.	The proposal is for the implementation of structural methods to achieve capacity in the stream for a 4% AEP flood event, consistent with the Pinehaven Stream FMP. As such the works are specifically for the mitigation of adverse effect associated with flooding. Therefore, it is considered the proposal is consistent this policy.	
Policy 4.2.19 To allow the maintenance of lawful flood mitigation works within river and lake beds and on floodplains.	The proposed structural works may require ongoing maintenance. This policy supports the NoR objective for those activities.	
Policy 4.2.20 To ensure that there is sufficient information about flood hazards to enable flooding in the Region to be mitigated to an acceptable level.	The proposal is for the implementation of structural methods to achieve capacity in the stream for a 4% AEP flood event, consistent with the Pinehaven Stream FMP. The development of the FMP included significant public consultation, and included information from flood modelling which was used to inform the development of the FMP. This process encouraged awareness and	
Policy 4.2.21 To encourage community awareness about flood hazards by involving people in the processes that establish acceptable levels of flood mitigation.		
Policy 4.2.22 To adopt a precautionary approach when planning for and making decisions about the potential adverse effects of flooding on people and communities where information is incomplete or limited.	involved the Pinehaven Community. Therefore, it is considered the proposal is consistent these policies.	

Having considered the relevant provisions, it is considered that the works authorised by the proposed designation and resource consents are consistent with the relevant objectives and policies of the RFP.

## 12.3.6 Proposed Plan Provisions

The provisions of a proposed plan are relevant to the consideration of the notice of requirement and resource consent applications, under sections 168A(3)(a) and 104(1)(b) RMA.

#### 12.3.6.1 Proposed Natural Resources Plan Decisions Version

The proposed Natural Resources Plan Decisions Version (PNRP) was publicly notified on 31 July 2019. The PNRP introduces a proposed new integrated objectives, policies and methods framework for the sustainable management of the region's air, land, water and coastal resources, replacing the five existing separate regional plans. The relevant objectives and policies of the PNRP are assessed in Appendix R.5, with particularly relevant provisions relating to the management of natural hazards assessed in Table 35 below.

#### Table 35. Consideration of PNRP Objectives and Policies

Objective / Policy	Assessment
Objective O20 The hazard risk, and residual hazard risk from natural hazards and adverse effects of climate change, on people, the community and infrastructure are acceptable.	The proposal is the implementation of structural methods for flood hazard mitigation as identified in the Pinehaven Stream FMP. Generally, the works will provide greater capacity in the stream to a 4% AEP event level, consistent with the UHCC stormwater level of service, and decrease the risk and consequences of flood hazard in the area to acceptable levels. The proposal is therefore considered to be consistent with this objective.
Objective O21 Inappropriate use and development in high risk areas is avoided.	The proposal is the implementation of structural methods for flood hazard mitigation as identified in the Pinehaven Stream FMP. This



		is considered to be appropriate use and development within the Pinehaven Stream hazard extent area, as identified in the UHDP policy 14.4.5 introduced by PC42.
Policy P27: High risk areas Use and development, including hazard mitigation methods, in high risk areas shall be avoided except where:		The proposed works are flood hazard mitigation methods within the Pinehaven flood extent area.
		In relation to (a), there is a functional need for flood mitigation measures within the catchment to address flood issues as identified in the Pinehaven Stream FMP. Alternatives to the proposal have been assessed through multi-criteria analysis.
a) b)	they have a functional need or operational requirement or there is no practicable alternative to be so located, and the hazard risk to the development and/or residual hazard risk after hazard	In relation to (b) and (c), generally the proposed works will result in a reduced risk of flooding in the area of works. There are some areas identified through modelling results where the depth of flood waters during certain rainfall event levels may increase as a result of the works, particularly around 48 and 50 Blue Mountains Road and 2A Freemans Way. The property at 48 Blue Mountains road has been purchased by Greater Wellington Regional Council. The
	mitigation measures, assessed using a risk-based approach, is low, and	Flood Hazard Report concluded that the houses on 50 Blue Mountains Road and 2A Freemans Way are approximately 10 metres above the Pinehaven Stream flood plain on their properties
<i>c)</i>	the development does not cause or exacerbate natural hazards in other areas, and	and are not at risk of flooding. In relation to (d), the Pinehaven Stream is highly modified, with associated effects on fluvial processes already apparent. The
d)	adverse effects on natural processes (coastal, riverine and lake processes)	proposed works will naturalise and restore some sections of the channel and associated natural processes.
- )	are avoided, remedied, or mitigated, and	In relation to (e), the design of the works has taken into account the potential for erosion and scour.
e)	natural cycles of erosion and accretion and the potential for natural features to fluctuate in position over time, including movements due to climate change and sea level rise over at least the next 100 years, are taken into account.	Therefore, the proposed works are considered to meet the policy requirements for appropriate use and development in a high hazard area.
Hard haz methods necessar unaccept based ap (a)	28: Hazard mitigation measures and engineering mitigation and protection shall be avoided except where it is y to protect existing development from table hazard risk, assessed using the risk- proach, and; any adverse effects are no more than minor, or where the environmental effects are more than minor the works form part of a hazard risk management strategy.	The proposed works are flood hazard mitigation methods, located within an area of existing development which is subject to unacceptable flood hazard risk, as set out in the Pinehaven Stream FMP. The works are part of the implementation of the proposed responses of the Pinehaven Stream FMP. Therefore, it is considered that the proposed works are necessary to protect existing development from flood risk and is therefore consistent with this policy.
Particular climate cl ecosyster exacerba next 100 developn	P9: Effects of Climate change r regard shall be given to the potential for hange to threaten biodiversity, aquatic m health and mahinga kai, or to cause or the natural hazard events over at least the years that could adversely affect use and nent including:	The current advice on the potential effects of climate change has been incorporated in the modelling of the anticipated flood levels and subsequent design of the proposed works. Therefore, it is considered that the proposed works are consistent with this policy
	(a) coastal erosion and inundation (storm surge), and	



(b)	river and lake flooding and erosion, aggradation, decreased minimum flows, and	
(c)	stormwater ponding and impeded drainage, and	
(d)	relative sea level rise, reliable scientific data for the Wellington Region.	

Having considered the relevant provisions, it is considered that the proposed designation and resource consents are consistent with the relevant objectives and policies of the PNRP.

## 12.4 Section 104(1)

This section of the Act requires that, when considering an application for resource consent, the consent authority must have regard to a number of factors, as considered below.

## 12.4.1 Section 104(1)(a)

This section requires that regard is given to the actual and potential effects on the environment of allowing the activity. These have been considered in detail under section 10 of this application. In summary the adverse effects are generally temporary effects associated with the construction of the proposed works that can be appropriately mitigated through the management plans as anticipated by the proposed conditions in section 11. The operational effects are generally positive, specifically the reduction in flood risk to the Pinehaven community and the associated benefits to health and wellbeing.

## 12.4.2 Section 104(1)(ab)

This section requires that regard is given to any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity. No offset or compensation for any adverse effect is proposed through this resource consent application.

## 12.4.3 Section 104(1)(b)

The relevant provisions of the documents listed in section 104(1)(b) are considered under section 12.3 above. The proposal is considered to be generally consistent with the objectives and policies of relevant operative and proposed plans.

## 12.4.4 Section 104(1)(c)

This section of the Act requires that regard is given to any other matter the consent authority considers relevant and reasonably necessary to determine the application. The Local Government Act 2002 documents addressed in section 3.2 are considered relevant to the determination of the consent applications. These are:

- Greater Wellington Regional Council Long Term Plan 2015 2025;
- draft Natural Hazards Management Strategy for the Wellington Region;
- draft Environmental Code of Practice and Monitoring Plan for Flood Protection Activities;
- Upper Hutt City Council Long Term Plan 2015 2025;



• Upper Hutt City Council Land Use Strategy 2016 – 2043.

The proposed works are considered to be consistent with and to support these documents. In particular, the works implement the outcomes sought in the Upper Hutt City Council Long Term Plan 2015 - 2025 for stormwater management, and the associated policy in the Infrastructure Strategy for flood protection.

## 12.5 Public work and designation reasonably necessary

Section 168A(3)(c) of the RMA requires that when considering a requirement and any submissions received, a territorial authority must, subject to Part 2, consider the effects on the environment of allowing the requirement, having particular regard to:

(c) whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought;

This therefore requires an assessment of the necessity of both the work proposed and the associated designation to provide for that work pursuant to section 9(3). The Project Objectives are:

- To provide improved capacity and effective and efficient functioning stormwater infrastructure in the stream and its tributaries to a 4% AEP (1 in 25 year return period) flood event level, which will also contribute to the management of flood risk to habitable floor levels up to the predicted peak 100 year flood level.
- To reduce the risk of injury or harm from fast or deep flowing water in Pinehaven Stream and its tributaries;
- To integrate overland flow paths into the wider stormwater network;
- To enable efficient and effective construction and ongoing maintenance of all structures and stream improvements; and

The decision of the Environment Court in *Queenstown Airport Corporation* [2017] NZEnvC 46 states at paragraph 9 that:

For the purposes of s 171(1)(c) RMA the work and designation are reasonably necessary where:

- there is a nexus between the work proposed and the achievement of the requiring authority's objectives for which the designation is sought;
- the spatial extent of land required is justified in relation to those works; and
- the designation is able to be used for the purpose of achieving the requiring authority's objectives for which the designation is sought.

It is noted that the wording of section 168A(3)(c) and 171(1)(c) are identical. The decision states that the list is not exhaustive and different considerations may apply in other cases. As such, the assessment below addresses these matters and any other matters considered relevant to the proposed designation and associated works.

There is considered to be a direct link (nexus) between the works proposed and the objectives for which the designation is sought for the following reasons:

• The works have been specifically designed to achieve improved capacity in the Pinehaven Stream to a 4% AEP flood event level (1 in 25 year return period) and therefore the effective and efficient functioning of stormwater infrastructure connected to and located within the stream.



- The works have been designed to provide increased capacity in the stream channel for flood waters up to a 4% AEP rainfall event. As noted in section 10.3, the proposed works are anticipated to result in a reduction of 67 habitable floors and 31 non-habitable floors within the floodplain in a 1%AEP (1 in 100 year return period) rainfall event. Over most of the area currently affected by flooding, the proposed works are anticipated to reduce the depth of flooding during extreme rainfall events. There is therefore a consequent reduction in the risk of injury or harm from fast or deep flowing water during flood events.
- The proposed works address current issues identified for overland flowpaths in the catchment, including by reducing restrictions to the flowpaths over private land. It is noted that the wider works outside of the proposed designation also include works to better manage overland flow within road reserves. These flowpaths will therefore be better integrated into the wider stormwater network through the proposed works.
- The efficient and effective construction and ongoing maintenance of the works is dependent on having available access and sufficient space adjacent to the proposed works. The proposed designation has been planned in consideration of the minimum required area for construction and maintenance of the works. Subsequent land acquisition or other formal legal processes (outside of RMA processes) will ensure this area will be available for construction and maintenance of the works.

The overall spatial extent of the proposed designation is shown in section 1.6, and in detail in the plans attached at Appendix B Appendix C. The required extent of the proposed designation is described in detail in section 4.4. The extent of the designation has been minimised as far as practicable, while ensuring the works can be effectively and efficiently constructed and maintained. It is therefore considered that the spatial extent of proposed designation is justified in relation to the proposed works.

The ability of the proposed designation to be used for the purpose of achieving the objectives is dependent on securing legal interest in the land not currently owned by UHCC or GWRC, or agreements with current owners of that land, as well as additional resource consents for works not provided for pursuant to section 9(3) of the RMA under the proposed designation. The consultation undertaken with directly affected landowners has identified high levels of acceptance with the proposed works and proposed access agreements are being prepared post lodgement of the notice of requirement, where these are required. Resource consents have been applied for to the GWRC to address requirements of sections 12 to 15 of the RMA and the relevant regional planning framework. As such, it is anticipated that there will be the ability to use the proposed designation to achieve the objectives for which it is sought.

Other matters considered to be relevant to the necessity of the proposed designation and works include:

- Ensuring future land use adjacent to the stream channel does not affect the potential to undertake the proposed works through section 176(1)(b) of the RMA;
- Ensuring future land use and development adjacent to the stream channel does not compromise the proposed flood mitigation works once constructed;
- The need to provide for ongoing maintenance of the proposed works; and
- Land use planning certainty, and notice to residents/prospective purchasers in the District Plan.

The interim effect of and confirmation of this notice of requirement will provide through section 176(1)(b) of the RMA, that land adjacent to the stream channel required for the proposed works will not be affected by development in the period until the works are undertaken. This is considered necessary to ensure that the works required to achieve the objectives are not compromised by potential further development adjacent to the stream channel.

While the land use framework of the District Plan has been addressed by PC42 in respect of the Pinehaven Stream, there may remain land uses permitted to be undertaken which, individually or cumulatively, may compromise the objectives of the proposed works once constructed. Confirmation of this notice of requirement will ensure, through section 176(1)(b) of the RMA, that potential future development cannot be undertaken



within the designation extent without consent of the requiring authority. This is considered necessary in order to ensure the ongoing integrity and function of the proposed works into the future.

The historic pattern of subdivision of land in the Pinehaven area has occurred in a manner which has generally not had appropriate regard to the location of the stream channel and the associated flood risks. The proposed designation is considered to be necessary to recognise and provide for the stream channel within the wider urban environment.

The proposed works, and the stream channel more generally, require ongoing maintenance. The current situation of the stream flowing through multiple private properties with no provision for maintenance access to the stream is not considered appropriate. The proposed designation is necessary to provide for ongoing maintenance of the proposed works.

The proposed designation is also necessary in order to provide certainty to the landowners and wider community about the land use planning framework in the area and the intended use of the land for structural flood mitigation works. Designation of the land will provide a public and easily accessible mechanism in the UHCC district plan maps for people to view and understand the extent of the works and ongoing maintenance land use requirements.

For these reasons, the proposed designation and associated works are considered to be reasonably necessary.

#### 12.5.1 Alteration to designations

The alignment of the proposed designation partially overlays existing designation UHC62 and UHC89, and fully overlays UHC61 and UHC73. UHC73 has the purpose of 'Drainage Reserve'. It is noted that the Upper Hutt City Council is the requiring authority for these designations and therefore there is no issue in relation to the requirements of section 177 of the RMA.

Section 181 of the RMA states that:

#### 181 Alteration of designation

- (1) A requiring authority that is responsible for a designation may at any time give notice to the territorial authority of its requirement to alter the designation.
- (2) Subject to subsection (3), sections 168 to 179 and 198AA to 198AD shall, with all necessary modifications, apply to a requirement referred to in subsection (1) as if it were a requirement for a new designation.

Accordingly, there was a potential option to alter one or more of the existing designations affected by the proposed works under section 181 of the RMA to include the additional area of land required. Because of its purpose as a drainage reserve, UHC73 may have provided a suitable existing designation for this process.

The requirements of section 181(2) would essentially mean that the alteration of designation process would also require an assessment as provided in this NoR. Overall, there is not considered to be a clear advantage in undertaking an alteration to designation in terms of process, as it would essentially be the same in practice. It is also considered that the UHC73 purpose of 'drainage reserve' may not be clear or specific enough to sufficiently provide for the proposed works.

It is considered to be clearer in terms of communication to the public in undertaking the current process for a new designation associated with the proposed works that overlays all four existing affected designations with the express purpose of providing for those works.

For these reasons, the option to alter one or more of the existing designations affected by the proposed designation was not considered appropriate. These existing designations will remain in place following conformation of the new designation.



## 12.6 **RMA Part 2**

#### 12.6.1 Subject to Part 2

Both section 168A(3)(a) and 104 of the RMA are 'subject to Part 2'. The implication of the words "subject to Part 2" in s104(1) of the RMA has recently been an issue of some legal scrutiny. This is discussed in relation to the Notice of Requirement and resource consent applications below.

#### 12.6.1.1 Notice of requirement

The Board of Inquiry into the Basin Bridge Proposal considered the decision of the Supreme Court in *EDS v NZ King Salmon* [2014] NZSC 38 (*'King Salmon'*) in relation to the meaning of 'subject to Part 2' for a notice of requirement under section 171 of the RMA, and stated at paragraph 187 that:

Accordingly, we do not understand King Salmon as rejecting, or materially altering, the need for us to finally determine an NoR (such as the one before us) in accordance with the established framework we have already outlined. Indeed, we do not consider we would be complying with the statutory requirement that our assessment of the Transport Agency's NoR be subject to Part 2, if we failed to ultimately determine that NoR by reference to Part 2, and undertake an overall judgement in accordance with Section 5. We would require very clear and explicit guidance before being persuaded we must now depart from this very specific Parliamentary direction. (emphasis added)

Since then, the High Court considered the determination of a resource consent in light of *King Salmon* in *R J Davidson Family Trust v Marlborough District Council* [2017] NZHC 52 (*'Davidson'*), and applied the Supreme Court's reasoning to consideration of a resource consent. However, subsequent case law has continued to apply the Basin Bridge Proposal decision in respect of notices of requirement.<sup>17</sup> The High Court's approach in *Davidson* was substantially upheld by the Court of Appeal in 2018.<sup>18</sup>

However, because the wording of section 171(1) and 168A(2A) to (4) are virtually identical, and the current case law of recent Environment Court decisions applying the Basin Bridge Proposal decision, applying the reasoning set out in that decision in respect of the application of 'subject to Part 2' is considered to be appropriate in consideration of this Notice of Requirement.

#### 12.6.1.2 Resource consents

The Court of Appeal in *R J Davidson Family Trust v Marlborough District Council* [2018] NZCA 316 has held that, in considering a resource consent application, the statutory language in section 104 plainly contemplates direct consideration of Part 2 matters.

However, the Court considered that where a plan has been competently prepared under the RMA, it may be that in many cases there will be no need for the Council to refer to Part 2, but can implement the policy direction in the relevant planning instruments (which are seen as giving substance to Part 2). However, if there is doubt that a plan has been "competently prepared" under the RMA, then it will be appropriate and necessary to have regard to Part 2.

In the context of this application the operative plans for the Wellington Region were prepared prior to the operative Regional Policy Statement for the Wellington region and a number of changes to Part 2 of the RMA.

In addition, the regional planning framework is currently in a state of flux, given that the decisions on the PNRP have recently been released, and have been appealed by a number of parties. The Environment Court

<sup>&</sup>lt;sup>17</sup> See Pukekohe East Community Society Incorporated v Auckland Council and Watercare Services Limited [2017] NZEnvC 27 and Queenstown Airport Corporation [2017] NZEnvC 46.

<sup>&</sup>lt;sup>18</sup> R J Davidson Family Trust v Marlborough District Council [2018] NZCA 316.



following *Davidson* has seen this kind of situation as one where it is appropriate to undertake a first principles Part 2 analysis<sup>19</sup>.

As such a first principles Part 2 analysis is considered to be appropriate.

#### 12.6.2 Section 5: RMA Purpose & Principles

Section 5 sets out the purpose of the RMA, being:

(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.

Sustainable management is defined as:

(2) In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—

(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.

The Pinehaven Stream is a natural resource that must be sustainably managed, along with the physical resources that make up the surrounding urban area. It is considered that the proposed structural works for flood mitigation will constitute significant physical resources which will provide for the social and economic well-being and the health and safety of the Pinehaven and Silverstream communities by reducing the risk and consequences of flood hazard in the Pinehaven catchment.

The flood mitigation works will help to sustain the potential of the physical resources of the Pinehaven catchment urban area to meet the reasonably foreseeable needs of future generations by ensuring flood capacity in the stream is at a level considered to be acceptable by the community. This will help to sustain the residential use of the area, and meet the needs of the community in terms of flood risk.

The life-supporting capacity of the air, water, soil, and ecosystems will be safeguarded and the adverse effects of the proposed activities on the environment avoided, remedied, or mitigated in relation to the proposed works, through the construction management plans and mitigation methods proposed.

As such, the proposed works and designation to reduce the risk of flooding will achieve the purpose of the RMA.

## 12.6.3 Section 6: Matters of National Importance

Section 6 of the RMA sets out matters of national importance that are to be recognised and provided for. The matters of national importance considered relevant to the proposed works and designation are:

(a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:

(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

<sup>&</sup>lt;sup>19</sup> in Cossens v Queenstown Lakes District Council [2018] NZEnvC 205 the Court found that relevant objectives of the proposed plan were uncertain "if only because of the many appeals about them", such that it was necessary to apply Part 2.



(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:

(e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:

(h) the management of significant risks from natural hazards.

In relation to matter 6(a), the Pinehaven Stream is highly modified, with a number of existing structures in and over the stream, and a resulting low level of natural character along much of the stream corridor. The proposed works, particularly the proposed riparian planting, are considered to enhance the natural character of the stream, with the assessment of landscape character concluding that the amenity of the stream corridor would improve over time. Therefore, the works are considered to be appropriate.

In relation to matter 6(c), the loss of indigenous trees due to the works, and subsequent effects on indigenous fauna, will be mitigated by the proposed riparian planting which includes specimen trees.

In relation to matter 6(d), much of the Pinehaven Stream is currently located in private property. The proposed expansion and redevelopment of Willow Park is considered to enhance public access to and along the stream in that location. Existing public access to and along the stream corridor in other areas will be retained during the operational phase of the works. Access to and along the stream will be restricted during the construction phase; however, this will be temporary and necessary to ensure the health and safety of maintenance workers and the public.

In relation to matter 6(e), the Pinehaven catchment is identified as having significance as a waterway, but not known to be an area of historic cultural significance, or current cultural significance to Māori.

In relation to matter 6(h), the proposed works will give effect to the preferred structural methods set out in the Pinehaven Stream FMP which was developed to address the significant risk of flood hazard in the Pinehaven catchment. These structural methods support and integrate with the non-structural methods (implemented through PC42) and stream maintenance methods also identified in the FMP. The application is necessary to give effect to this matter of national importance in Pinehaven and Silverstream.

Based on the assessment of effects for the proposed works, and the assessment above, it is concluded that the proposal appropriately recognises and provides for the relevant matters of national importance.

## 12.6.4 Section 7: Other Matters

Section 7 of the RMA sets out other matters that all persons exercising functions and powers under it, are to have particular regard to in achieving the purpose of the RMA. Matters in section 7 that are considered to be of relevance to the proposed designation and associated works are:

- (b) the efficient use and development of natural and physical resources:
- (c) the maintenance and enhancement of amenity values:
- (d) intrinsic values of ecosystems:
- (f) maintenance and enhancement of the quality of the environment:
- (h) the protection of the habitat of trout and salmon:
- (i) the effects of climate change:

In relation to matter 7(b), the proposal works are considered to represent efficient use and development of natural and physical resources as they will result in the reduction of flood risk in the Pinehaven catchment, an established urban area, to acceptable levels. These works have been subject to extensive public consultation



and analysis processes, including multi-criteria analysis, and have been developed to integrate with nonstructural (District Plan provisions) and stream management methods. This includes the minimum use of land resources necessary to achieve the outcomes sought.

In relation to matter 7(c), the proposed works will result in the removal of indigenous trees identified with amenity values; however, this will be mitigated by the proposed riparian planting which is considered to result in an enhancement in amenity values over time as the planting becomes established. Residential amenity values will also be affected temporarily during the construction of the works, particularly in relation to noise. These effects will generally be short term and will be minimised through construction management plans.

In relation to matter 7(d), the ecological effects of the proposal have been assessed, with these being considered to be minor during the construction phase which will be temporary, and in the long-term will be mitigated by the proposed riparian planting.

In relation to matter 7(f), the quality of the physical urban environment is considered to be enhanced through the proposal due to the resulting reduction in flood hazard risk. This will enhance the continued use of the surrounding area for residential purposes. The quality of the stream and riparian area are also considered to be enhanced through the proposal, in particular through the proposed riparian planting which will enhance the stream in terms of ecological values through increased habitat along and in the stream, as well as potentially positively impact the water quality of the stream through overland stormwater filtration.

In relation to matter 7(h), it is recognised that Hulls Creek and the Hutt River, into which the Pinehaven Stream discharges, are identified as 'rivers with important trout habitat' in the regional planning framework. The assessment of ecological effects identified that the potential effects of sedimentation on fish and ongoing turbidity is expected to be negligible due to its temporary nature.

In relation to matter 7(h), the current advice on taking account of climate change in terms of expected changes to rainfall event intensity has been factored into the design inputs of the proposed works.

Based on the assessment of effects for the proposed works, and the assessment above, it is concluded that the proposal has had appropriate regard to Part 2 matters.

## 12.6.5 Section 8: Treaty of Waitangi

Section 8 of the RMA requires that:

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

In relation to taking account of the principles of the Treaty of Waitangi, the RPS for the Wellington Region includes relevant objectives and policies, in particular Objective 24 and Policy 48. These are assessed at Appendix R.1. The RPS for the Wellington Region also identifies principles included in a charter of understanding between GWRC and the region's iwi authorities. The principles relevant to this notice of requirement include:

- Partnership, including a duty for partners to act reasonably and in good faith;
- Active protection of Māori in the use of their lands, waters and other resources; and
- A duty to consult with Māori, including early consultation.

Consultation has occurred with the relevant iwi through the development of the Pinehaven Stream FMP. Through this consultation, the Pinehaven catchment was identified as having significance as a waterway, but not known to be an area of historic cultural significance, or current cultural significance to Māori. It is also noted that there are no iwi management plans relevant to the area of proposed works and designation. In addition,



assessment of the area of works by an archaeologist has concluded that there is no reasonable cause to suspect that archaeological sites will be disturbed during the proposed works.

Further consultation during the design phase has been undertaken with Tararaki Whanui. An initial position statement has been provided and further engagement responding to this position statement will be occurring post lodgement of the application. A Pinehaven Kaitiaki Monitoring Strategy has been proposed as a condition of consent in response to the outcomes sought by Te Atiawa Taranaki Whānui.

As such, it is considered that the principles of the Treaty of Waitangi have been appropriately taken into account in relation to the proposed works and designation.

Overall it is considered that proposal will achieve the purpose and principles of the RMA as established by Part 2 RMA.

## 12.7 Section 105

Section 105 of the RMA sets out matters relevant to certain applications, and states that:

(1) If an application is for a discharge permit or coastal permit to do something that would contravene section 15 or section 15B, the consent authority must, in addition to the matters in section 104(1), have regard to—

(a) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and

(b) the applicant's reasons for the proposed choice; and

(c) any possible alternative methods of discharge, including discharge into any other receiving environment.

The nature of the discharge is water taken for dewatering purposes, and construction phase stormwater associated with the construction of the Pinehaven Stream Improvements. The receiving environment is the Pinehaven Stream as described in section 5 of this report. Due to the need for the disturbance of soil adjacent to the stream and the need for a dry working environment for the installation of structural works no alternatives have been identified for the discharge other than simply not undertaking the works at all. Given the need to recognise and provide for significant risk from natural hazards, that is not considered to be reasonable option for this application.

## 12.8 Section 107

Section 107 of the RMA relates to restrictions on granting certain discharge permits. Section 107 states that:

(1) Except as provided in subsection (2), a consent authority shall not grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 or section 15A allowing—

(a) the discharge of a contaminant or water into water; or

...

if, after reasonable mixing, the contaminant or water discharged (either by itself or in combination with the same, similar, or other contaminants or water), is likely to give rise to all or any of the following effects in the receiving waters:

(c) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials:

(d) any conspicuous change in the colour or visual clarity:

(e) any emission of objectionable odour:

(f) the rendering of fresh water unsuitable for consumption by farm animals:

(g) any significant adverse effects on aquatic life.

(2) A consent authority may grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 or section 15A that may allow any of the effects described in subsection (1) if it is satisfied—

(a) that exceptional circumstances justify the granting of the permit; or

(b) that the discharge is of a temporary nature; or



(c) that the discharge is associated with necessary maintenance work and that it is consistent with the purpose of this Act to do so

It is noted that the Proposed Natural Resources Plan includes at Chapter 2 Interpretation the definition of 'zone of reasonable mixing' which is:

For the purpose of permitted rules in the Plan, but excluding discharges to coastal water, the zone of reasonable mixing is:

(a) in relation to flowing surface water bodies, whichever of the following is the least:

(i) a distance 200m downstream of the point of discharge if the width of the wetted channel is greater than 30m at the point of discharge, or

(ii) a distance equal to seven times the width of the wetted channel of the surface water body, but which shall not be less than 50m, or

(iii) the distance downstream at which mixing of contaminants has occurred across the full width of the wetted channel of the surface water body, but which shall not be less than 50m, or

As such, the minimum zone for the Pinehaven Stream would be at least 50 metres. Taking into account Policy P72 as set out in Appendix R, the appropriate zone of reasonable mixing is considered to be 50 metres.

The discharges are not anticipated to result in the adverse effects set out in section 107 (1) (c), (e), (f) or (g) after reasonable mixing. In relation to (1)(d) 'any conspicuous change in the colour or visual clarity' a limit of 150 milligrams per litre total additional sediment load in the stream from the discharges from the works is proposed, as set out in the proposed condition in section 11. In addition, the discharges will be temporary in nature as they are related to construction works. Therefore, it is considered that consent can be granted without contravening section 107.

## 12.9 Section 176A Outline Plan

Given the level of detail provided in the notice of requirement and associated plans for the proposed works, no outline plan is proposed to be submitted, in accordance with section 176A(2)(b) which states that an outline plan need not be submitted to the territorial authority if the details of the proposed public work, project, or work, as referred to in subsection (3), are incorporated into the designation. Section 176A(3) states:

- (3) An outline plan must show—
- (a) the height, shape, and bulk of the public work, project, or work; and
- (b) the location on the site of the public work, project, or work; and
- (c) the likely finished contour of the site; and
- (d) the vehicular access, circulation, and the provision for parking; and
- (e) the landscaping proposed; and
- (f) any other matters to avoid, remedy, or mitigate any adverse effects on the environment.

The matters in (3) (a) to (e) are addressed by the plans attached at Appendix B, Appendix E, and Appendix F. Matter (f) is addressed by the Erosion and Sediment Control Plan attached at Appendix W and the proposed conditions for additional construction management plans as set out in section 11.2 of this report.



## 13. Summary

Pinehaven Catchment is located on the eastern hills of Upper Hutt City, with the Pinehaven Stream flowing north, from the upper catchment in the south through the urban areas of Pinehaven and Silverstream and discharging to Hulls Creek in the north. Pinehaven Stream has a history of flooding, with a number of recorded events causing extensive damage to property.

Pinehaven Stream has a history of flooding. The Pinehaven Stream Floodplain Management Plan (FMP) was developed to address the causes and issues associated with flooding in the catchment. The Pinehaven Stream FMP included proposed in-stream structural methods to assist in flood mitigation in addition to non-structural (District Plan) and stream maintenance methods.

The preferred options for the structural works outlined in the Pinehaven FMP were selected through an options identification and multi-criteria analysis process (MCA), followed by selection of a preferred option, further refinement and community engagement. This process included analysis of specific option combinations for each reach of Pinehaven Stream. Further alternatives analysis, and in particular multi-criteria analysis for significant decisions in relation to road crossing designs and retaining walls, has been undertaken for the design of the proposed works.

The proposed stream improvement works that make up the project include significant changes to the Pinehaven Stream channel and crossing structures in the lower reaches to provide for a 25-year channel capacity. These include:

- Creation of naturalised channel sections with suitable riparian planting;
- Construction of vertically sided lined stream sections;
- Upgrades to inlet structures;
- Securing secondary flow paths;
- Replacing private vehicle crossings and pedestrian bridges;
- Blockage reduction for inlet structures; and
- Relocation of utilities which cross the stream to avoid blockages.

This report presents the required information in support of a notice of requirement for designation and Outline Pan requirements in accordance with section 186A of the Resource Management Act 1991 for the Pinehaven Stream Improvements which implement the structural options for managing the flood risks in the Pinehaven catchment recommended in the Pinehaven Stream FMP.

An assessment of the effects of the proposed works and designation, found that in summary the following effects can be expected:

- Significant positive effects in terms of the mitigation of flood risk;
- Beneficial but limited effects on stormwater and hydrology;
- Minor adverse effects on water quality during construction, and beneficial but limited effects during operation;
- Some significant positive social effects during operation associated with the reduction in flood risk, but also moderate adverse effects on personal and property rights due to access requirements;



- Some minor effects on ecology during construction, which will be mitigated through proposed riparian planting and construction methods;
- Less than minor short term effects on landscape values, landscape elements and character, with improved amenity of the corridor over time;
- Significant visual effects during construction due to the loss of vegetation and encroachment on to properties. These reduce to minor effects once mitigation vegetation is established;
- Some positive urban design effects, which are significant in terms of the expansion and development of Willow Park;
- Limited effects on cultural values due to construction effects on the stream which are not considered to be significant;
- Some temporary construction related adverse effects in terms of traffic and transport, air quality, and noise and vibration which will be minimised as far as practicable through the implementation of the CMP. Noise and vibration effects may be significant for some adjacent properties;
- No anticipated effects on archaeological resources; and
- Net positive effects in providing for future maintenance activities.

The proposal has been assessed against the relevant sections of the RMA, national policy statements, regional policy statement, and relevant plans and proposed plans. It is considered that generally the proposed works and designation are consistent with the objectives and policies of these documents.

Due to the anticipated effects of the proposal and the likely significant public interest in the project, public notification of this notice of requirement is requested.

Taking an overall judgment approach, consistent with the decision of the Board of Inquiry for the Basin Bridge Proposal, the proposed works and designation are considered to be appropriate and promote the sustainable management purpose of the RMA, particularly the matter of national importance relating to natural hazards.



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# 15. Glossary of Acronyms and Terms

## Acronyms

Acronym	
AADT	Annual Average Daily Traffic
AEP	Annual Exceedance Probability
EPT	EPT refers to three Orders of invertebrates that are generally regarded as 'cleanwater' taxa. These Orders are Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), forming the acronym EPT.
GWRC	Greater Wellington Regional Council
HVFMS	Hutt Valley Flood Management Subcommittee
MCI	Macroinvertebrate Community Index
ONRC	One Network Road Classification
PNRP	Proposed Natural Resources Plan
RFP	Regional Freshwater Plan
RMA	Resource Management Act 1991
SEV	Stream Ecological Valuation
UHCC	Upper Hutt City Council
RPS	Regional Policy Statement for the Wellington Region

#### Terms

Term	Explanation
Annual Exceedance Probability	Describes the size of a flood event by the likelihood of it occurring in any given year. A 1%AEP flood has a 1% probability of occurring in any year.
Stream Bed	The space of land which the waters of the river cover at its fullest flow without overtopping its banks.
District Plan	The Upper Hutt City Council District Plan
Hutt Valley Flood Management Subcommittee	The Hutt Valley Flood Management Subcommittee is comprised of the Greater Wellington Regional Councillors for the Upper Hutt and Lower Hutt constituencies, the Chair of the Environment Committee and the Chair of the Greater Wellington Regional Council, and three elected members nominated by Hutt City Council, three elected members nominated by Upper Hutt City Council, one member nominated by Port Nicholson Block Settlement Trust and one member nominated by Toa Rangatira Trust, whom are all appointed by Council.
	The Subcommittee provides oversight of the development, implementation and review of the Floodplain Management Plans (FMPs) of the Hutt River floodplain. The Subcommittee also provides oversight of the public involvement process for FMPs.



# **Appendix A. Location Plans**



# **Appendix B. General Arrangement Plans**



# **Appendix C. Designation Plans**



# **Appendix D. Site Access and Laydown Plans**



# **Appendix E. Typical Cross-Sections**



# **Appendix F. Landscape Plans**



# **Appendix G. Properties Affected**

Reach	Address	Legal Description	Property Land Area (m²)	Designation Land Area (m²)
1	48 - 50 Whitemans Road	Pt Lot 1 DP 17067, Pt Lot 1 DP 11499	2868	458
1	52 Whitemans Road	Lot 1 DP 20082	1339	70
1	54 Whitemans Road	Lot 1 DP 24812	101	
1	56 Whitemans Road	Lot 1 DP 44269	523	300
1	4 Blue Mountains Road	Lot 1, 2 & 3 DP 26272	3852	2114
1	8 Blue Mountains Road	Lot 2 DP 5336	2686	527
1	10A Blue Mountains Road	Lot 1 DP 40536	1003	1002
1	14 Blue Mountains Road	Lot 2 DP 29885 and Lot 3 DP 27402	1601	206
1	13 Clinker Grove	Lot 4 DP 44269	925	71
1	14 Clinker Grove	Lot 3 DP 44269	932	225
1	15 Clinker Grove	Lot 2 DP 44269	1005	560
1	1 Tapestry Grove	Lot 43 DP 43710	998	331
2	5 Sunbrae Drive	Lot 6 DP 27402	506	5
2	20A Blue Mountains Road	Lot 6 DP 32985	759	116
2	22 Blue Mountains Road	Lot 7 DP 32985	549	6
2	24 Blue Mountains Road	Lot 19 DP 16738	942	183
2	26 Blue Mountains Road	Lot 18 DP 16738	954	422
2	30 Blue Mountains Road	Lot 16 DP 16738	874	292
2	32 Blue Mountains Road	Lot 15 DP 16738	874	168
2	34 Blue Mountains Road	Lot 14 DP 16738	918	497
2	36 Blue Mountains Road	Lot 13 DP 16738	925	504
2	38 Blue Mountains Road	Lot 1 DP 33010	898	113
2	5 Deller Grove	Lot 8 DP 27402	506	6
2	7 Deller Grove	Lot 9 DP 27402	506	1
2	13 Deller Grove	Lot 12 DP 27402 and Lot 1 DP 32931	516	21
2	15 Deller Grove	Lot 2 DP 32931	551	143
2	17 Deller Grove	Lot 14 DP 27402	551	215
3	1 Pinehaven Road	Lot 1 DP 15346	904	31
3	3 Pinehaven Road	Lot 2 DP 15346	995	58
3	7 Pinehaven Road	Lot 4 DP 15346	1430	804



Total			55,179	17,616
3	12 Birch Grove	Lot 22 DP 15346	1164	762
3	11 Birch Grove	Lot 21 DP 15346	1749	695
3	10C Birch Grove	Lot 1 DP 422324, Lot 3 DP 422324	685	202
3	10B Birch Grove	Lot 1 DP 33755	776	27
3	10A Birch Grove	Lot 2 DP 422324	1025	492
3	10 Birch Grove	Lot 1 DP 27100	607	66
3	9 Birch Grove	Lot 20 DP 15346	1558	457
3	8 Birch Grove	Lot 1 DP 43185	900	68
3	2A Freemans Way	Lot 1 DP 32105, Lot 3 DP 31536	2167	324
3	50 Blue Mountains Road	Lot 3 DP 45182	8164	4770
3	9 Pinehaven Road	Lot 5 DP 15346	1429	186



### Appendix H. Pinehaven Stream Improvements Engagement Report



# Pinehaven Stream Improvements Engagement Report

September 2019







### Pinehaven Stream Improvements Engagement Report

#### **1.0 Project context**

The Pinehaven Stream Improvements project implements the Pinehaven Stream Floodplain Management Plan (FMP 2015). The project involves a range of structural and non-structural measures designed to reduce the flood risk to the community and the catchment. The overall vision of the FMP is: 'A prosperous, and safe community that proactively manages the risk of flooding in the Pinehaven catchment'.

This is a collaborative project between Upper Hutt City Council (UHCC) and Greater Wellington Regional Council (GWRC). Wellington Water Ltd (WWL) is implementing the project on behalf of both project partners.

#### 1.1 A long lead-in

Pinehaven has a long history of regular flooding events, with 1976 being the largest; Whitemans Road bore the brunt of the floodwaters. This flooding event is known locally as 'the great flood'. The following year, GWRC and UHCC agreed to jointly administer the Pinehaven Stream with the Watercourses Agreement. <sup>1</sup>

However, as a result of ongoing flooding issues it was identified that improvements could be made with the stormwater system. The catchment is also quite contained in nature, within a built environment which has contributed to the Pinehaven Stream's susceptibility to flooding.

About a decade ago, GWRC expressed a desire to transfer responsibility for the Pinehaven Stream to UHCC. However the District Plan objectives, policies and rules did not recognise the identified Flood Hazard Extent and associated risk to development for either the Mangaroa River or the Pinehaven Stream. There was a need to address structures that were impeding the flow of water during heavy rain events and improve the capacity of the Pinehaven Stream.

In 2012, GWRC and UHCC notified Plan Change 15 – Mangaroa River Flood Hazard Assessment. However Plan Change 15 expired due to an extended flood modelling review period. The Pinehaven Floodplain Management Plan (PFMP) was developed in 2015. Both Councils committed to Plan Change 42 – Mangaroa and Pinehaven Flood Extents, which addressed the issue. The Plan Change addresses the risk from flooding within the Mangaroa River and Pinehaven Stream catchments for the 1:100 year flood event. The plan change identifies a range of risks associated with flood events in both the Pinehaven Stream and Mangaroa River catchments. The proposed provisions seek to avoid development in the high hazard areas and avoid and mitigate the risk from flooding in the lower hazard areas.

On 27 March 2018, the Upper Hutt City Council (UHCC) unanimously approved Plan Change 42 (PC42). This was the culmination of decades of work by Greater Wellington Regional Council (GWRC) and UHCC to address the issues of flood management for the Pinehaven community. Two appeals were then lodged with the Environment Court; one relating to matters not affecting the project and the second by Save Our Hills – appealing the entirety of PC42. Experts' conferencing was completed on 8 April and 9 April 2019. At the May mediation session, Save Our Hills advised that they had withdrawn their appeal. The Environment Court has now released its decision and PC42 has been approved.

<sup>&</sup>lt;sup>1</sup> http://www.gw.govt.nz/rivers-and-schemes/

An understanding of these events is important because it has informed the position and the questions raised by directly affected property owners.

#### **1.2** The Engagement Approach

Engaging with directly affected property owners early means we have actively promoted positive community engagement and stakeholder involvement in the project. Effective communication and inviting community input with preliminary design thinking has enabled the project team to take property owners on the 'project journey'.

This respectful approach builds trust and harnesses project opportunities. It provides clarity regarding what degree of disruption and project outcomes are acceptable to directly affected property owners.

Care has been taken to work closely with the 48 directly affected property owners first, before a wider public launch of the project. This is because it would not be acceptable for property owners to find out what was planned to occur on their property at the same time as the wider community.

#### 2.0 Pre-Engagement – July 2018

The primary purpose of the pre-engagement exercise was to reintroduce the project and establish a connection with property owners.

The objectives of the July 2018 pre-engagement were to:

- Reintroduce the Pinehaven Stream Improvements project to affected property owners
- Provide an update about what's happened since GWRC engaged with them about the project in 2012 on the Floodplain Management Plan (FMP)
- Invite property owners to share their thoughts about the project objectives and likely impact on their property.

Property owners received a letter, the overview image of the stream improvements (Image 1) and the Reach that their property is within. Over a few weeks, property owners were invited to meet onsite to talk about what the proposed stormwater improvement works meant for them. The narrative was as follows:

- Over the years, GWRC and UHCC have been working on the joint project to improve flood protection in the Pinehaven Catchment.
- Delivering the vision for a prosperous and safe community that proactively manages the risk of flooding involves a structural improvements project and planning controls through the Upper Hutt District Plan.
- The funding for the project has been approved in the Long Term Plan, which means that now is a good time to talk with you about the project and what it might mean for your property.
- The project works will be focused on key flooding areas around Blue Mountains Road, Sunbrae Drive, Whitemans Road, Pinehaven Road, Birch Grove, Pinehaven Reserve, and Clinker Drive, Upper Hutt.
- The goal is to provide capacity in the stream for a 1 in 25-year return period flood event and to protect floor levels to a 1 in 100-year return period. So, property owners can expect the capacity of the stream to be five times greater than now and for flood water not to enter homes during 100-year weather events.
- As your property is directly affected by the project, we'd like to come and meet with you at your place to talk about the project process. Because we are just about to enter the detailed

design phase of the project there's plenty of opportunity for your thoughts to be included into our design thinking.

The team wanted to understand the flooding concerns that people had and how flooding had affected them over the years. The information gathered provided a clear indication of how the project was viewed by the Pinehaven community and identified practical issues that needed to be taken into account for detailed design.

The pre-engagement response was strong with 85% of property owners choosing to meet to talk about the project. The majority of property owners were supportive of the project (74%), and some with concerns (15%) and one property owner with significant project trust issues (2%).

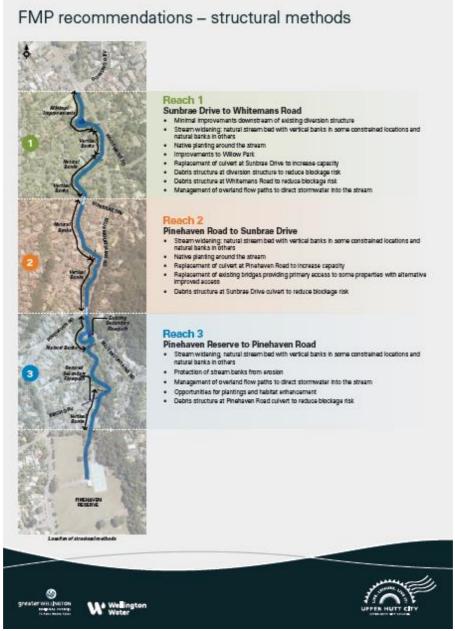


Image 1: How the project has been broken down into reaches with outcomes

#### 3.0 Ongoing Engagement – August 2018 – July 2019 – Investigation period

The project is challenging to construct due to constraints on site; the team have selected a contractor early to assist with property consultation and enable the design process to scope and develop construction methods. Given that the majority of work is being undertaken within private property, the project can be thought of as 48 separate infrastructure projects with a shared community outcome. Because of this, a dedicated relationship manager has been assigned to the project. The contractor was introduced to the affected property owners, which is important for on-going engagement throughout the project. Property owners were aware that the investigations work was to inform the detailed design of the project and was subject to change.

In preparing for detailed design and consenting the project team have conducted survey and geotechnical investigations, stream bed sampling, and ecological stream reviews over the 2018/19 summer period. This work on private property was enabled by existing property owner relationships. The investigations period also provided the opportunity to talk with property owners about how potential design changes within one stream reach can affect design needs downstream. This has been helpful in customer comfort with design options in some properties being quite different than those first discussed the previous year.



Image 2: Socialisation of the Pinehaven Stream Improvements Project with outcome signage

#### 1.3 Engagement tools

Throughout the engagement period, affected property owners have been interested in understanding more about just how the stream improvements project will affect their property. Some people have been thinking about this since 2012 when GWRC engaged on the Floodplain Management Plan (FMP). This project uncertainty, regarding the time that has passed in getting to this point, has resulted in some people feeling in 'limbo' regarding maintaining or upgrading their properties. With more detailed project information available, 100% of property owners have been engaged with by the project team during June/July 2019. The following engagement tools have been used.

#### A) Project website – <u>https://www.wellingtonwater.co.nz/pinehaven-stream-improvements/</u>

The Pinehaven Stream Improvements website serves as the accessible location for all publicly available project information. When the physical works begin the site will be the primary platform for community updates.

#### B) Detailed property packs

Each property owner was contacted and given their detailed property pack. The property packs are designed for additional information to be easily stored as the project progresses. In most cases the property pack was handed over on-site. The packs contained:

- Copies of letters sent to date;
- A draft property access agreement (for familiarisation purposes)
- Preliminary design proposed new top of bank as affecting the property;
- Indicative designs of what new top of bank could look like;



Images 3 & 4: Relationship Manager (Genevieve Drake) with the Property Pack (left), Tim Haylock from Downer explaining impacts of new top of bank location to LLyod and Judith of 5 Sunbrae Drive (right)

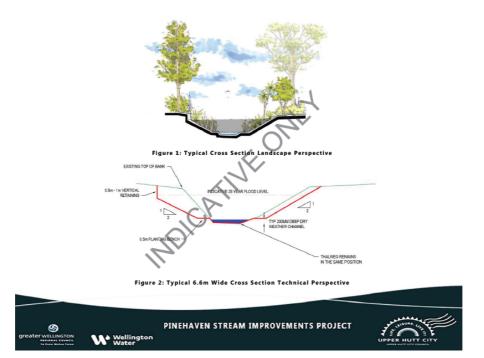
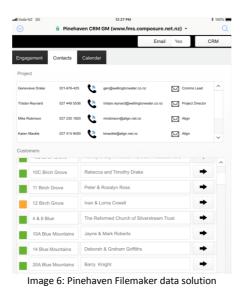


Image 5: Indicative Typical Cross Section

#### C) Engagement data solution – Filemaker

One of the issues in dealing with multiple customer relationships is recording site visits and discussions in a transparent and effective way. On-site discussions have been recorded using a data solution on Filemaker. The solution allows photos to be taken directly on the hand-held tablet and data entry is immediately available to project leads.



#### 1.4 Engagement Results

Working closely with property owners over the last year has enabled the development of a trusted relationship where project impacts can be honestly explored. From a construction impact perspective, most properties will experience minor impacts, such as temporary disruption as improvement works are being completed. However, the duration of the construction impact and exactly what access requirements will be required are shared issues for the affected Pinehaven property owners.

One common request has been for the project to remove large trees near homes, especially the ones that contain deadwood. Many of these trees are close to the stream bank and will need to be removed as part of the project anyway. As quite a few of the property owners are elderly, they are very much looking forward to things being tidied up and maintenance of their properties and Pinehaven Stream being easier in the future.

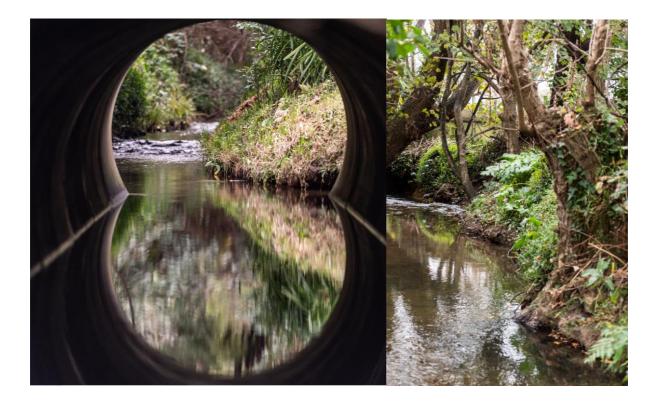
A key message expressed to property owners has been that the project is actively seeking opportunities for 'betterment' rather than going down the compensation route. This means that opportunities for improving the functionality of back yards as we do our work will be considered. This sits comfortably with most people although there are instances where requests have been made for property valuation where usable land will be required for stream widening; this work is underway for 10A Blue Mountains Road, 10A and 10C Birch Grove, 13 Deller Grove and 1 Tapestry Grove.

Further valuation work will be required for significantly impacted properties including 12 Birch Grove and properties on Blue Mountain Road (numbers 30 - 38) where the project design is introducing a shared private driveway to replace most of the individual access-ways.

#### **1.5 Property Owner Understanding of project impact**

Affected property owners have received a copy of the General Arrangement drawing that relates to works in and around their property. The project team has made sure that there is understanding about what needs to be built and the disruption associated with getting the work done. This 'no surprises' approach is essential for continued positive working relationships.

All affected property owners are in communication with the project team, via the relationship manager. We are confident that the majority of property owners will be satisfied with the project process. To date, engagement has been ongoing for over a year. This relationship management will continue until the physical works project and reinstatement is complete.





### Appendix I. Te Atiawa Taranaki Whānui position statement

Port Nicholson Block Settlement Trust, on behalf of Te Atiawa Taranaki Whānui, has developed this position statement.

### 1. Introduction to the Te Atiawa Taranaki Whānui's view

- 1.1 The Port Nicholson Block Settlement Trust (The Trust and also referred to as Taranaki Whānui ki Te Upoko o Te Ika) represents the members and who have direct whakapapa connections to the tribal takiwā (area) of Te Atiawa Taranaki Whānui.
- 1.2 The takiwā of Te Atiawa Taranaki Whānui extends from Pipinui to Remutaka, down to Turakirae, across to Rimurapa and back up to Pipinui. Te Atiawa Taranaki Whānui has overlapping interests with Ngāti Toa Rangatira, Rangitāne o Wairarapa and Ngāti Kahungunu ki Wairarapa.
- 1.3 Te Atiawa Taranaki Whānui has a statutory acknowledgement over Te Awa Kairangi. Although this project is isolated to the Pinehaven Stream. This stream is a tributary of Te Awa Kairanga creating an intimate connection between each other and their mouri and mana.
- 1.4 Alongside their mouri, they have an interconnected kawa. Over time people have trampled on this kawa through building walls, straightening riverbanks and augmenting the true and natural state of our Awa. However there has come a general realisation by some that we must work with our Awa and that it is easier to abide by their kawa then is to apply the traditional conventions of command and control by man.
- 1.5 In applying our relationship with our Awa, we must understand that their Kawa does not have us – the humans at the centre. Our water ways were not created 'for us'. Our waterways, according to our tradition were a gift from our ancestors – 'Ngā Wai Tuku Kiri mai ngā mātua tupuna'. Our obligation as Taranaki Whānui and as ngā tāngata tiaki of these water bodies is to honour that gift.
- 1.6 Therefore, in abiding the kawa of these Awa we must act in a manner that sees us manage people for the benefit of our Awa this is not about managing our Awa. Our role as tangata tiaki is to develop a renewed collective responsibility for our human impacts on our Awa and respond to the impacts we can foresee.
- 1.7 The '**Te Pinehaven Stream Improvements'** (The Project) presents a situation where the applicant is making a significant effort to return the Pinehaven Stream back to its more natural state.

### 2. Mana Whenua Considerations

2.1 The applicant explicitly acknowledges the relationship of Taranaki Whānui with the Pinehaven Stream as a tributary of Te Awa Kairangi in The Project consent and all other relevant documents.

- 2.2 The applicant explicitly articulates within the resource consent application and other relevant and associated documents how it will support Taranaki Whānui's relationship with the Awa.
- 2.3 The applicant ensures Taranaki Whānui are involved in the development of all relevant management plans
- 2.4 The applicant provides for the development and implementation of a Pinehaven Kaitiaki Monitoring Strategy (KMS) specifically noting:
  - a. The need by the applicant to meet reasonable costs in preparing the Kaitiaki Monitoring Strategy,
  - b. Each KMS will include the following, as applicable
    - i. identification of tohu (attributes) and methods to monitor them;
    - ii. dentification of mahinga kai and Māori customary use and methods to monitor them;
  - c. The applicant will provide for any reasonable costs associated with the development and implementation of the KMS
- 2.5 The applicant undertakes to ensure that the mana and mouri of the stream is not negatively impacted on by the activities of the applicant
- 2.6 The applicant ensures that any requirements of mitigation and or offsetting is confined as much as possible to the stream and or wider catchment
- 2.7 In ensuring that the relationship with the stream and Taranaki Whānui is maintained, the applicant will support all opportunities for water quality enhancement and enabling the local and mana whenua stories of the stream to be shared
- 2.8 The applicant undertakes to ensure that all conditions of consent relating to the interests of Taranaki Whānui are written with our knowledge and in collaboration.

### 3. Conclusion

3.1 Taranaki Whānui seeks an intergenerational view to introduce new practices that are based on our commitment to meet our responsibility. The honouring of our Awa will create greater admiration and respect for their kawa and our obligation to uphold it.



# Appendix J. Parties Consulted and General Works Summary

Location	Properties Consulted	General Summary of Works
Reach 3: Birch Grove	8 Birch Grove 10 Birch Grove 10B Birch Grove 10C Birch Grove 11 Birch Grove 12 Birch Grove	Removal of some structures including some fencing, sheds and decks. Stream will be piped to divert low flows from stream during construction. Some improvements to occur outside of stream where possible. Both banks will be cleared of vegetation. Existing footbridge to be removed and vehicular access over culvert to be replaced with bridge. Temporary pedestrian bridge to be constructed to access property before replacement bridge constructed. During construction parking proposed on Birch Grove. Some property boundary adjustments required to accommodate stream improvements. Improvements for conveyance of overland flow path from Birch Grove to stream required. Construction activity will occur in Birch Grove for loading of excavated material and unloading of precast blocks and other materials.
Downstream of Reach 3: Between Birch Grove and Pinehaven Road	2A Freemans Grove 50 Blue Mountains Road 1 Pinehaven Road 3 Pinehaven Road	Overland flow exits stream from this area. Five areas where bank erosion observed to be stabilised. Some on site grading may be required to manage drainage; design will aim to minimise impacts. Acesss through property may be required for proposed works. Minimal disruption proposed to existing vegetation where possible; extent of stabilisation activities to consider existing vegetation.
Reach 2: Blue Mountains Road between Pinehaven Road and 28 Blue Mountans Road	30 Blue Mountains Rd 32 Blue Mountains Rd 34 Blue Mountains Rd 36 Blue Mountains Rd 38A Blue Mountains Rd 38B Blue Mountains Rd	Existing vehicle and pedestrian bridges to be removed and replaced with a revised access proposed for 30-32 Blue Mountains Road and another proposed for 34-36 Blue Mountains Road. No changes proposed to access for 38A, 38B or 40 Blue Mountains Road. Existing structures over and adjacent to stream to be removed. Both banks will be cleared of vegetation in most areas.



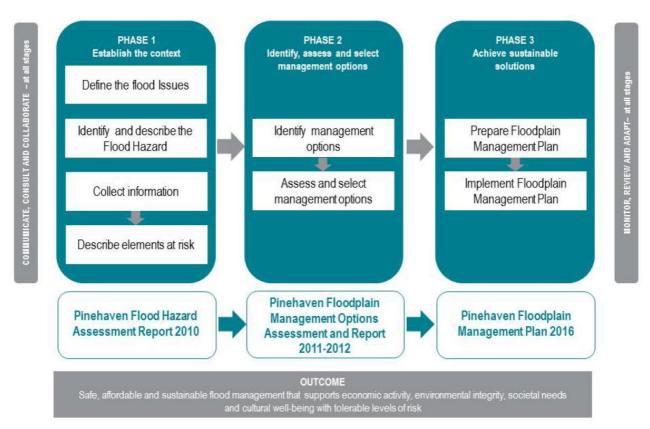
		Vertical walled stream channel proposed on both sides.
Reach 2: between 28 Blue Mountains Road and Sunbrae Drive	20A Blue Mountains Rd 22 Blue Mountains Rd 24 Blue Mountains Rd 26 Blue Mountains Rd 3 Sunbrae Drive 5 Sunbrae Drive 6 Sunbrae Drive 1 Deller Grove 5 Deller Grove 9 Deller Grove 10 Deller Grove 13 Deller Grove Unit 1 – 15 Deller Grove Unit 2 – 15 Deller Grove 17 Deller Grove	Top of bank will move towards the property boundaries in most areas. Some sections of existing bank to be retained where possible. Vegetation clearance along most areas of stream with one or both banks to be be cleared of vegetation. Naturalised banks with 2:1 slopes. Low height retaining wall on left bank upstream of Sunbrae Dr. For Deller Grover properties, top of bank will shift towards the property. Potential for revisions to the wastewater alignment and chambers.
Reach 1: Sunbrae Dr through Willow Park	14 Blue Mountains Rd 1 Tapestry Grove 10A Blue Mountains Rd	Vertical walls proposed approximately 40m downstream of Sunbrae Dr culvert. Top of banks will shift towards the properties on right bank. Both banks cted for the culvert works will be cleared of vegetation, including an existing beech tree (assessed by an arborist). Top of bank will adjust slightly towards the property however this will be offset through realocation of land from 4 Sunbrae Drive. Regrade within property to new top of bank. Both banks will be cleared of vegetation Top of bank will shift towards the property and a new low 300mm flood wall will be provided. Existing garage and sleep out structure will require demolition and replacement.
Reach 1: Between existing diversion and Willow Park	4-8 Blue Mountains Rd	Site access via existing bridge (subject to structural assessment) and along stream length on both sides. Top of bank will shift towards property by up to 1 metre to account for stepped retaining wall. Portions of low lying garden area between car park and stream will need to be re-graded and re-planted. Both banks will be cleared of vegetation.



Reach 1: Downstream of existing diversion	11 Clinker Grove 12 Clinker Grove 13 Clinker Grove 14 Clinker Grove 15 Clinker Grove Flat 1, 48 Whitemans Rd Flat 2, 48 Whitemans Rd Flat 3, 48 Whitemans Rd Flat 1 50 Whitemans Rd Flat 2 50 Whitemans Rd Flat 3 50 Whitemans Rd	Lowering of accessway and formation of new kerbing to secure overland flow path from Clinker Grove to stream including local adjustments required to kerbing at pedestrian/vehicle access points. Formalise existing overland flow path across garden area. Existing top of bank area is low and will either require regrading or small bund/wall to raise top of bank. Existing top of bank area is low and will either require regrading or small bund/wall to raise top of bank. Existing footbridge to be replaced. Replacement of existing debris structure at culvert inlet. Three pedestrian bridges to be replaced with new raised pedestrian bridges.
Other engagement to be completed	7 Pinehaven Road 9 Birch Grove	Identified opportunity for improved drainage and mitigation of overland flow. Possible access for improvements to existing stream erosion between Birch Grove and Pinehaven Road. Pending engagement.



### **Appendix K. Pinehaven Stream FMP Development Process**





### Appendix L. Floodplain Management Options Considered

### L.1 Structural Options Considered

Structural Option	Description
Channel modification	Widening and deepening of channel cross-sections was considered in order to increase the capacity of the stream. This included two broad options, naturalised cross-sections and lined cross-sections. Consideration for the appropriateness of stream channel widening included the extent of existing modification of the stream, the required channel footprint and the potential impact on private property, erosion protection requirements, and riparian environmental enhancement opportunities.
Bridge and culvert upgrades	Upgrading of private and public structures was considered as a number of the current structures along the stream channel have insufficient capacity, have high potential for blockages and are significant contributors to flooding risk. Sunbrae Drive and Pinehaven Road culverts were found to be particularly key structures that require upgrade.
Debris control	Reducing blockage risk at structures through debris control could significantly reduce direct flood damage in future events. Debris control was particularly considered important for bypass and pipe network inlets.
Flood defences	Stop banks and floodwalls were considered for the Pinehaven stream. Considerations included the close proximity of development and potential overflow path obstruction from above ground structures.
Secondary overflow paths	Modifications to topography and other improvements were considered in order to provide safer and more effective overflow paths, which are an important part of the Pinehaven catchment flood response.
Connected stormwater network upgrades	Consideration was given to the need to upgrade pipe capacities in conjunction with stream upgrades, and whether any benefits to pipe capacity resulted from lowering tail water levels.
Detention storage	Detention storage was considered in Pinehaven Reserve as it could help limit downstream channel upgrade requirements. Due to adverse effects of large scale detention storage, it was concluded that it was not feasible.

### L.2 Reach Specific Options Considered

Option	Description	Comments
Reach 1		
1.0	25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level.	Achieves UHCC target levels of service
	Key features:	Positive impacts on riparian and in
	Naturalised channel with suitable riparian planting	stream environment
	New bridge at Sunbrae Drive	
	Upgrade of piped stream and bypass inlet structures	
1.1	25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level.	Achieves UHCC target levels of service
	Key features:	Reduction in footprint of channel
	Concrete lining of channel through constrained sections	works
	<ul> <li>Naturalised channel with suitable riparian planting as per Option 1.0 for remainder of reach</li> </ul>	Reduction in channel maintenance requirements
	New bridge at Sunbrae Drive	
	Upgrade of piped stream and bypass inlet structures	
1.2	10 year channel capacity.	Lower target level of service
	Key features:	



Option	Description	Comments
	<ul> <li>No channel works required downstream of 8 Blue Mountains road</li> </ul>	Reduction in footprint of channel works
	<ul> <li>Naturalised channel with suitable riparian planting</li> </ul>	No channel works required
	Bridge at Sunbrae Drive	downstream of 8 Blue Mountains Road
	Upgrade of piped stream and bypass inlet structures	Positive impacts on riparian and in stream environment
		Reduction in ability to adapt to future catchment land use change and climate change predictions
Reach 2		
2.0	25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level. Key features:	Achieves UHCC target levels of service
	<ul> <li>Naturalised channel with suitable riparian planting</li> </ul>	
	<ul> <li>Bridge at Pinehaven Road</li> </ul>	
2.1	25 year channel capacity to protect residential floor levels up to	Achieves UHCC target levels of
	the predicted peak 100 year flood level. Key features:	service Reduction in footprint of channel
	Vertical sided lined section from Pinehaven Road to 26 Blue	works
	Mountains Road	Reduction in channel maintenance
	<ul> <li>Naturalised channel with suitable riparian planting as per Option 2.0 for remainder of reach</li> </ul>	requirements
	Bridge at Pinehaven Road	
2.2	A reduced channel footprint option (10 year channel capacity) was considered but there was insignificant benefits in reduced impacts or cost as well as increased risks. This option is therefore not reported in this summary.	
Reach 3		I
3.0	25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level.	Achieves UHCC target levels of service
	Key features:	Positive impacts on riparian and in
	Naturalised channel with suitable riparian planting	stream environment
3.1	25 year channel capacity to protect residential floor levels up to the predicted peak 100 year flood level. Reduced footprint	Achieves UHCC target levels of service
	channel shape.	Reduction in footprint of channel
	Key features:	works Reduction in channel maintenance
	<ul> <li>Concrete lined section though Birch Grove properties</li> <li>Naturalised channel with suitable riparian planting as per</li> </ul>	requirements
0.0	Option 3.0 for	
3.2	<b>10 year channel capacity. Naturalised channel.</b> Key features:	Lower target level of service Reduction in footprint of channel
	<ul> <li>Naturalised channel with suitable riparian planting</li> </ul>	works
	<ul> <li>Reduced level of service</li> </ul>	Positive impacts on riparian and in stream environmental
		Reduction in ability to adapt to future catchment land use changes and climate change predictions
3.3	10 year channel capacity. Reduced footprint.	Lower target level of service
	Key features:	Reduction in footprint of channel
	Concrete lined section through Birch Grove properties	works



Option	Description	Comments
	<ul> <li>Naturalised channel with suitable riparian planting as per option 3.2 for remainder of reach</li> <li>Reduced level of service</li> </ul>	Reduction in channel maintenance requirements Reduction in ability to adapt to future catchment land use changes and climate change predictions
3.4	<ul> <li>Hybrid option of a concrete lined 25 year channel capacity through the space restricted areas adjacent to Birch Grove but with the remainder of the channel upgraded to a naturalised channel with only a 10 year capacity.</li> <li>Key features;</li> <li>25 year capacity concrete lined section through Birch Grove properties</li> <li>Naturalised channel with suitable riparian planting as per Option 3.2 for remainder of reach.</li> </ul>	Lower target level of service Reduction in footprint of channel works Reduction in channel maintenance requirements
Upper C	atchment	
4.0	<ul> <li>Do Minimum</li> <li>No structural upgrades</li> <li>Enforce existing planning controls the design of new bridges</li> <li>Set a minimum underside of deck level, channel width and required capacity for any new vehicle and pedestrian access structures.</li> </ul>	Stream channel in upper catchment tributaries are largely within private property. Most of the impacts of flooding related to channel constraints are limited to the immediate area and adjacent properties Upgrades to increase channel capacity in the upper catchment will first require upgrades in the lower catchment to prevent adverse flooding effects
4.1	Secure flow paths and pipe network upgrades to facilitate long term improvements in the upper catchment.	Reduces nuisance flooding and protects some floor levels
	<ul> <li>Set a minimum underside of deck level, channel width and required capacity for any new vehicle and pedestrian access structures.</li> </ul>	Management of residual risks through secondary overflow paths
	<ul> <li>Blockages reduction measures at network and culvert inlet structures</li> <li>Upgrades to high risk council owned culvert and pipe networks</li> <li>Modifications to road kerbs, crossings and driveways as well as easements to secure key secondary overflow paths</li> <li>Securing key overflow paths in Pinehaven Road</li> <li>Culvert upgrades in Pinehaven Road, Wyndham Road and Forest Road.</li> </ul>	Increasing the capacity of the council owned constraints such as the pipes under Pinehaven reserve will allow for private upgrades in the upper catchment.
	Stormwater network upgrades in Pinehaven School and Pinehaven Reserve.	
4.2	Secure flow paths only, to facilitate long term improvements in the upper catchment.	Reduces nuisance flooding and protects some floor levels
	Set a minimum underside of deck level, channel width and required capacity for any new vehicle and pedestrian access structures.	Management of residual risks through secondary flow paths
	Modifications to road kerbs, crossings and driveways as well as easements to secure key secondary overflow paths	
	Securing key overflow paths in Pinehaven Road	



# Appendix M. Multi-Criteria Analysis

### M.1 Selected MCA Criteria and Weighting

Criteria Category	Weighting for FMP	Criteria Definition/Sub Criteria					
Flooding (long term	20%	Achieves UHCC target levels of service					
flooding impacts)		Consistency with regional flood hazard policies (avoiding flood hazard, protecting existing development)					
		Blockage susceptibility					
		Stormwater network flooding susceptibility					
		Security of secondary flow paths					
		Residual risk					
Social (long term social impacts)	15%	Impacts on community infrastructure (includes schools, halls, parks, and other assets in public or community care)					
		Impact on landowners (includes land in private ownership, outside those mentioned under maintenance)					
		Impact on wider community (includes the wider Upper Hutt and regional community)					
Cultural (long term	15%	Impact on Iwi					
cultural impacts)		Impact on interest groups					
Environment (long		Impact on heritage					
term environmental impacts)		Impacts on in stream environment (water quality, sedimentation, stream ecology)					
mpuotoj		Impact on riparian environment					
		Impact on wider environment					
Economic	15%	Annualised flood damages					
		Implementation cost					
		Annualised maintenance costs					
Construction (short	15%	Ease of access for construction					
term impacts during		Health & safety risks associated with construction					
construction)		Impacts on landowners during construction including noise, dust, truck movements, vibration, etc					
		Dealing with flooding during construction					
		Consent process resource requirement intensity (perceived consentability with UHCC and GWRC)					
Maintenance (long	10%	Ease of access					
term maintenance impacts)		Safety of maintenance teams					
		Impact on landowners					
Sustainability	10%	Future land use and development beyond life of plan					
(Adaptability to beyond long term		Flexibility to adapt to changes in climate change predictions					
impacts)		Allows expansion to full Integrated Catchment Management approach					



#### M.2 FMP Preferred Options MCA Results Summaries

#### M.2.1 Summary of MCA Weighted Scores Prior to Community Consultation

Reach	Option	Flooding	Social	Cultural	Economic	Construction	Maintenance	Environment	Sustainability	Total
1	Option 1.0	0.9	0.5	0.3	0.4	0.2	0.3	0.5	0.6	3.6
	Option 1.1	0.9	0.5	0.3	0.5	0.1	0.4	0.3	0.5	3.5
	Option 1.2	0.6	0.6	0.3	0.5	0.2	0.4	0.5	0.3	3.4
2	Option 2.0	0.9	0.4	0.3	0.4	0.2	0.3	0.5	0.6	3.5
	Option 2.1	0.9	0.6	0.3	0.5	.0.1	0.5	0.4	0.5	3.7
	Option 2.2	-	-	-	-	-	-	-	-	-
3	Option 3.0	0.9	0.4	0.3	0.5	0.1	0.3	0.5	0.6	3.6
	Option 3.1	0.9	0.5	0.3	0.6	0.1	0.5	0.4	0.6	3.8
	Option 3.2	0.6	0.5	0.3	0.5	0.2	0.3	0.5	0.4	3.2
	Option 3.3	0.6	0.6	0.3	0.6	0.1	0.5	0.4	0.3	3.2
	Option 3.4	0.8	0.6	0.3	0.7	0.1	0.5	0.4	0.6	3.2

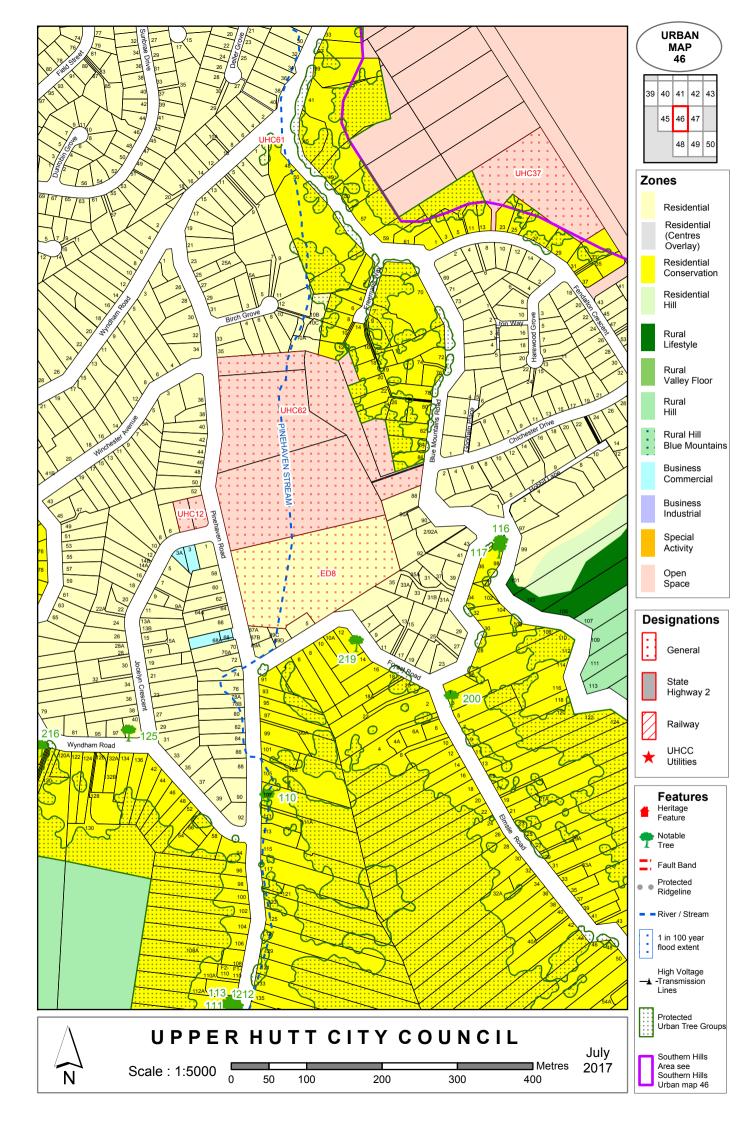
#### M.2.2 Summary of MCA Weighted Scores Post Community Consultation

The adjusted scores are indicated by grey cells

Reach	Option	Flooding	Social	Cultural	Economic	Construction	Maintenance	Environment	Sustainability	Total
1	Option 1.0	0.9	0.5	0.3	0.4	0.2	0.3	0.5	0.6	3.6
	Option 1.1	0.9	0.6	0.3	0.5	0.1	0.4	0.4	0.5	3.7
	Option 1.2	0.6	0.6	0.3	0.5	0.2	0.4	0.5	0.3	3.4
2	Option 2.0	0.9	0.4	0.3	0.4	0.2	0.3	0.5	0.6	3.6
	Option 2.1	0.9	0.6	0.3	0.5	.0.1	0.5	0.4	0.5	3.8
	Option 2.2	-	-	-	-	-	-	-	-	-
3	Option 3.0	0.9	0.4	0.3	0.5	0.1	0.3	0.5	0.6	3.6
	Option 3.1	0.9	0.5	0.2	0.6	0.1	0.5	0.4	0.6	3.6
	Option 3.2	0.6	0.5	0.3	0.5	0.2	0.3	0.5	0.4	3.2
	Option 3.3	0.6	0.6	0.3	0.6	0.1	0.5	0.4	0.3	3.2
	Option 3.4	0.8	0.6	0.3	0.7	0.1	0.5	0.3	0.6	3.2



### Appendix N. Relevant Upper Hutt City Council District Plan Map





### Appendix O. Existing Designations in the Pinehaven Catchment Area

Ref.	Title	Location	Relevance to Proposed Works	
ED8	Pinehaven Primary	Pinehaven Road	Stormwater pipes located within the designation, conveying water from the upper catchment tributaries.	
ED11	Silverstream Primary	Whitemans Road	Stormwater pipes located within designation, including those conveying water from the Pinehaven Stream and diversion pipe.	
UHC12	Civic purposes – Pinehaven Library and Reserve (Local Purpose)	Pinehaven Road / Jocelyn Crescent	No relevance to proposed works.	
UHC34	Recreation	Duncraig Street, Penny Lane (Duncraig Park)	No relevance to proposed works.	
UHC35	Recreation	Dunns Street / Prouse Grove / Tapestry Grove (Dunns Park)	No relevance to proposed works.	
UHC37	Recreation	Fendalton Crescent (Fendalton Scenic Reserve)	No relevance to proposed works.	
UHC46	Recreation	Kurth Crescent / Dunns Street (Kurth Crescent Reserve)	No relevance to proposed works.	
UHC61	Recreation	Pinehaven Road / Blue Mountains Intersection (Pickerills Reserve)	Works required in designation, to be fully incorporated into the operative designation boundary.	
UHC62	Recreation	Pinehaven Road (Pinehaven Reserve)	Small amount of stream channel works required at edge of designation, with associated small designated area within reserve. Larger construction phase designation area required.	
UHC63	Recreation	Pioneer Grove / Kurth Crescent (Pioneer Grove Park)	No relevance to proposed works.	
UHC69	Recreation	Whitemans Road (Silverstream Park)	Stormwater pipes located within designation, including those conveying water from the Pinehaven Stream and diversion pipe.	
UHC73	Local Purpose (Drainage Reserve)	Sunbrae Drive	Pinehaven Stream runs through reserve. Works proposed to create naturalised channel. Whole of area to be incorporated into the proposed operational designation.	
UHC74	Recreation	Tapestry Grove / Field Street (Tapestry Park)	No relevance to proposed works.	
UHC89	Recreation	Blue Mountains Road / Tapestry Grove (Willow Park)	Pinehaven Stream runs through Willow Park. Major works proposed to create naturalised channel. Whole of area to be incorporated into the proposed operational designation.	
UHC90	Recreation	Wyndham Road (Reserve)	No relevance to proposed works.	
UHC91	Recreation	Sylvan Way	No relevance to proposed works.	



### Appendix P. Upper Hutt City Council District Plan Rule Assessment

Ref.	Rule / Standard	Assessment			
Chapter 18	Chapter 18 Residential Zone Rules				
Land Use	Activities	Status			
Activities Table 18.2	Residential Activities				
	Removal of a building from a site	Ρ	The removal of access bridges and other accessory buildings and structures is permitted under this rule.		
	Non-Residential Activities				
	Work affecting indigenous or exotic trees in the Residential Conservation and Residential Hill Sub- zones	Ρ	The only work affecting trees is related to the bridge at 4 Blue Mountains Road, which is not located within the Residential Conservation and Residential Hill Sub-zones.		
	Activities which are not listed in this Table unless otherwise covered in the City-wide provisions of the Plan	D	The bridge at 4 Blue Mountains Road will be within the front boundary setback and therefore would not comply with 18.17. The bridge is not accessory to a permitted or controlled activity. Bridges over Pinehaven Stream are addressed by Chapter 33, and as such this would be considered under those provisions rather than under Chapter 18.		
Standards for	or Permitted and Controlled Activities				
18.9	<ul> <li>Access standards for subdivision and land use activities</li> <li>Where vehicle access points are shared by three or more dwelling units, for all rear lots and for all sites fronting arterial, or distributor/collector streets (identified in Chapter 37) there must be provision for turning a vehicle on site in order that vehicles do not reverse into the street.</li> <li>All accessways and manoeuvring areas shall be formed and surfaced in accordance with the Code of Practice for Civil Engineering Works. The required surfacing must be completed prior to certification of the survey plan. Exemption – the requirement for accessways serving sites solely occupied by unstaffed utilities shall be that the accessway shall be surfaced with permanent all weather surfacing for a minimum length of 5m from the edge of the road carriageway seal.</li> <li>All sites shall have practical vehicle access to car parking and loading spaces, in accordance with the Code of Practice for Civil Engineering Works. This requirement does not apply to sites solely occupied by unstaffed utilities shall not obstruct the footpath or create a traffic hazard on the road.</li> <li>Vehicular access to a corner lot shall be located no closer than 8m from the street corner. Where a site is located on an</li> </ul>		The proposed private way serving 30 to 36 Blue Mountains Road would meet these standards.		



Ref.	Rule / Standard		Assessment	
	<ul> <li>intersection of a primary or secondary (identified in Chapter 37) the siting of t shall be located as far as practicable fin street. The 8 metre setback shall be methe two front boundaries of the site (recorner lot) join, or in accordance with t</li> <li>Where a corner lot is located at an interprimary or secondary arterial traffic rout Chapter 37, no building, fence or other erected and no vegetation allowed to ge a traffic sight line.</li> <li>At the intersection of a road or rail lever fence or other obstructions which block shall be erected, placed or grown in the marked in Diagram A in Chapter 38.</li> <li>Subdivision and land use activities with State Highway shall comply with the arstandards set out in Diagrams B to E in There shall be no private vehicle acces Alexander Road for any site contained Wallaceville Structure Plan Area.</li> <li>There shall be no new private vehicle after the section 102B Hutt District Wellingto Hutt District.</li> <li>In relation to the land identified in Appen NA</li> </ul>			
18.12	Setbacks from boundaries The setback distance for residential and non-re (excluding accessory buildings) shall not be less	The proposed replacement bridges providing access to lots within the Residential zone are		
	Boundary	Minimum setback	considered to be 'accessory buildings' under the definition in	
	Front boundary along all other roads.	4m	Chapter 2, and therefore are not	
	Rear boundaries.	3m	subject to the boundary setback.	
	Side boundaries except within the Residential Conservation and Residential Hill Sub-zones.	One of 1.5m & one of 3m		
	Side boundaries within the Residential Conservation and Residential Hill Sub-zones.	3m (both sides)		
18.13	Outdoor living court One outdoor living court capable of containing a shall be provided for each dwelling and be locat aspect, or directly accessible from a living area.	These standards are not anticipated to be breached due to the proposed works.		
18.15	Building height The maximum height of any building shall not e			
18.16	Sunlight access		_	
10.10	Height control planes apply to all buildings:			
	<ul> <li>In, or adjacent to, a Residential Zone.</li> <li>On sites smaller than 1500m<sup>2</sup> in a Rur</li> </ul>			
	Buildings shall be designed so that they fit withi planes defined below:			
18.17	Accessory buildings		The proposed replacement	
	<ul> <li>Accessory buildings</li> <li>Accessory buildings shall not be erected within the front boundary setback.</li> <li>Any wall closer than 1m from a boundary shall be no longer than 8m, except in a Residential (Centres Overlay) Area on a</li> </ul>		bridges providing access to lots within the Residential zone are considered to be 'accessory buildings' under the definition in	



Ref.	Rule / Standard	Assessment	
	<ul> <li>site with a net site area of less than 400m<sup>2</sup>, with closer than 1m from a boundary shall be no lot.</li> <li>The distance between an accessory building a the main window of a habitable room on an acceasured at right angles to the plane of the window not less than 3m.</li> </ul>	Chapter 2. The bridge at 4 Blue Mountains Road will be within the front boundary setback.	
	For garages and other accessory buildings which form dwelling, the standards for accessory buildings shall ap dwelling, but only to the area of the dwelling which is a building.		
18.18	Water supply, stormwater and wastewater All activities shall comply with the water supply, stormwater and wastewater standards in the Code of Practice for Civil Engineering Works.		Any relocation of utility services will be undertaken to comply with the Code of Practice for Civil Engineering Works.
18.20	<ul> <li>Dust</li> <li>Activities shall not create a dust nuisance. A dust nuisa if:</li> <li>There is visible evidence of suspended solids beyond the site boundary.</li> <li>There is visible evidence of suspended solids a dust source, settling on the ground, building a neighbouring property or on water.</li> </ul>	The management of construction activities will ensure compliance with this standard during construction works.	
Chapter 21	Open Space Zone Rules		
Land Use	Activities	Status	
Activities Table 21.3	Passive recreation activities (unless otherwise specified in this table)	Ρ	Willow Park will continue to be used for passive recreation following the proposed works.
	Removal of a building from a site	Ρ	The removal of the existing bridge within Willow Park will be permitted under this rule.
	Buildings accessory to a permitted activity	Ρ	The proposed bridge within Willow Park is considered to be an accessory building to the passive recreation activities undertaken on the site, and therefore permitted under this rule. The proposed low wall within Willow Park is not considered to be a 'building' under the definition in Chapter 2.
Zone-wide p	provisions (including Speedway Area)		I
. 21.9	<ul> <li>Dust <ul> <li>Activities shall not create a dust nuisance. A dust nuisance may occur if:</li> <li>There is visible evidence of suspended solids in the air beyond the site boundary.</li> <li>There is visible evidence of suspended solids, traceable from a dust source, settling on the ground, building or structure on</li> </ul> </li> </ul>		The management of construction activities will ensure compliance with this standard during construction works.



Ref.	Rule / Standard			Assessment	
Zone wide provisions (outside Speedway Area only)					
21.18	Setbacks from boundaries			The proposed low wall within	
	Boundary	Minimum setba	ack	Willow Park is not considered to	
	Front boundary	бm		be a 'building' under the definition in Chapter 2, and	
	Boundaries adjoining a Residential Zone	3m		therefore is not subject to the	
	All other boundaries	Om		boundary setback.	
	Exemptions:				
	Eaves, bay windows or similar feature boundary setbacks by up to 0.7m.	ures, may encroach	h into		
	Non-enclosed and uncovered decks o above ground level.	f 1.0m or less in	height		
21.19	Building height			The proposed replacement	
	The maximum height of any building sh	all not exceed 8m	۱.	bridge within Willow Park will not breach any of these standards.	
21.20	Sunlight access				
	All buildings shall comply with the heigh 18.16.	t control planes c	defined in rule		
21.21	Floor area				
	The gross floor area for any building sha	all not exceed:			
	Principal buildings - 200m <sup>2</sup>				
	Accessory buildings - 100m <sup>2</sup>				
21.24	Landscaping				
	All sites shall be landscaped according	to the following:			
	<ul> <li>If a building is required to be set back from the road boundary, the set back area between the road boundary and the building shall be landscaped unless it is used for access or car parking purposes. If car parking or accessways are provided between the road boundary and the building, a landscape strip with a minimum width of 0.6m shall be provided within the site along the road boundary.</li> <li>Where a site adjoins a site outside the Open Space Zone (excluding road boundaries), a landscape buffer with a minimum width of 0.6m shall be provided between the zone boundary and the building.</li> </ul>				
Chapter 23 Rules for Earthworks					
Activities	Activities	4	All Zones		
Table 23.1	Earthworks which meet the standards u 23.2 – <u>23.17</u>	inder rules F	2	The Pinehaven Flood Hazard Extent by definition excludes land within that area where the flood depth is not anticipated to exceed 100mm. Areas of earthworks where the current flood depth is not modelled to exceed 100mm would not be captured by the Pinehaven Flood Hazard Extent rule below and would be permitted under this rule, as all relevant permitted activity standards would be met.	



Ref.	Rule / Standard		Assessment
	Earthworks on a site identified in Schedule 26.8 or affecting a tree identified in Schedule 27.7 or 27A.14 For the purposes of this rule, the following exclusion applies: Earthworks undertaken by a network utility operator affecting a tree identified in Schedule 27A.14 when undertaken in compliance with the rules of Chapters 27A.	D	The proposed earthworks for stream channel reshaping at 11 and 12 Birch Grove, 50 Blue Mountains Road, and the corner of Pinehaven Road and Blue Mountains Road, and the installation of the proposed wall along the boundary of 48 and 50 Blue Mountains Road, may affect Urban Tree Group 99 and 102. This is not permitted under the rules of Chapter 27A. As such, this would be a <b>discretionary</b> activity.
	Earthworks within the Pinehaven Flood Hazard Extent		
	Earthworks associated with the flood mitigation works within the Pinehaven Flood Hazard Extent.	Ρ	The earthworks for the proposed works within the Pinehaven Flood Hazard Extent are specifically for flood mitigation works and would comply with the relevant standards, and would therefore be permitted under this standard.
	Earthworks associated with the maintenance, upgrade or installation of network utilities within the ponding area, overflow path or stream corridor of the Pinehaven Flood Hazard Extent where earthworks are located within the legal road reserve and complies with standards under Rule 23.17.	Ρ	Any relocation of network utilities requiring works within the legal road reserve for the flood mitigation works will comply with the relevant standards and therefore will be permitted under this rule.
Standards fo	r Permitted Activities		
23.2 - 23.9	<ul> <li>ground level shall not be altered by cutting by a vertical height of more than 1.5m, or filling by a vertical height of more than 0.5m.</li> <li>23.3 In the Open Space and Rural Zones, existing ground level shall not be altered by cutting or filling by a vertical height of more than 1.5m.</li> <li>23.4 The physical extent of earthworks shall not exceed 150m<sup>2</sup> in surface area on any one site within any continuous 12 month period.</li> <li>23.5 Earthworks shall not be undertaken on erosion prone land, identified as land with a gradient steeper than 28 degrees, or within 10m of a downhill slope with a gradient steeper than 28 degrees (see diagram below).</li> <li>23.6 Earthworks shall not be undertaken within 10m of any water body (measured from the bank of the water body), or within the 1 in 100 year flood extent of the Hutt River (as defined on the Planning</li> </ul>		The exception states that 'the above standards shall not apply to earthworks for flood mitigation purposes undertaken or approved by a local authority'.
Maps). 23.7 Sediment retention and run-off controls sha ensure there is no contamination of natural wate 23.8 Earthworks which are not being worked for		ediment.	



Ref.	Rule / Standard		Assessment
	<ul><li>23.9 Earthworks shall be undertaken in accordance wi provisions of the Code of Practice for Civil Engineering Exemption:</li><li>The above standards shall not apply to earthworks for purposes undertaken or approved by a local authority.</li></ul>	y Works.	
23.10	Stormwater resulting from earthworks development is and managed so as to avoid, remedy or mitigate advert other land.	The Erosion and Sediment Control Plan attached at Appendix W would ensure compliance with this standard.	
23.14	Earthworks associated with flood mitigation works with Pinehaven or Mangaroa Flood Hazard Extents. Must be undertaken by Greater Wellington Regional C Hutt City Council or their nominated contractor and be purpose of mitigating the identified flood hazard and, w applicable, achieving the design and objectives of the floodplain mitigation plan.	The earthworks for the proposed works within the Pinehaven Flood Hazard Extent are specifically for flood mitigation works and would be undertaken by a contractor nominated by GWRC and UHCC, and have been designed to achieve the objectives of the Pinehaven FMP. As such, the works would comply with the standard.	
23.17	<ul> <li>Earthworks associated with the maintenance, upgrade of network utilities within the identified Pinehaven and Flood Hazard Extents where earthworks are located w road reserve;</li> <li>Standards <ul> <li>Ground levels are reinstated to those existing works; or,</li> <li>Earthworks are associated with the installatio underground utilities using directional drilling techniques.</li> </ul> </li> </ul>	Mangaroa ithin the legal prior to the n of	Any relocation of network utilities requiring works within the legal road reserve for the flood mitigation works will comply with this standard.
Chapter 27	A Rules for Urban Tree Groups and Removal of Indig	enous Vegetatio	n
Activities	Activities	All Zones	
Table 27A.1	Any work, or activity proposed within the dripline of an identified tree(s) within an Urban Tree Group listed in Schedule 27A.14, which meets all the Permitted Activity Standards 27A.3 to 27A.8.	Ρ	As identified below, compliance with standards 27A.3 and 27A.6 cannot be guaranteed, and therefore the works are not considered to be permitted under this rule.
	The trimming or removal of any tree and the pruning of any tree roots (including roots over 50mm in diameter providing they are authorised by a Council approved arborist) in an Urban Tree Group listed in Schedule 27A.14 to maintain the safe operation of network utility infrastructure.	Ρ	The pruning of any tree roots required for the works is not considered to be specifically to maintain the safe operation of network utility infrastructure, and as such will not be permitted under this rule.
	The trimming, removal, or any activity within the dripline of an identified tree(s) within an Urban Tree Group listed in Schedule 27A.14, which is not a Permitted Activity, or does not meet the standards specified in Rules 27A.3 to 27A.8.	Any trimming, or any activity within the dripline of a tree within Urban Tree Groups 99 and 102 will be a <b>discretionary</b> activity under this rule.	



Ref.	Rule / Standard		Assessment		
Standards fo	or Permitted Activities				
27A.3	Trimming of an identified tree(s) within an Urban Schedule 27A.14 shall be undertaken in accord Zealand Arboriculture Association Best Practice Tree Pruning, dated April 2011 or any subseque document. Such trimming shall not detrimentally tree.	The proposed earthworks for stream channel reshaping at 11 and 12 Birch Grove, 50 Blue Mountains Road, and the corner of Pinehaven Road and Blue Mountains Road, and the			
27A.6	The pruning or trimming of any roots from any in Urban Tree Group listed in Schedule 27A14, pro the root at the point of cutting does not exceed in any one direction.	BILLE MOUNTAINS ROAD MAY ATTECT			
Chapter 29	Rules for Water Bodies		1		
Activities	Activities	All Zones			
Table 29.1	New buildings and structures (except undergrou cables and lines) within 20m of the bank of any water body with an average width of 3m or more	D	Measuring from the existing top of bank for the Pinehaven Stream, it is likely that the Stream has an average width of 3m or more. As such, all of the proposed bridges, vertical walls and other structures would be <b>discretionary</b> activities under this rule.		
Chapter 30	Rules for Utilities		·	·	
Activities	Activities	Statu	is Zone		
Table 30.1	Removal, maintenance, operation and upgradin	ıg			
	The removal of existing network utilities, including any existing structures	P All		The removal and replacement or relocation of any network utilities	
	The minor upgrading of existing electricity and telecommunication lines	Ρ	All	crossing the stream will be permitted under these rules.	
	The upgrading of all other network utilities, excluding: NA				
	General				
	Aerial crossings necessary for network utilities, located on or within existing bridges and structures or across watercourses, and including regulator stations, but not compressor stations.	Aerial crossings necessary for network utilities, located on or within existing bridges and structures or across watercourses, and including regulator stations, but notP			
	Radiocommunication, Telecommunication and				



Ref.	Rule / Standard					Assessment
	Temporary abo	ve ground lines	5	P	All	Any temporary above ground lines will be permitted under this rule.
Standards for	or Permitted Activ	ities				
30.2	Development associated with network utilities shall comply with Council's Code of Practice for Civil Engineering Works where th development involves assets which are managed by or to be ve Council.				here that	for Civil Engineering Work will be
30.7	Specific standards for temporary above ground lines The line(s) shall be in place for no longer than six calendar months from the date of erection until its removal.				Any temporary above ground lines will comply with this standard.	
30.8	Where any wor responsible for before work be	the work shall				
30.8a	<ul> <li>Network utility structures (excluding cabinets) that:</li> <li>crossing a stream or river; and,</li> <li>are within an identified flood hazard area;</li> <li>must either;</li> <li>be located underground; or,</li> <li>positioned above the 1 in 100-year flood level, except when attached to existing lawfully established crossing structures such as bridges in which case the Network Utility Structure must not be fixed or positioned any closer to the stream bed or river bed than the lowest point of the existing crossing structure it is attached to.</li> </ul>					s e
Chapter 32	Rules for Noise	and Vibration				
Activities	Activities			AII	Zones	
Table 32.1		Any activity ([]) which complies with the noise and vibration standards in rules 32.3 to 32.6				As it is likely that the standards for construction and demolition
	Any activity ([]) which does not comply with the NC noise and vibration standards in rules 32.3 to 32.6					noise under 32.3 would likely be exceeded, the works would be a <b>non-complying</b> activity.
Standards fo	or Permitted Activ	ities				·
32.3	The maximum measured at or site) in the Res outside dwelling levels:	within the bou idential and Op	,			
	Mon to SatAll other times,7:00am - 7:00pmSundays & public holidays					construction -or demolition activities.
	L <sub>eq</sub> dBA	L <sub>max</sub> dBA	L <sub>eq</sub> dBA	L <sub>max</sub> dBA		
	75	90	45	75		
	NZS 6803:1999 A	be measured in a acoustics – Constr of dBA, L <sub>eq</sub> and				
	6803:1999.	or abri, beq and				



Ref.	Rule / Standard		Assessment
Chapter 33	Rules for Flooding and Fault Band Hazards		
Activities	Activities	All Zones	
Table 33.1	Flood mitigation works undertaken or approved by a local authority	Ρ	The proposed works are specifically for flood mitigation and are approved by a local authority and are therefore permitted under this rule.
	Pinehaven Flood Hazard Extent and Pinehaven Cat	chment Overlay	
	Driveways and bridges over the Pinehaven Stream	С	The six bridges to be replaced would be <b>controlled</b> activities under this rule.
	Any building, structure or fence within the stream corridor of the Pinehaven Flood Hazard Extent (except where provided for under the rule for driveways and bridges as a Controlled Activity).	NC	Technically the realignment of the stream and installation of associated stream bank structures would lead to these structures being located within the stream corridor as shown on the planning maps, and therefore would be a non-complying activity. However, in consideration of the above permitted activity rule for flood mitigation works an dthe enabling policy framework, the intent of this rule is obviously not to capture flood mitigation structures as proposed.
	Note:	1	
	Network Utility Structures are addressed through the provisions within Chapters 16, 23 and 30. For the avoidance of doubt any Network Utility Structure activity undertaken by a network utility operator within the Flood Hazard Extent subject to the provisions of Chapters 16, 23 and 30, will prevail over the provisions of Chapters 14 and 33.		The proposed works are not considered to be Network Utility Structures.
Standards for	br Permitted and Controlled Activities		
33.3	<ul> <li>Driveways and bridges over the Pinehaven Stream.</li> <li>Only one crossing per property</li> <li>No fences (excluding required support rails constructed along the bridge crossing.</li> </ul>	The six bridges to be replaced would meet these standards.	
	<ul> <li>Council may impose conditions over the following m</li> <li>Design of the crossing to avoid obstructing corridor from conveying flood water.</li> </ul>		



# Appendix Q. Regional Plans for the Wellington Region Assessment

## Q.1 Proposed Natural Resources Plan Decisions Version

#### **Summary of Consent Requirements**

Project Component	RMA	Rules Triggering	Assessment
Vertically sided channel sections (retaining walls) Reach 1 – 4- 8 Blue Mountains Road (Reformed Church of Silverstream) Reach 2 - from Pinehaven Rd to 28 Blue Mountains Road Reach 3 – 48 Blue Mountains Road and 2A Freemans Rd, and 10, 10A 11 and 12 Birch Grove.	Section 9(2), 13(1) 14(2) 15(1)	Consent R101 Earthworks and vegetation clearance – discretionary activity R68 All other discharges – discretionary activity R129 All other activities in river and lake beds – discretionary activity R131 Damming or diverting water within or from rivers – discretionary activity R142 All other take and use – discretionary activity	As a precaution, it is assumed that condition 9(d)(ii) of R99 cannot be met relating to conspicuous change of colour or visual clarity from earthworks adjacent to the stream, and therefore consent is required pursuant to RMA s9(2) under R101. The placement of the retaining walls in the bed of the stream, including the extraction of bed material, is considered to be a discretionary activity under rule R129. Diversion of the stream during the construction works requires consent under R131 as a discretionary activity. The need for the take and discharge of water for site dewatering is considered to require consent as a discretionary activity under rules R142 and R68.
Naturalised channel with suitable riparian planting	9(2), 13(1) 15(1)	<b>R101</b> Earthworks and vegetation clearance – discretionary activity	Permanent diversion of water by the new structures requires consent under R131 as a discretionary activity As a precaution, it is assumed that condition 9(d)(ii) of R99 cannot be met relating to conspicuous change of colour or visual clarity
Reach 1 – remainder of reach. Reach 2 - remainder of reach.		<b>R68</b> All other discharges – discretionary activity	from earthworks adjacent to the stream, and therefore consent is required pursuant to RMA s9(2) under R101.
Reach 3 - 48 Blue Mountains Road		R123 Planting – permitted activity R129 All other activities in river and lake beds – discretionary activity R131 Damming or diverting water within or from rivers – discretionary activity	The earthworks required within the stream bed are considered to be a discretionary activity under rule R129. The potential need for the take and discharge of water for site dewatering is considered to require consent as a discretionary activity under rules R142 and R68.
		R142 All other take and use – discretionary activity	Diversion of the stream during the construction works and for the realignment of the stream requires consent under R131 as a discretionary activity. The planting of the stream and riparian area is considered to be permitted under R129.



Project Component	RMA	Rules Triggering	Assessment
Bank Stabilisation Works/Erosion Repair/Scour Protection Reach 3 – bank stabilisation and erosion repair works at various locations along Pinehaven Stream within 50 Blue Mountain Road and 2A Freemans Way	9(2) 13(1)	Consent R101 Earthworks and vegetation clearance – discretionary activity R129 All other activities in river and lake beds – discretionary activity	As a precaution, it is assumed that condition 9(d)(ii) of R99 cannot be met relating to conspicuous change of colour or visual clarity from earthworks adjacent to the stream, and therefore consent is required pursuant to RMA s9(2) under R101. The earthworks required within the stream bed are considered to be a discretionary activity under rule R129.
Inlet Structures Reach 1 - Upgrade of piped stream & bypass inlet structures at Whitemans Road	13(1) 14(2) 15(1)	R68 All other discharges – discretionary activity R129 All other activities in river and lake beds – discretionary activity R131 Damming or diverting water within or from rivers – discretionary activity R142 All other take and use – discretionary activity	The placement of the structures in the bed of the stream is not considered likely to be permitted under rules R112 (upgrade of structures), or R117 and R118 (removal of existing, and new structures), and so will require consent as discretionary activities under the rule R129. As a precaution, it is assumed that condition 9(d)(ii) of R99 cannot be met relating to conspicuous change of colour or visual clarity from earthworks adjacent to the stream, and therefore consent is required pursuant to RMA s9(2) under R101. The need for the take and discharge of water for site dewatering by is considered to require consent as a discretionary activity under rules R142 and R68. Damming and diversion of the stream during the construction works requires consent under R131 as a discretionary activity. Permanent diversion of water by the new structures requires consent under R131 as a discretionary activity.
Secondary Flowpaths Reach 1 - driveway servicing 12- 15 Clinker Gr. Reach 1 - from Deller Grove through 4 Sunbrae Dr Reach 2 - Swale to capture secondary flow paths at 2 - 4 Pinehaven Road Reach 3 - driveway at 11 Birch Grove a lowered overland flow at 48 Blue Mountains Road	9(2) 15(1) 243	<b>R51</b> Stormwater from a local authority network with a stormwater management strategy	The plan defines 'stormwater network' as: <i>The</i> <i>network of devices designed to capture,</i> <i>detain, treat, transport and discharge</i> <i>stormwater, including but not limited to kerbs,</i> <i>intake structures, pipes, soak pits, sumps,</i> <i>swales and constructed ponds and wetlands,</i> <i>and that serves more than one property.</i> The swale in the road corridor at 2 and 4 Pinehaven Road is therefore considered to be a part of the wider stormwater network. Rule R51 requires consent as a restricted discretionary activity for discharges of <i>stormwater from a local authority network two</i> <i>years after public notification. The Upper Hutt</i> City Council Long Term Plan 2018 – 2028 <i>states that: A global (regional) consent has</i>



Project Component	RMA Section	Rules Triggering Consent	Assessment
	Section	CUIISEIIL	been lodged with GWRC for the discharge of stormwater under the Natural Resources Plan. As such the discharge of stormwater from the proposed secondary overflow path is considered to be addressed by that consent application.
			The required earthworks within driveway areas is permitted under Rule R99 Earthworks as the conditions will be met through the implementation of appropriate construction management.
Upper Catchment Overland Flowpaths Modifications to road kerbs, road grading, crossings and driveways as well as easements to secure secondary overflow paths	9(2) 15(1)	R51 Stormwater from a local authority network with a stormwater management strategy	The plan defines 'stormwater network' as: <i>The</i> <i>network of devices designed to capture,</i> <i>detain, treat, transport and discharge</i> <i>stormwater, including but not limited to kerbs,</i> <i>intake structures, pipes, soak pits, sumps,</i> <i>swales and constructed ponds and wetlands,</i> <i>and that serves more than one property.</i> The road kerbs are considered to be a part of the wider stormwater network. Rule R51 requires consent as a restricted discretionary <i>activity for discharges of stormwater from a</i> <i>local authority network two years after public</i> <i>notification. The Upper Hutt City Council Long</i> <i>Term Plan 2018 – 2028 states that: A global</i> <i>(regional) consent has been lodged with</i> <i>GWRC for the discharge of stormwater from the</i> <i>proposed secondary overflow paths is</i> <i>considered to be addressed by that consent</i> <i>application.</i> The required earthworks will be permitted <i>activities under Rule R99 Earthworks as the</i> <i>conditions will be met through the</i> <i>implementation of appropriate construction</i>
Private vehicle and pedestrian bridge crossings Replacement of existing pedestrian and vehicle bridges	9(2), 13(1) 14(2) 15(1)	R68 All other discharges – discretionary activity R118 removing or demolishing structures	management. As a precaution, it is assumed that conditions under Rule 114 cannot be met relating to area of the structure, and therefore consent is required under R129 as a discretionary activity.
and removal of existing bridges		<ul> <li>permitted activity</li> <li>R129 All other</li> <li>activities in river and</li> <li>lake beds –</li> <li>discretionary activity</li> <li>R131 Damming or</li> <li>diverting water within</li> <li>or from rivers –</li> <li>discretionary activity</li> </ul>	The removal of some of the smaller pedestrian bridge structures is permitted under Rule 118. The need for the take and discharge of water for site dewatering in order to construct new structures but is considered to require consent as a discretionary activity under rules R142 and R68.



Project Component	RMA Section	Rules Triggering Consent	Assessment
		<b>R142</b> All other take and use – Discretionary activity	Damming and diversion of the stream during the construction works requires consent under R131 as a discretionary activity
Relocation of Utilities	13(1) 14(2)	R68 All other discharges –	A precautionary approach is taken and it is assumed that the relocation of utilities cannot
Design and construction of the relocation of utility services	15(1)	discretionary activity <b>R129</b> All other activities in river and lake beds – discretionary activity <b>R131</b> Damming or diverting water within or from rivers – discretionary activity <b>R142</b> All other take and use – discretionary activity	be undertaken as permitted activities under rules R117 and R118, primarily in relation to the release of sediment under the general conditions in section 5.5.4. There may also be a need for the take and discharge of water for site dewatering in order to construct new structures which is considered to require consent as a discretionary activity under rules R142 and R68. Therefore, it is considered that R68, R129, D424 and D442 are trianguages.
			R131 and R142 are triggered as a discretionary activity.
Low wall Reach 1 – along the boundary of Willow Park and 10a Blue Mountains Rd	14(2)	Rule R135 General rule for taking, use, damming and diverting water – discretionary activity	The low wall is a new structure which will divert flood water outside of the bed of the stream, the low wall requires consent under R135 as a discretionary activity.

### **Detailed Rules Analysis Table**

Rule	Proposal Compliance Assessment	Consents required
5.2 Discharges to land and water		
Rule R43: Water to water – permitted activity The discharge of water into water is a permitted activity, provided the following conditions are met: (a) the discharge is to the same water body or area of coastal water it was taken from, and (b) the quality of the discharged water is the same as or better than the quality of the water body or area of coastal water it was taken from, and (c) the discharge shall not cause a change in temperature of more than 2°C in the receiving water after the zone of reasonable mixing, and (d) the discharge shall not cause any erosion of the channel or banks of the receiving water body or the coastal marine area.	The proposal includes the dewatering of the works area separated from the flow of the stream by sheet piling. The water taken for dewatering purposes is to be discharged back to the stream after treatment in a settlement tank. In relation to condition (a), this will be met. In relation to condition (b), while the water taken from the works area will be treated, it may have a higher sediment concentration than the water in the main flow of the stream, and as such this condition may not be met. In relation to condition (c), the water will likely not result in any change to the temperature of the stream.	The discharge of dewatering water is not a permitted activity under Rule R43, and is subsequently assessed under Rule R42.



Rule	Proposal Compliance Assessment	Consents required
	In relation to condition (d), the discharge will be monitored to avoid any erosion of the channel or bank.	
Rule R51: Stormwater from a local authority network with a stormwater management strategy - restricted discretionary activity. The discharge of stormwater, including stormwater that may be contaminated by wastewater, into water, or onto or into land where it may enter water, from a local authority stormwater network that is not provided for by Rule R50 is a restricted discretionary activity, provided the following condition is met: (a) the resource consent application includes a stormwater management strategy in accordance with Schedule N (stormwater strategy).	The plan defines 'stormwater network' as: The network of devices designed to capture, detain, treat, transport and discharge stormwater, including but not limited to kerbs, intake structures, pipes, soak pits, sumps, swales and constructed ponds and wetlands, and that serves more than one property. The overflow paths are considered to be a part of the wider stormwater network. Rule R51 requires consent as a restricted discretionary activity for discharges of stormwater from a local authority network two years after public notification. The Upper Hutt City Council Long Term Plan 2018 – 2028 states that a global (regional) consent has been lodged with GWRC for the discharge of stormwater under the Natural Resources Plan.	The discharge of stormwater from the proposed secondary overflow paths is considered to be addressed by that consent application
<ul> <li>Rule R42: Minor discharges – permitted activity</li> <li>The discharge of <u>a</u> contaminants into water, or onto or into land where it may enter water that is not specifically provided for by any other rule in this Plan is a permitted activity provided the following conditions are met: <ul> <li>(a) the contaminant is not a hazardous substance</li> <li>(b) where the discharge is onto or into land where it may enter groundwater,</li> <li>(i) the discharge is not located within 20m of a bore used for water abstraction for potable supply or stock water, and</li> <li>(ii) where the discharge is a point source discharge, the discharge shall not cause an adverse effect beyond the boundary of the property, and</li> <li>(c) where the discharge may enters a surface water body or coastal water,</li> <li>(i) the concentration of total suspended solids in the discharge shall not exceed:</li> <li>50g/m<sup>3</sup> where the discharge enters a site or habitat identified in Schedule A (outstanding water bodies), Schedule C (mana whenua), Schedule F1 (rivers/lakes), Schedule F3 (significant wetlands), er Schedule F4 (coastal sites) or Schedule H1 (contact recreation),</li> <li>100g/m<sup>3</sup> where the discharge enters any other water,</li> </ul> </li> </ul>	The proposal includes the dewatering of the works area separated from the flow of the stream by sheet piling. In relation to condition (a), the discharge will not contain any hazardous substances. Condition (b) is not relevant. In relation to condition (c), the treatment of sediment laden water may not achieve the maximum concentration of 100g/m <sup>3</sup> at all times, and therefore has the possibility of breaching condition (c)(i) and (c)(iii)(3).	The proposed discharge of water taken for dewatering purposes is a <b>discretionary</b> activity under Rule R68.



Rule	Proposal Compliance Assessment	Consents required
<ul> <li>(iii) the discharge shall not give rise to the following effects after the zone of reasonable mixing:</li> <li>a change in the pH of ±0.5pH unit, or</li> <li>the production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials, or</li> <li>any conspicuous change in the colour or visual clarity, or</li> <li>any emission of objectionable odour, or</li> <li>the fresh water is unsuitable for consumption by farm animals, or</li> <li>any significant adverse effects on aquatic life.</li> <li>Rule R68: All other discharges – discretionary activity</li> <li>The discharge of water or contaminants into water, or onto or into land where it may enter water, that is not:</li> <li>(a) in a site or habitat identified in Schedule A (outstanding water bodies), Schedule C (mana whenua), Schedule F1 (rivers/lakes), Schedule F3 (significant wetland), Schedule F4 (coastal sites) or Schedule H1 (contact recreation), and</li> </ul>	The Pinehaven Stream is not in the Schedules identified in condition (a). The discharge of water taken from work areas for dewatering purposes is not provided for under any other rule	
(b) a permitted, controlled, restricted discretionary, or non-complying activity under any other rule in the Plan, or a discretionary activity under Rules R53, R58, R60, R61, R56 or R66, is a discretionary activity.		
5.4 Land use		
Rule R99: Earthworks– permitted activity The use of land, and the associated discharge of sediment into water or onto or into land where it may enter water from earthworks up to a total area of 3,000m <sup>2</sup> per property per 12 month period is a permitted activity, provided the following conditions are met: (a) soil or debris from earthworks is not placed where it can enter a surface water body or the coastal marine area, and (b) earthworks will not create or contribute to instability or subsidence of a slope or another land surface at or beyond the boundary of the property where the earthworks occurs, and (c) work areas are stabilised within six months after the completion of the earthworks. (d) any earthworks shall not, after the zone of reasonable mixing, Result in any of the following effects in receiving waters (i) the production of conspicuous oil or grease films, scums of foams, or floatable or suspended materials, or (ii) any conspicuous change in colour or visual clarity, or (iii) any emission of objectionable odour, or (iv) the rendering of fresh water unsuitable for consumption by animals, or (v) any significant effect on aquatic life, and (e) earthworks shall not occur within 5m of a surface water body except for activities permitted by Rule R114 or Rule R115. Rule R101: Earthworks and vegetation clearance – discretionary activity	The bed of the Pinehaven Stream is taken to be the area between the existing 'top of bank' as shown on the location plans attached at Appendix A. Earthworks within the stream bed are addressed by the relevant rules under section 5.5 of the PNRP Decisions Version. Earthworks adjacent to but outside of the existing bed of the stream are addressed by Rule R99. In relation to condition (a), soil or debris from the earthworks will be placed and controlled in accordance with the ESCP attached at Appendix W. In relation to condition (b), the earthworks will not contribute to instability or subsidence. In relation to condition (c), the works area will be	The proposed earthworks adjacent to but outside of the bed of the stream are a <b>discretionary</b> activity under Rule R101.
Activity The use of land, and the associated discharge of sediment-into water or onto or into land where it may enter water from earthworks not permitted by Rule R99 or vegetation clearance on erosion prone land that is not permitted by-Rule R100 is a discretionary activity.	stabilised upon completion of the works. In relation to condition (d), the earthworks will be controlled in accordance with the ESCP attached at Appendix W.	



Rule	Proposal Compliance Assessment	Consents required
	In relation to condition (e), the earthworks are not permitted under R114 or R115, and will occur within 5m of the Pinehaven Stream. Therefore, this condition will not be met.	
5.5 Wetlands and beds of lakes and rivers	1	1
Beds of lakes and rivers general conditions Beds of lakes and rivers general conditions for activities in the beds of lakes and rivers that apply as specified in Rules R112 to R125: (a) except where the discharge is expressly allowed by the activity description of a rule in this chapter there shall be no discharge of contaminants (including but not limited to oil, petrol, diesel, paint, <del>or</del> solvent, heavy metals or other toxicants) to water or the bed, except where this is the result of the disturbance of sediment and other	The beds of lakes and rivers g are addressed below generally proposal. More specific asses in relation to proposed activitie which refer to these conditions appropriate. In relation to (a), there will be contaminants other than sedir	y in relation to the sment is provided as under the rules s where no discharge of
materials already existing in the water or bed, and (b) no cleaning or refuelling of machinery or equipment, or storage of fuel shall take place in, or within 10m of, a river or lake bed, or at any location where fuel can enter any water body, and	materials in the water or bed. In relation to (b), this will be co included in the CMP. In relation to (c), this will not b	-
<ul> <li>(c) all machinery, equipment and materials used for the activity shall be removed from the river or lake bed every night and on completion of the activity. This includes any excess material from the construction operation, any materials used during construction of any structure but not part of that structure, and any material removed or demolished from any structure, and</li> <li>(d) structures are designed, installed and maintained, and activities are carried out in a manner to ensure that fish passage is maintained at all times, unless a temporary restriction of no more than 48 hours is required for construction or maintenance activities. This shall include avoiding any aggradation or scouring of the bed of the river or lake that may inhibit fish passage, and</li> </ul>	where diversion of the stream takes place. In relation to (d), the proposed been designed to maintain fish construction of the works will I temporary restriction of fish pa than 48 hours, and therefore w condition. The freshwater eco attached at Appendix S has a and potential effects on fish du and operation of the proposal. In relation to (e), the Pinehave	and over pumping I structures have n passage. The ikely result in a assage for more will not meet this logical report ddressed actual uring construction
(e) in any part of the river bed identified as inanga spawning habitat in Schedule F1 (rivers/lakes), no bed disturbance, diversions of water or sediment discharge shall occur between 1 January and 31	identified in Schedule F1. In relation to (f), the Pinehave identified in Schedule I.	
May, and (f) in any part of the river or lake bed covered by water, which is identified as trout spawning waters in Schedule I (trout habitat), disturbance of the bed or diversions of water shall not take place during the spawning period of between 31 May and 31 August, and (g) all reasonable steps shall be taken to minimise the generation and release of sediment from the activity, and the discharge of any sediment to water from any activity in, on, over or under the bed of a river or lake must not, after reasonable mixing, result in-any conspicuous change in the colour of water in the receiving water or change in horizontal visibility of greater than 30%, and	In relation to (g), the ESCP at Appendix W sets out the meth the generation and release of activity. In relation to (h), no car bodies rubble will be used for any put In relation to (i), these matters with, as any diversion will only duration of construction of the In relation to (j), the ESCP atta	ods for minimising sediment from the s or demolition pose. will be complied be in place for th structures. ached at Appendiv
(h) car bodies or demolition rubble shall not be used for any purpose on the bed of any river or lake, and	W sets out the methods for av during the works. The structur designed to address potential	es have been
<ul> <li>(i) all reasonable steps shall be taken to minimise the duration of the diversion of water, and any diversion of water required to undertake the activity shall:</li> <li>(i) only be temporary and for a period no longer than that required to complete the activity, and</li> </ul>	scour. In relation to (k), the proposed specifically designed to contai within the channel. As such, th complied with.	l works have been n flood water his condition will b
<ul> <li>(ii) must not involve a lake, and</li> <li>(iii) any diversion channel required must have sufficient capacity to carry the same flow as the original channel, so as not to cause flooding or erosion of any neighbouring property, and</li> </ul>	In relation to (I), the proposed specifically designed to contai within the channel, and therefore from the natural course during	n flood water ore divert water



Rule	Proposal Compliance	Consents		
(j) the activity shall not result in erosion or scour of the river banks or	Assessment also include planting within the	required		
shall not result in flooding of any neighbouring property, and		As such, this condition will not be complied with.		
(k) any structure, other than a stormwater intake structure or debris arrestor, shall be designed so that it does not reduce the ability of the river to convey flood flows. All structures shall be maintained to manage flood debris accumulated against the structure and the conveyance of flood flows, and	In relation to (m), the stream bed will only be disturbed to a depth or an extent required to undertake the activity. In relation to (n), the Pinehaven Stream is not identified in Schedule F2.			
(I) any structure shall not alter the natural course of the river, including any diversion of water from the natural course during floods. Tree planting or vegetative bank edge protection works that are limited to the banks of the river and do not extend into the active channel are not considered to alter the course of the river for the purpose of this condition, and				
(m) the river or lake bed shall not be disturbed to a depth or an extent greater than that required to undertake the activity-, and				
(n) in any part of a river or lake bed identified in Schedule F2a (birds- rivers) or Schedule F2b (birds-lakes), no structure shall be constructed, and no disturbance shall take place, during the critical period identified in Schedule F2a (birds-rivers) or Schedule F2b (birds-lakes) if the named birds are identified as nesting, roosting and foraging at the work site, and				
<ul> <li>(o) beds of lakes and rivers general conditions (a) to (m) that apply as specified in Rule R112 to R125 do not cover any activities regulated by Sub-Part 4 – River crossings and Sub-Part 10 – General provisions in the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017.</li> </ul>				
Rule	Proposal Compliance Assessment	Consents required		
Rule R112: Maintenance, repair, replacement, upgrade or use of existing structures (excluding the Barrage Gates) – permitted activity The maintenance (including the maintenance of function), repair, replacement, upgrade or use of a lawfully established structure or a part of a structure excluding activities regulated by the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017 (excluding the Barrage Gates located in the lower Wairarapa Valley) that is fixed in, on, under, or over the bed of a river or lake, including any associated: (a) disturbance of the river or lake bed, and (b) deposition on the river or lake bed, and (c) diversion of water, and (d) discharge of sediment to water, and (e) temporary damming of water is a permitted activity, provided the following conditions are met: (f) the activity shall comply with the beds of lakes and rivers general conditions specified above in Section 5.5.4, except the use of existing structures shall only comply with conditions (d), (h), (j), and (k), and (g) the resulting structure, excluding any cable, pipe or duct (for example gas pipes, electricity cables or ducts) attached to the structure and including any deposition, adds no more to the existing structure than whichever is the lesser of: (i) 5% of the plan or cross-sectional area of the structure in the river or lake bed, or (ii) 1m in horizontal projection and 1m in vertical projection	Replacement of existing structures The proposal includes replacement of existing structures including the gabion baskets adjacent to Blue Mountains road (ref General Arrangement Sheet 1), and three private access bridges. The Whitemans Road inlet and bypass are proposed to be upgraded with debris screens. In relation to condition (f), while it is anticipated that the general conditions can be met, due to the proposed works occurring from within the stream it is possible that the discharge of sediment during construction may result in an excess of 30% change in horizontal visibility in the receiving water. As such this condition may not be met. In relation to condition (g), as the baskets will be a direct	Replacement of existing structures The proposed replacement of the gabion baskets, private bridges, and debris screens are a <b>discretionary</b> activity under Rule R129. <i>Maintenance of</i> <i>proposed</i> <i>structures</i> It is considered that Rule R112 appropriately provides for maintenance of the proposed <i>structures</i> , and no consent is required at this stage.		
measured from the structure as it was in the river or lake bed on the date of 31 July 2015 or from the date that the structure was lawfully established, whichever is later, and	replacement, no addition to the structure is anticipated. As the replacement bridges are to be standardised			



Rule	Proposal Compliance	Consents
b) compared and the function of a start of the function of the function of the function of the start of the s	Assessment	required
<ul> <li>h) any maintenance of the function of a structure shall:</li> <li>(i) only be for the purpose of removing or redistributing flood debris or gravel, sand or other natural bed material that has accumulated as a result of a culvert, stormwater inlet or outlet, bridge or debris arrestor structure, or a dam spillway, outflow pipe or overflow pipe, or to reduce the perched nature of any culvert due to scour, and</li> <li>(ii) be undertaken within 5m of the structure, and</li> <li>(iii) result in the disturbance or excavation of an area of bed of no more than 10m<sup>2</sup>, and</li> <li>(iv) not result in the deposition of non-natural material, or the deposition of flood debris or bed material in such a way as to form a stockpile, dam or mound within the bed of the river, except as required to provide for fish passage, and</li> <li>(i) the use of any water monitoring equipment may divert up to 30m<sup>3</sup> of water per day for the purpose of measuring water quality or quantity provided the water is returned to the water in the receiving body after the diversion point, and the quality of the water in the receiving body after the divert que to 31 July 2015 or from the date that the structure was lawfully established, whichever is later, and no increase in size shall be provided for by clause (g) of this rule.</li> </ul>	designs, these may be in excess of 5% of the plan or cross-sectional area of the existing structure in the stream bed. As the debris screens will add to the plan area of the structure, these may be in excess of 5% of the plan or cross-sectional area of the existing structure in the stream bed. <i>Maintenance of proposed</i> <i>structures</i> The maintenance and repair, as well as any potential replacement or upgrade, of the proposed structures will be permitted under this rule. In relation to condition (f), the general conditions are expected to be able to be complied with. Condition (h) will allow for the removal of flood debris from the proposed structures, if required. There are no anticipated maintenance activities that would breach the standards for Rule R112, and therefore maintenance activities will likely be permitted activities.	
Rule R114: River crossing structures – permitted activity The placement or construction of a river crossing structure, including, but not limited to, weirs, fords and bridges, excluding culverts and a river crossing that dams a river, that is fixed in, on, under, or over the bed of a river, excluding activities regulated by the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017, including any associated: (a) disturbance of the river or lake bed, and (b) deposition on the river or lake bed, and (c) diversion of water, and (d) discharge of sediment to water, and (e) temporary damming of water, and (f) reclamation associated with the crossing structure is a permitted activity, provided the following conditions are met: ( <del>\o)</del> (g) the activity shall comply with the beds of lakes and rivers general conditions specified above in section 5.5.4, and ( <del>f)</del> (h) the river crossing that has any part of the structure fixed in or on the bed has a catchment in the region on the eastern side of the Ruamāhanga River, or (ii) 50ha in any catchment in the region on the western side of the Ruamāhanga River, and	A new vehicle access bridge is proposed for 28/30 Blue Mountains Road. A new foot bridge is proposed for Willow Park. In relation to condition (g), while it is anticipated that the general conditions can be met, it is possible that the discharge of sediment during construction may result in an excess of 30% change in horizontal visibility in the receiving water. As such this condition may not be met. In relation to condition (h), the catchment of the Pinehaven Stream is less than 50ha. In relation to condition (i) the replacement private access bridges and new bridge structures in area in or on the bed at 28/30 Blue Mountains Road and Willow Park will not exceed 20m <sup>2</sup> , and will be no wider than	The proposed new bridges are a <b>discretionary</b> activity under Rule R129.



Rule	Proposal Compliance Assessment	Consents required
<ul> <li>(i) the formed crossing shall be no wider than what is required for the purpose of the crossing and the total area of the structure in or on the bed of the river shall not exceed 20m<sup>2</sup>, and</li> <li>(i) the activity does not accur within a site identified in Schedula C</li> </ul>	required to provide appropriate access. In relation to (j), the	
(j) the activity does not occur within a site identified in Schedule C (mana whenua).	Pinehaven Stream is not identified in Schedule C.	
Rule R117: New structures – permitted activity The placement-of a new structure, including sediment retention weirs, pipes, ducts, cables, hydrological and water quality monitoring equipment, fences, erosion protection structures, debris arrestor structures and structures associated with vegetative bank edge protection except a structure permitted by Rules R114, R115, and R116 that is fixed in, on, under, or over the bed of any river or lake, excluding activities regulated by the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017 except general condition 5.5.4(n)), including any associated: (a) disturbance of the river or lake bed, and (b) deposition on the river or lake bed, and (c) diversion of water, and (d) discharge of sediment to water, and (e) temporary damming of water, and (f) partial stream reclamation associated with the structure is a permitted activity, provided the following conditions are met: (g) the activity shall comply with the beds of lakes and rivers general conditions specified above in Section 5.5.4, and (h) the activity does not occur within a site identified in Schedule C (mana whenua), excluding adding pipes or cables to an existing structure or providing for fish refuge, and (i) the structure does not occupy a bed area any greater than 10m <sup>2</sup> , except for where the structure is asociated with vegetative bank edge protection, or a pipe, duct, fence or cable which is located over or under the bed where no bed occupancy limits apply, and (j) the catchment upstream of any sediment retention weir is not greater than 200ha, and (k) the height of any sediment retention weir from the upstream base to the crest of the weir at the time of construction shall be no more than 0.5m.	The proposed structures within the stream bed, not covered by another specific rule, would be addressed by this rule. This includes the proposed bank retaining structures. In relation to condition (g), while it is anticipated that the general conditions can be met, it is possible that the discharge of sediment during construction may result in an excess of 30% change in horizontal visibility in the receiving water. As such this condition may not be met. In relation to condition (h), the Pinehaven Stream is not identified in Schedule C. In relation to condition (i), given the length of stream to be retained, the individual retaining structures may exceed 10 square metres. As such this condition may not be met.	The proposed structures within the stream bed, not covered by another specific rule, including the proposed bank retaining structures, are a <b>discretionary</b> activity under Rule R129.
Rule R118: Removing or demolishing structures – permitted activity The removal or demolition of a structure or a part of a structure that is fixed in, on, under, or over any river or lake bed, excluding activities regulated by the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017 including any associated: (a) disturbance of the river or lake bed, and (b) deposition on the river or lake bed, and (c) diversion of water, and (d) discharge of sediment to water is a permitted activity, provided the following conditions are met: (e) the activity shall comply with the beds of lakes and rivers general	The proposal includes the removal of a number of existing structures where these are not being directly replaced or upgraded (and therefore covered by R112), including: • Retaining walls; • Private bridges; and • Service crossings. In relation to condition (e), while it is anticipated that the general conditions can be	The proposed removal of structures from within the stream bed will be a <b>discretionary</b> activity under Rule R129.
conditions specified above in Section 5.5.4, and (f) the removal or demolition of the structure disturbs less than $10m^{23}$ of the bed of the river or lake, and	met, due to the proposed construction from within the stream it is possible that the discharge of sediment during construction may result in an excess of 30% change in	



Rule	Proposal Compliance	Consents
	Assessment	required
(g) it results in the complete removal of the structure from the river or lake bed, or the complete removal of that part of the structure requiring removal from the river or lake bed, and	horizontal visibility in the receiving water. As such this condition may not be met.	
<ul><li>(h) no explosives shall be used in the demolition of the structure, and</li><li>(i) the removal or deposition shall not result in the diversion of water from a natural wetland.</li></ul>	The removal of some structures will likely disturb in excess of 10m <sup>2</sup> , and therefore will not meet condition (f). Conditions (g), (h) and (i)	
	would be met.	
Rule R122: Removing vegetation from the bed of any river or lake – permitted activity	The proposal includes the planted benches within the	It is considered that Rule R122
The trimming or removal of vegetation (including weeds) from the bed of any river or lake (excluding a drain or highly modified river or stream) and any associated sediment or bed material attached to the roots of the vegetation being removed, excluding activities regulated by the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017 except general condition 5.5.4(n)), including any associated:	stream corridor. Maintenance of these plantings may require trimming or removal of the vegetation. Given the likely nature of the trimming or removal of the	appropriately provides for maintenance of the proposed plantings, and no consent is required at this
(a) disturbance of the river or lake bed, and	vegetation for maintenance	stage.
(b) deposition on the river or lake bed, and	purposes, all conditions are considered likely to be met.	
(c) diversion of water, and	considered likely to be met.	
(d) discharge of sediment to water		
is a permitted activity, provided the following conditions are met:		
(e) the activity shall comply with the beds of lakes and rivers general conditions specified above in Section 5.5.4, and		
(f) the activity shall not cause any increase in flooding on neighboring properties, and		
(g) any fish (except identified pest species), kākahi and kōura removed from the river or lake bed during maintenance works shall be returned to the river or lake at a site upstream of the works as soon as practicable, and no later than one hour after removal, and		
(h) floating debris and plant material shall be prevented from drifting away and causing obstructions to the river or lake bed, or spreading pest plants (as listed in the <i>Greater Wellington Regional Pest Management Strategy 2002-2022</i> ), and		
<ul> <li>(i) where the activity involves the mechanical clearance of aquatic vegetation from a river, to provide fish refuge areas either:</li> </ul>		
(i) only one side of the river shall be cleared at any one time, and the other side may only be cleared at least three months following completion of the initial works, or		
(ii) if clearing both sides of the river, for every 200m length of watercourse cleared at least a 10m length of intact aquatic vegetation cover is retained (and may not be cleared for at least three months), and-		
(j)no excavation of the bed, or widening or deepening of the bed is permitted by this rule.		
Rule R123: Planting – permitted activity	The proposal includes the	The proposed
The deliberate introduction or planting of a plant in the bed of a river or lake, including any associated:	planted benches within the stream corridor.	planting within the Pinehaven
(a) disturbance of the river or lake bed, and	In relation to (f), all general	Stream bed will be a permitted
(b) deposition on the river or lake bed, and	conditions are anticipated to be met by the proposed	activity under
(c) diversion of water, and	planting.	Rule 123.
(d) discharge of sediment to water but excluding the deliberate introduction or planting of:	In relation to condition (g), Pinehaven Stream is not	



Rule	Proposal Compliance	Consents
	Assessment	required
(e) a species listed in the Greater Wellington Regional Pest Management Strategy 2002-2022.	identified in Schedule A, C or F.	
is a permitted activity, provided the following conditions are met:	In relation to condition (h),	
(f) the activity shall comply with the beds of lakes and rivers general conditions specified above in Section 5.5.4, and	the planting will associated with works identified in the Pinehaven Stream	
(g) only native plants shall be used in a site identified in Schedule A (outstanding water bodies), or Schedule C (mana whenua). In a site identified in Schedule F (indigenous biodiversity) only native plants shall be used, except where appropriate non-native species are required for flood protection or erosion control, and	Floodplain Management Plan.	
(h) no planting shall be undertaken in an identified river management scheme area, unless it is undertaken in accordance with the planting program specified in the relevant floodplain management plan.		
Rule R124: Entry or passage over bed (excluding livestock access) – permitted activity	The proposed construction methodology includes	The proposed location and
The entry or passage across the bed of a river or lake that is not associated with any use of the river or lake bed specified in Rules R112 to R123, excluding activities regulated by the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017, which is not for the purpose of livestock access covered by Rules R97 and R98 is a permitted activity provided the following condition is met:	construction plant located and moving across the stream bed. In relation to condition (a), due to the proposed construction from within the stream it is possible that the discharge of sediment during	movement of construction machinery across the stream bed will be a <b>discretionary</b> activity under
(a) the activity shall comply with the beds of lakes and rivers general conditions specified above in Section 5.5.4, except if the entry or passage is associated with an activity with an existing resource consent granted prior to 31 July 2015.	construction may result in an excess of 30% change in horizontal visibility in the receiving water. As such this condition may not be met.	Rule Ŕ129.
Rule R127: Reclamation of the beds of rivers or lakes – non- complying activity	The realignment of the stream though 26 and 28	The reclamation within 26 and 28
The reclamation of the bed, or any part of the bed, of a river or lake:	Blue Mountains Road is	Blue Mountains
(a) in a site identified in Schedule A1 (outstanding rivers) or Schedule A2 (outstanding lakes) where the reclamation is necessary to enable the operation, maintenance or upgrade of regionally significant infrastructure, or	considered to be reclamation of the bed of the stream. This is not provided for under other rules, as the reclamation of the section of	Road is a discretionary activity under Rule R129.
(b) in a site identified in Schedule C (mana whenua) where the reclamation is necessary to enable the operation, maintenance or upgrade of regionally significant infrastructure or the reclamation is only a partial reclamation,	stream will not be associated with a structure, as the banks will be naturalised slope. The site is not	
is a non-complying activity.	identified in Schedule A1 (outstanding rivers) or Schedule C (mana whenua). As such the reclamation is not a non-complying activity.	
Rule R129: All other activities in river and lake beds – discretionary activity	A number of proposed activities are not provided for	The identified activities will be
All other activities, except for damming and diverting of water, in river and lake beds that is not permitted or restricted discretionary by Rule R112 to Rule R125 is a discretionary activity except for those activities that are non-complying or prohibited under Rule R126, Rule R127 or Rule R128.	under the relevant permitted activity rules as identified above.	discretionary activities under Rule R129.
Rule R131: Damming or diverting water within or from rivers – discretionary activity	The proposed construction methodology includes the	The proposed use of
The damming or diverting of water within or from a river that does not meet Rules R112, R114, R115, R116, R117, R118, R119, R121, R122 and R123 and R140 is a discretionary activity, provided the following conditions are met:	use of temporary sheet piles to divert the stream flow from the area being worked. This is not provided for under the	temporary sheet piles for the diversion of water during



Rule	Proposal Compliance Assessment	Consents required
<ul> <li>(a) the damming or diverting of water shall not result in river flows falling below minimum flows in chapters 7 to 11 of the Plan, and</li> <li>(b) the damming or diverting of water is not in any outstanding river identified in Schedule A1 (outstanding rivers).</li> </ul>	relevant permitted activity rules. In relation to condition (a), the diversion will not result in the stream flow falling below the minimum flow as any water taken for dewatering will be discharged back to the stream. In relation to condition (b), the Pinehaven Stream is not identified in Schedule A1.	construction will be a <b>discretionary</b> activity under Rule R131.
Rule R113: Diversion of flood water by existing structures – permitted activity  Note The diversion of flood waters by any new structure constructed outside the bed of a lake or river, or any upgraded structures that do not meet condition (a) of Rule R113, would fall under Rule R135. Rule R135: General rule for damming and diverting water – discretionary activity	The proposal includes a low wall within Willow Park. Given the note included under Rule R113, the low walls are addressed by Rule R135.	The low wall within Willow Park is a new structure which will divert flood water outside of the bed of the stream and is a <b>discretionary</b> activity under Rule R135.
The damming or diverting of water that would otherwise contravene sections 14(2) or 14(3) of the Resource Management Act 1991 and is not permitted, controlled, restricted discretionary, discretionary, non-complying or a prohibited activity is a discretionary activity.		

## Q.2 Regional Freshwater Plan

### **Summary of Consent Requirements**

Project Component	RMA Section	Rules Triggering Consent	Comments
Vertically sided channel	13(1)	Rule 5 All remaining	As a precaution, it is assumed that the
sections (retaining walls)	14(2)	discharges to fresh water -	conditions of Rules 1 and 2 cannot be
	15(1)	discretionary activity	met relating to the discharge of
Reach 1 – 4- 8 Blue Mountains			dewatering water and construction phase
Road (Reformed Church of		Rule 15 Bore construction –	stormwater, and therefore consent is
Silverstream)		discretionary activity	required under Rule 5.
Reach 2 - from Pinehaven Rd to		Rule 16 Taking, use,	The definition of 'bore' in the plan
28 Blue Mountains Road		damming or diversion of	includes any hole that intercepts
		water, or the transfer to	groundwater. A precautionary approach
Reach 3 – 48 Blue Mountains		another site of any water	is taken, and consent under rule 15 is
Road and 2A Freemans Rd, and		permit to take or use water	considered to be required for excavation
10, 10A 11 and 12 Birch Grove.		<ul> <li>discretionary activity</li> </ul>	within the stream bed for to provide for
			the retaining wall structures.
		Rule 49 All remaining uses	
		of river and lake beds –	The need for the take of water for site
		discretionary activity	dewatering and diversion of the stream
			during the construction works requires
			consent under Rule 16 as a discretionary activity.
			-



Project Component	RMA Section	Rules Triggering Consent	Comments
			Permanent diversion of water by the new structures requires consent under Rule 16 as a discretionary activity. The placement of the retaining walls in the bed of the stream, including the extraction of bed material, is considered to be a discretionary activity under rule 49.
Naturalised channel with suitable riparian planting Reach 1 – remainder of reach. Reach 2 - remainder of reach. Reach 3 - 48 Blue Mountains Road	13(1) 15(1)	Rule 5 All remaining discharges to fresh water – discretionary activity Rule 16 Taking, use, damming or diversion of water, or the transfer to another site of any water permit to take or use water – discretionary activity Rule 49 All remaining uses of river and lake beds– discretionary activity	As a precaution, it is assumed that the conditions of Rules 1 and 2 cannot be met relating to the discharge of dewatering water and construction phase stormwater, and therefore consent is required under Rule 5. The need for the take of water for site dewatering and diversion of the stream during the construction works requires consent under Rule 16 as a discretionary activity. Permanent diversion of water by stream realignment requires consent under Rule 16 as a discretionary activity. It is considered the permitted activity Rule 37 "Beach" recontouring condition (4) will not be met as construction machinery will be within the stream bed and is considered to be a discretionary activity under Rule 49. Rule 41 Planting provides for planting within the stream bed as a permitted activity.
Bank Stabilisation Works/Erosion Repair/Scour Protection Reach 3 – bank stabilisation and erosion repair works at various locations along Pinehaven Stream within 50 Blue Mountain Road and 2A Freemans Way.	9(2) 13(1)	Rule 48 Placement of impermeable erosion protection structures – Controlled ActivityRule 49 All remaining uses of river and lake beds – discretionary activity	As a precaution, it is assumed that the bank stabilisation works / erosion repair will not comply with Rule 48 and therefore the works are considered to be a discretionary activity under Rule 49.
Inlet Structures Reach 1 - Upgrade of piped stream & bypass inlet structures at Whitemans Road	13(1) 14(2) 15(1)	Rule 5 All remaining discharges to fresh water – discretionary activityRule 15 Bore construction – discretionary activityRule 16 Taking, use, damming or diversion of	A precautionary approach is taken and it is assumed the activity is not permitted under Rule 22 or a controlled activity under Rule 43. The definition of 'bore' in the plan includes any hole that intercepts groundwater. A precautionary approach is taken, and consent under rule 15 is



Project Component	RMA Section	Rules Triggering Consent	Comments
		water, or the transfer to another site of any water permit to take or use water – discretionary activity <b>Rule 49</b> All remaining uses of river and lake beds– discretionary activity	<ul> <li>considered to be required for excavations required for the structures which may intercept groundwater.</li> <li>The discharge of dewatering water and construction phase stormwater requires consent as a discretionary activity under Rule 5.</li> <li>The need for the take of water for site dewatering and diversion of the stream during the construction works requires consent under Rule 16 as a discretionary activity.</li> <li>Permanent diversion of water by the new structures requires consent under Rule 16 as a discretionary activity.</li> <li>The placement of the new structures in the bed of the stream, including the extraction of bed material, is considered to be a discretionary activity under rule</li> </ul>
Secondary Flowpaths Reach 1 - driveway servicing 12- 15 Clinker Gr. Reach 1 - from Deller Grove through 4 Sunbrae Dr Reach 2 - Swale to capture secondary flow paths at 2 - 4 Pinehaven Road Reach 3 - driveway at 11 Birch Grove a lowered overland flow at	15(1)	Rule 5 All remaining discharges to fresh water – discretionary activity	49. As a precaution, it is assumed that the conditions of Rules 1 and 2 cannot be met relating to the discharge of construction phase stormwater, and therefore consent is required under Rule 5.
48 Blue Mountains Road Upper Catchment Overland Flowpaths Modifications to road kerbs, road grading, crossings and driveways as well as easements to secure secondary overflow paths.	15(1)	Rule 5 All remaining discharges to fresh water – discretionary activity	As a precaution, it is assumed that the conditions of Rules 1 and 2 cannot be met relating to the discharge of construction phase stormwater, and therefore consent is required under Rule 5.
Private Vehicle and pedestrian bridge crossings Replacement of existing pedestrian and vehicle bridges and removal of existing bridges	13(1) 14(2) 15(1)	Rule 5 All remaining discharges to fresh water – discretionary activity Rule 16 Taking, use, damming or diversion of water, or the transfer to another site of any water	A precautionary approach is taken and it is assumed the activity is not permitted under Rule 22 or a controlled activity under Rule 43. The bridges are not permitted by Rule 31 as they are longer than 6m. As a precaution, the discharge of dewatering water and construction phase



Project Component	RMA Section	Rules Triggering Consent	Comments
		permit to take or use water – discretionary activity	stormwater requires consent as a discretionary activity under Rule 5.
		<b>Rule 49</b> All remaining uses of river and lake beds– discretionary activity	As a precaution, the potential need for the take of water for site dewatering and diversion of the stream during the construction works requires consent under Rule 16 as a discretionary activity.
			The placement of the new structures over the bed of the stream, including the extraction of bed material, is considered to be a discretionary activity under rule 49.
<b>Relocation of Utilities</b> Design and construction of the relocation of utility services	13(1) 14(2) 15(1)	<b>Rule 46</b> Pipelines – controlled activity	Rule 22 is not considered to cover these activities as the utility services are to be relocated.
		Rule 5 All remaining discharges to fresh water – discretionary activity	It is considered likely that rule 32 provides for the relocation of any overhead cables as permitted, while rule 33 likely enables the removal of any
		Rule 16 Taking, use, damming or diversion of water, or the transfer to another site of any water permit to take or use water – discretionary activity	utility services. However, the placement of any new pipelines in the bed of the stream will require consent as a controlled activity under rule 46.
		<b>Rule 49</b> All remaining uses of river and lake beds– discretionary activity	As a precaution, the discharge of dewatering water and construction phase stormwater requires consent as a discretionary activity under Rule 5.
			As a precaution, the potential need for the take of water for site dewatering and diversion of the stream during the construction works requires consent under Rule 16 as a discretionary activity.
			The placement of the new structures other than pipelines over the bed of the stream, including the extraction of bed material, is considered to be a discretionary activity under rule 49.
Low wall Reach 1 – Low height wall along boundary between Willow Park and 10a Blue Mountains Road	14(2)	Rule 16 Taking, use, damming or diversion of water, or the transfer to another site of any water permit to take or use water – discretionary activity	The low wall is a new structure which will divert flood water outside of the bed of the stream. As a precaution, diversion of flood waters by the structure requires consent under Rule 16 as a discretionary activity.



### **Detailed Rules Analysis Table**

Rule	Proposal Compliance	Consents required						
Water Quality and Discharges to Ersch Water	Assessment							
Water Quality and Discharges to Fresh Water								
Rule 1 Discharges of water and minor contaminants The discharge of contaminants, or water, into surface water [, other than the discharge of stormwater,] is a Permitted Activity provided the discharge complies with the conditions specified below.	The proposal includes the dewatering of the works area separated from the flow of the stream by sheet piling. The water taken for	The discharge of dewatering water is not a permitted activity under Rule 1, and is						
Conditions	dewatering purposes is to be	subsequently						
<ul> <li>(1) the discharge is not to any wetland, lake or river being managed in its natural state (Appendix 2, part A); and</li> </ul>	discharged back to the stream after treatment in a settlement tank.	assessed under Rule 5.						
(2) the discharge shall not contain any contaminants other than [contaminants at concentrations specified in] conditions (3) to (7) below; and	In relation to condition (4), while the water taken from							
(3) concentrations of free or combined residual chlorine in the discharge shall be no more than 0.5 g/m3; and	the works area will be treated, it may have a higher sediment concentration than							
(4) concentrations of suspended solids in the discharge shall be no more than 50 g/m <sup>3</sup> ; and	the water in the main flow of the stream, and as such this							
(5) concentrations of acid-soluble aluminium in the discharge shall be no more than 0.15g/m <sup>3</sup> ; and	condition may not be met. In relation to condition (7), the water will likely not result							
(6) concentrations of fluoride in the discharge shall be no more than 1.5 g/m3; and	the water will likely not result in any change to the temperature of the stream.							
(7) the discharge temperature shall not differ from the ambient temperature of the receiving water by more than 5° Celsius; and	In relation to condition (8), the discharge will be							
(8) the discharge does not cause erosion at the point of discharge; and	monitored to avoid any erosion of the channel or							
(9) the discharge does not alter the natural course of the river or stream.	bank							
Rule 2 Stormwater discharges	Stormwater means the water	The discharge of						
The discharge of stormwater into surface water is a Permitted Activity provided that the discharge complies with the conditions specified below.	and contaminants from land or the external surface of any structure as a result of	construction phase stormwater is not a permitted activity						
Conditions	rainfall.	under Rule 2, and is subsequently						
(1) The discharge does not contain drainage from a stockyard; and	As a precaution, it is assumed that the conditions of Rule 2 cannot be met	assessed under Rule 5.						
(2) The discharge does not [originate from industrial or trade premises] where hazardous substances are stored or [used] unless:	relating to the discharge of construction phase stormwater, and therefore							
(a) hazardous substances cannot enter the stormwater system; or	consent is required under Rule 5							
(b) there is an interceptor system in place to collect hazardous contaminants or divert contaminated stormwater to a trade waste system; and								
(3) The person responsible for the discharge shall ensure that, after reasonable mixing, the stormwater discharge will not give rise to any of the following effects:								
(a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials; or								
(b) any conspicuous change in the colour or visual clarity; or								
(c) any emission of objectionable odour; or								
(d) the rendering of fresh water unsuitable for consumption by farm animals; or								
(e) any significant adverse effects on aquatic life; and								
[(3a) The discharge does not originate from an area of bulk earthworks greater than 0.3 ha;								



(3b) Concentrations of acid-soluble aluminium in the discharge shall be no more than 0.15g/m <sup>3</sup> ;]		
(4) The discharge does not cause erosion at the point of discharge; and		
(5) The discharge does not alter the natural course of the river or stream.		
<ul> <li>Rule 5 All remaining discharges to fresh water</li> <li>The discharge of any contaminant or water into fresh water: <ul> <li>that is not provided for in Rules 1, 2, 3, and 4; and</li> <li>which cannot meet the requirements of Rules 1, 2, 3, and 4; and</li> <li>which is not a non-complying activity in Rule 6; is a Discretionary Activity.</li> </ul> </li> </ul>	The discharge of construction phase stormwater and water taken from work areas for dewatering purposes is not provided for under any other rule.	The proposed discharge of dewatering water and construction phase stormwater is a <b>discretionary</b> <b>activity</b> under Rule R5.
Water Quantity and the Taking, Use, Damming or Diversion of Fres	sh Water	
Rule 8 Damming and diversion of water by existing structures The damming and diversion of water by a structure that was existing and lawful on 25 January 1997 (the date the Proposed Plan was publicly notified) [, excluding the Lake Wairarapa Barrage Gates,] is a Permitted Activity.	Existing structures (pre 1997) that dam or divert water are permitted by Rule 8.	Damming and diversion of water by existing structures is <b>Permitted</b> .
<ul> <li>Rule 9A Diversion of water from an artificial watercourse or drain The diversion of water from an artificial watercourse or drain, including any associated disturbance of the drain bed or deposition on the drain bed during construction of the diversion; is a permitted activity, provided that it complies with the conditions specified below:</li> <li>(1) All material used to construct the diversion but which is not part of any diversion structure shall be removed from the artificial watercourse or drain and disposed of in an appropriate manner.</li> <li>(2) All reasonable steps shall be taken to minimise the release of sediment to water during construction.</li> <li>(3) There shall be no adverse effects on the availability of water supply for upstream or downstream water users other than for a temporary period during construction of no more than 24 hours.</li> <li>(4) There shall be no flooding of land, including neighbouring land, on properties upstream or downstream of the diversion.</li> <li>(5) The ability of the artificial watercourse or drain to convey flood flows shall not be reduced.</li> <li>(6) There shall be no lowering of water levels in any river, lake, or wetland.</li> <li>(7) Fish passage shall not be impeded other than for a temporary period during construction of no more than 24 hours.</li> </ul>	The proposed construction methodology includes the use of temporary sheet piles to divert the stream flow from the area being worked. Additionally a section of Pinehaven Stream through 28 Blue Mountains Road will be realigned. As a precaution, it is assumed that the conditions of Rule9A cannot be met and therefore consent is required under Rule 16.	Permanent diversion of water by the new structures requires consent under Rule 16 as a <b>discretionary</b> <b>activity</b> .
Rule 15 Bore construction The construction of any bore is a Discretionary Activity.	The definition of 'bore' in the plan includes any hole that intercepts groundwater. A precautionary approach is taken, and consent under rule 15 is considered to be required for excavation within the stream bed for to provide for the retaining wall structures.	Any 'bore' construction is a <b>discretionary</b> <b>activity</b> .
Rule 16 Taking, use, damming or diversion of water, or the transfer to another site of any water permit to take or use water The taking, use, damming, or diversion of any fresh water, or the		Permanent diversion of water by the new
<ul> <li>transfer to another site of any water permit to take or use water:</li> <li>that is not specifically provided for in any other rules in this Plan; and</li> </ul>		structures requires consent under Rule 16 as a



<ul> <li>which cannot meet the requirements of those rules; and</li> <li>that, for takes of water from the Lower Hutt Groundwater</li> </ul>		discretionary activity.
Zone (Taita Alluvium/Waiwhetu aquifers), would not cause the maximum rate of takes authorised by resource consents to exceed 32.85 million cubic metres per year; and		
<ul> <li>which is not a non-complying activity in Rules 17, 18, [19, 19A or 19B] is a Discretionary Activity.</li> </ul>		
Use of the Beds of Rivers and Lakes and Development on the Floo	odplain	
<ul> <li>Use of the Beds of Rivers and Lakes and Development on the Flox</li> <li>Rule 22 Maintenance, repair, replacement, extensions, additions and alterations to structures (excluding extensions of linear rock protection and overhead cables)</li> <li>The maintenance, repair, replacement, extension, addition to, or alteration of any existing lawful structure or any part of an existing lawful structure (excluding extensions of linear rock protection (Rule 23) and excluding the erection, use, maintenance, alteration, replacement, or addition of over-head cables (Rule 32)) that is fixed in, on, under, or over the bed of any river or lake, including any associated: <ul> <li>disturbance of river or lake bed; or</li> <li>deposition on the river or lake bed; or</li> <li>temporary diversion of water; which</li> </ul> </li> <li>(1) is contained within the form of the existing structure; or</li> <li>(2) adds no more than whichever is the lesser of;</li> <li>5% to the plan or cross-sectional area of the structure; or</li> <li>atter in horizontal projection and 1 metre in vertical projection;</li> <li>measured from the structure as it was on 25 January 1997 (the date the Proposed Plan was publicly notified); and</li> <li>(3) disturbs sand, shingle, gravel, or other natural river or lake bed material over an area less than 2 square metres per lineal metre of structure measured along the length or breadth of the structure;</li> <li>is a Permitted Activity provided it complies with the conditions specified below.</li> <li>Conditions</li> <li>(1) No contaminants (including but not limited to oil, petrol, diesel, paint, or solvent) shall be released to water from equipment being used for the operation, and no refuelling of equipment shall take place on any area of river or lake bed.</li> <li>(2) All material removed or demolished from the structure (or any part of the structure), and any excess material from the construction operation, shall be removed from the river or lake bed and disposed of in an appropriate manner.</li></ul>	Replacement of existing structures         The proposal includes replacement of existing structures including the gabion baskets adjacent to Blue Mountains road private vehicle and pedestrian access bridges. The Whitemans Road inlet and bypass are proposed to be upgraded with debris screens.         A precautionary approach is taken and it is assumed structure replacement is not permitted under Rule 22.         Maintenance of proposed structures         The maintenance and repair, or upgrade, of the existing and proposed structures will be permitted under this rule.         There are no anticipated maintenance activities that would breach the standards for Rule 22, and therefore maintenance activities will likely be permitted activities	Replacement of existing structures The proposed replacement of the gabion baskets, private bridges, and debris screens is considered to be a <b>discretionary</b> <b>activity</b> under rule 49. <i>Maintenance of</i> <i>proposed structures</i> It is considered that Rule 22 appropriately provides for maintenance of the proposed structures, and no consent is required at this stage.



Rule 31 Small bridges The erection and maintenance of Permitted Activity provided the ac conditions specified below.		The bridges are not permitted by Rule 31 as they are longer than 6m.	The proposed works is considered to be a <b>discretionary</b>
Conditions			activity under rule 49.
(1) The bridge is no more than 6 r	netres in total length.		45.
(2) The bridge does not reduce th flood flows.	e ability of the river to convey		
(3) The bridge does not alter the r including any diversion of water fr floods.			
(4) The bridge is maintained free	of any flood debris.		
(5) No part of the structure occurs river bed covered by water.	in, on, or under the area of		
(6) All material used during consti the bridge, is removed from the ri appropriate manner.			
Rule 32 Overhead cables		It is considered likely that	New overhead
The erection use, maintenance, a addition of any overhead cable ov which does not involve the disturb lake bed is a Permitted Activity pr conditions specified below. Conditions	er the bed of any river or lake ance or damage of any river or ovided it complies with the	rule 32 provides for the relocation of any overhead cables as permitted, while rule 33 likely enables the removal of any utility services.	cables are likely to be permitted under Rule 32
(except Lake Wairarapa) Voltage of Cable	Minimum Height Above High		
, , , , , , , , , , , , , , , , , , ,	Lake or River Level (metres)		
0 to 650	5.00		
650 to 11,000	5.5		
Between 11,000 and 110,000	6.5		
Over 110,000	7.5		
Rule 33 Removal or demolition of The removal or demolition of any structure that is fixed in, on, unde including any associated; • disturbance of river or lake be • deposition on any river or lal • temporary diversion of water (1) disturbs less than 10 cubic me other natural river or lake bed ma (2) results in the complete removal or lake bed or complete removal or river or lake bed; and (3) is not the removal or demolition of the replacement of a structure p [(4) will not result in the diversion is a Permitted Activity provided it specified below. Conditions	structure or any part of a r, or over any river or lake bed, ed; or ke bed; or r, which: tres of sand, shingle, gravel, or terial; and al of the structure from the river of that part of the structure in the n of a structure for the purposes permitted by Rule 22; of water from any wetland.]	<ul> <li>The proposal includes the removal of a number of existing structures where these are not being directly replaced or upgraded (and therefore covered by R33), including: <ul> <li>Retaining walls;</li> <li>Private bridges; and</li> <li>Service crossings.</li> </ul> </li> <li>It is anticipated that the general conditions can be met, All reasonable steps will be taken to minimise the release of sediment to water during construction as outlined in the CMP and ESCP.</li> </ul>	Removal or demolition of structures are considered to be permitted under Rule 33.



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(2) There is no use of explosives.		
(3) All material removed or demolished from the structure (or any part of the structure) shall be removed from the river or lake bed and disposed of in an appropriate manner.		
(4) All reasonable steps shall be taken to minimise the release of sediment to water during construction.		
(5) In any part of the river or lake bed covered by water in any water body identified in Policy 4.2.14 (Appendix 4 - Water bodies with important trout habitat), the activity shall not take place between 31 May and 31 August.		
(6) Water is only diverted for the period necessary to carry out the work.		
Rule 35 Entry or passage	The proposed activity, and	Entry or passage is
The entry or passage across the bed of any river or lake that is not covered by any use of the river or lake bed specified in Rules 22 to 48 and does not breach any condition or standard is a Permitted Activity.	subsequent entry and passage is addressed by Rules 22 to 48 and the activities are considered to be a discretionary activity under rule 49.	addressed to undertake the proposed works is considered to be a <b>discretionary</b> <b>activity</b> under rule 49.
Rule 36 Clearance of flood debris from rivers and lakes	Clearance of flood debris	Clearance of flood
The disturbance of any river or lake bed associated with clearing flood debris that poses a flood or erosion hazard or for the purposes of protecting structures, is a Permitted Activity, provided it complies with the conditions specified below.	from Pinehaven Stream is considered to be permitted under Rule 36.	debris from Pinehaven Stream is considered to be permitted under Rule 36.
Conditions		
(1) Public access shall not be restricted to an extent or for a period greater than necessary to complete the clearance.		
(2) All reasonable steps shall be taken to minimise the release of sediment to water during the activity.		
(3) No contaminants (including but not limited to oil, petrol, diesel, paint, or solvent) shall be released to water from equipment being used for the operation, and no refuelling of equipment shall take place on any area of river or lake bed.		
(4) Any debris cleared shall be removed from the river or lake bed and any material excavated from the river and lake bed shall not be mounded up so that it forms a barrier to water movement.		
(5) All equipment and materials used for the clearance operation shall be removed from the river or lake bed on completion of the operation.		
Rule 37 "Beach" recontouring	It is considered the permitted	The proposed
The disturbance and recontouring of any part of the bed of any river that is not covered by water (i.e., beach recontouring) to remedy or mitigate the adverse effects of flooding or erosion is a Permitted Activity, provided that the activity complies with the conditions below.	activity Rule 37 "Beach" recontouring condition (4) will not be met as construction machinery will be within the stream bed.	works are considered to be a <b>discretionary</b> <b>activity</b> under rule 49.
Conditions		
(1) The river or lake bed shall not be disturbed to a depth or an extent greater than that required to reduce the flood or erosion hazard to an acceptable level.		
(2) The material shall not be mounded up so that it forms a barrier to water movement.		
(3) No contaminants (including but not limited to oil, petrol, diesel, paint, or solvent) shall be released onto the bed from equipment being used for the operation, and no refuelling of equipment shall take place on any area of river or lake bed.		
(4) There shall be no machinery within the area of river bed covered by water while the operation is in progress.		



(5) There shall be no disturbance to posting Danded Datter-I-		
<ul> <li>(5) There shall be no disturbance to nesting Banded Dotterels</li> <li>(Charadrius bicinctus), Black Fronted Dotterels (Charadrius melanops), Black Billed Gulls (Larus bulleri), Pied Stilts</li> <li>(Himantopus leucocephalus), or Variable Oystercatchers</li> </ul>		
(Haematopus unicolor), South Island Pied Oystercatcher		
(Haematopus ostralegus), Caspian Terns (Sterna caspia), White- Fronted Terns (Sterna striata), and Spur-Winged Plover		
(Vanellus miles).		
Rule 40 Removal of vegetation	Given the likely nature of the	It is considered that removal of
The trimming and removal of vegetation[, including any associated;	trimming or removal of the vegetation for maintenance purposes, all conditions are	vegetation is provided for as a
<ul> <li>disturbance of any lake or river bed; or</li> <li>deposition on the river or lake bed; or</li> </ul>	considered likely to be met.	permitted activity
<ul> <li>temporary diversion;]</li> </ul>		under Rule 40.
<ul> <li>from the bed of any river or lake:</li> <li>to avoid or mitigate the adverse effects of flooding or</li> </ul>		
<ul> <li>to avoid of mitigate the adverse effects of noouning of erosion, or</li> <li>for the purpose of protecting structures;</li> </ul>		
which is not in a river or lake bed identified in Policy 4.2.10		
(Appendix 2 – water bodies with a high degree of natural character) is a Permitted Activity provided it complies with the conditions listed below.		
Conditions		
(1) No contaminants (including but not limited to oil, petrol, diesel,		
paint, or solvent) shall be released to the river bed from equipment being used for the operation, and no refuelling of equipment shall take place on any area of river or lake bed.		
<ul><li>(2) All reasonable steps shall be taken to minimise the release of sediment to water during the activity.</li></ul>		
(3) In any part of the river or lake bed covered by water in any		
water body identified in Policy 4.2.14 (Appendix 4 - Water bodies with important trout habitat), the activity shall not take place between 31 May and 31 August.		
<ul> <li>(4) There shall be no disturbance to nesting Banded Dotterels</li> <li>(Charadrius bicinctus), Black Fronted Dotterels (Charadrius melanops), Black Billed Gulls (Larus bulleri), Pied Stilts</li> <li>(Himantopus leucocephalus), or Variable Oystercatchers</li> <li>(Haematopus unicolor) South Island Pied Oystercatcher</li> <li>(Haematopus ostralegus), Caspian Terns (Sterna caspia), White-Fronted Terns (Sterna striata), and Spur-Winged Plover</li> <li>(Vanellus miles).</li> </ul>		
(5) Public access shall not be restricted more than is necessary to complete the removal of vegetation.		
(6) No machinery shall be left overnight in an area of river or lake bed covered by water.		
(7) All equipment and materials used for the removal of vegetation shall be removed from the river or lake bed on completion of the operation.		
Rule 41 Planting	The proposal includes the	It is considered that
The deliberate introduction or planting of any plant except:	planted benches within the stream corridor.	Rule R41 appropriately
<ul> <li>crack willow (Salix fragilis); and grey willow (Salix cinerea); other than on the margins of rivers where they are already predominant; or</li> </ul>	Maintenance of these plantings may require trimming or removal of the	provides for the proposed plantings, and no consent is
<ul> <li>any introduced, submersed aquatic plant; or</li> </ul>	vegetation (permitted under	required.
<ul> <li>any species listed in the Regional Pest Plant Management Strategy;</li> </ul>	Rule 40).	
<ul> <li>[including any associated;</li> </ul>		
<ul> <li>disturbance of any lake or river bed; or</li> <li>deposition on the river or lake bed; or</li> </ul>		
temporary diversion;]		



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<ul> <li>in the bed of any river or lake to remedy or mitigate the adverse</li> </ul>		
effects of flooding, erosion, or non-point source discharges of contaminants, or to restore habitat, is a Permitted Activity, provided it complies with the conditions below.		
Conditions		
(1) No contaminants (including but not limited to oil, petrol, diesel, paint, or solvent) shall be released to the river bed from equipment being used for the operation, and no refuelling of equipment shall take place on any area of river or lake bed.		
(2) All reasonable steps shall be taken to minimise the release of sediment to water during the activity.		
(3) In any part of the river or lake bed covered by water in any water body identified in Policy 4.2.14 (Appendix 4 - Water bodies with important trout habitat), the activity shall not take place between 31 May and 31 August.		
(4) There shall be no disturbance to nesting Banded Dotterels (Charadrius bicinctus), Black Fronted Dotterels (Charadrius melanops), Black Billed Gulls (Larus bulleri), Pied Stilts (Himantopus leucocephalus), or Variable Oystercatchers (Haematopus unicolor) South Island Pied Oystercatcher (Haematopus ostralegus), Caspian Terns (Sterna caspia), White- Fronted Terns (Sterna striata), and Spur-Winged Plover (Vanellus miles).		
(5) Public access shall not be restricted more than is necessary to complete the planting.		
(6) No machinery shall be left overnight in an area of river or lake bed covered by water.		
(7) All equipment and materials used for the removal of vegetation shall be removed from the river or lake bed on completion of the operation.		
Rule 42 Urgent works	Where urgent works are	Urgent works are
The repair of any bank protection works and the recontouring of the bed of any river or stream including any associated disturbance of the bed or any deposition on the bed by a local authority or network utility operator, which:	required, they will comply with the conditions of Rule 42.	permitted by Rule 42
(1) is necessary to protect existing permanent dwellings, existing network utility structures, or existing flood mitigation structures from an imminent threat of erosion; and		
(2) is undertaken and completed within 10 working days of a natural hazard event which results in erosion causing an imminent threat to any existing permanent dwelling, existing network utility structure, or existing flood mitigation structure		
is a Permitted Activity provided it complies with the conditions specified below.		
Conditions		
(1) The river or lake bed is not disturbed any more than is necessary to carry out the works.		
(2) The works are restricted to the minimum area necessary to protect the structure.		
(3) Public access is not restricted to an extent, or for a period, greater than that necessary to complete the works.		
(4) No contaminants (including but not limited to oil, petrol, diesel, paint, or solvent) shall be released to water from equipment being used for the operation, and no refuelling of equipment shall take place on any area of river or lake bed.		
(5) All reasonable steps shall be taken to minimise the release of	1	1



(6) Any repairs to bank protection works use similar material to		
the work being protected, excluding vehicle bodies or demolition material.		
(7) Either the Manager, Consents Management, Wellington, or		
the Manager, Planning and Resources, Wairarapa, is notified prior to the work being undertaken.		
Rule 43 Maintenance, repair, replacement, extensions, additions and alterations to structures	Replacement of existing structures	Replacement of existing structures
The maintenance, repair, replacement, extension, addition to, or alteration of any existing lawful structure or any part of an existing lawful structure that is fixed in, on, under, or over the bed of any river or lake, including any associated:	The proposal includes replacement of existing structures including the gabion baskets adjacent to	The proposed replacement of the gabion baskets, private bridges, and
<ul> <li>disturbance of river or lake bed; or</li> <li>deposition on the river or lake bed; or</li> <li>temporary diversion of water:</li> </ul>	Blue Mountains road private vehicle and pedestrian access bridges. The Whitemans Road inlet and	debris screens is considered to be a discretionary activity under rule
(1) which is not allowed as a permitted activity by Rule 22; and	bypass are proposed to be	49.
(2) which adds no more than whichever is the lesser of:	upgraded with debris	
<ul> <li>5% to the plan or cross-sectional area of the structure;</li> </ul>	screens.	
<ul> <li>two metres in horizontal projection and one metre in vertical projection;</li> </ul>	A precautionary approach is taken and it is assumed structure replacement is not	
measured from the structure as it was on 25 January 1997 (the date the	controlled under Rule 43.	
Proposed Plan was publicly notified); and		
(3) disturbs sand, shingle, gravel, or other natural river or lake bed material over an area less than four square metres per lineal metre of structure measured along the length or breadth of the structure, with a maximum disturbance of 200 square metres for any structure;		
is a Controlled Activity, provided that it complies with the standards and terms specified below.		
Standards		
(1) No contaminants (including but not limited to oil, petrol, diesel, paint, or solvent) shall be released to water from equipment being used for the operation, or from any part of the structure which may have been used for the storage or conveyance of hazardous substances, and no refuelling of equipment shall take place on any area of river or lake bed.		
(2) All material removed or demolished from the structure (or any part of the structure), and any excess material from the construction operation, shall be removed from the river or lake bed and disposed of in an appropriate manner.		
(3) In any part of the river or lake bed covered by water in any water body identified in Policy 4.2.14 (Appendix 4 – Water bodies with important trout habitat) the activity shall not take place between 31 May and 31 August.		
(4) Car bodies or demolition rubble shall not be used as a structural material.		
(5) Water is only diverted for the period that is necessary to carry out the works.		
(6) All reasonable steps shall be taken to minimise the release of sediment to water.		
Rule 46 Pipelines	A range of utility pipelines	The placement of
The placement of any pipeline or duct in or under any river or lake bed, which:	are to be replaced or relocated, however these	any new pipelines in the bed of the
(1) is not a permitted activity; and	activities will likely comply	stream will require consent as a
(2) disturbs less than 20 cubic metres of sand, shingle, gravel, or other natural river or lake bed material;	with the standards under Rule 46.	controlled activity under rule 46



is a Controlled Activity, provided that it complies with the standards and terms specified below.		
Standards		
(1) No contaminants (including but not limited to oil, petrol, diesel, paint, or solvent) shall be released to water from equipment being used for the operation, and no refuelling of equipment shall take place on any area of river or lake bed.		
(2) Any excess material from the construction operation, shall be removed from the river or lake bed and disposed of in an appropriate manner.		
(3) In any part of the river or lake bed covered by water in any water body identified in Policy 4.2.14 (Appendix 4 – Water bodies with important trout habitat), the activity shall not take place between 31 May and 31 August.		
Rule 47 River Crossings	The project involves the	The proposed river
The placement and use of any river crossing [of a width necessary for the crossing, excluding any river crossing that dams a river,] which is not a permitted activity, including any associated:	construction of new vehicle and pedestrian bridges across the stream. It is likely that more than 20 cubic metres of river bed material	crossings are considered to be a <b>discretionary</b> <b>activity</b> under rule 49.
<ul> <li>disturbance of river bed; or</li> <li>deposition on the river bed; or</li> <li>diversion of water:</li> </ul>	may be disturbed and therefore the works will not comply with the standards of	
(1) which is in, on, or under any river bed except the beds (but excluding their tributaries unless otherwise stated) of:	Rule 47	
[]		
(2) which disturbs less than 20 cubic metres of sand, shingle, gravel, or other natural river or lake bed material; and		
(3) which does not include the reclamation, infilling and deposition of fill in the river or stream for landfilling purposes or for disposing of excess construction material		
is a Controlled Activity, provided that it complies with the standards and terms specified below.		
Standards		
(1) No contaminants (including but not limited to oil, petrol, diesel, paint, or solvent) shall be released to water from equipment being used for the operation, and no refuelling of equipment shall take place on any area of river or lake bed.		
(2) Any excess material from the construction operation, shall be removed from the river or lake bed and disposed of in an appropriate manner.		
(3) In any part of the river or lake bed covered by water in any water body identified in Policy 4.2.14 (Appendix 4 – Water bodies with important trout habitat), the activity shall not take place between 31 May and 31 August.		
(4) Fish passage shall not be impeded once the culvert is operational.		
Rule 48 Placement of impermeable erosion protection structures	The placement of erosion	
The placement of any impermeable rock groyne, rock rip rap, or gabion, which is an integral part of any Floodplain Management Plan or River Control Scheme that is fixed in, on, or under, the bed of any river or stream, including any associated:	protection structures	
<ul> <li>disturbance of river bed; or</li> <li>deposition on the river bed; or</li> <li>diversion of water;</li> </ul>		
<ul> <li>(1) which is not in a water body, identified by policy 4.2.10</li> <li>(Appendix 2 – Water bodies with a high degree of natural character); and</li> </ul>		



(2) which extends into the available river bed width from the bank no more than whichever is the lesser of:		
<ul><li>10% of the width of the water body; or</li><li>10 metres;</li></ul>		
is a Controlled Activity provided that it complies with the standards and terms specified below.		
Standards		
(1) No contaminants (including but not limited to oil, petrol, diesel, paint, or solvent) shall be released to water from equipment being used for the operation, and no refuelling of equipment shall take place on any area of river or lake bed.		
(2) Any excess material from the construction operation shall be removed from the river bed and disposed of in appropriate manner.		
(3) In any part of the river or lake bed covered by water in any water body identified in Policy 4.2.14 (Appendix 4 – Water bodies with important trout habitat), the activity shall not take place between 31 May and 31 August.		
Rule 49 All remaining uses of river and lake beds	A number of proposed	A number of
The use, of any river or lake bed;	activities are not provided for	activities associated
<ul> <li>which is not specifically provided for in Rules 22 to 48; and</li> <li>which cannot meet the requirements of Rules 22 to 48; and</li> <li>which is not a non-complying or prohibited activity in Rules 50 and 51</li> </ul>	under the relevant permitted or controlled activity rules as identified above.	with the project are considered to be <b>discretionary</b> <b>activities</b> under rule 49.
is a Discretionary Activity.		
Rule 50 Reclamation of the beds of lakes or rivers, excluding Lake Wairarapa The reclamation of the bed, or any part of the bed, of any lake or river that is included in Policy 4.2.10, excluding Lake Wairarapa which is subject to Rule 51, is a Non-complying Activity.	The proposal includes the realignment of the Pinehaven Stream within 26 and 28 Blue Mountains Road. This is considered to be reclamation. The Pinehven Stream is not identified in Policy 4.2.10.	The proposed reclamation is not considered to be a non-complying activity under Rule 50.
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# **Appendix R. Consideration of Objectives and Policies**

## R.1 Regional Policy Statement for the Wellington Region

Assessment
The potential discharges to air of dust from unconsolidated surfaces and earthworks are to be controlled through appropriate management practices incorporated into the CMP to ensure that any dust emissions do not adversely affect amenity values and people's wellbeing.
Territorial authority stormwater networks are defined as regionally significant infrastructure. The Pinehaven Stream is part of the wider stormwater network in Upper Hutt. The works will ensure that this infrastructure will provide the appropriate level of service for the community and subsequent social and economic benefits.
The proposed expansion and redevelopment of Willow Park is considered to enhance the access to and along the Pinehaven Stream, consistent with this objective.
Any take of water will be for creating a temporary dry work area within the stream, and will be discharged back to the stream, and is therefore not a consumptive take.
The disturbance of stream bed material and ripariar margins associated with the works may have adverse effects on the water quality in the stream through sedimentation, however this will be temporary and the effects on freshwater equality has been assessed as negligible.
The proposed riparian planting may have some positive benefits for long term water quality in the stream.
The reasonably foreseeable needs of future generations are considered to include appropriate mitigation of natural hazard risk, for which the proposed works will have long term benefits.
The current state of the terrestrial and freshwater ecology has been assessed, with some minor effects through construction of the works anticipated, which will be mitigated by the proposed riparian planting and managed through construction management plans.
In relation to (a), the ecological effects of the proposed works including water quality effects from potential sedimentation have been assessed as minor during construction, and beneficial during the operational phase due to the proposed riparian
planting. In addition, the design of the works for the stream include the maintenance of the existing low flow channel so that the extent of available habitat within the stream will not be adversely affected



Objective / Policy	Assessment
(b) NA (c) managing water bodies and the water quality of coastal water for other purposes identified in regional plans.	during low flow events, while also providing for the required channel capacity during high flow events. In relation to (c), the Pinehaven Stream is not identified in the relevant regional plans as having any particular values. Minor water quality effects may be experienced temporarily during construction works. Water quality may be improved following construction works and establishment of the riparian planting through increased filtration.
<ul> <li>Policy 42: Minimising contamination in stormwater from development – consideration</li> <li>When considering an application for a resource consent, notice of requirement, or a change, variation or review of a district plan, the adverse effects of stormwater run-off from subdivision and development shall be reduced by having particular regard to: <ul> <li>(a) limiting the area of new impervious surfaces in the stormwater catchment;</li> <li>(b) using water permeable surfaces to reduce the volume of stormwater leaving a site;</li> <li>(c), (d) and (e): NA</li> <li>(f) using roadside swales, filter strips and rain gardens;</li> <li>(g) using constructed wetland treatment areas;</li> <li>(h): NA</li> </ul> </li> <li>(i) using stormwater attenuation techniques that reduce the velocity and quantity of stormwater discharges; and</li> <li>(j) NA.</li> </ul>	While the proposed works are not for subdivision, they could be considered as development of the area. Following construction works and establishment of the proposed riparian planting, the proposed works may have positive benefits for stormwater attenuation and quality. A roadside swale is proposed for part of Pinehaven Road. As such the proposal is considered to be generally consistent with this policy.
<ul> <li>Policy 43: Protecting aquatic ecological function of water bodies <ul> <li>consideration</li> </ul> </li> <li>When considering an application for a resource consent, notice of requirement, or a change, variation or review of a district or regional plan, particular regard shall be given to: <ul> <li>(a) maintaining or enhancing the functioning of ecosystems in the water body;</li> <li>(b) maintaining or enhancing the ecological functions of riparian margins;</li> <li>(c) minimising the effect of the proposal on groundwater recharge areas that are connected to surface water bodies;</li> <li>(d) maintaining or enhancing the amenity and recreational values of rivers and lakes, including those with significant values listed in Table 15 of Appendix 1;</li> <li>(e) protecting the significant indigenous ecosystems and habitats with significant indigenous biodiversity values of rivers and lakes, including those listed in Table 16 of Appendix 1;</li> <li>(f) maintaining natural flow regimes required to support aquatic ecosystem health;</li> <li>(g) maintaining fish passage;</li> <li>(h) protecting and reinstating riparian habitat, in particular riparian habitat that is important for fish spawning;</li> </ul> </li> </ul>	The proposal is considered to give effect to policy 43 clauses (a), (b) and (h) through the design of the proposed works, and in particular the proposed riparian planting. Clause (d) is also given effect to through the proposed expansion and redevelopment of Willow Park. Clause (f) is given effect to through the maintenance of the low flow channel in the cross section designs. Clause (g) has been considered through the construction timing and methods to be implemented, as well as potential removal of existing fish barriers. As assessed in the AEE, the overall ecological effects of the construction phase may be adverse but minor, and beneficial following establishment of the riparian planting. Overall the proposed works are therefore considered to be generally consistent with this policy.



Objective / Policy	Assessment
<ul> <li>Policy 53: Public access to and along the coastal marine area, lakes and rivers – consideration</li> <li>When considering an application for a subdivision consent, or a coastal or land use consent on public land, or a change, variation or review of a district plan to address subdivision or rezoning, particular regard shall be given to enhancing public access to, and along: <ul> <li>(a) areas of the coastal marine area, and lakes and rivers with:</li> <li>(i) places, sites and areas with significant historic heritage values identified in accordance with policy 21;</li> <li>(ii) areas of indigenous ecosystems and habitats, and areas with significant indigenous biodiversity values identified in accordance with policy 23;</li> <li>(iii) outstanding natural features and landscapes identified in accordance with policy 25;</li> <li>(iv) special amenity landscapes identified in accordance with policy 27;</li> <li>(v) places, sites and areas with high natural character identified in accordance with policy 36; and</li> <li>(vi) the rivers and lakes identified in Table 15 of Appendix 1;</li> <li>(b) Wellington Harbour and Porirua (Onepoto Arm and Pauatahanui Inlet) Harbour;</li> <li>Except where there is a need to protect:</li> <li>(c) sensitive indigenous habitats of species;</li> <li>(d) the health or safety of people;</li> <li>(e) sensitive cultural and historic heritage values; and/or</li> <li>(f) the integrity and security of regionally significant infrastructure.</li> </ul> </li> </ul>	Territorial authority stormwater networks are defined as regionally significant infrastructure. The Pinehaven Stream is part of the wider stormwater network in Upper Hutt. Therefore, the need to protect the integrity and security of the infrastructure is a consideration under clause (f). In addition, the stream is not considered to have values identified in clause (a) (i) to (vi). The proposed expansion and redevelopment of Willow Park is considered to enhance public access to and along the Pinehaven Stream, and therefore the proposed works are consistent with this policy.
Historic Heritage	
Objective 15 Historic heritage is identified and protected from inappropriate modification, use and development.	The area was evaluated by an archaeologist who concluded that there was no reasonable cause to
Policy 46: Managing effects on historic heritage values – consideration When considering an application for a resource consent, notice of requirement, or a change, variation or review of a district or regional plan, a determination shall be made as to whether an activity may affect a place, site or area with historic heritage value, and in determining whether an activity is inappropriate particular regard shall be given to: $[(a) - (i)]$	suspect that archaeological sites will be disturbed during the proposed works. In addition, there are no identified heritage resources or areas of heritage value within the area of the proposed works. Therefore, the proposed works are considered to be consistent with this objective and policy.
Indigenous ecosystems	
Objective 16 Indigenous ecosystems and habitats with significant biodiversity values are maintained and restored to a healthy functioning state. Policy 47: Managing effects on indigenous ecosystems and habitats with significant indigenous biodiversity values – consideration	The proposed works will result in the loss of a number of indigenous significant trees considered to have ecological value as assessed against the criteria in Policy 23. The assessment considered that in the context of the Pinehaven area, the loss is a minor adverse ecological effect. The proposal includes the planting of the riparian
When considering an application for a resource consent, notice of requirement, or a change, variation or review of a district or regional plan, a determination shall be made as to whether an	areas affected by the works. This planting is considered to mitigate any loss of existing vegetation, including for both terrestrial and freshwater ecology.



Objective / Policy	Assessment
activity may affect indigenous ecosystems and habitats with significant indigenous biodiversity values, and in determining whether the proposed activity is inappropriate particular regard shall be given to:	Therefore, overall the proposal is considered to be consistent with this policy.
(a) maintaining connections within, or corridors between, habitats of indigenous flora and fauna, and/or enhancing the connectivity between fragmented indigenous habitats;	
(b) providing adequate buffering around areas of significant indigenous ecosystems and habitats from other land uses;	
(c) managing wetlands for the purpose of aquatic ecosystem health;	
(d) avoiding the cumulative adverse effects of the incremental loss of indigenous ecosystems and habitats;	
(e) providing seasonal or core habitat for indigenous species;	
(f) protecting the life supporting capacity of indigenous ecosystems and habitats;	
(g) remedying or mitigating adverse effects on the indigenous biodiversity values where avoiding adverse effects is not practicably achievable; and	
(h) the need for a precautionary approach when assessing the potential for adverse effects on indigenous ecosystems and habitats.	
Landscape	
Objective 18 The region's special amenity landscapes are identified and those landscape values that contribute to amenity and the quality of the environment are maintained or enhanced.	The area of works is not within an area of landscape value as identified in the District Plan. A Landscape and Visual Impact Assessment has been undertaken which concluded the proposal would
Policy 50: Managing effects on outstanding natural features and landscapes – consideration	have less then minor effects on landscape values as there are no landscape overlays relevant to the area of the works.
When considering an application for a resource consent, notice of requirement or a change, variation or review of a district or regional plan, a determination shall be made as to first, whether an activity may affect an outstanding natural feature and/or landscape, and second, whether or not an activity is inappropriate, having particular regard to the following:	or the works.
(a) the degree to which the natural feature or landscape values will be modified, damaged or destroyed including:	
(i) the duration and frequency of any effect, and/or	
(ii) the magnitude or scale of any effect;	
(b) the irreversibility of adverse effects on landscape values;	
(c) the resilience of the natural feature, place or area to change;	
(d) the opportunities to remedy or mitigate previous damage to natural feature or landscape values; and	
(e) whether the activity will lead to cumulative adverse effects on the natural feature or landscape values	
Natural Hazards	
Objective 20 Hazard mitigation measures, structural works and other activities do not increase the risk and consequences of natural hazard events.	The proposal is the implementation of structural methods for flood hazard mitigation as identified in the Pinehaven Stream FMP. Generally, the works will provide greater capacity in the stream to a 4%



Objective / Policy	Assessment	
	AEP event level, and decrease the risk and consequences of flood hazard in the area.	
	There are some areas identified through modelling results where the depth of flood waters during certain rainfall event levels may increase as a result of the works, particularly around 48 and 50 Blue Mountains Road and 2A Freemans Way. The property at 48 Blue Mountains road has been purchased by GWRC. The Flood Hazard Report concluded that the houses on 50 Blue Mountains Road and 2A Freemans Way are approximately 10 metres above the Pinehaven Stream flood plain on their properties and are not at risk of flooding. The proposed works are therefore considered to be consistent with this objective.	
Objective 21 Communities are more resilient to natural hazards, including the impacts of climate change, and people are better prepared for the consequences of natural hazard events.	The resilience of the community to flood hazard has been considered through the Pinehaven Stream FMP process. The design of the proposed works in terms of required flow capacity has been undertaken with the consideration of climate change. The FMP process itself has increased public awareness of the risks, and also led to a plan change process to control future development in the catchment.	
Policy 51: Minimising the risks and consequences of natural hazards – consideration When considering an application for a resource consent, notice of requirement, or a change, variation or review to a district or regional plan, the risk and consequences of natural hazards on people, communities, their property and infrastructure shall be minimised, and/or in determining whether an activity is inappropriate particular regard shall be given to: (a) the frequency and magnitude of the range of natural hazards	In relation to clause (a), the proposed works address the capacity in the stream to a 4% AEP event. The structures have been appropriately designed to meet required standards for other potential hazards. The MCA for the Pinehaven Stream FMP included residual risk.	
	In relation to clause (b), the current advice on the potential effects of climate change has been incorporated in the modelling of the anticipated flood levels and subsequent design of the proposed works.	
<ul><li>that may adversely affect the proposal or development, including residual risk;</li><li>(b) the potential for climate change and sea level rise to increase</li></ul>	In relation to clause (c), (g), (h), and (i), the proposed development is hazard mitigation for the existing surrounding community.	
<ul> <li>(c) the frequency or magnitude of a hazard event;</li> <li>(c) whether the location of the development will foreseeably require hazard mitigation works in the future;</li> <li>(d) the potential for injury or loss of life, social disruption and</li> </ul>	In relation to clause (d), the emergency management and civil defence implications during construction of the proposed works will be appropriately considered through construction management requirements.	
emergency management and civil defence implications – such as access routes to and from the site;	In relation to clause (e), the proposed works upstream of 50 Mountains Road (where channel works are not proposed) has increased the potential flood depth during high rainfall events on 48 and 50 Blue Mountains Road and 2A Freemans Way. The property at 48 Blue Mountains Road has been purchased by GWRC. The Flood Hazard Report concluded that the houses on 50 Blue Mountains Road and 2A Freemans Way are approximately 10 metres above the Pinehaven Stream flood plain on their properties and are not at risk of flooding, and	
<ul> <li>(e) any risks and consequences beyond the development site;</li> <li>(f) the impact of the proposed development on any natural features that act as a buffer, and where development should not interfere with their ability to reduce the risks of natural hazards;</li> </ul>		
(g) avoiding inappropriate subdivision and development in areas at high risk from natural hazards;		
(h) the potential need for hazard adaptation and mitigation measures in moderate risk areas; and	therefore the risk and consequences are not considered to increase due to the proposed works.	
(i) the need to locate habitable floor areas and access routes above the 1:100 year flood level, in identified flood hazard areas.	In relation to clause (f), the proposed channel design has, where available space allows, incorporated naturalised channels to provide for the required stream capacity to a 4% AEP event.	



Objective / Policy	Assessment
	Overall, as the proposed works are to be undertaken specifically to reduce the risk and consequences of flood risk in the Pinehaven Catchment, they are considered to be consistent with this policy.
Policy 52: Minimising adverse effects of hazard mitigation measures – consideration When considering an application for a resource consent, notice of requirement, or a change, variation or review of a district or regional plan, for hazard mitigation measures, particular regard hall be given to: a) the need for structural protection works or hard engineering methods; b) whether non-structural or soft engineering methods are a nore appropriate option; c) avoiding structural protection works or hard engineering methods unless it is necessary to protect existing development or property from unacceptable risk and the works form part of a ong-term hazard management strategy that represents the best racticable option for the future; d) the cumulative effects of isolated structural protection works; and e) residual risk remaining after mitigation works are in place, o that they reduce and do not increase the risks of natural mazards.	In relation to clause (a), (b),(c) and (d), the proposed structural works have been considered through a long term integrated and collaborative process through the development of the Pinehaven Stream FMP, which addresses significant flood risk in an established urban area. The proposed works forming the structural methods as part of a wider response which also includes non-structural and stream management methods. In relation to clause (e), the anticipated residual flood risk during a 1% AEP event have been modelled, with the proposed works resulting in a reduction of the overall extent of potential flooding, and generally lower flood depths for most properties. In relation to the reduction, and not increase, of the risk of natural hazards, the proposed works are anticipated to result in 48 and 50 Blue Mountains Road and 2A Freemans way experiencing greater depths of flooding in a 1% AEP events. However, 48 Blue Mountains Road has been purchased by the Greater Wellington Regional Council and the Flood Hazard Report concluded that the houses on 50 Blue Mountains Road and 2A Freemans Way are approximately 10 metres above the Pinehaven Stream flood plain on their properties and are not at risk of flooding, and therefore the risk and consequences are not considered to increase due to the proposed works. As such, the proposed works are generally considered to be consistent with this policy.
legional form, design and function	

Regional form, design and function		
Objective 22 A compact well designed and sustainable regional form that has an integrated, safe and responsive transport network and:Policy 54 is identified NZUDP Design Qualities[]NZUDP Design QualitiesPolicy 54: Achieving the region's urban design principles – consideration When considering an application for a notice of requirement, or a change, variation or review of a district or regional plan, for development, particular regard shall be given to achieving the region's urbanContext	Policy 54 is identified as giving effect to Objective 22.	
		Assessment
	Context	The assessment of visual and landscape effects is set out in section 10.8 above which addresses effects on the wider landscape context. The project is considered to fit within the context of Pinehaven, as it is part of a long term view for the aspirations of the area, and overall will enhance the relationship of the surrounding land uses with the stream by providing a more defined stream corridor in terms of land use planning.
	As assessed in the LVIA attached at Appendix V, the proposed works are considered to have less than minor adverse effects on landscape character once mitigation planting has established. While some significant trees will be lost, overall the proposed works are considered to enhance the character of the Pinehaven area as a whole, as they will result in an improved stream corridor through naturalised sections and planted riparian margins. This will reflect the 'green' character of the area, and in particular the existing native vegetation cover in parts of the catchment.	
design principles in Appendix 2.		In regard to regional urban design principle 2(c) which relates to the protection and improvement of public open space, the



jective / Policy		Assessment
		changes to Willow Park are considered to improve the quality of the open space, with a boardwalk proposed that will provide greater usability of the space, and areas to appreciate the Pinehaven Stream.
		Regional urban design principles 2(d), (e) and (f) relate to quality urban design protecting and enhancing distinctive landforms, water bodies and indigenous plants and animals, creating locally appropriate spaces and places, and reflecting and celebrating New Zealand's culture and identity and celebrating our multicultural society. These will also be given effect to through the proposed works, as the Pinehaven Stream waterbody will be protected and enhanced, and planting of indigenous species will be undertaken in the riparian areas which will reflect the New Zealand culture and identity.
	Choice	Regional urban design principles relevant to the design quality are given effect to principally through the redevelopment of Willow Park which is proposed to include a boardwalk and viewing platforms. This design provides for the required flood capacity while also ensuring the continued usability of the space for people, and encourage greater use of the space. These will also be designed to ensure accessibility for people with disabilities, and the viewing platforms will provide safe access to the stream.
	Connections	Regional urban design principles relevant to the connections design quality are also given effect to principally through the redevelopment of Willow Park, which will include expansion to the south with a new connection to Sunbrae Drive, and removal of the existing narrow pathway to the west. This is considered to provide a more convenient and safer route through the park, encouraging greater use by and better connectivity for pedestrians.
	Creativity	The proposed works are not considered to be particularly relevant to the regional urban design principles related to creativity.
	Custodianship	The regional urban design principles relevant to custodianship are considered to be recognised by the proposed works, in particular 6(g) as they will mitigate the effects of flood hazard. The design of the proposed works will also benefit 6(k) through the proposed riparian planting, and 6(i) through the design of naturalised stream banks where possible. The ongoing maintenance of the structures are also considered to give effect to 6(h).
	Collaboration	The Pinehaven Stream FMP was developed through a significant consultation process, and is being implemented through a collaboration of multiple agencies. Communities have therefore been involved in the development of the solutions, and as such the proposed works are considered to give effect to the relevant regional urban design principles related to collaboration.



Objective / Policy	Assessment
Resource management with tangata whenua	
Objective 23 The region's iwi authorities and local authorities work together under Treaty partner principles for the sustainable management of the region's environment for the benefit and wellbeing of the regional community, both now and in the future.	This NoR and resource consent is being sought by the Upper Hutt City Council. The iwi with an interest in the area of the works were identified and consulted with through the development of the Pinehaven Stream FMP with the Pinehaven catchment being identified as having significance as a waterway, but not known to be an area of historic
Objective 24 The principles of the Treaty of Waitangi are taken into account in a systematic way when resource management decisions are made.	cultural significance, or current cultural significance to Māori. The Treaty partner principles are set out in the RPS in relation to Policy 49, and are therefore assessed
Objective 25 The concept of kaitiakitanga is integrated into the sustainable management of the Wellington region's natural and physical resources.	below. Overall, the proposal is considered to have appropriately taken into account the principles of the Treaty of Waitangi through early and engagement and formal consultation with potentially affected iwi.
Objective 26 Mauri is sustained, particularly in relation to coastal and fresh waters.	The Pinehaven Stream is not identified as having mahinga kai values. The mauri of the stream may be temporarily affected during construction works,
Objective 27 Mahinga kai and natural resources used for customary purposes, are maintained and enhanced, and these resources are healthy and accessible to tangata whenua.	however may be enhanced following the completion of the works through increased naturalisation of the stream and potentially positive impacts on water quality.
Objective 28 The cultural relationship of Māori with their ancestral lands, water, sites, wāhi tapu and other taonga is maintained.	Therefore, it is considered that these objectives and policies have been appropriately given effect to
Policy 48: Principles of the Treaty of Waitangi – consideration	through the development of and consultation on the proposed works.
When considering an application for a resource consent, notice of requirement, or a change, variation or review of a district or regional plan, particular regard shall be given to:	
(a) the principles of the Treaty of Waitangi; and	
(b) Waitangi Tribunal reports and settlement decisions relating to the Wellington region.	
Soils and minerals	
Objective 29 Land management practices do not accelerate soil erosion.	Some sedimentation of the stream has the potential to occur during the construction of the works. An Erosion and Sediment Control Plan has been
Policy 41: Minimising the effects of earthworks and vegetation disturbance – consideration	developed and is to be implemented during the works to minimise any potential adverse effects.
When considering an application for a resource consent, notice of requirement, or a change, variation or review of a regional or district plan, particular regard shall be given to controlling earthworks and vegetation disturbance to minimise:	This will ensure the proposed works are consister with these provisions.
<ul> <li>(a) erosion; and</li> <li>(b) silt and sediment runoff into water, or onto or into land that may enter water, so that healthy aquatic ecosystems are sustained.</li> </ul>	



#### R.2 UHCC District Plan

Note: Objectives and policies introduced by PC42 are identified as underlined.

Objective / Policy	Assessment
Residential Zone	
Objective 4.3.1 The promotion of a high quality residential environment which maintains and enhances the physical character of the residential areas, provides a choice of living styles and a high level of residential amenity.	The residential environment will be enhanced through the reduction in flood risk, and the additional amenity provided by the proposed riparian planting is considered to enhance the physical character of the area. Overall the proposal is considered to be consistent with this objective.
Objective 4.3.2 The maintenance and enhancement of the special landscape and natural values of the Conservation and Hill Areas.	While some significant trees will be lost, the proposed riparian planting is considered to enhance the landscape and natural values of the adjacent Residential Conservation areas. The proposal is considered to be consistent with this objective.
Policy 4.4.2 To ensure that the scale, appearance and siting of buildings, structures and activities are compatible with the character and desired amenity values of the area.	The proposed flood mitigation structures will be within the stream corridor, which is already significantly modified by existing structures. The landscape and visual effects have been assessed the effects on landscape values and character, and visual effects. In terms of visual effects, with minor or less than minor residual effects anticipated following mitigation. Therefore, these structures are not considered to adversely affect and are compatible with the amenity values of the surrounding area. The proposal is considered to be consistent with this policy.
Policy 4.4.4 To ensure that the location and design of buildings and earthworks do not significantly detract from the residential amenity of the area.	The proposed structures and earthworks are considered to integrate with the existing modified stream environment, and therefore not detract from the residential amenity of the area. The proposal is considered to be consistent with this policy.
Policy 4.4.6 To mitigate the adverse effects of noise within residential areas to a level consistent with a predominantly residential environment.	The construction phase of the works has the potential to have significant adverse effects on the surrounding residential environment. Mitigation is to be implemented through the Construction Management Plan and associated construction traffic and noise management plans.
Policy 4.4.10 To protect trees and vegetation which contribute to the amenity values, landscape values, character, ecological, historical and cultural values of the Conservation and Hill Areas.	The trees to be removed have been assessed for ecological and amenity values, which concluded that the effects will be minor, and mitigated by the proposed riparian planting.
Open Space Zone	
Objective 7.3.1 The promotion of a range of open spaces, maintained and enhanced to meet the present and future recreation, conservation, visual amenity and hazard management needs of the City.	The proposed redeveloped and expanded Willow Park will provide enhanced recreational, visual amenity and hazard management values in the open space, and is therefore consistent with this objective.
Objective 7.3.2 The protection of the life supporting capacity of the environment and amenity values by avoiding, remedying or mitigating the adverse effects of activities in the City's open spaces.	The adverse effects of the proposed works on the life supporting capacity of the environment and amenity values within the open space areas are considered to be minor, and mitigated by the proposed riparian planting.
Policy 7.4.2 To recognise and protect the amenity values of open space areas.	The amenity values of the open space areas may be affected by the removal of significant trees. These effects will be mitigated by the proposed riparian planting.



Policy 7.4.3 To enable a range of activities to be undertaken	The character and function of the open spaces are not
in open spaces that will not adversely affect the character and function of the open space.	considered to be adversely affected by the proposed works.
Policy 7.4.4 To manage activities in open spaces to ensure that adjoining land uses receive adequate daylight and sunlight and maintain visual and aural amenity.	The proposed works with the open space areas are not considered to adversely affect adjoining land uses during the operational phase, but may be affected during the construction phase. The construction phase effects will be managed through a Construction Management Plan to minimise these effects.
Policy 7.4.6 To incorporate in the Plan appropriate noise controls and hours of operation that have been accepted by the surrounding residents.	The relevant noise controls relate to construction noise. Construction noise effects will be mitigated through the Construction Management Plan.
Subdivision and Earthworks	
Objective 9.3.1 The promotion of subdivision and development that is appropriate to the natural characteristics, landforms, and visual amenity of the City, significant areas of indigenous vegetation and habitats of indigenous fauna, is consistent with the sustainable use of land, and has regard for walking, cycling and public transport.	The proposed works are considered to be appropriate for the natural characteristics, landform and visual amenity of the area.
Objective 9.3.3 To control earthworks within identified Flood Hazard Extents and Erosion Hazard Areas to ensure that the function of the floodplain is not reduced and unacceptable flood risk to people and property is avoided or mitigated.	The proposed works are within the Flood Hazard Extent and therefore subject to the relevant rules for earthworks in those areas.
Policy 9.4.1 To ensure that earthworks are designed and engineered in a manner compatible with natural landforms, significant areas of indigenous vegetation and habitats of indigenous fauna, the amenity of an area, and the mitigation of natural hazards.	The earthworks include naturalisation as far as practicable of stream channel banks, and so are compatible with the natural landforms.
	Some significant indigenous trees will be lost, but given the abundance of these in the area and the mitigation through the proposed riparian planting this has been assessed as a minor effect.
	The amenity of the area is considered to be enhanced through the proposed earthworks naturalising the stream channel and subsequent riparian planting.
	The earthworks required are to provide for the mitigation of flood hazard.
	Therefore, the earthworks proposed are considered to be consistent with this policy.
Policy 9.4.2 To avoid, remedy or mitigate the contamination, degradation and erosion of soil from earthworks or vegetation removal through advocating responsible land use practices.	An Erosion and Sediment Control Plan has been developed for the construction works. The proposed works are considered to be consistent with these
Policy 9.4.8 Require earthworks within identified Flood Hazard Extents and Erosion Hazard Area to be designed to minimise erosion and loss of sediment from the area of work to streams and rivers	policies.
Policy 9.4.6 Limit earthworks in the high hazard areas within identified Flood Hazard Extents and Erosion Hazard Areas to avoid an increase in risk from flood hazards to people and property.	The proposed earthworks are directly associated with the flood mitigation works as identified in the Pinehave Stream FMP. Policy 9.4.9 is therefore considered to provide a direction to enable these earthworks, and the limitation or management of earthworks as directed by policies 9.4.6 and 9.4.7 is not applicable.
Policy 9.4.7. To manage earthworks in the low hazard areas within identified Flood Hazard Extents and Erosion Hazard Areas to reduce the flood risk to people and property.	
Policy 9.4.9 Enable earthworks within identified Flood Hazard Extents and Erosion Hazard Areas that are directly associated with specific and planned flood mitigation works or floodplain management that are designed to reduce the flood risk to people and property or maintain the function of the floodplain.	



Landscape and Ecology	
Objective 12.3.2 The protection, maintenance or enhancement of essential natural landscape elements that determine Upper Hutt's landscape and geological structure and identity and contribute to the amenity values of the City.	A Landscape and Visual Impact Assessment has been undertaken, which concluded that the proposal will have less than minor adverse effects on landscape values, elements and character. Therefore, the proposed works are considered to be consistent with this policy.
Objective 12.3.4 Control development and vegetation removal within identified Urban Tree Groups to ensure their respective high amenity, landscape and/or ecological values are protected.	Trees within the works area were assessed for amenity and ecological significance. Trees identified as 27 and 29 on the designation plans are within the District Plan Tree Group 99 and are proposed to be removed.
Policy 12.4.7 To protect trees of ecological, biophysical, historic, cultural or botanic value, or significant visual amenity value in both public and private ownership from activities	The removal of significant trees was assessed overall as a minor adverse effect, and will be mitigated by the proposed riparian planting.
which may result in adverse effects on these trees.	The tree removal will be undertaken in a manner that protects the surrounding vegetation values.
Policy 12.4.9 To protect notable trees in both public and private ownership that score 100 points or more against the STEM tree evaluation criteria from activities which may adversely affect these trees.	Therefore, the proposed works are not considered to be inconsistent with this objective and supporting policies.
Policy 12.4.11 New development, buildings and works within the dripline of a tree(s) identified as being within an Urban Tree Group shall be undertaken in a manner that ensures their respective high amenity values, landscape values, and]/or ecological values identified for the Urban Tree Group are protected.	
Policy 12.4.12 Tree trimming and removal shall be undertaken in a manner that ensures their respective high amenity values, landscape values and/or ecological values identified for the Urban Tree Group are protected.	
Policy 12.4.14 To support the trimming and removal of trees where they present an imminent threat to people, property and network utilities.	The removal of the trees is required to enable flood mitigation works to be carried out. Floods in the catchment pose a threat to people, property and
Policy 12.4.15 To support the trimming of trees (including root pruning) and their removal to maintain the safe operation of network utilities.	network utilities. Therefore, the proposed works are no considered to be inconsistent with these policies.
Water Resources	
Objective 13.3.1 The protection and enhancement of the high water quality and diversity of aquatic habitats in the City's water bodies.	While some adverse effects will likely be experienced during the construction phase due to earthworks and disturbance of the stream bed, these will be mitigated
Policy 13.4.1 To avoid, remedy or mitigate the adverse effects of land use activities on the quality or quantity of water resources and the diversity of aquatic habitats.	through the implementation of a Construction Management Plan, and an Erosion and Sedimen Control Plan. These effects will also be limited in duration.
Policy 13.4.2 To promote the separation of land use activities adjoining water bodies by vegetated riparian areas to assist in filtering contaminants which adversely affect water quality and aquatic habitats.	Following completion of the works and establishment of the riparian planting, filtration of stormwater flowing overland into the stream will result in the water quality in the stream being enhanced. Therefore, the proposed works are considered to be consistent with this objective and associated policies.
Objective 13.3.2 The provision of access to water bodies and the management of activities on water bodies in a manner that does not result in undue adverse effects on the environment and which avoids conflict between users and with adjoining land uses.	The proposed expansion and redevelopment of Willow Park will provide enhanced access to Pinehaven Stream. The proposed works are considered to be consistent with this objective.
Natural Hazards	
Objective 14.3.1 – The avoidance, remedying or mitigation of	The proposed works are part of the wider implementation of the Pinehaven Stream FMP which



Policy 14.4.1 – To identify and mitigate the potential adverse effects of natural hazards that are a potentially significant threat within Upper Hutt.	addresses flood hazard in the catchment. The works are structural methods for mitigation of the flood hazard. The proposed works are therefore considered to give effect to this objective and associated policy.
Policy 14.4.2 – In areas of known susceptibility to natural hazards, activities and buildings are to be designed and located to avoid, remedy, or mitigate, where practicable, adverse effects of natural hazards on people, property and the environment.	While the proposed works are considered to be included in the broader sense of development, activities and buildings, these policies are not considered to be relevant, particularly in consideration of Policy 14.4.5.
Policy 14.4.3 Avoid development within high hazard areas of identified Flood Hazard Extents and Erosion Hazard Areas.	
Policy 14.4.4 To control development (including buildings) within the lower hazard areas of identified Flood Hazard Extents and Erosion Hazard Areas by requiring mitigation to minimise the risk to people and property.	
Policy 14.4.5 Enable planned flood mitigation works within identified Flood Hazard Extents that decrease the flood risk to people and property or maintain the function of the floodplain.	The proposed works are part of the wider implementation of the Pinehaven Stream FMP which addresses flood hazard in the catchment. The works are structural methods for mitigation of the flood hazard, as planned in the FMP. The proposed works generally decrease the flood risk to people and property. This policy is therefore considered to provide direction to enable the proposed works.
Policy 14.4.6 Within the Pinehaven Flood Hazard Extent, reduce blockage potential from fences, buildings and driveways in high hazard areas through design controls on development.	In addition to design controls, the proposed designation will also provide a method of address the potential for these structures to results in blockages and subsequent increase in flood risk.
Environmental Quality	
Objective 15.3.1 The promotion of a high level of environmental quality in the City by protecting amenity values.	The proposed works are considered to be consistent with this objective as the proposed naturalisation of some stream sections and the riparian planting along the Pinehaven Stream corridor will result in a high level of environmental quality.
Policy 15.4.1 To identify and maintain amenity values that the community wishes to protect.	Two of the trees requiring removal are identified as within Urban Tree Group 99 and 102. The loss of these trees will be mitigated by the proposed riparian planting which includes a number of specimen trees. The amenity values of the affected stream corridor will therefore be maintained, and the proposal is considered to be consistent with this policy.
Policy 15.4.2 To promote the maintenance of air quality within the City.	Dust may be emitted from unconsolidated surfaces during earthwork activities. Mitigation measures will be implemented through the Construction Management Plan to maintain the air quality in the area. The proposal is therefore considered to be consistent with this policy.
Policy 15.4.3 To promote the development of a safer and more secure environment for the community.	The proposal is to mitigate flood hazard in the Pinehaven Stream catchment area, and will therefore result in a safer environment or the community.
	In addition, the proposed expansion, re-planning, and redevelopment of Willow Park will result in the removal of a long and narrow access point.
Policy 15.4.4 To manage noise emissions to levels acceptable to the community.	The construction phase of the works has the potential to have significant adverse effects on the surrounding



Objective 16.3.3 To recognise and provide for the sustainable, secure and efficient use, operation, maintenance and upgrading and development of network utilities within the City.	Territorial authority stormwater networks are defined regionally significant infrastructure. The proposed works are upgrading and developmen the existing stream channel and associated structure
Policy 16.4.9 Enable the efficient construction, installation, operation, upgrading and maintenance of network utilities.	to ensure the levels of service for stormwater infrastructure are met.
Policy 16.4.11 Encourage the appropriate use of designations for new network utilities and extensions to existing network utilities that are not designated.	The proposed designation of the stream channel and associated riparian areas will ensure the secure and efficient use, operation, maintenance of the stormwater infrastructure.
	The designation and associated works are therefore considered to give effect to this objective and associated policies.
Objective 16.3.4 To manage any adverse effects on the environment resulting from the design, location, construction, operation, upgrading and maintenance of network utilities.	The potential adverse effects of the proposed works have been assessed, with the construction of the works potentially resulting in significant adverse effects. These are to be managed through an appropriate Construction Management Plan, and will be temporary in nature.
Policy 16.4.12 Ensure that network utilities are designed, developed, constructed, located, upgraded, operated and maintained to avoid remedy or mitigate any actual or	
maintained to avoid, remedy or mitigate any actual or potential adverse effects on the environment.	The long term effects of the operation of the works are considered to be positive, particularly in relation to flood hazard.
	The proposed works are therefore considered to be consistent with this objective and policy.
Objective 16.3.5 To ensure the continued operation of network utilities in flood hazard extents and to maintain the function of the floodplain to convey flood waters.	Network utility pipes and cables are to be relocated to ensure they do not unacceptably impede flood flow. The proposed works are therefore considered to be consistent with this objective and associated policies.
Policy 16.4.18 Network utility structures crossing streams within identified Flood Hazard Extents must be installed in a way to avoid contributing to blockages or restricting flood flows or compromising flood mitigation works.	
Policy 16.4.19 To control the location of network utilities in identified Flood Hazard Extents to ensure their operation is not compromised during a flood event.	
Policy 16.4.4 To promote the safe and efficient use and development of the transportation network.	The construction phase of the works will be subject to appropriate traffic management plans where they involve use of the transport network. The proposed works are therefore considered to be consistent with this policy.
Policy 16.4.8 To recognise and provide for the:	Territorial authority stormwater networks are defined as regionally significant infrastructure.
<ul> <li>need for new and the maintenance and upgrading of existing network utilities; and</li> </ul>	The proposed works are upgrading and development of the existing stream channel and associated structures
<ul> <li>technical and operational requirements and constraints of network utilities in assessing their location, design, development, construction and appearance; and</li> <li>benefits that network utilities provide to the economic, social and cultural functioning of the City, Region and Nation.</li> </ul>	to ensure the levels of service for stormwater infrastructure are met.
	The proposed works are therefore considered to be consistent with this policy.

### R.3 Regional Freshwater Plan

Objective / Policy	Assessment
General Objectives and Polices	
Objective 4.1.1 The relationship of tangata whenua and their culture and traditions with fresh water, and with ancestral sites,	The iwi with an interest in the area of the works were identified and consulted with through the



Objective / Policy	Assessment
<ul><li>waahi tapu and other taonga within the beds of rivers and lakes, is recognised and provided for.</li><li>Objective 4.1.2 The mauri of water bodies and river and lake beds is protected.</li></ul>	development of the Pinehaven Stream FMP, with the Pinehaven catchment being identified as having significance as a waterway, but not known to be an area of historic cultural significance, or current cultural significance to Māori.
Objective 4.1.3 The principles of the Treaty of Waitangi are taken into account in the management of the Region's water bodies and river and lake beds.	The Pinehaven Stream is not identified as having mahinga kai values. The mauri of the stream may be temporarily affected during construction works, however may be enhanced following the completion of the works through increased naturalisation of the stream and potentially positive impacts on water quality.
	Therefore, it is considered the proposal has appropriately taken account of these objectives and the Treaty of Waitangi principles.
Objective 4.1.4 The natural character of wetlands, and lakes and rivers and their margins, is preserved and protected from inappropriate subdivision, use and development.	The Pinehaven Stream is currently highly modified. The proposed works will result in some channel sections being naturalised, and planting of the riparian margins. Therefore, it is considered the proposal is consistent this objective.
Objective 4.1.5 The life-supporting capacity of water and aquatic ecosystems is safeguarded from the adverse effects of any subdivision, use and development.	The assessment of the freshwater ecological effects of the proposal concluded that much of effects are associated with the construction phase that once in operation, ecological values of the stream are expected to increase as a result of improved riparian vegetation and canopy cover. Therefore, it is considered the proposal is consistent this objective.
Objective 4.1.6 Significant indigenous aquatic vegetation and significant habitats of fresh water fauna in water bodies are protected.	The Pinehaven Stream is not identified as significant freshwater habitat.
Objective 4.1.7 The amenity and recreational values of wetlands, lakes, and rivers are maintained and, where appropriate, enhanced.	The amenity values of the stream are considered to be enhanced by the proposed works. Therefore, it is considered the proposal is consistent this objective.
Objective 4.1.8 The quality of lawful public access to and along river and lake beds is maintained and, where appropriate, enhanced.	The proposal will not affect lawful public access to the stream, except in Willow Park where it will be enhanced. Therefore, it is considered the proposal is consistent this objective.
Objective 4.1.9 The risk of flooding to human life, health, and safety is at an acceptable level.	The proposal is for the implementation of structural methods to achieve capacity in the stream for the
Objective 4.1.10 The adverse effects of flooding on natural values and physical resources, including people's property, are at an acceptable level.	4% AEP event, consistent with UHCC's stormwater infrastructure level of service which was subject to public consultation processes. Therefore, it is considered the proposal is consistent these objectives.
Objective 4.1.11 People and communities are able to use and develop freshwater resources to provide for their social, economic, and cultural well being and for their health and safety.	The freshwater resources in the Pinehaven Stream will be temporarily affected during the construction of the works, which will help to provide for the social and economic wellbeing of the surrounding community. Therefore, it is considered the proposal is consistent this objective.
Objective 4.1.12 The adverse effects of the use and development of freshwater resources are avoided, remedied, or mitigated.	The effects of use of the freshwater resources in the Pinehaven Stream during the construction phase will be appropriately mitigated through the management measures summarised in section 12.1 of the AEE. Therefore, it is considered the proposal is consistent this objective.



Assessment
The proposed riparian planting is considered likely to enhance the freshwater resources in the Pinehaven Stream. Therefore, it is considered the proposal is consistent this objective.
The development of the Pinehaven Stream FMP included significant consultation. The proposed works are implementing the structural methods proposed in the FMP. Public consultation will also occur through the notification of this NoR. Therefore, it is considered the proposal is consistent this objective.
Consultation has been undertaken with the relevant iwi through the Pinehaven Stream FMP process. The Pinehaven catchment being identified as having significance as a waterway, but not known to be an area of historic cultural significance, or current cultural significance to Māori. Therefore, it is considered the proposal is consistent this policy.
The assessment of freshwater ecological effects of the proposed works concluded that ecological effects of the construction phase may be adverse but minor, and beneficial following establishment of the riparian planting. Overall the proposed works are therefore considered to be generally consistent with this policy.
The matters stated have been taken into account through the assessment of effects on the Pinehaven Stream. The proposed works are therefore considered to be generally consistent with this policy.
The assessment of freshwater ecological effects of the proposed works concluded that ecological effects of the construction phase may be adverse but minor, and beneficial following establishment of the riparian planting.
Mitigation will include the timing of works outside of fish migration periods, and ensuring fish passage
during instream works.
Overall the proposed works are therefore considered to be generally consistent with this
policy.



Objective / Policy	Assessment
<ul> <li>Policy 4.2.14 To avoid, remedy or mitigate any adverse effects on important trout habitat in the Region, identified in Appendix 4, by:</li> <li>managing water quality so that Policy 5.2.3 is satisfied; and</li> <li>managing the flows and levels of water bodies so that Policies 6.2.1, 6.2.2, 6.2.12, and 6.2.13, whichever is (are) relevant, is (are) satisfied; and</li> <li>having particular regard to offsetting adverse effects on trout habitat; and</li> <li>having particular regard to maintaining the same, or similar, river bed configuration in the rivers identified.</li> </ul>	<ul> <li>While the Pinehaven Stream is not identified as having important trout habitat, Hulls Creek and the Hutt River are identified as such.</li> <li>The assessment of freshwater ecological effects of the proposed works concluded that ecological effects of the construction phase may be adverse but minor, and beneficial following establishment of the riparian planting.</li> <li>It is considered that the potential effects of the subsequent discharge into Hulls Creek and the Hutt River will be temporary and negligible.</li> <li>Overall the proposed works are therefore considered to be generally consistent with this policy.</li> <li>The proposal will not affect lawful public access to</li> </ul>
lawful public access along the beds of lakes and rivers unless exceptional circumstances arise that make restrictions necessary, including to:	the stream, except in Willow Park where it will be enhanced. Therefore, it is considered the proposal is consistent these policies.
<ul> <li>protect any characteristic of any site or feature which gives a water body its special value or any conservation value; or</li> </ul>	
<ul> <li>provide for public health and safety; or</li> </ul>	
<ul> <li>provide for security on private property; or</li> </ul>	
<ul> <li>protect the rights of property owners, including the protection of crops and stock.</li> </ul>	
Policy 4.2.17 To promote lawful public access to water bodies when the subdivision, use and development of land adjacent to water bodies is being considered, particularly those water bodies which:	
<ul> <li>have a high degree of natural character (Policy 4.2.10), are important trout habitat in the Region (Policy 4.2.14), or are regionally significant for amenity values and recreational use (Policy 4.2.15); or</li> </ul>	
<ul> <li>are considered by the relevant territorial authority to be of benefit to the local community for their recreational, cultural, scenic, spiritual, or other amenity values.</li> </ul>	
Policy 4.2.18 To promote the avoidance or mitigation of the potential adverse effects associated with flooding.	The proposal is for the implementation of structural methods to achieve capacity in the stream for the 4% AEP event, consistent with the Pinehaven Stream FMP. Therefore, it is considered the proposal is consistent this policy.
Policy 4.2.19 To allow the maintenance of lawful flood mitigation works within river and lake beds and on floodplains.	The proposed structural works may require ongoing maintenance. This policy supports the NoR objective for those activities.
Policy 4.2.20 To ensure that there is sufficient information about flood hazards to enable flooding in the Region to be mitigated to an acceptable level.	The proposal is for the implementation of structural methods to achieve capacity in the stream for the 4% AEP event, consistent with the Pinehaven
Policy 4.2.21 To encourage community awareness about flood hazards by involving people in the processes that establish acceptable levels of flood mitigation.	Stream FMP. The development of the FMP included significant public consultation, and included information from flood modelling. Therefore, it is considered the proposal is consistent these policies.
Policy 4.2.22 To adopt a precautionary approach when planning for and making decisions about the potential adverse effects of flooding on people and communities where information is incomplete or limited.	



Objective / Policy	Assessment
Policy 4.2.23 To have regard to the benefits arising from any proposal for the use and development of a water body when assessing the proposal.	The proposed works will have significant benefits for the surrounding community in terms of reducing the risk of flood hazard, and therefore on the social and economic health, safety and wellbeing of the community.
Policy 4.2.24 To have regard to the effects on other established activities when considering any proposal for the use and development of water bodies.	The proposed works will result in positive operational effects for the surrounding Pinehaven community.
Policy 4.2.27 To encourage the restoration or rehabilitation of freshwater resources in the Region, including the establishment of wetlands, where appropriate.	The proposed riparian planting is considered likely to enhance the freshwater resources in the Pinehaven Stream. Therefore, it is considered the proposal is consistent this policy.
Water Quality and Discharges to Fresh Water	
Objective 5.1.1 The quality of fresh water meets the range of uses and values for which it is required while the life supporting capacity of water and aquatic ecosystems is safeguarded.	The discharge of water will be from areas of works which are to be kept dry during construction. The assessment of freshwater ecological effects of the proposed works concluded that ecological effects of the construction phase with the proposed mitigation, the effects are considered to be short term, localised and minor in significance. Therefore, it is considered the proposal is consistent this objective.
Objective 5.1.2 The quality of fresh water has the potential to meet the reasonably foreseeable needs of future generations.	The assessment of freshwater ecological effects of the proposed works identified that the proposed riparian planting may have beneficial effects in terms of stormwater land flow filtration. Therefore, it is considered the proposal is consistent this objective.
Objective 5.1.3 The quality of water is, as far as practicable, consistent with the values of the tangata whenua.	See discussion related to Objective $4.1.1 - 4.1.3$ . It is considered the proposal is consistent this policy.
Policy 5.2.6 Except for rivers and streams identified in Appendix 7, to manage the water quality of all surface water bodies in the Region for aquatic ecosystem purposes (subject to Policy 5.2.10).	The assessment of freshwater ecological effects of the proposed works identified that the overall ecological effects of the construction phase may be adverse but minor, and beneficial following establishment of the riparian planting. Overall the proposed works are therefore considered to be generally consistent with this policy.
Policy 5.2.10 To allow the discharge of contaminants to fresh water which do not satisfy Policies 5.2.1 to 5.2.9, whichever is (are) relevant, only where: (1) the discharge is of a temporary nature; or	Any discharge of water or contaminates to the stream associated with the proposed works would be temporary in nature. It is considered the proposal is consistent this policy.
(2) the discharge is associated with necessary maintenance works; or	
(3) exceptional circumstances justifying the granting of a permit; or	
(4) the discharge:	
<ul> <li>was present at the time the Plan was notified; and</li> </ul>	
• is not likely to cause a decrease in the existing quality of water at that site and the person responsible for the discharge has defined a programme of work for upgrading the discharge within a specified timeframe; or	
(5) that in any event, it is consistent with the purpose of the Act to allow the discharge.	



Objective / Policy	Assessment
<ul> <li>Policy [5.2.10A 1. When considering any application for a discharge the consent authority must have regard to the following matters:</li> <li>a) the extent to which the discharge would avoid contamination that will have an adverse effect on the life-supporting capacity of fresh water including on any ecosystem associated with fresh</li> </ul>	The assessment of freshwater ecological effects of the proposed works identified that the overall ecological effects of the construction phase may be adverse but minor, and beneficial following establishment of the riparian planting. Overall the proposed works are therefore considered to be generally consistent with this policy.
water and b) the extent to which it is feasible and dependable that any more than minor adverse effect on fresh water, and on any ecosystem associated with fresh water, resulting from the discharge would be avoided.	
2. When considering any application for a discharge the consent authority must have regard to the following matters:	
a) the extent to which the discharge would avoid contamination that will have an adverse effect on the health of people and communities as affected by their secondary contact with fresh water; and	
b) the extent to which it is feasible and dependable that any more than minor adverse effect on the health of people and communities as affected by their secondary contact with fresh water resulting from the discharge would be avoided.	
3. This policy applies to the following discharges (including a diffuse discharge by any person or animal):	
a) a new discharge or	
b) a change or increase in any discharge – of any contaminant into fresh water, or onto or into land in circumstances that may result in that contaminant (or, as a result of any natural process from the discharge of that contaminant, any other contaminant) entering fresh water.	
4. Paragraph 1 of this policy does not apply to any application for consent first lodged before the National Policy Statement for Freshwater Management 2011 took effect on 1 July 2011.	
5. Paragraph 2 of this policy does not apply to any application for consent first lodged before the National Policy Statement for Freshwater Management 2014 takes effect]	
Policy 5.2.14 To encourage the treatment of stormwater discharges to reduce the adverse effects of such discharges on the receiving water body.	An Erosion and Sediment Control Plan has been developed to minimise effects of construction phase stormwater discharges as far as practicable. The proposal is therefore considered to be consistent with this policy.
Water Quantity and the Taking, Use, Damming or Diversion of Fresh Water	
Objective 6.1.1 People and communities are able to take, use, dam, or divert surface water, and take and use groundwater, while ensuring that the flows in rivers, and water levels in lakes and wetlands, are sufficient to maintain the natural and amenity values of water bodies.	The take and discharge, or diversion of the water in the Pinehaven Stream for the construction phase of the project will be temporary, and will only be undertaken to create a dry site in the stream required for construction of flood hazard mitigation measures. The water take will not be consumptive,
Objective 6.1.3 Water abstracted from rivers, streams, lakes and aquifers is used efficiently and water conservation is promoted.	with the discharge back to the stream of the full take. The proposal is therefore considered to be consistent with these objectives.



Objective / Policy	Assessment
Objective 6.1.4 The flows in rivers and water levels in lakes and wetlands are, as far as practicable, consistent with the values of the tangata whenua.	The flow in the stream will only be affected in those areas where a dry site is required, with the full flow taken returned to the stream. The proposal is therefore considered to be consistent with this objective.
Policy 6.2.2 To manage the flows in rivers and streams not identified in Policy 6.2.1 by having regard to:	The Pinehaven stream is a modified urban stream and is not identified in the RFP as having any significant natural, amenity or tangata whenua
<ul> <li>the significance of natural, amenity, and tangata whenua values; and</li> </ul>	values. An y adverse effects of the take and discharge or diversion of stream flow will be
• the scale/magnitude of any adverse effects on natural, amenity and tangata whenua values; and	temporary for the purpose of construction, and will be reversible on completion.
<ul> <li>the reversibility of any adverse effects on natural, amenity and tangata whenua values.</li> </ul>	
Policy [6.2.4A 1 When considering any application the consent authority must have regard to the following matters:	The assessment of effects on ecology considered the effects of the potential take and discharge or
(a) the extent to which the change would adversely affect safeguarding the life- supporting capacity of fresh water and of any associated ecosystem and	diversion, and concluded that with the mitigation proposed it is expected that ecological values would be reduced during construction but will be localised and require the property of the second sec
(b) the extent to which it is feasible and dependable that any adverse effect on the life-supporting capacity of fresh water and of any associated ecosystem resulting from the change would be avoided.	and recoverable over a relatively short period of time.
2. This policy applies to:	
(a) any new activity and	
(b) any change in the character, intensity or scale of any established activity – that involves any taking, using, damming or diverting of fresh water or draining of any wetland which is likely to result in any more than minor adverse change in the natural variability of flows or level of any fresh water, compared to that which immediately preceded the commencement of the new activity or the change in the established activity (or in the case of a change in an intermittent or seasonal activity, compared to that on the last occasion on which the activity was carried out).]	
Policy 6.2.14 To provide for minor or temporary diversions of water in any river, lake or wetland, where they are associated with authorised works and/or the exercise of a resource consent.	The diversions to create a dry site in the stream will be temporary, and only for the period required for construction. This policy is therefore permissive in terms of the proposed diversions.
Policy 6.2.15 To allow the damming or diversion of water in any river, lake, or wetland, provided:	Adverse effects are to be mitigated through construction management as identified in section 12.1 of the AEE report. No significant adverse
(1) adverse effects are avoided, remedied or mitigated; and	effects are anticipated. This policy is therefore
(2) significant adverse affects, which cannot be adequately offset, are avoided on:	permissive in terms of the proposed diversions.
<ul> <li>the values held by tangata whenua; and</li> </ul>	
<ul> <li>natural or amenity values; and</li> </ul>	
<ul> <li>water quality and flows below the dam or diversion; and</li> </ul>	
<ul> <li>water levels in any lake or wetland; and</li> </ul>	
<ul> <li>biological and physical processes; and</li> </ul>	
• fish passage; and	
<ul> <li>sediment transport processes; and</li> </ul>	
• the quality of lawful public access along a river or lake bed; and	
• the flood hazard; and	
<ul> <li>river or lake bed or bank stability.</li> </ul>	



Objective / Policy	Assessment
Use of the Beds of Rivers and Lakes and Development on the	Floodplain
Objective 7.1.1 Appropriate uses of the beds of rivers and lakes are allowed while avoiding, remedying, or mitigating any adverse effects.	The proposed flood mitigation structures are considered to be appropriate structures in the Pinehaven Stream, in particular because there are existing structures and the proposal will result in an enhanced stream channel. The proposal is therefore considered to be consistent with this objective.
Objective 7.1.2 The risk of flooding or erosion is not increased by locating structures or carrying out activities in the beds of rivers and lakes or on the floodplain.	The proposed structures have been designed to allow for the appropriate flood flow. The proposed works are anticipated to result in 48 and 50 Blue Mountains Road and 2A Freemans way experiencing greater depths of flooding in a 1% AEP event. However, 48 Blue Mountains Road has been purchased by the Greater Wellington Regional Council and the Flood Hazard Report concluded that the houses on 50 Blue Mountains Road and 2A Freemans Way are approximately 10 metres above the Pinehaven Stream flood plain on their properties and are not at risk of flooding, and therefore the risk and consequences are not considered to increase due to the proposed works.
Objective 7.1.3 Activities do not cause damage to, or destruction of, existing lawful flood mitigation works.	The proposal is for the replacement of structures and new structures to mitigate flood risk. The proposal is therefore considered to be consistent with this objective
Objective 7.1.4 The uses of river and lake beds are, as far as practicable, consistent with the values of the tangata whenua.	See discussion related to Objective $4.1.1 - 4.1.3$ . It is considered the proposal is consistent this policy.
<ul> <li>Policy 7.2.1 To allow the following uses within river and lake beds:</li> <li>structures or activities for flood mitigation or erosion protection purposes;</li> <li>structures for transportation and network utility purposes; or</li> <li>structures for activities which need to be located in, on, under, or over the beds of rivers and lakes; or</li> <li>structures for cultural harvest (e.g., pa tuna); or</li> <li>the maintenance of any lawful structure; or</li> <li>the removal of aquatic weeds from farm drains and urban drains for drainage purposes; or</li> <li>the extraction of sand, gravel, or rock; or</li> <li>the diversion of water associated with activities that are otherwise authorised; or</li> <li>the enhancement of the natural character of any wetland, lake or river and its margins;</li> <li>provided that any adverse effects are avoided, remedied or mitigated and that the significant adverse effects are of activities for the Transmission Gully Project and are addressed in accordance with Policy 4.2.33A).</li> </ul>	The proposed works are all considered to be addressed by relevant uses identified in this policy, in particular 'structures or activities for flood mitigation or erosion protection purposes'. This policy is therefore permissive in terms of the proposed works and structures in the stream bed.
<ul> <li>Policy 7.2.2 To not allow the use of river and lake beds for structures or activities that have significant adverse effects on:</li> <li>the values held by tangata whenua; and/or</li> <li>natural or amenity values; and/or</li> </ul>	No significant adverse effects are anticipated on the matters listed. It is therefore considered that this policy does not restrict the proposed activities.



Objective / Policy	Assessment
lawful public access along a river or lake bed; and/or	
the flood hazard; and/or	
<ul> <li>river or lake bed or bank stability; and/or water quality; and/or</li> </ul>	
<ul> <li>water quantity and hydraulic processes (such as river flows and sediment transport); and/or</li> </ul>	
the safety of canoeists or rafters;	
unless the structures or activities are for the Transmission Gully Project and addressed in accordance with Policy 4.2.33A.	
<ul> <li>Policy 7.2.3 To not allow new uses within the beds of rivers and lakes, and subdivision, use and development on the floodplain where the potential effect of flooding significantly increases the risk to human life, health, and safety; or where the actual or potential effect of flooding has significant adverse effects on:</li> <li>private or community property; and</li> <li>flood mitigation structures and works; and</li> <li>natural values.</li> </ul>	the proposed works are anticipated to result in 48 and 50 Blue Mountains Road and 2A Freemans way experiencing greater depths of flooding in a 1% AEP events. However, 48 Blue Mountains Road has been purchased by the Greater Wellington Regional Council and the Flood Hazard Report concluded that the houses on 50 Blue Mountains Road and 2A Freemans Way are approximately 10 metres above the Pinehaven Stream flood plain on their properties and are not at risk of flooding, and therefore the risk and consequences are not considered to increase the risk to human life, health, and safety the proposed works are not considered to have significant adverse effects on private or community property, flood mitigation structures and works, or natural values of the Pinehaven Stream.
Policy 7.2.4 To not allow the development of ad hoc flood or erosion mitigation structures within river beds or on floodplains with Floodplain Management Plans or River Management Schemes; and To discourage the development of ad hoc flood or erosion mitigation structures in other rivers, unless all feasible alternatives have been evaluated and found to be impracticable or have greater adverse effects on the environment.	The proposed works are giving effect to the preferred structural methods in the Pinehaven Stream FMP.
Policy 7.2.6 To have regard to any relevant Floodplain Management Plan and the information provided in any relevant flood hazard assessment, or in connection with any River Management Scheme, when considering subdivision, use, or development within any river bed or floodplain.	The proposed works are giving effect to the preferred structural methods in the Pinehaven Stream FMP.
<ul> <li>Policy 7.2.8 To allow re-contouring of the beds of rivers provided:</li> <li>the activity is necessary to avoid or mitigate the effects of flood hazard; and</li> <li>the assessment of a resource consent application to carry out the activity is subject to Part II of the Act.</li> </ul>	The proposed works include naturalised stream channel sections as part of the flood mitigation package. This policy is therefore permissive in terms of the proposed re-contouring of the stream bed.
<ul> <li>Policy 7.2.9 To encourage the removal of any structure which:</li> <li>is derelict; or</li> <li>poses a threat to the safety of people; or</li> <li>is not in active use and is not likely to be used in the future unless its removal is not practicable or will create more adverse effects on the environment than its non-removal.</li> </ul>	The proposed works include the removal off structures within this the stream bed which may fall under one or more of the matters listed. This policy is therefore permissive in terms of the removal of those structures.
Policy 7.2.10 To ensure that all structures in or on the beds of rivers and lakes which are visible are adequately maintained so that: • the structure is safe; and	The proposed project footprint has been located so to allow for ongoing maintenance of the structures, and has taken into account visual amenity of the area to minimise adverse effects. The proposal is therefore consistent with this policy.



Objective / Policy	Assessment
<ul> <li>any adverse effects on the visual amenity of the area are minimised.</li> </ul>	
<ul> <li>Policy 7.2.12 To ensure that the disturbance of any river or lake bed associated with the removal of vegetation:</li> <li>does not exacerbate bank erosion or the flood hazard; and/or</li> <li>maintains the drainage of farmland; and/or</li> <li>is required to be carried out either as a permitted activity or an activity for which a resource consent has been granted.</li> </ul>	Any removal of vegetation proposed is to allow adequate area for the flood mitigation works to occur. It is therefore considered that the matters listed will not be triggered by the removal.
Policy 7.2.13 To ensure that the removal of sand, gravel, or rock, from any lake or river bed is located and carried out in such a way that flood or erosion hazards are reduced or there is, at least, no increase to these hazards.	The proposed works are for the proposed flood mitigation structural methods to be constructed. This may include some removal of stream bed material. Any removal will not increase the flood hazard.
Policy 7.2.14 To ensure that the deliberate introduction of plants to a river or lake bed for flood mitigation, erosion protection, habitat restoration, or for mitigating non-point source discharges of contaminants, will not result in the displacement of desirable species which are already present.	The ecological assessment undertaken concluded that the proposed riparian planting would lead to positive ecological effects during the operational phase.
Policy 7.2.15 To ensure that the reclamation or drainage of any river or lake bed is only carried out when:	
<ul> <li>there are no practicable alternatives which do not involve reclamation or drainage; and</li> </ul>	
<ul> <li>the reclamation or drainage provides significant benefits to the community; and</li> </ul>	
• the reclamation or drainage is consistent with Policy 4.2.10.	

## R.4 Regional Soil Plan for the Wellington Region

Objective / Policy	Assessment
Objective 4.1.10 Riparian vegetation cover is maintained, enhanced or established, so that erosion and sediment deposition is minimised in and around water bodies.	The proposal includes the replanting of the riparian areas affected by the works. The proposal is therefore considered to be consistent with this objective and policy.
Policy 4.2.14 To avoid, remedy or mitigate the adverse effects of vegetation disturbance by promoting:	
[];	
<ul> <li>riparian management, including where this will help safeguard the life- supporting capacity of aquatic ecosystems;</li> </ul>	
[]	
Objective 4.1.11 Land management practices are adopted for the effective control of sediment runoff to water bodies.	The construction works have the potential to result in sedimentation of the stream. An Erosion and Sediment Control Plan
Policy 4.2.15 To regulate soil disturbance activities to ensure that they are unlikely to have significant adverse effects on:	has been developed to minimise these effects as far as practicable. The
• erosion rates;	proposal is therefore considered to be consistent with this objective and policies.
• soil fertility;	
• soil structure;	
<ul> <li>flood mitigation structures and works;</li> </ul>	
• water quality;	
downstream locations;	
<ul> <li>bridges, culverts and other water crossing structures;</li> </ul>	



Objective / Policy	Assessment
• aquatic ecosystems; and	
historic sites with tangata whenua values.	
Policy 4.2.16 To ensure that recognised erosion control and land rehabilitation techniques are adopted to avoid, remedy or mitigate any adverse effects resulting from soil disturbance activities	

#### R.5 Proposed Natural Resources Plan for the Wellington Region Decisions Version

Objective / Policy	Assessment
Objectives	
Ki uta ki tai: mountains to the sea	
Objective O1 Air, land, fresh water bodies and the coastal marine area are managed as integrated and connected resources; ki uta ki tai – mountains to the sea.	The effects of the proposal have been considered in relation to the potential downstream effects on Hulls Creek and the Hutt River, particularly in relation to water quality and associated values.
Objective O3 Mauri particularly the mauri of fresh and coastal waters is sustained and, where it has been depleted, natural resources and processes are enhanced to replenish mauri.	The mauri of the Pinehaven Stream may be adversely affected during the construction phase, but is considered to be potentially enhanced during the operational phase due to the naturalisation of the stream banks where possible, and the positive effects on water quality from riparian planting.
Objective O4 The intrinsic values of fresh water and marine ecosystems are recognised and the life supporting capacity of water is safeguarded.	While the Pinehaven Stream is not identified as having any significant ecological values in the PNRP Decisions Version, the potential effects on the aquatic fresh water ecology have been assessed, which recognises the intrinsic values of the freshwater ecosystem in the Pinehaven Stream. The ecological assessment concludes that with the identified mitigation methods, the construction phase of the proposed works will have minor adverse effects on aquatic ecology, while the operational phase will have less than minor or nil effects.
Beneficial use and development	
Objective O9 The recreational values of the coastal marine area, rivers and lakes and their margins and natural wetlands are maintained and enhanced.	Public access to and the recreational value of the riparian margins of the Pinehaven Stream will be enhanced through the proposed expansion and redevelopment of Willow Park. Therefore, it is
Objective O10 Public access to and along the coastal marine area and rivers and lakes is maintained and enhanced.	considered the proposal is consistent these objectives.
Objective O12 The social, economic, cultural and environmental benefits of regionally significant infrastructure, renewable energy	Territorial authority stormwater networks are defined as regionally significant infrastructure.
generation activities and the utilisation of mineral resources are recognised.	The proposed works are upgrading and development of the existing stream channel and associated structures to ensure the levels of service for stormwater infrastructure are met.
	The proposed designation of the stream channel and associated riparian areas will ensure the secure and efficient use, operation, maintenance of the stormwater infrastructure.



Objective / Policy	Assessment
	The designation and associated works are therefore considered to give effect to this objective and associated policies.
Māori relationships	
<ul> <li>Objective O14 The relationships of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga are recognised and provided for, including:</li> <li>(a) maintaining and improving opportunities for Māori customary use of the coastal marine area, rivers, lakes and their margins and natural wetlands, and</li> <li>(b) maintaining and improving the availability of mahinga kai species, in terms of quantity, quality and diversity, to support Māori customary harvest, and</li> <li>(c) providing for the relationship of mana whenua with Ngā Taonga Nui a Kiwa, and</li> <li>(d) protecting sites with significant mana whenua values from use and development that will adversely affect their values and restoring those sites to a state where their characteristics and qualities sustain the identified values.</li> <li>Objective O15 Kaitiakitanga is recognised and mana whenua actively participate in planning and decision-making in relation to the use, development and protection of natural and physical resources.</li> </ul>	The iwi with an interest in the area of the works were identified and consulted with through the development of the Pinehaven Stream FMP, with the Pinehaven catchment being identified as having significance as a waterway, but not known to be an area of historic cultural significance, or current cultural significance to Māori. Iwi were also engaged through the development of the Pinehaven Stream Improvements project. No known mahina kai, contact recreation, Māori customary use, or use associated with the health of people is associated with the Pinehaven Stream. There are no sites with significant mana whenua values identified in the PNRP Decision's Version maps associated with the Pinehaven Stream. The assessment of the freshwater ecological effects of the proposal concluded that much of effects are associated with the construction phase that once in operation, ecological effects are expected to be negligible to positive following riparian vegetation re- establishment. Pinehaven Stream is not identified in Schedule B – Nga Taonga Nui a Kiwa, nor is Hulls Creek into which the stream discharges. The proposed conditions included in section 11.3 of the AEE include the preparation of a Pinehaven Kaitiaki Monitoring Strategy (PKMS) to ensure that the potential effects of construction to the mana and mouri of the stream within and downstream of the construction area are appropriately managed and mitigated. Therefore, it is considered that these objectives have been appropriately given effect to through the development of and consultation on the proposed works.
Natural character, form and function	
Objective O17 The natural character of the coastal marine area, natural wetlands, and rivers, lakes and their margins is preserved and protected from inappropriate use and development.	Pinehaven Stream is a highly modified urban waterbody. The natural character of the Pinehaven Stream is to be enhanced by the proposed stream channel modification and riparian planting. Designation of the surrounding area will protect it from inappropriate use and development.
	The designation and associated works are therefore considered to give effect to this objective.
Natural hazards	•
Objective O20 The hazard risk <del>,</del> and residual hazard risk, from natural hazards and adverse effects of climate change, on people, the community and infrastructure are acceptable.	The proposal is the implementation of structural methods for flood hazard mitigation as identified in the Pinehaven Stream FMP. The works will provide greater capacity in the stream to a 4% AEP event level, and decrease the risk and consequences of flood hazard in the area to acceptable levels. The proposal is therefore considered to be consistent with this objective.



Objective / Policy	Assessment
Objective O21 Inappropriate use and development in high risk areas is avoided.	The proposal is the implementation of structural methods for flood hazard mitigation as identified in the Pinehaven Stream FMP. This is considered to be appropriate use and development.
Water quality	
Objective O23 The quality of groundwater, water in surface water bodies, and the coastal marine area is maintained or improved.	The proposed construction methodology will have some adverse effects on the quality of the water in the Pinehaven stream. This will be temporary. The proposal includes riparian planting along the stream corridor, which may help to improve the water quality in the stream in the long term. The proposal is considered to not be inconsistent with this objective.
Objective O24 Rivers, lakes, natural wetlands and coastal water are suitable for contact recreation and Māori customary use, including by: (a) maintaining water quality, or	Following the construction phase, the quality of the water in the Pinehaven Stream will not be adversely affected.
(b) improving water quality in:	
(i) significant contact recreation fresh water bodies and sites with significant mana whenua values and Ngā Taonga Nui a Kiwa to meet, as a minimum, the primary contact recreation objectives in Table 3.1, and	
(ii) coastal water and sites with significant mana whenua values and Ngā Taonga Nui a Kiwa to meet, as a minimum, the primary contact recreation objectives in Table 3.3, and	
(iii) all other rivers and lakes and natural wetlands to meet, as a minimum, the secondary contact recreation objectives in Table 3.2.	
Biodiversity, aquatic ecosystem health and mahinga kai	·
Objective O25 Biodiversity, aquatic ecosystem health and mahinga kai in fresh water bodies and the coastal marine area are safeguarded such that: (a) water quality, flows, water levels and aquatic and coastal habitats are managed to maintain biodiversity aquatic ecosystem	The ecological effects of the proposed works including water quality effects from potential sedimentation have been assessed as minor during construction, and beneficial during the operational phase due to the proposed riparian planting.
health and mahinga kai, and (b) where an objective in Tables 3.4, 3.5, 3.6, 3.7 or 3.8 is not met, a fresh water body or coastal marine area is improved over time to meet that objective.	The design of the works for the stream include the maintenance of the existing low flow channel so that the extent of available habitat within the stream will not be adversely affected during low flow events, while also providing for the required channel capacity during high flow events.
	The Pinehaven Stream is not identified as having any particular values associated with it, including any mahinga kai values.
Objective O27 Vegetated riparian margins are established, <del>and</del> maintained <del>.</del> or restored to enhance water quality, aquatic ecosystem health, mahinga kai and indigenous biodiversity of rivers, lakes, natural wetlands and the coastal marine area.	The proposal includes extensive riparian planting along the stream corridor. The proposal is therefore considered to give effect to this objective.
Objective O29 The passage of fish and koura is maintained, and the passage of indigenous fish and koura is restored.	The proposed construction works are to be managed and timed to minimise effects on fish passage. The proposed works also provides the opportunity to remove existing fish barriers, if possible. If existing grade control weirs need to be reinstated, these will be designed to ensure fish passage. The proposal is therefore considered to be consistent with this objective.



Objective / Policy	Assessment	
Air quality		
Objective O41 The adverse effects of odour, smoke and dust on amenity values and people's well-being are minimised.	The construction phase of the works may emit dust from earthworks and unconsolidated surfaces. The emission of dust will be minimised through management and mitigation measures, and will be temporary. The proposal is therefore considered to be consistent with this objective.	
Discharges to land and water		
Objective O47 The amount of sediment-laden runoff entering water is minimised.	The disturbance of stream bed material and earthworks in riparian margins associated with the works may have adverse effects on the water quality in the stream through sedimentation.	
	The works are to be controlled through the Erosion and Sediment Control Plan developed for the works, as attached at Appendix W. Sediment-laden runoff will be temporary and minimised as far as practicable.	
	The proposal is therefore considered to be consistent with this objective.	
Objective O48 The adverse quality and quantity effects of stormwater discharges from stormwater networks and urban land uses are improved over time.	The proposal includes riparian planting along the stream corridor, which may help to improve the water quality in the stream in the long term. The proposal is therefore considered to be consistent with this objective.	
Policies	I	
Ki uta ki tai and integrated catchment management		
Policy P1: Ki uta ki tai and integrated catchment management Air, land, fresh water bodies and the coastal marine area will be	The Pinehaven Stream FMP considered the hydrology of the stream catchment as a whole in determining the appropriate flood mitigation options.	
managed recognising ki uta ki tai by using the principles of integrated catchment management. These principles include: (a) decision-making using the catchment as the spatial unit, and	The Pinehaven Stream catchment and stream channel has been extensively studied in relation to multiple aspects including hydrology, topography, ecology and landscape values.	
<ul> <li>(b) applying an adaptive management approach to take into account the dynamic nature and processes of catchments, and</li> <li>(c) coordinated management, with decisions based on best available information and improvements in technology and</li> </ul>	The effects of the proposal have considered in relation to the potential downstream effects on Hulls Creek and the Hutt River, particularly in relation to water quality and associated values.	
science, and (d) taking into account the connected nature of resources and natural processes within a catchment, and	The effects of the proposal have considered environmental, social, cultural and economic aspects.	
(e) recognising links between environmental, social, cultural and economic sustainability of the catchment.	The proposal is therefore considered to be consistent with this policy.	
Policy P3: Precautionary approach	The Pinehaven Stream catchment and stream	
Use and development shall be managed with a precautionary approach where there is limited information regarding the effects and any adverse effects are potentially significant.	channel has been extensively studied in relation to multiple aspects including hydrology, topography, ecology and landscape values. There is considered to be adequate information on which to proceed	
Beneficial use and development		
Policy P9: Public access to and along the coastal marine area and the beds of lakes and rivers	The proposed works will not affect the public access to or along the Pinehaven Stream.	
Maintain and enhance the extent or quality of public access to and along the coastal marine area and the beds of lakes and rivers except where it is necessary to:	The proposed expansion and redevelopment of Willow Park will provide enhanced access to Pinehaven Stream.	



Objective / Policy	Assessment
(a) protect the values of estuaries, sites with significant mana whenua values identified in Schedule C (mana whenua), sites with significant historic heritage value identified in Schedule E (historic heritage) and sites with significant indigenous biodiversity value identified in Schedule F (indigenous biodiversity), or	The proposed works are considered to be consistent with this policy.
(b) provide access to significant surf breaks within the coastal marine area on a permanent or ongoing basis, or	
(bc) protect public health and safety, or	
(ed) provide for a temporary activity such as construction, a recreation or cultural event or stock movement, and where the temporary restrictions shall be for no longer than reasonably necessary before access is fully reinstated, and	
with respect to (a), and (b) where it is necessary to permanently restrict or remove existing public access, the loss of public access shall be mitigated or offset by providing enhanced public access at a similar or nearby location.	
Policy P10: Contact recreation and Māori customary use Use and development avoid, remedy or mitigate any_adverse effects on contact recreation and Māori customary use in fresh and coastal water, including by:	In relation to (a), the operational phase of the project will have no adverse effect on water quality, while the construction phase will have temporary adverse effects.
(a) providing water quality and, in rivers, flows for contact recreation and Māori customary use, and	In relation to (b) and (d), access to, and the passive recreation and amenity values of, the Pinehaven Stream will be enhanced through the redevelopment
(b) managing activities to maintain or enhance contact recreation values in the beds of lakes and rivers, including by retaining existing swimming holes and maintaining access to existing contact recreation locations, and	of Willow Park. In relation to (c), the Pinehaven Stream is not a suitable swimming location.
(c) encouraging improved access to suitable swimming and surfing locations, and	
(d) providing for the passive recreation and amenity values of fresh water bodies and the coastal marine area.	
Policy P12: Benefits of regionally significant infrastructure and renewable electricity generation facilities	In relation to (a), the proposed project is to aid in the integration and management of the stormwater infrastructure and surrounding land use.
The benefits of regionally significant infrastructure and renewable energy generation activities are recognised by having regard to:	In relation to (b), the proposed structures have a functional need to be located within the stream bed.
<ul><li>(a) the strategic integration of infrastructure and land use, and</li><li>(b) the location of existing infrastructure and structures, and</li></ul>	In relation to (e), territorial authority stormwater networks are defined as regionally significant
(c) [NA]	infrastructure. The proposed works are required to increase the capacity of the stream channel to meet
(d) the functional need and operational requirements associated with developing, operating, maintaining and upgrading regionally significant infrastructure and renewable energy generation activities in the coastal marine area and the beds of lakes and rivers.	levels of service for stormwater infrastructure. The policies therefore recognise the benefits of the stormwater infrastructure and requires regard to be given to the operational requirements of the development, operation, maintenance and
Policy P13: Providing for regionally significant infrastructure	upgrading of the infrastructure, and that these activities are beneficial and generally appropriate.
The use, development, operation, maintenance, and upgrade of regionally significant infrastructure and renewable energy generation activities are provided for.	
Policy P16: New flood protection and erosion control	The policy recognises the social, cultural, economic
The social, cultural, economic and environmental benefits of new catchment based flood and erosion risk management activities are recognised.	and environmental benefits of the flood risk management activities proposed. The benefits of the proposed works include significant reduction in the risk of flood hazard, and associated social and economic wellbeing.



Objective / Policy	Assessment
Māori relationships	
Policy P17: Mauri The mauri of fresh and coastal waters shall be recognised as being important to Māori and is sustained and enhanced, including by: (a) managing the individual and cumulative adverse effects of activities that may impact on mauri in the manner set out in the rest of the Plan, and (b) providing for those activities that sustain and enhance mauri, and (c) recognising and providing for the role of kaitiaki in sustaining mauri.	The proposal is considered to potential enhance mauri through removal existing structures from the stream and naturalising the banks where this is possible. The role of kaitiaki is sustaining mauri has been provided for through the incorporation of proposed consent conditions for a Pinehaven Kaitiaki Monitoring Strategy (PKMS) to ensure that the potential effects of construction to the mana and mauri of the stream within and downstream of the construction area are appropriately managed and mitigated.
Policy P19: Māori values The cultural relationship of Māori with air, land and water shall be recognised and the adverse effects on this relationship and their values shall be minimised.	The iwi with an interest in the area of the works were identified and consulted with through the development of the Pinehaven Stream FMP, with the Pinehaven catchment being identified as having significance as a waterway, but not known to be an area of historic cultural significance, or current cultural significance to Māori. Therefore, it is considered that the proposed works are consistent with this policy.
Policy P20: Exercise of kaitiakitanga Kaitiakitanga shall be recognised and provided for by involving mana whenua in the assessment and decision-making processes associated with use and development of natural and physical resources including; (a) managing activities in sites with significant mana whenua values listed in Schedule C (mana whenua) in accordance with tikanga and kaupapa Māori as exercised by mana whenua, and (b) the identification and inclusion of mana whenua attributes and values in the kaitiaki information and monitoring strategy in accordance with Method M2, and (c) identification of mana whenua values and attributes and their application through tikanga and kaupapa Māori in the maintenance and enhancement of mana whenua relationships with Ngā Taonga Nui a Kiwa.	The iwi with an interest in the area of the works were identified and consulted with through the development of the Pinehaven Stream FMP, with the Pinehaven catchment being identified as having significance as a waterway, but not known to be an area of historic cultural significance, or current cultural significance to Māori. In relation to matter (a), the Pinehaven Stream is not identified with any site in Schedule C of the PNRP Decisions Version. The kaitiakitanga has been provided for through the incorporation of proposed consent conditions for a Pinehaven Kaitiaki Monitoring Strategy (PKMS) to ensure that the potential effects of construction to the mana and mouri of the stream within and downstream of the construction area are appropriately managed and mitigated. This is considered to be consistent with the broader objectives of matter (b). In relation to matter (c), the Pinehaven Stream is not identified as Ngā Taonga Nui a Kiwa in the PNRP Decisions Version.
Policy P21: Statutory acknowledgements Wellington Regional Council will: (a) include any relevant statutory acknowledgments in Schedule D (statutory acknowledgements) for public information, and (b) have regard to any relevant statutory acknowledgment in Schedule D (statutory acknowledgements) when processing resource consent applications.	The Ngāti Toa Rangatira Claims Settlement Act 2014 includes in the Statements of Association the 'Hutt River and its tributaries'. As Pinehaven Stream flows into Hulls Creek, which in turn feeds the Hutt River, Pinehaven Stream is covered by the Statement of Association and therefore is a statutory acknowledgement area.
Natural hazards	1
Policy P27: High risk areas Use and development, including hazard mitigation methods, in high risk areas shall be avoided except where:	The proposed works are flood hazard mitigation methods.



Objective / Policy	Assessment
<ul> <li>(a) they have a functional need or operational requirement or there is no practicable alternative to be so located, and</li> <li>(b) the hazard risk to the development and/or residual hazard risk after hazard mitigation measures, assessed using a risk-based approach, is low, and</li> <li>(c) the development does not cause or exacerbate natural hazards in other areas, and</li> <li>(d) adverse effects on natural processes (coastal, riverine and lake processes) are avoided, remedied, or mitigated, and</li> <li>(e) natural cycles of erosion and accretion and the potential for natural features to fluctuate in position over time, including movements due to climate change and sea level rise over at least the next 100 years, are taken into account.</li> </ul>	In relation to (a), there is a functional need for flood mitigation measures within the catchment to address flood issues as identified in the Pinehaven Stream FMP. Alternatives to the proposal have been assessed through multi-criteria analysis. In relation to (b) and (c), generally the proposed works will result in a reduced risk of flooding in the area of works. There are some areas identified through modelling results where the depth of flood waters during certain rainfall event levels may increase as a result of the works, particularly around 48 and 50 Blue Mountains Road and 2A Freemans Way. The property at 48 Blue Mountains road has been purchased by Greater Wellington Regional Council. The Flood Hazard Report concluded that the houses on 50 Blue Mountains Road and 2A Freemans Way are approximately 10 metres above the Pinehaven Stream flood plain on their properties and are not at risk of flooding. In relation to (d), the Pinehaven Stream is highly modified, with associated effects on fluvial processes. In relation to (e), the design of the works has taken into account the potential for erosion and scour.
Policy P28: Hazard mitigation measures Hard hazard engineering mitigation and protection methods shall be avoided except where it is necessary to protect existing development from unacceptable hazard risk, assessed using the risk-based approach, and; (a) any adverse effects are no more than minor, or (b) where the environmental effects are more than minor the works form part of a hazard risk management strategy.	The proposed works are flood hazard mitigation methods, located within an area of existing development which is subject to unacceptable flood hazard risk. The works are part of the implementation of the Pinehaven Stream FMP. Therefore, it is considered that the proposed works are consistent with this policy.
<ul> <li>Policy P29: Effects of climate change</li> <li>Particular regard shall be given to the potential for climate change to threaten biodiversity, aquatic ecosystem health and mahinga kai, or to cause or exacerbate natural hazard events over at least the next 100 years that could adversely affect use and development including:</li> <li>(a) coastal erosion and inundation (storm surge), and</li> <li>(b) river and lake flooding and erosion, aggradation, decreased minimum flows, and</li> <li>(c) stormwater ponding and impeded drainage, and</li> <li>(d) relative sea level rise, using reliable scientific data for the Wellington Region.</li> </ul>	The current advice on the potential effects of climate change has been incorporated in the modelling of the anticipated flood levels and subsequent design of the proposed works. Therefore, it is considered that the proposed works are consistent with this policy.
Policy P30: Natural buffers Provide for the restoration or enhancement of natural features such as beaches, dunes or wetlands that buffer development from natural hazards and ensure the adverse effects of use and	
development on them are minimised. Biodiversity, aquatic ecosystem health and mahinga kai	
Policy P31: Biodiversity, <u>a</u> quatic ecosystem health and mahinga kai	The ecological effects of the proposed works including water quality effects from potential sedimentation have been assessed as minor during



Objective / Policy	Assessment
Objective / Policy         Biodiversity, Aaquatic ecosystem health and mahinga kai shall be maintained or restored by managing the effects of use and development on physical, chemical and biological processes to:         Hydrology         (a) maintain or restore natural flow characteristics and hydrodynamic processes, and the natural pattern and range of water level fluctuations in rivers, lakes and natural wetlands, and Water quality         (b) maintain or improve water quality to meet the objectives in Tables 3.4, 3.5, 3.6, 3.7 and 3.8 of Objective O25, and Aquatic habitat diversity and quality         (c)maintain or restore aquatic habitat diversity and quality, including the form, frequency and pattern of pools, runs, and riffles in rivers, and the natural form of rivers, lakes, natural wetlands and the coastal marine area, and         (d) restore the connections between fragmented aquatic habitats, and         Critical habitat for indigenous aquatic species and indigenous birds         (e) maintain or restore habitats that are important to the life cycle and survival of indigenous aquatic species and the habitats of indigenous birds in the coastal marine area, natural wetlands and the beds of lakes and rivers and their margins that are used for breeding, roosting, feeding, and migration, and         (f) minimise adverse effects on aquatic species at times which will most affect the breeding, spawning, and dispersal or migration of those species, including timing the activity, or the adverse effects may be more significant, and         (g) maintain or restore riparian habitats, and	Assessment construction, and beneficial during the operational phase due to the proposed riparian planting. In relation to (a), the design of the works for the stream include the maintenance of the existing low flow channel so that the extent of available habitat within the stream will not be adversely affected during low flow events, while also providing for the required channel capacity during high flow events. In relation to (d), the migration periods for relevant species is to be avoided for activities which may impact on fish passage during construction. In relation to (f) the proposal includes riparian planting. The Pinehaven Stream is not identified as having any particular values associated with it in the plan schedules. Therefore, it is considered that the proposed works are consistent with this policy.
(h) avoid the introduction, and restrict the spread, of aquatic pest plants and animals.	
<ul> <li>Policy P32: Adverse effects on <u>biodiversity</u>, aquatic ecosystem health and mahinga kai</li> <li>Adverse effects on biodiversity, aquatic ecosystem health and mahinga kai shall be managed by:</li> <li>(a) avoiding significant adverse effects, and</li> <li>(b) where significant adverse effects cannot be avoided, minimising them, and</li> <li>(c) where significant adverse effects cannot be, mitigating them avoided and/or minimised they are remedied, and</li> <li>(d) where significant residual adverse effects remain, it is appropriate to consider the use of biodiversity offsets.</li> <li>Proposals for biodiversity mitigation and biodiversity offsetting will be assessed against the principles listed in Schedule G1</li> <li>(biodiversity mitigation) and Schedule G2 (biodiversity offsetting).</li> </ul>	The Pinehaven catchment is identified as having significance as a waterway, but not known to be an area of historic cultural significance, or current cultural significance to Māori. The ecological effects of the proposed works including water quality effects from potential sedimentation have been assessed as minor during construction, and beneficial during the operational phase due to the proposed riparian planting. Therefore, it is considered that the proposed works are consistent with this policy.



Objective / Policy	Assessment
Policy P34: Fish passage The construction or creation of new barriers to the passage of fish and koura species shall be avoided-, except where this is required for the protection of indigenous fish and koura populations.	The proposed works will not create fish barriers. Therefore, it is considered that the proposed works are consistent with this policy.
Policy P35: Restoring fish passage The passage of indigenous fish and koura shall be restored where this is appropriate for the management and protection of indigenous fish and koura populations.	There is the potential for the works to remove existing fish barriers. Therefore, it is considered that the proposed works are consistent with this policy.
Air quality	
Policy P55: Managing air amenity Air quality amenity in urban, rural and the coastal marine areas shall be managed to minimise offensive or objectionable odour, smoke and particulate matter, fumes, ash and visible emissions.	The potential discharges to air of dust from unconsolidated surfaces and earthworks are to be controlled through appropriate management practices incorporated into the CMP to ensure that any dust emissions do not adversely affect amenity values and people's wellbeing. Therefore, it is considered that the proposed works are consistent with this policy.
Land and water quality	
<ul> <li>Policy P66: National Policy Statement for Freshwater Management requirements for discharge consents</li> <li>When considering any application for a discharge the consent authority shall have regard to the following matters: <ul> <li>(a) the extent to which the discharge would avoid contamination that will have an adverse effect on the life-supporting capacity of fresh water including on any ecosystem associated with fresh water, and</li> <li>(b) the extent to which it is feasible and dependable that any more than minor adverse effects on fresh water, and on any ecosystem associated with fresh water, resulting from the discharge would be avoided, and</li> <li>(c) the extent to which the discharge would avoid contamination that will have an adverse effect on the health of people and communities as affected by their contact with fresh water, and</li> <li>(d) the extent to which it is feasible and dependable that any more than minor adverse effects on the health of people and communities as affected by their contact with fresh water, and</li> </ul> </li> </ul>	The assessment of freshwater ecological effects of the proposed works identified that the overall ecological effects of the construction phase may be adverse but minor, and beneficial following establishment of the riparian planting. Overall the proposed works are therefore considered to be generally consistent with this policy.
resulting from the discharge would be avoided. This policy applies to the following discharges (including a diffuse discharge by any person or animal): (e) a new discharge, or (f) a change or increase in any discharge of any contaminant into fresh water, or onto or into land in circumstances that may result in that contaminant (or, as a result of any natural process from the discharge of that contaminant, any other contaminant) entering fresh water. Sections (a) and (b) of this policy do not apply to any application for consent first lodged before the National Policy Statement for Freshwater Management 2011 took effect on 1 July 2011.	



Objective / Policy	Assessment
for consent first lodged before the National Policy Statement for Freshwater Management 2014 took effect (1 August 2014).	
<ul> <li>Policy P67: Minimising discharges to water or land</li> <li>Discharges of contaminants to water or land will be minimised by adopting the following hierarchy:</li> <li>(a) avoiding the production of the contaminant,</li> <li>(b) reducing the amount of contaminants, including by reusing, recovering or recycling contaminants,</li> <li>(c) minimising the volume or amount of the discharge,</li> <li>(d) discharging to land is promoted over discharging direct to water, including using land-based treatment, constructed wetlands or other systems to treat contaminants prior to discharge.</li> </ul>	The discharge of sediment to the stream during construction is to be avoided and minimised through all practicable management and mitigation methods in accordance with the ESCP attached at Appendix W. Overall the proposed works are therefore considered to be generally consistent with this policy.
<ul> <li>Policy P63: Improving water quality for contact recreation and Māori customary use</li> <li>The quality of fresh water bodies and coastal water shall be improved to meet, over time and as a minimum, the objectives in Table 3.1, 3.2 and 3.3, including by:</li> <li>(a) improving water quality in all first priority for improvement water bodies for secondary contact with water listed in Schedule H2 (priority water bodies) in accordance with Method M27, and</li> <li>(b) having particular regard to improving water quality in fresh water bodies and coastal where contact recreation and/or Māori customary use are adversely affected by discharges from stormwater from a port, airport or state highway, wastewater networks <del>or</del> and wastewater treatment plants.</li> </ul>	<ul> <li>While the proposed construction works will have adverse effects on water quality of the Pinehaven Stream, this will be mitigated as far as practicable in accordance with the ESCP attached at Appendix W, and will be temporary.</li> <li>In the long term, water quality in the stream may be positively affected through the increase in riparian planting proposed.</li> <li>Overall the proposed works are therefore considered to be generally consistent with this policy.</li> </ul>
<ul> <li>Policy P70: Managing point source discharges for aquatic ecosystem health and mahinga kai</li> <li>Where an objective in Table 3.4, Table 3.5, Table 3.6, Table 3.7 or Table 3.8 of Objective O25 is not met, point source discharges to water shall be managed in the following way:</li> <li>(a) for an existing discharge that contributes to the objective not being met, the discharge is only appropriate if:</li> <li>(i) an application for a resource consent includes a defined programme of work for upgrading the discharge, in accordance with good management practice, within the term of the resource consent, and</li> <li>(ii) conditions on the resource consent require the reduction of adverse effects of the discharge in order to improve water quality in relation to the objective, and</li> <li>(b) for a new discharge, other than a wastewater discharge, the discharge is inappropriate if the discharge would cause the affected fresh water body or area of coastal water decline in relation to the objective.</li> <li>In assessing the appropriateness of a new discharge or existing discharge, the ability to offset residual adverse effects may be considered.</li> </ul>	The proposed discharges will be temporary, and will be avoided and minimised through all practicable management and mitigation methods in accordance with the ESCP attached at Appendix W. Overall the proposed works are therefore considered to be generally consistent with this policy as the it relates more appropriately to ongoing discharges.
Policy P71: Quality of point source discharges to rivers Where all of the objectives in Table 3.4 of Objective O25 are met the adverse effects of point source discharges, excluding stormwater and wastewater discharges, to rivers shall be minimised by the use of measures that result in the discharge as a minimum maintaining quality in the receiving water after the zone of reasonable mixing:-when measured: (a) below the discharge point compared to above the discharge point, having particular regard to the following indicators of ecosystem health:	The discharge of sediment to the stream during construction is to be avoided and minimised through all practicable management and mitigation methods in accordance with the ESCP attached at Appendix W. This policy has been considered in the assessment of environmental effect in section 10.5.1.1 of the AEE. As the discharged water will be temporary dewatering water taken from the stream, and treated for entrained sediment prior to discharge back to the stream downstream of the works area,



<ul><li>(i) the Quantitative Macroinvertebrate Community Index</li><li>(b) the 7-day mean minimum dissolved oxygen concentration</li><li>(c) the daily minimum dissolved oxygen</li></ul>	the indicator of ecosystem health most likely to be affected is (a)(iii) water clarity.
	The potential effects of the proposed construction works have been considered in relation to freshwater ecology values in the technical report attached at Appendix S. Conditions of consent relating to the sediment load generated by the proposed construction works have been proposed in section 11.3 of the AEE. As such, the potential adverse effects from the quality of point source discharges to the stream during the proposed works are considered to be appropriate
<ul> <li>Policy P72: Zone of reasonable mixing</li> <li>When a discharge to water requires resource consent, the zone of reasonable mixing shall be minimised and will be determined on a case-by-case basis. In determining the zone of reasonable mixing, particular regard shall be given to: <ul> <li>(a) acute and chronic toxicity effects, and</li> <li>(b) adverse effects on aquatic species migration, and</li> <li>(c) efficient mixing of the discharge with the receiving waters, and</li> <li>(d) avoiding a site with significant mana whenua values identified in Schedule C (mana whenua), and</li> <li>(e) the identified values of that area of water, and</li> <li>(f) avoiding significant adverse effects within the zone of reasonable mixing.</li> </ul> </li> </ul>	Given the definition of 'zone of reasonable mixing' in chapter 2 of the PNRP Decisions Version, the zone of reasonable mixing is 'at least 50m'.
<ul> <li>Policy P79: Managing land use impacts on stormwater</li> <li>Land use, subdivision and development, including stormwater</li> <li>discharges, shall be managed so that runoff volumes and peak</li> <li>flows:</li> <li>(a) avoid or minimise scour and erosion of stream beds, banks</li> <li>and coastal margins, and</li> <li>(b) do not increase risk to human health or safety, or increase the</li> <li>risk of inundation, erosion or damage to property or</li> <li>infrastructure,</li> <li>including by retaining, as far as practicable, pre-development</li> <li>hydrological conditions in new subdivision and development.</li> </ul>	The effects of the proposal on stormwater flowing into the stream over land may be beneficial following establishment of the riparian planting. The proposal will improve the hydrological conditions for the surrounding area. Overall the proposed works are therefore considered to be generally consistent with this policy.
<ul> <li>Policy P98: Land use activities, erosion and associated discharges</li> <li>Earthworks, vegetation clearance and plantation forestry harvesting activities that have the potential to result in significant accelerated soil erosion, or to lead to off-site discharges of silt and sediment to surface water bodies, shall use measures, including good management practice, to: <ul> <li>(a) minimise the risk of accelerated soil erosion, and</li> <li>(b) control silt and sediment runoff, and</li> <li>(c) ensure the site is stabilised and vegetation cover is restored.</li> </ul> </li> <li>Policy P101: Management of riparian margins <ul> <li>Maintain or restore water quality, aquatic ecosystem health,</li> </ul> </li> </ul>	The potential for discharges of sediment to the stream during construction is to be avoided and minimised through all practicable management and mitigation methods in accordance with the ESCP attached at Appendix W. The proposed works are therefore considered to be generally consistent with this policy.



Objective / Policy	Assessment
contaminants entering surface water bodies, through the	
management of riparian margins including: (a) the exclusion or restricted access of livestock likely to affect	
riparian margins or water quality,	
(b) appropriate set-back distances from surface water bodies for some land use activities,	
(c) encouraging the planting of appropriate riparian vegetation, and	
(d) the control of pest plants and animals.	
Policy P102: Reclamation or drainage of the beds of lakes and rivers	The proposal includes the realignment of the Pinehaven Stream within 26 and 28 Blue Mountains
The reclamation or drainage of the beds of lakes and rivers and natural wetlands shall be avoided, in particular those identified in	Road. This is considered to be reclamation. The Pinehaven Stream is not identified in Schedule
Schedules A (outstanding water bodies) and C (mana whenua), except where the reclamation or drainage is:	A or C. The proposed reclamation is part of the Pinehaven
(a) partial reclamation of a river bank for the purposes of flood prevention or erosion control, or	Stream Improvements works for flood mitigation, and therefore meets clause (a).
(b) associated with a growth and/or development framework or strategy approved by a local authority under the Local Government	The realignment works will shift and widen the stream bed, and therefore also meets clause (d).
Act 2002, or (c) necessary to enable the development, operation, maintenance	In relation to (f), given the existing location to the true right bank of the stream in proximity to the
and upgrade of regionally significant infrastructure, or (d) associated with the creation of a new river bed and does not	dwelling located on 26 Blue Mountains Road, there is not considered to be any other practicable alternative to reclamation of the stream bed in this
involve piping of the river, and (e) for the purpose of forming a reasonable crossing point, and	area.
(f) in respect of (a) to (e) there are no other practicable alternative methods of providing for the activity, or	As such, it is considered that the proposed works are consistent with this policy.
(g) the reclamation or drainage is of an ephemeral flow path.	
<del>.</del>	
Policy P106: Management of plants in the beds of lakes and rivers	The proposal includes significant areas of riparian planting. The matters listed in the policy will inform
The introduction to and removal of a plants, or part of a plant, from the beds of lakes and rivers shall be managed so that:	any plants located within the bed of the stream. The proposed works are therefore considered to be
(a) pest plants are not introduced and their removal is enabled, and	generally consistent with this policy.
(b) indigenous plant species are encouraged to be planted where they are appropriate for the purpose and are typical of the area and their removal (in whole or in part) is only enabled for the purpose of Māori customary use or for the reasonable use of an individual, or where it is necessary to manage flooding and erosion, and	
(c) the introduction or removal of a plants, or part of a plant, does not increase flooding and erosion either at the site of introduction or removal, or across the wider river catchment, and	
(d) the introduction or removal of a plant <del>s</del> , or a part of a plant, does not adversely affect significant biodiversity values of the site.	
Taking, using, damming and diverting water	
Policy P110: National Policy Statement for Freshwater Management requirements for water takes, damming and diversion	The assessment of freshwater ecological effects of the proposed works identified that the overall ecological effects of the construction phase may be adverse but minor, including any required diversion
When considering any application the consent authority shall have regard to the following matters:	or take and discharge of water. Overall the proposed works are therefore considered to be generally consistent with this policy.



Objective / Policy	Assessment
<ul> <li>(a) the extent to which the change would adversely affect safeguarding the life-supporting capacity of fresh water and of any associated ecosystem, and</li> <li>(b) the extent to which it is feasible and dependable that any adverse effect on the life-supporting capacity of fresh water and of any associated ecosystem resulting from the change would be avoided.</li> <li>This policy applies to:</li> <li>(c) any new activity, and</li> <li>(d) any change in the character, intensity or scale of any established activity that involves any taking, using, damming or diverting of fresh water or draining of any wetland which is likely to result in any more than minor adverse change in the natural variability of flows or level of any fresh water, compared to that which immediately preceded the commencement of the new activity or the change in the established activity (or in the case of a change in an intermittent or seasonal activity was carried-out).</li> </ul>	
This policy does not apply to any application for consent first lodged before the National Policy Statement for Freshwater Management 2011 took effect on 1 July 2011.	
<ul> <li>Policy P126: Site dewatering</li> <li>Localised land subsidence resulting from dewatering that affects structures shall be avoided and any adverse effects from dewatering that are more than minor on the following shall be avoided, remedied or mitigated:</li> <li>(a) the ecosystem functioning of connected water bodies, and</li> <li>(b) the reliability of supply for existing surface and ground water users, and</li> <li>(c) the quality of surface or groundwater, and</li> <li>(d) the contamination of land and water.</li> </ul>	The dewatering required will be from within the stream channel, behind a diversion created by sheet pile walls. As such no effects on structures from land subsidence are anticipated. In relation to matter (a), this has been considered int the freshwater ecology report attached at Appendix S. Matters (b) and (d) are not considered relevant given the location of the take of water within the stream. In relation to (c) this has been addressed by the erosion and sediment control plan attached at Appendix W. The proposed works are therefore considered to be
Policy P129: Minimum flows and minimum water levels The damming or diversion of water from a surface water body shall not reduce flows or water levels below minimum flows or minimum water levels identified in the whaitua chapters of the Plan (chapters 7-11).	generally consistent with this policy. Any diversion of water required for the construction phase of the proposal will not reduce the flow of the water in the stream. The proposed works are therefore considered to be generally consistent with this policy.



## **Appendix S. Ecology Assessments**



**Pinehaven Stream Improvements** Assessment of Freshwater Ecological Effects: Main Works

September 2019









# Pinehaven Stream Improvements Project – Assessment of Freshwater Ecological Effects: Main Works

EOS Ecology Report No. JAC01-18078-01 | September 2019 Prepared for Jacobs Prepared by EOS Ecology – Alex James Reviewed by Shelley McMurtrie (EOS Ecology), Helen Anderson (Jacobs), Simon Treadwell (Jacobs)





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SCIENCE + ENGAGEMENT

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#### **EXECUTIVE SUMMARY**

The lower reaches of Pinehaven Stream flow through the suburb of Pinehaven in Upper Hutt City and has a history of flooding. The Pinehaven Stream Improvement Project involves a suite of works to increase flood capacity and reduce the likelihood of channel blockages. These include widening the stream flood channel, removal of some houses, replacement of existing private bridges and upgrade of two existing road crossing culverts. EOS Ecology was contracted to provide an assessment of environmental effects (AEE) on the freshwater ecology of Pinehaven Stream. This technical report focusses on the main works and excludes the replacement of two existing road crossing culverts at Sunbrae Drive and Pinehaven Road, which are covered in a separate report.

The Pinehaven Stream through the project area has had its channel modified by urban development such that for much of the length it has been straightened and/or deepened with the banks now concrete lined. Bed substrate is predominantly small and small-medium gravels although there was a significant silt/sand component which ranged from 16–27% cover among three representative survey sections. Riparian vegetation generally consists of exotic and native shrubs, exotic trees, and various residential garden plantings.

The macroinvertebrate community is dominated by taxa that prefer or tolerate degraded habitat and/or water quality conditions (e.g., snails, amphipods, worms), but still retains several EPT and other "cleanwater" taxa that require relatively good habitat and/or water quality conditions (e.g., mayflies, stoneflies, some caddisflies, as well as the *Archichauliodes* dobsonfly). A total of seven fish species are known from the greater Hulls Creek-Pinehaven Stream catchment based on actual fish survey data: longfin eel, shortfin eel, common bully, redfin bully, bluegill bully, inanga, and giant kokopu. Of these, four fish species (giant kokopu, shortfin eel, longfin eel, common bully) are confirmed from within the project area. The lower approximately 500 m of Pinehaven Stream down to its confluence with Hulls Creek is piped, and has a perched outlet, which is likely a barrier to some fish. Overall Pinehaven Stream in the project area was deemed to be of "moderate" ecological value.

Access to the majority of the project area will involve either temporary piped diversion of the stream or where space does not allow that, machinery tracking in the flowing streambed. The proposed works have a range of potentially adverse effects on Pinehaven Stream during the construction phase including disturbance of stream habitat, mortality of fauna, dewatering via temporary flow diversion, mobilisation of fine sediments through machinery operating in the streambed, removal of riparian vegetation where channel is to be widened, disruption of fish migration, and introduction of contaminants (via machinery and construction materials). Some adverse outcomes can be minimised or mitigated (e.g., minimise fish mortality through fish relocations, employ appropriate erosion and sediment control measures). The magnitude of construction effects has been deemed to be "moderate". Coupled with the "moderate" ecological value of the project area, using the matrix approach of Roper-Lindsay *et al.* (2010) the level of adverse effects during construction is "moderate". Provided the confirmed avoidance, remedy, and mitigation measures are adequately implemented then construction will have "minor adverse effects" in an RMA context.

The replanting of riparian vegetation that includes more dense marginal vegetation on the widened "floodplain" as well as taller canopy species, stable fish cover in the form of constructed undercuts, embedded eel pipes, and marginal boulders, and remediation of the fish barrier at the confluence of Pinehaven Stream and Hulls Creek (to compensate to some extent for the lag period between replanting and achieving maximum canopy cover by riparian vegetation), mean the operational effects on freshwater ecology could be considered "negligible" to "positive". With "moderate" ecological value and a "negligible" to "positive" effect magnitude the overall level of effect of the operational phase will be "very low" to "net gain" using the matrix approach of Roper-Lindsay *et al.* (2010). Provided the confirmed remedy and mitigation measures are implemented adequately the adverse operational effects on aquatic ecology will have "less than minor adverse effects" or "nil effects" in an RMA context.

# **1** INTRODUCTION

2

Pinehaven Stream has its catchment in the eastern hills of Upper Hutt City and flows through the suburbs of Pinehaven and Silverstream before discharging into Hulls Creek, which itself discharges directly to the Hutt River (Figure 1). Pinehaven Stream has a history of flooding and Upper Hutt City Council (UHCC) and Greater Wellington Regional Council (GRWC) jointly developed the Pinehaven Stream Floodplain Management Plan (FMP)(GWRC & UHCC, 2015) to address this. The FMP recommended various structural, non-structural, and river management methodologies to manage flood risk to an acceptable level in the Pinehaven and Silverstream urban areas. The Pinehaven Stream Improvement Project (PSIP) involves the implementation of the structural options recommended in the FMP.

In practice this will involve a suite of works to increase flood capacity and reduce the potential for blockages, including widening the stream flood channel (some sections to be lined with vertical retaining walls and others to have naturalised banks), removal of some houses, and replacement of existing road bridges and private bridges.

The proposed works have the potential to have effects (both adverse and positive) on the freshwater ecological values of the affected section of Pinehaven Stream. EOS Ecology was commissioned to provide freshwater ecological expertise, initially to review an existing freshwater ecology assessment of environmental effects for the project (Jacobs, 2017). Following this review EOS Ecology was asked to write a new freshwater ecology AEE to support the resource consent application. This AEE utilises the data collected during ecological surveys by Jacobs (2017), as well as additional information from the New Zealand Freshwater Fish Database (NZFFD) and other grey literature (Kingett Mitchell, 2005; Warr, 2007).



Figure 1 Location of the Pinehaven Stream Improvement Project in context of the overall Pinehaven Stream catchment and Hutt River.

## 2 METHODS

## 2.1 Data Sources

The majority of project area-specific ecological data was collected by Jacobs staff during field surveys on 16 March 2015 (measurement of physical habitat parameters and macroinvertebrate sampling) and 1 April 2015 (to sample fish) (Jacobs, 2017). Additional fish data from the project area and the greater catchment has subsequently been obtained from the New Zealand Freshwater Fish Database (NZFFD; Crow, 2017), while additional macroinvertebrate data was obtained from previous reports that included sites in Pinehaven Stream (Kingett Mitchell, 2005; Warr, 2007). We also utilised the predictive modelling of fish distribution as described in NIWA (2014). These predictions were examined for each River Environment Classification 2 (REC2) segment within the project area, as well as directly downstream and upstream of the project area. The output of this modelling gives a probability of finding each fish species via electrofishing methodology within each segment. This predictive modelling is at a national scale and does not include many very small streams that are too small to be included in the REC.

## 2.2 Site Selection

Three sampling sites, all approximately 70 m long, were selected by Jacobs staff to be representative of the existing environment and spread along the project area (Jacobs, 2017), (Figure 2):

- » Reach 1 Pinehaven Lower: located in the lower (downstream) part of the project area and adjacent to the Silverstream Christian School with a portion within Willow Park.
- » Reach 2 Pinehaven Mid: located in a middle part of the project area running parallel to Blue Mountains Road.
- » Reach 3 Pinehaven Upper: located in the upper (upstream most) part of the project area just downstream of Pinehaven Reserve and behind private properties on Birch Grove.

## 2.3 Sampling

#### 2.3.1 Habitat

The 2015 Jacobs survey (Jacobs, 2017) primarily measured physical habitat characteristics as part of the Stream Ecological Valuation (SEV) process. These include various habitat parameters including degree of channel modification, channel lining, stormwater pipe inlets, floodplain connectivity, state of riparian vegetation, fish passage barriers, channel shading, oxygen demand, water velocity, water depth, macrophyte cover, substrate size, riparian filtering ability, Galaxiidae and Gobiidae spawning habitat, and catchment imperviousness. The detailed methodology of how SEV measures various habitat variables can be found in Storey *et al.* (2011). The 2004 Kingett Mitchell survey assessed habitat using a modified Auckland Regional Council habitat assessment method (Maxted *et al.* 2000) and what they described as "standard stream survey methods". These are described in detail in Kingett Mitchell (2005).

#### 2.3.2 Macroinvertebrates

From within each of the three representative stream sections Jacobs (2017) collected a single macroinvertebrate kick net sample following the Protocol C1 (hard-bottomed, semi-quantitative) methodology of Stark *et al.* (2001). Ryder Consulting Limited processed samples to a Macroinvertebrate Community Index (MC) level of identification (i.e., primarily to a genus or broader level of taxonomic identification).

Kingett Mitchell (2005) used a similar methodology collecting a single "standard triangular kick net (500 m)" over a 1-2 minute period and sampling each available habitat in approximate proportion within its abundance in the stream reach. Taxa were identified to genus where possible using various keys. Chironomidae, Oligochaeta, and early instar invertebrates where identified to family level.

### 2.3.3 Fish

Fish were sampled within each of the three representative stream sections by Jacobs (2017) via electrofishing following the methods of Joy *et al.* (2013).

#### 2.3.4 Stream Ecological Valuation (SEV)

The SEV is a method for quantifying stream value based on the performance of key ecological functions and was developed to quantify the ecological value of streams in a consistent manner to inform resource management decisions (Storey *et al.* 2011). The methodology consists of the 14 most important ecosystem functions as identified by an expert panel which fall into four broad categories (hydraulic, biogeochemical, habitat provisions, and biodiversity). SEV assesses the performance of each function relative to reference conditions and provides a scheme to compile data and then interpret and report the results as a numeric scoring system (Storey *et al.* 2011). The technical report of Storey *et al.* (2011) provides full background on the development and use of the SEV. A Wellington-specific version of the SEV calculation Excel spreadsheet (dated 16 October 2012) was used by Jacobs (2017) to generate SEV values for the three representative Pinehaven Stream sections. Note that SEV was only undertaken in three distinct representative sections rather than the whole project area so did not pick up issues outside of those sections such as fish barriers.

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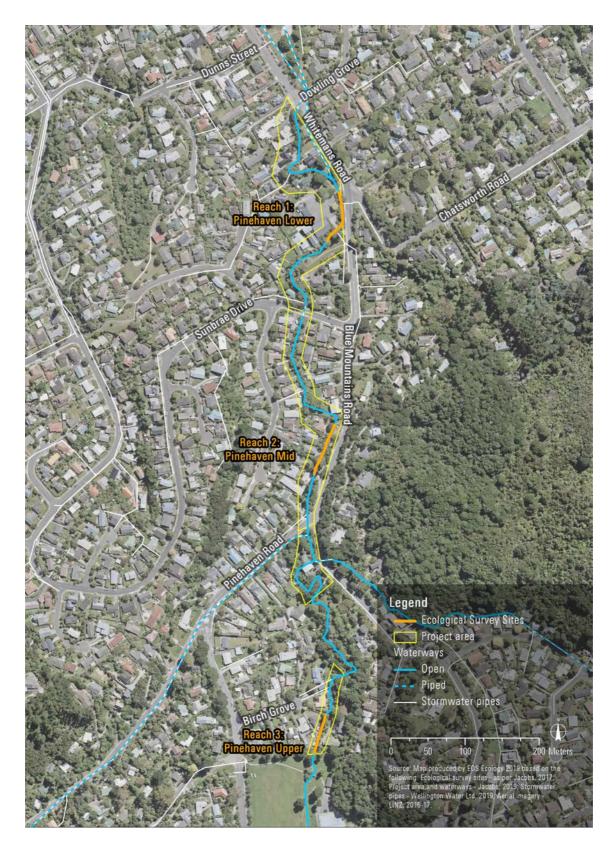


Figure 2 Location of the three representative stream sections along the project area in Pinehaven Stream surveyed by Jacobs in 2015 (Jacobs, 2017).

## 2.4 Data Analysis

#### 2.4.1 Macroinvertebrates

Raw macroinvertebrate data obtained from the Jacobs (2017) surveys were summarised by taxa richness, total abundance, and abundance of the five most common taxa. Invertebrate community metrics calculated were the number of Ephemeroptera-Plecoptera-Trichoptera taxa (EPT taxa richness), %EPT abundance, and the Macroinvertebrate Community Index (MCI and QMCI). The points below provide brief clarification of these metrics.

- » Taxa richness is the number of different taxa identified in each sample. Taxa is generally a term for taxonomic groups, and in this case refers to the lowest level of classification that was obtained during the study. Taxa richness is a useful community metric related to habitat diversity, with sites with more diverse habitats often having greater richness. However, there are numerous aquatic invertebrate taxa that prefer or tolerate degraded instream conditions such that taxa richness on its own should not be used to infer stream health.
- » EPT refers to three Orders of invertebrates that are generally regarded as 'cleanwater' taxa. These Orders are Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies); forming the acronym EPT. These taxa are relatively intolerant of organic enrichment or other pollutants and habitat degradation. The exceptions to this are the hydroptilid caddisflies (e.g. Trichoptera: Hydroptilidae: *Oxyethira, Paroxyethira*), which are algal piercers and often found in high numbers in nutrient enriched waters with high algal content. These taxa were not found in the project area. In general, the disappearance and reappearance of EPT taxa can also provide evidence of whether a site is impacted or recovering from a disturbance. EPT taxa are generally diverse in non-impacted, non-urbanised stream systems, although there is a small set of EPT taxa that are also found in urbanised waterways.
- » In the mid-1980s the MCI was developed as an index of community integrity for use in stony riffles in New Zealand streams and rivers and can be used to determine the level of organic enrichment for these types of streams (Stark, 1985). Although developed to assess nutrient enrichment, the MCI will respond to any disturbance that alters macroinvertebrate community composition (Boothroyd & Stark, 2000), and as such is used widely to evaluate the general health of waterways in New Zealand. Recently a variant for use in streams with a streambed of sand/silt/mud (i.e. soft-bottomed) was developed by Stark & Maxted (2007a) and is referred to as the MCI-sb. Both the hard-bottomed (MCI-hb) and soft-bottomed (MCI-sb) versions calculate an overall score for each sample, which is based on pollution-tolerance values for each invertebrate taxon that range from 1 (very pollution tolerant) to 10 (pollution-sensitive). MCI-hb and MCI-sb are calculated using presence/absence data and a quantitative version has been developed that incorporates abundance data and so gives a more accurate result by differentiating rare taxa from abundant taxa (QMCI-hb, QMCI-sb). MCI (QMCI) scores of ≥120 (≥6.00) are interpreted as 'excellent', 100–119 (5.00–5.99) as 'good', 80–99 (4.00–4.99) as 'fair', and <80 (<4.00) as 'poor' (Stark & Maxted, 2007b). The hard-bottomed variant was used for Pinehaven Stream as the substrate is predominantly stony.</p>

# **3 EXISTING STATE OF ENVIRONMENT**

## 3.1 Catchment Description

The Pinehaven Stream catchment is on the eastern side of the Hutt Valley and drains a catchment of approximately 450 ha (4.5 km<sup>2</sup>). The main channel flows generally north until it joins Hulls Creek (Figure 1). The upper catchment has steep valleys clad primarily in pine trees and thin areas of housing follow the tributaries into these valleys (Figure 1). The lower catchment flows through the residential areas of Pinehaven and part of Silverstream and this section the channel has been severely modified through concrete linings, bridges, and culverts. The final approximately 500 m of the main channel flows through two pipes, one being a flood bypass that conveys water only during high flow events that overtop an entrance weir. GWRC's Proposed Natural Resources Regional Plan designates the Pinehaven Stream as a Class 2 waterway (moderate to steep gradient, coastal, hard sedimentary).

## 3.2 Habitat

#### 3.2.1 General Description

The Pinehaven Stream through the project area has had its channel modified by urban development such that for much of the length it has been straightened and/or deepened with the banks now concrete lined (Table 1, Figure 3). The degree of channel shading is variable, but moderate to low shading predominated over higher levels of shading (Table 1). Mean water velocities were low to moderate in the 0.24–0.35 m/s range, which is slightly higher than those reported from Hulls Creek, and lower than that reported further upstream in Pinehaven Stream by Kingett Mitchell (2005) (Table 1, Table 2). Mean water depths across the three representative sections were in the 0.12–0.18 m range (Table 1), which was very similar to those measured in Hulls Creek (Table 2). Macrophytes were present but were not a major component of instream habitat in the project area (Table 1), although they were a major component of one Hulls Creek site (Table 2). Bed substrate was predominantly small and small-medium gravels although there was a significant silt/sand component which ranged from 16–27% cover among the three representative sections (Table 1). Cobbles and gravels were the dominant substrate in Hulls Creek and in Pinehaven Stream upstream of the project area (Table 2). Riparian vegetation generally consisted of exotic and native shrubs, exotic trees, and various residential garden plantings. A fuller description of riparian vegetation composition is given in Blaschke (2017).

Parameter	Reach 1 — Pinehaven Lower	Reach 2 — Pinehaven Mid	Reach 3 — Pinehaven Upper
Channel type	20% unmodified natural 80% straightened/deepened	100% straightened/deepened	100% straightened/deepened
Shading	High (71-90%): 20% Moderate (51-70%): 10% Low (31-50%): 60% Very low (11-30%): 10 %	High: 30% Moderate: 50% Low: 20%	Very high (>90%): 10% High: 10% Moderate: 10% Low: 30% Very low: 40%
Water velocity (m/s)	Arithmetic mean: 0.35±0.03 Median: 0.33 Range: 0.03–1	Arithmetic mean: 0.24±0.04 Median: 0.2 Range: 0.11–0.5	Arithmetic mean: 0.26±0.04 Median: 0.25 Range: 0.13–0.5
Water depths (m)	Arithmetic mean: 0.18±0.02 Median: 0.15 Range: 0.02–0.9	Arithmetic mean: 0.17±0.01 Median: 0.16 Range: 0.02–0.42	Arithmetic mean: 0.12±0.01 Median: 0.12 Range: 0.02–0.27
Macrophytes (% cover)	Emergent/bankside: 2% Submerged: 6%	Emergent/bankside: 0% Submerged: 0.1%	Emergent/bankside: 1% Submerged: 3%
Bed substrate Silt/sand (<2 mm) Small gravel (2–8 mm) Small-med gravel (8– 16 mm) Med-large gravel (16– 32 mm) Large gravel (32–64 mm) Small cobble (64–128 mm) Boulder (>256 mm) Small wood (<50 mm) Med wood (50-100 mm)	Silt/sand: 27% Small gravel: 37% Small-med gravel: 15% Med-large gravel: 6% Large gravel: 3% Small cobble: 2% Boulder: 10%	Silt/sand: 17% Small gravel: 42% Small-med gravel: 18% Med-large gravel: 9% Large gravel: 9% Small cobble: 1% Small wood: 3% Med wood: 1%	Silt/sand: 16% Small gravel: 26% Small-med gravel: 28% Med-large gravel: 12% Large gravel: 13% Small cobble: 5%
Riparian cover (% cover)	Regenerating bush/early stage restoration planting/low exotic shrubs: 60% Mainly short grass (grazed or mown): 40 %	Mature exotic trees: 20% Regenerating bush, low diversity/high exotic shrubs: 20% Regenerating bush/early stage restoration planting/low exotic shrubs: 60%	Mature exotic trees: 10% Regenerating bush/early stage restoration planting/low exotic shrubs: 40% Mainly short grass (grazed or mown): 30% Disturbed bare soils/artificial surfaces: 20%

# Table 1 Habitat characteristics of the three representative sections of Pinehaven Stream in the project area from survey data collected by Jacobs in 2015 (Jacobs, 2017).

Table 2Habitat characteristics from three sites in the Hulls Creek-Pinehaven Stream catchment (one in Pinehaven Stream<br/>upstream of urban area; two in Hulls Creek) from data collected by Kingett Mitchell in 2004 (Kingett Mitchell, 2005).<br/>All values are arithmetic means.

Parameter	Hull Creek upstream of Pinehaven Stream confluence (Kingett Mitchell "SSU" site)	Hull Creek downstream of Pinehaven Stream confluence (Kingett Mitchell "SSL" site)	Pinehaven Stream upstream of urban area (Kingett Mitchell "PHU" site)
Shading (%)	4	0	64
Water velocity (m/s)	0.21	0.19	0.43
Water depths (m)	0.16	0.17	0.06
Wetted width (m)	2	3.4	1.1
Channel width (m)	2	3.4	1.4
Periphyton cover (%)	100	100	100
Macrophyte cover (%)	72	0	0
Bed substrate (%)	Silt/sand: 4% Small gravel: 8% Med-large gravel: 6% Large gravel: 22% Small cobble: 46% Large cobble: 14%	Silt/sand: 13% Small gravel: 14% Med-large gravel: 10% Large gravel: 12% Small cobble: 30% Large cobble: 21%	Silt/sand: 2% Small gravel: 5% Med-large gravel: 12% Large gravel: 29% Small cobble: 39% Large cobble: 12% Boulder: 1%
Riparian cover (% cover)	Grass: 90% Exotic trees: 9% Native shrubs: 1%	Grass: 68% Exotic shrubs: 26% Native shrubs: 5.5% Exotic trees: 0.5%	Grass: 81% Native shrubs: 0.5% Exotic trees: 1.5% Native trees: 17%





## 3.3 Macroinvertebrates

### 3.3.1 Project Area Overview

A total of 31 invertebrate taxa were recorded from three representative Pinehaven Stream sites by Jacobs in 2015 (Jacobs, 2017) (Figure 4). The most diverse groups were the caddisflies (Trichoptera) with 8 taxa, followed by twowinged flies (Diptera: 6 taxa), molluscs (Mollusca: 4 taxa), mayflies (Ephemeroptera: 4 taxa), stoneflies (Plecoptera: 3 taxa), and crustaceans (Crustacea: 3 taxa). Groups represented by one taxon included worms (Oligochaeta), flatworms (Platyhelminthes), and dobsonflies (Megaloptera).

The overall community was dominated by the freshwater snail *Potamopyrgus antipodarum* (40.3%) and the amphipod *Paracalliope fluviatilis* (33.4%) (Figure 5). Only four other taxa had relative abundances greater than 1% (*Deleatidium* mayflies (7.2%); Orthocladiinae midge larvae (5.7%); oligochaete worms (5.4%); and *Helicopsyche* cased-caddisflies (1.7%)). The other 25 taxa collectively accounted for 6.3% of all macroinvertebrates captured.

All three Orders of the cleanwater EPT group were present, with the mayfly *Deleatidium* being the third most abundant taxon overall (Figure 5). Collectively the EPT taxa accounted for 11.8% of all macroinvertebrates captured. Mayflies (Ephemeroptera) accounted for 7.4%, caddisflies (Trichoptera) 4.2%, and stoneflies (Plecoptera) only 0.2%.

Waikoura (freshwater crayfish – *Paranephrops planifrons*) are also present in the project area, having been captured during electrofishing by Jacobs (2017) (Figure 6) and in one of the macroinvertebrate samples from Jacobs (2017) (one individual in the Reach 3 – Pinehaven Upper kick net sample).

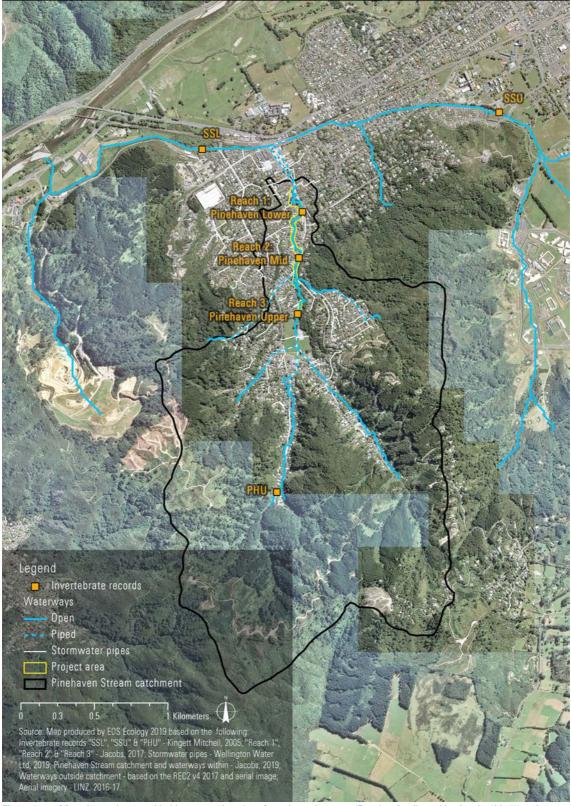


Figure 4 Macroinvertebrate and habitat survey locations from the project area (Reach 1-3 collected by Jacobs (2017)) and greater catchment (PHU, SSU, and SSL) collected by Kingett Mitchell (2005)).



Figure 5 Images of the most abundant (% indicated) aquatic macroinvertebrates in each of the three representative sections and overall in the Pinehaven Stream. Unless indicated, photos are by EOS Ecology.

The three representative sites had similar macroinvertebrate assemblages with four of the five most abundant taxa shared among the sites and *Potamopyrgus* snails and *Paracalliope* amphipods being the most common two taxa at all the sites (Figure 5). Overall the macroinvertebrate community was dominated by taxa that prefer or tolerate degraded habitat and/or water quality conditions (e.g., snails, amphipods, worms), but still retains several EPT "cleanwater" taxa that require relatively good habitat and/or water quality conditions (e.g., mayflies, stoneflies, some caddisflies). In addition, dobsonfly larvae, one of New Zealand's largest freshwater insects, were also recorded in all three sites.

Streambed compaction and increased rates of fine sediment entering the water column are the greatest risks to the macroinvertebrate community from the project. A large increase in deposited sediment within and downstream of the project area would likely have the greatest impact on those taxa that prefer hard substrates that are relatively free of fine sediment cover and embedment. Such taxa found within the project area include *Deleatidium* mayflies and *Helicopsyche* caddisflies, which feed by grazing diatoms from hard stony surfaces. Dobsonfly larvae are especially long-lived (>1 year) and require coarse substrates.

#### 3.3.2 Community Metrics

Within the project area taxa richness was similar across the three representative sections and EPT taxa richness was identical (Table 3). The percentage of EPT taxa was also similar between reaches, although the percentage of EPT individuals was noticeably higher in Reach 2 (Pinehaven Mid). MCI-hb values were similar among the sections and indicative of "good" quality conditions (Table 3). QMCI-hb values indicated "good" conditions for Reach 2 but dropped to "fair" conditions for Reach 1 and Reach 3. Overall the macroinvertebrate community of the project area is indicative of fair to good habitat and/or water quality conditions and despite having modified banks and receiving urban stormwater, still has several taxa that are often absent from urban streams (e.g., *Deleatidium* mayflies, *Helicopsyche* caddisflies, *Austroperla* stoneflies, dobsonfly larvae).

Community metrics from the other sites in the Hulls Creek-Pinehaven Stream catchment (based on data from Kingett Mitchell, 2005) contrast with those of the project area; the two Hulls Creek sites appear to be in considerably poorer condition (few EPT, low MCI/QMCI scores) while the site in Pinehaven Stream upstream of the urban area is in considerably better condition (comprised of mostly EPT taxa, very high MCI/QMCI scores)(Table 3). It must be noted that the Kingett Mitchell (2005) data is some 15 years old, although it does not appear any major land use changes have occurred in the catchment in this time, thus it is likely macroinvertebrate communities remain generally unchanged at those sites.

Table 3Macroinvertebrate community metrics for the three representative sections (and for all sections combined) of<br/>Pinehaven Stream sampled 16 March 2015 by Jacobs (Jacobs, 2017). Also shown are the values from three sites<br/>outside the project area in the Hulls Creek-Pinehaven Stream catchment collected by Kingett Mitchell in 2004<br/>(Kingett Mitchell, 2005). For MCI and QMCI the quality classes of Stark & Maxted (2007) are shown in<br/>parentheses.

Metric	Reach 1 – Pinehaven Lower	Reach 2 – Pinehaven Mid	Reach 3 – Pinehaven Upper	Overall Project Area	Hull Creek US of Pinehaven Stream confluence (Kingett Mitchell "SSU" site)	Hull Creek DS of Pinehaven Stream confluence (Kingett Mitchell "SSL" site)	Pinehaven Stream upstream of urban area (Kingett Mitchell "PHU" site)
Taxa Richness	23	24	21	31	25	20	24
EPT Taxa Richness	10	10	10	15	4	6	15
%EPT Taxa	43.5	41.7	47.6	48.4	16	30	62.5
%EPT Individuals	8.5	18.3	11.5	11.8	0.2	0.7	95.9
MCI-hb	108 (Good)	108 (Good)	111 (Good)	114 (Good)	77 (Poor)	85 (Fair)	133 (Excellent)
QMCI-hb	4.2 (Fair)	5.1 (Good)	4.6 (Fair)	4.5 (Fair)	3.3 (Poor)	2.1 (Poor)	7.6 (Excellent)

## 3.4 Fish

## 3.4.1 Predicted Fish

Based on the predictive modelling of NIWA (2014) longfin eels, shortfin eels, and redfin bully are likely to be the most commonly encountered fish species upstream, downstream, and within the project area (Table 4). There is also a low to moderate chance of encountering banded kokopu and giant kokopu within the project area, while common bully are more likely to be found downstream of the project in Hulls Creek (Table 4). The model also predicted chinook salmon would be present upstream, within, and downstream of the project area with probabilities ranging from 0.336 to 0.462. This is highly unlikely due to salmon not generally being present in the North Island (apart from perhaps the odd vagrant) so we have not included this in Table 4.

Table 4The probability of capturing various fish species via electrofishing upstream, within, and downstream of the project<br/>area from NIWA (2014). Results for selected REC2 segment numbers are shown. Only those species with<br/>probabilities greater than 0.100 in at least one segment are shown. The higher the values the more likely that fish<br/>species will be encountered.

	Ur	ostream of proj	ect	Within Pr	oject area		tream of Iull Creek)
Fish Species/ REC2 nzsegment #	9261629	9261695	9261390	9261055 (Includes Reach 1 & 2)	9261272 (Includes Reach 3)	9261049	9261031
<i>Anguilla australis</i> (shortfin eel)	0.210	0.208	0.320	0.526	0.444	0.528	0.430
<i>A. dieffenbachii</i> (longfin eel):	0.804	0.424	0.568	0.532	0.832	0.576	0.546
<i>Gobiomorphus huttoni</i> (redfin bully)	0.332	0.348	0.372	0.448	0.356	0.470	0.504
<i>Gobiomorphus</i> <i>cotidianus</i> (common bully)	<0.100	<0.100	<0.100	0.156	<0.100	0.392	0.554
<i>Galaxias fasciatus</i> (banded kokopu)	0.244	0.182	0.126	<0.100	0.156	<0.100	0.114
<i>Galaxias argenteus</i> (giant kokopu)	<0.100	<0.100	<0.100	<0.100	0.222	<0.100	0.162
<i>Galaxias brevipinnis</i> (koaro)	<0.100	0.126	0.144	<0.100	<0.100	<0.100	<0.100
<i>Galaxias maculatus</i> (inanga)	<0.100	<0.100	<0.100	<0.100	<0.100	0.194	<0.100
<i>Salmo trutta</i> (brown trout)	0.194	0.120	0.232	<0.100	0.240	<0.100	<0.100

### 3.4.2 Known Fish

A total of seven fish species are known from the greater Hulls Creek-Pinehaven Stream catchment based on actual fish survey data: longfin eel, shortfin eel, common bully, redfin bully, bluegill bully, inanga, and giant kokopu (Figure 6, Figure 7). All are native or endemic and four (longfin eel, bluegill bully, inanga, giant kokopu) have a "declining" conservation status according to the latest threat classification of Dunn *et al.* (2018). It is possible that banded kokopu (*Galaxias fasciatus*) and koaro (*Galaxias brevipinnis*) are also present, especially upstream of the urban area. Of the seven species recorded in the wider catchment, four fish species (giant kokopu, shortfin eel, longfin eel, common bully) are confirmed from within the project area. The lower approximately 500 m of Pinehaven Stream up to its confluence with Hulls Creek is piped, and has a perched outlet, which may pose a barrier to some fish species (although the significance of this barrier could only be confirmed if the length of the pipe was walked in order to visually confirm whether the pipe does pose a barrier to fish passage). Common bully, a species not considered particularly adept at negotiating instream obstacles, is present in the project area upstream of the pipe, hence the pipe itself may not be a major barrier to those fish species willing to enter such environments.

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Fish records upstream	Fish records within project area	Fish records downstream
<i>Anguilla</i> spp eels (NZFFD (Crow, 2017); 2009)	Anguilla spp eels (NZFFD (Crow, 2017); 2009)	Anguilla spp eels (NZFFD (Crow, 2017); 2004, 2009)
Anguilla dieffenbachii – longfin eel (NZFFD (Crow, 2017); 2004) [Declining]	Paranephrops planifrons – waikoura/freshwater crayfish (NZFFD (Crow, 2017); 2009 & Jacobs (2017); 2015) [Not Threatened]	Gobiomorphus cotidianus – common bully (NZFFD (Crow, 2017); 2004, 2009) [Not Threatened]
Waikoura/freshwater crayfish (NZFFD (Crow, 2017); 2004, 2009) [Not Threatened]	<i>Galaxias argenteus</i> – giant kokopu (NZFFD (Crow, 2017); 2009) [Declining]	<i>Gobiomorphus huttoni</i> – redfin bully (NZFFD (Crow, 2017); 1963, 2009) [Not Threatened]
	Anguilla australis – shortfin eel (Jacobs (2017); 2015) [Not Threatened]	Galaxias maculatus – inanga (NZFFD (Crow, 2017); 2009) [Declining]
	Longfin eel (Jacobs (2017); 2015) [Declining]	<i>Gobiomorphus hubbsi</i> – bluegill bully (NZFFD (Crow, 2017); 1963) [Declining]
	Common bully (Jacobs (2017); 2015) [Not Threatened]	

Figure 6 Fish (and waikoura) records from the Hulls Creek – Pinehaven Stream catchment (upstream of confluence with the Hutt River). The data source and year of record is shown in parentheses. The conservation status from Dunn *et al.* (2018) (for fish) or Grainger *et al.* (2018) (for waikoura) is shown in brackets.

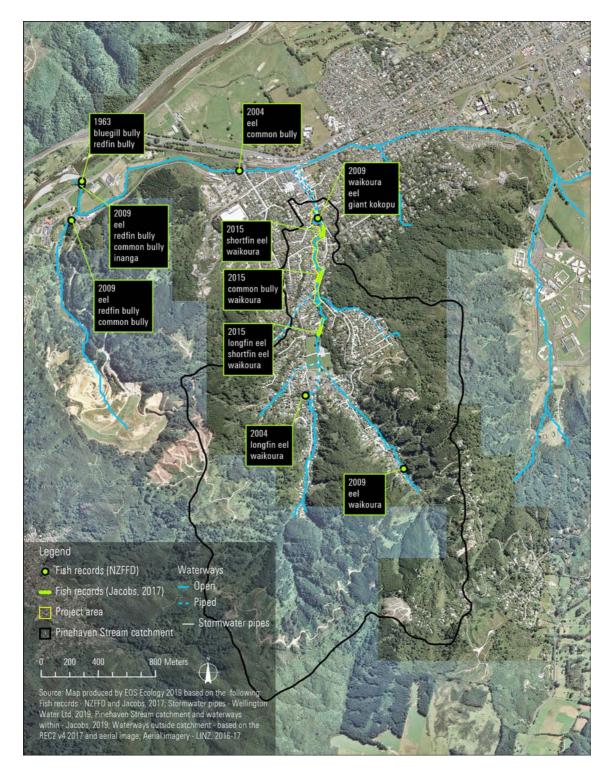


Figure 7 Locations of the fish and waikoura records in the Pinehaven Stream-Hulls Creek catchment.

### 3.4.3 Existing Fish Passage Barriers

Pinehaven Stream has numerous structures that are likely to be at least partial barriers to fish passage. The confluence with Hulls Creek involves a perched drop and a likely a velocity and depth barrier (Figure 8). Fish that opt to travel through the flood bypass pipe are met by shallow water conditions through the pipe and steep gradient ramp with a concrete lip at the bypass inlet (Figure 8). The project area also includes various small grade control weirs which may impede the passage of some fish species (Figure 8).



The confluence of Pinehaven Stream with Hull Creek. The left-hand box culvert is the outlet of a piped section of Hull Creek, the middle circular pipe is the outlet of the Pinehaven Stream flood bypass, and the right-hand outlet is Pinehaven Stream emerging from its lower piped section.



A grade control weir adjacent 28 Blue Mountains Road.

The entrance to the flood bypass (i.e., the bypass inlet) with the original channel to the left.



## 3.5 Stream Ecological Valuation (SEV)

Overall SEV scores calculated from data collected by Jacobs on 16 March 2015 (Jacobs, 2017) for the three representative reaches in the project area were very similar ranging between 0.35–0.42 (Table 5). This is well below the theoretical "perfect" score of 1. When compared to the scores from the 19 trial sites from the Auckland region shown in Storey *et al.* (2011), the Pinehaven Stream scores are in the range of the more degraded urban stream sites and well below native forest and exotic forest sites (0.68–0.96 range). Particularly low scoring functions across all representative sites included natural flow regime (on account of highly modified channel form and stormwater inputs), floodplain connectivity (due to flood flows being artificially contained in the channel) and riparian zone connection (due to extensive bank lining preventing connectivity between riparian root zone and stream channel). Only two functions had maximum scores of 1 (connectivity for species migration and dissolved oxygen levels maintained, in both Reach 2 and Reach 3) (Table 5). Overall the Pinehaven Stream in the project area would be considered to have relatively poor ecological function based on the SEV.

Function	Reach 1 – Pinehaven Lower	Reach 2 – Pinehaven Mid	Reach 3 – Pinehaven Upper
Natural flow regime	0.11	0.06	0.06
Floodplain effectiveness	0.04	0.00	0.00
Connectivity for species migrations	0.30	1.00	1.00
Natural connectivity to groundwater	0.46	0.35	0.33
Hydraulic function mean	0.23	0.35	0.35
Water temperature control	0.48	0.62	0.44
Dissolved oxygen levels maintained	0.68	1.00	1.00
Organic matter input	0.08	0.66	0.14
In-stream particle retention	0.36	0.20	0.20
Decontamination of pollutants	0.60	0.47	0.30
Biogeochemical function mean	0.44	0.59	0.41
Fish spawning habitat	0.47	0.05	0.05
Habitat for aquatic fauna	0.47	0.53	0.44
Habitat provision function mean	0.47	0.29	0.25
Fish fauna intact	0.37	0.47	0.67
Invertebrate fauna intact	0.48	0.45	0.50
Riparian vegetation intact	0.01	0.03	0.00
Biodiversity function mean	0.29	0.32	0.39
Overall SEV score	0.35	0.42	0.37

 Table 5
 Stream Ecological Valuation (SEV) function scores from data collected by Jacobs on 16 March 2015 (Jacobs, 2017).

 Greyed cells are function means with the overall mean SEV score shown at bottom of table.

## 3.6 Ecological Values

Ecological value has been assessed for the entire project area (Table 6). Roper-Lindsey *et al.* (2018) provides guidance for the evaluation of ecological value or importance in terms of four "matters", representativeness, rarity/distinctiveness, diversity and pattern, and ecological context. Table 7 of Roper-Lindsey *et al.* (2018) indicates attributes that may be considered for each of these "matters" for freshwater sites. Roper-Lindsey *et al.* (2018) further gives guidance on scoring sites by combining values for four matters. According to Table 6 in Roper-Lindsey *et al.* (2018) a site or area scoring "High" for one matter and "Moderate" or "Low" for the remainder, overall can be considered to be of "Moderate" ecological value.

Table 6Freshwater ecological values site assessment of the Pinehaven Stream Improvements Project. Descriptions of the<br/>four matters are derived from Roper-Lindsay *et al.* (2018). Each matter is scored on a scale of high, moderate, low,<br/>and very low as per Roper-Lindsay *et al.* (2018).

Matters	Site Assessment and Score
<b>Representativeness</b> – extent to which habitats and taxa of site are typical of characteristic of those naturally found in community of that type within the region. An unmodified or more natural site is likely a better representative example than a more modified one.	<ul> <li>Habitat: Naturalness degraded by urbanisation (extensive bank works, stormwater inputs, exotic riparian vegetation).</li> <li>Instream habitat still relatively natural with stony bed substrate and riffle-run-pool habitat present.</li> <li>Taxa: Fish assemblage likely modified due to barriers and piping of lower catchment. Macroinvertebrate fauna likely now has higher portion of taxa tolerant to effects of urbanisation. But still dominated by native and endemic taxa.</li> <li>Score: Moderate</li> </ul>
<b>Rarity/Distinctiveness</b> – a measure of scarcity of species, communities, habitats or ecosystem types in a region. Purposed is to identify species, habitats, or ecological features which are more prone to local or national loss or extinction.	<ul> <li>Habitat: Second-order gravel bed streams are not a particularly rare habitat in the Wellington region or nationally.</li> <li>Taxa: Two "At risk – declining" fish species are known from the project area (giant kokopu, longfin eel). Table 5 of Roper-Lindsey <i>et al.</i> (2018) indicates this results in high ecological value.</li> <li>Score: High</li> </ul>
<b>Diversity/Pattern</b> – a measure of the number of different species or habitat types in a given area. Includes both physical and biological diversity, and ecological processes.	<ul> <li>Habitat: Channel retains riffle, runs, and pools although natural habitat diversity has invariably been impacted by urbanisation and channel management (grade weirs, debris removal, road culverts).</li> <li>Taxa: Macroinvertebrate diversity moderate (31 taxa) but has relatively high diversity of EPT taxa for urbanised stream (15 taxa). Known fish diversity relatively low (four species).</li> <li>Score: Moderate</li> </ul>
<b>Ecological context</b> – the maintenance of indigenous biodiversity in relation to size/shape of an area, how it is buffered from the surrounding anthropogenic landscape, and how areas important for ecological processes or life histories are connected.	Relatively low SEV scores. Project area channel is a migration pathway to upstream, less impacted stream habitat, although extent is limited due to small catchment size. Poorly buffered from surrounding urban landscape – numerous stormwater inputs and riparian vegetation limited by existing bank reinforcement and urban encroachment. <b>Score: Low</b>

## 3.7 GWRC Regional Plan Values

The Pinehaven Stream-Hulls Creek catchment is not listed in Schedule F of GWRC's Proposed Natural Resources Plan (PNRP) as having any significant indigenous biodiversity values (e.g., high macroinvertebrate community health, threatened or at risk fish habitat, migratory fish habitat). Nor is it included under any of the significant values categories of the Regional Freshwater Plan (e.g., important trout habitat, catchments with nationally threatened indigenous fish, catchments with high degree of natural character). However, Hulls Creek into which Pinehaven Stream discharges is considered to be important trout habitat by the Regional Freshwater Plan.

The PNRP does have some objectives and policies of relevance to the proposed works which are outlined in Table 7.

Table 7
 Objectives and policies from the decisions version of the proposed natural resources plan (PNRP) of relevance to the Pinehaven Stream Improvements Project. For brevity only directly relevant content from relevant objectives and policies have been included.

Objective (O)/Policy (P)	Relevance
<ul> <li>O25: Biodiversity, aquatic ecosystem health and mahinga kai in fresh water bodies and the coastal marine area are safeguarded such that:</li> <li>(a) water quality, flows, water levels and aquatic and coastal habitats are managed to maintain biodiversity, aquatic ecosystem health and mahinga kai, and</li> <li>(b) where an objective in Tables 3.4, 3.5, 3.6, 3.7, or 3.8 is not met, a fresh water body or coastal marine area is improved over time to meet that objective.</li> </ul>	The proposed works have the potential to have positive effects on aquatic habitats by incorporating design elements that mimic natural features that help maintain biodiversity (e.g., overhanging riparian vegetation, stable undercuts to provide cover for fish, emergent boulders). Provided sufficient habitat enhancement is incorporated into the final design the project is consistent with this objective.
027: Vegetated riparian margins are established, maintained, or restored to enhance water quality, aquatic ecosystem health, mahinga kai, and indigenous biodiversity of rivers, lakes, natural wetlands and the coastal marine area.	The proposed works involve the replacement of existing riparian vegetation with a predominantly native vegetation plant assemblage. Provided the proposed riparian revegetation plan for the project is correctly executed (i.e., plantings are maintained over time to meet their potential) then the project is consistent with the objective.
029: The passage of fish and koura is maintained, and the passage of indigenous fish and koura is restored.	The proposed works have the potential to improve fish passage in Pinehaven Stream through replacement of existing road culverts with larger structures (subject to separate consent application) and repair of partial fish barrier at Pinehaven Stream-Hulls Creek confluence. Hence the project is consistent with the objective.
047: The amount of sediment-laden runoff entering water is minimised.	The proposed works have the potential to generate sediment- laden runoff in close proximity to Pinehaven Stream but proposed various control measures that if correctly implemented will mean the project is consistent with this objective.
<ul> <li>P28: Hard hazard engineering mitigation and protection methods shall be avoided except where it is necessary to protect existing development from unacceptable hazard risk, assessed using the risk-based approach, and:</li> <li>(a) any adverse effects are no more than minor, or</li> <li>(b) where the environmental effects are more than minor the works from part of a hazard risk management strategy.</li> </ul>	The proposed works involve hard hazard mitigation engineering and protection methods due to the confined nature of the stream corridor due to residential property and road infrastructure. In general the hard engineering works of the project are replacing existing such structures and the operational adverse effects have been deemed less than minor, hence meet this objective.

<ul> <li>P31: Biodiversity, aquatic ecosystem health and mahinga kai shall be maintained or restored by managing the effects of use and development on physical, chemical and biological processes to:</li> <li>(c) maintain or restore aquatic habitat diversity and quality, including the form, frequency and pattern of pools, runs, and riffles in rivers, and the natural form of rivers, lakes, natural wetlands and the coastal marine area, and</li> <li>(d) restore the connections between fragmented aquatic habitats, and</li> <li>(f) minimise adverse effects on aquatic species at times which will most affect the breeding, spawning, and dispersal or migration of those aquatic species, including timing the activity, or the adverse effects may be more significant, and</li> <li>(g) maintain or restore riparian habitats</li> <li>P32: Adverse effects on biodiversity, aquatic ecosystem</li> </ul>	The project will restore any habitats damaged by the works (e.g., recreate any pools that need to be filled in for vehicle access) and do not involve any changes to bed levels. The enlarged road crossing culverts will restore habitat connection to some extent (subject to separate consent application). The project involves revegetation of riparian habitat with predominantly native species so could be considered a form of restoration. Overall the project is consistent with the policy.
health, and mahinga kai shall be managed by: (a) avoiding significant adverse effects, and (b) where significant adverse effects cannot be avoided, minimising them (c) where significant adverse effects cannot be avoided and/or minimised they are remedied	significant effects so is consistent with this policy. For example, bank excavation work areas will be physically separated from flowing water and fish will be relocated from sections where machinery will be tracking in the stream channel.
P34: The construction or creation of new barriers to the passage of fish and koura species shall be avoided, except where this is required for the protection of indigenous fish and koura populations.	The project does not involve construction of any new migration barriers so is consistent with this policy.
P35: The passage of indigenous fish and koura shall be restored where this is appropriate for the management and	The project involves replacement of two existing road crossings with much larger, fish friendly structures (subject to

# 4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

The potential effects of the planned programme on aquatic ecology can be split into two distinct phases:

- » Construction effects: these relate primarily to accessing the project area (including machinery tracking in the streambed), temporary flow diversion, vegetation clearance, and the earthworks required to improve channel capacity and stabilise the new banks. Potential adverse effects include the discharge of contaminants (especially fine sediment and machinery-related hydrocarbons) and habitat disturbance (e.g., machinery in the stream bed, infilling of pool habitat).
- » Operational effects: these relate to the on-going effects of the new channel once it is constructed and operating. Potential adverse operational effects include a reduction in pool habitat and impediments to fish passage.

The magnitude of effects was determined using Table 8 of Roper-Lindsay *et al.* (2018), which is reproduced below (Table 8). An evaluation of the level of effects was undertaken utilising the matrix approach described in Roper-Lindsay (2018) whereby the ecological value of the site to be disturbed is compared against the magnitude of effect (Table 9).

Magnitude	Description
Very high	Total loss of, or very major alteration to, key elements/features/ of the existing baseline conditions, such that the post-development character, composition and/or attributes will be fundamentally change and may be lost from the site altogether; AND/OR
	Loss of a very high proportion of the known population or range of the element/feature
High	Major loss or major alteration to key elements/features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR
	Loss of a high proportion of the known population or range of the element/feature
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed; AND/OR
	Loss of a moderate proportion of the known population or range of the element/feature
Low	Minor shift away from existing baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances or patterns; AND/OR Having a minor effect on the known population or range of the element/feature
Negligible	Very slight change from the existing baseline condition. Change barely distinguishable, approximating to the 'no change' situation; AND/OR
	Having negligible effect on the known population or range of the element/feature

#### Table 8 Criteria for describing magnitude of effect (from Table 8 of Roper-Lindsay et al. (2018)).

# Table 9 Matrix for determining the level of effects based on ecological value of site to be disturbed and magnitude of the effects of the proposed activity. Adapted from Table 10 of Roper-Lindsay *et al.* (2018).

		Ecological Value								
		Very high	High	Moderate	Low	Negligible				
	Very high	Very high	Very high	High	Moderate	Low				
	High	Very high	Very high	Moderate	Low	Very low				
itude	Moderate	High	High	Moderate	Low	Very low				
Magnitude	Low	Moderate	Low	Low	Very low	Very low				
~	Negligible	Low	Very low	Very low	Very low	Very low				
	Positive	Net gain	Net gain	Net gain	Net gain	Net gain				

The level of effect derived from Table 9 above was then adapted into planning terminology/RMA context using the continuum below, obtained from the Quality Planning website (www.qualityplanning.org.nz).

- » Nil effects No effects at all.
- » Less than minor adverse effects Adverse effects that are discernible day-to-day effects, but too small to adversely affect other persons.
- » Minor adverse effects Adverse effects that are noticeable but will not cause any significant adverse impacts.
- » More than minor adverse effects Adverse effects that are noticeable that may cause an adverse impact but could be potentially mitigated or remedied.
- » Significant adverse effects that could be remedied or mitigated An effect that is noticeable and will have a serious adverse impact on the environment but could potentially be mitigated or remedied.
- » Unacceptable adverse effects extensive adverse effects that cannot be avoided, remedied or mitigated.

## 4.1 Project Details

#### 4.1.1 Overview

The project seeks to provide 25-year flood channel capacity through significant changes to the Pinehaven Stream channel and crossing structures over an approximate 900 m long section in the lower urbanised part of the catchment. Works include:

- » Creating "naturalised" channel sections with appropriate riparian plantings: Located throughout the project area where space allows; existing low flow channel retained; stream banks excavated and reshaped to increase channel capacity.
- » Creating sections with vertical lined walls: Located throughout the project area where constraints (buildings, fence lines, etc.) do not allow for a "naturalised" channel form. Vertical walls will be constructed from either sheet piling or precast concrete block walls. The streambed will remain unlined and, in some locations, such vertical walls will be limited to one bank with a "naturalised" form on the other.
- » Upgrading of two existing road culverts (1800 mm diameter concrete pipe at Sunbrae Drive and 3 m wide, 1.5 m high single span concrete box culvert at Pinehaven Road): This will involve replacement of existing culverts with wider single-span concrete box culverts with a buried base. These culvert upgrades will be subject of a separate consent application and are not considered further here.
- » Upgrades to inlet structures: upgrade at the inlets to the piped section of Pinehaven Stream at the downstream extent of the project area to achieve required flow conveyance.

- » Securing of secondary flow paths: Lowering driveways, swale creation, and altering road grading at certain locations in the catchment to ensure secondary flow paths can freely convey stormwater to the stream.
- » Replacement of private vehicle crossings: Private vehicle crossings through the project area will be replaced with new structures at a sufficient height to achieve the desired flood capacity or alternate access ways (i.e., shared driveways).
- » Installing blockage reduction structures: Installation of debris screens at key locations to capture large items that may cause blockages further downstream.
- Removal of three houses to provide more space for the stream: The complete removal of houses at 4 Sunbrae Drive,
   28 Blue Mountains Road and 48 Blue Mountains Road to provide more space for the stream channel.
- » Relocation of utilities crossing the channel to minimise blockage potential: Relocation of various pipes and lines that currently cross the stream channel.
- » Installation of a flood wall to protect some properties: Construction of a flood wall along western boundary of 50 Blue Mountains Road to direct design floodwaters away from adjacent properties.

#### 4.1.2 Construction Methodology

#### Working From Within the Streambed

Two main methods of working from within the streambed have been developed, sheet pile protection and piped diversion. The descriptions of these below is directly quoted from Section 4.2 of the draft Erosion and Sediment Control Plan dated 13 September 2019 (Jacobs, 2019):

#### "Methodology 1 - Sheet Pile Protection

The construction methodology is to perform the works from within the stream and select bespoke small construction machinery that has a low ground pressure and will use the stream channel as the movement route. The benefit of this is reduced vegetation clearance on the banks and avoiding entering private property.

When a poor or heavy rain weather event forecast is received the construction equipment will be removed from the stream such that there are no obstructions in the stream channel for the rain event flows. A dry construction zone will be created by installing temporary sheetpiles such that in a weather event any exposed cut surfaces will not discharge to the "clean" stream flood water, and water would instead be collected behind the sheetpiles. The sheetpiles would be vibrated/driven into the streambed to separate the two zones so that excavation of the stream bank can be carried out over the sheetpiles and the sediment loaded/unloaded into small wheeled dumpers, thus not enter the live stream corridor.

Dirty water that gathers behind the sheetpiles will be treated by a silt filter before being released back into the stream. Once the permanent works have been constructed behind this separation wall the temporary sheetpiles will be removed as works progress up/down the stream alignment.

Following tree/vegetation clearance the temporary sheetpiles will be installed where there are excavation activities to be performed. Where retaining structures are proposed a team would be deployed following the excavation activity.

#### Methodology 2 - Piped Diversion

The 'piped diversion' methodology has been developed in recognition of the importance of reducing disturbance to the stream bed which may have the effect of increasing the turbidity of the water. The methodology will require significantly more land to stage the works, and will be more intrusive to selected landowners, when compared to the 'sheet pile

protection methodology. These significant secondary factors will be addressed in the AEE as part of the consenting process, they are not specifically addressed in this ESCP.

The typical construction stages are set out below:

- 1) Install ramp down to stream;
- 2) Install pipe and inlet/outlet dams (the dams are anticipated to comprise sand bags or driven steel sheets);
- 3) Install sump pump near down steam dam and treat water through sediment curtain;
- 4) Excavate right bank and install wall from the bank;
- 5) Relocate pipe to the right side, by movement in the 'dry' stream bed;
- 6) Install ramp over pipe;
- 7) Excavate left bank from 'dry' stream bed and install wall;
- 8) Track out and remove ramp.

The staging and components will differ slightly where the section of stream widening comprises a trapezoidal channel, although the principal stages will still apply.

Some specific components of the diversion are set out below:

- Pipe comprises 630mm OD, Euroflow culvert pipe (or similar);
- Designed for 0.5 cumecs flow, which corresponds approximately to the 95% rainfall gauge readings;
- Steel plates or sheet piles installed to form inlet and outlet dams. Sand bags may also be employed. Earthfill dams are not an acceptable solution."

#### Working From the Banks

Based on advice received from Tim Haylock (Downer – Project Manager, Infrastructure Projects) received 7 July 2019 the construction methodology for working from the banks will be the same as working from within the streambed (e.g., as described above Methodology 1 - Sheet Pile Protection or Methodology 2 – Piped Diversion, but with the machinery (excavator and dumpers) operating from the upper bank, not the streambed).

#### **Diversion Channel – 28 Blue Mountains Road**

Based on a sketch included with the draft ESCP (Drawing no. IZ089000-300-CH-SKT-2205) this diversion channel will largely be constructed offline, with the stream being diverted once construction is complete. This will require a temporary bridge to be installed to allow machinery to access the site.

#### 4.1.3 Erosion and Sediment Control

The following erosion and sediment control information is derived from the draft ESCP (dated 13 September 2019)

#### **During Construction**

Site specific environmental managements plans (SSEMPs) will be created for each stage of the project (seven stages are currently proposed) and will detail the ESC requirements. These will include:

- » Temporary sheet piling and settlement tanks (or similar) To create dry work areas physically separated from the flowing water. Water from the partitioned area will be pumped to settlement tanks (or similar) for treatment prior to discharge to the stream. The use of temporary sheet piling to separate the bank excavations from the wetted channel mean that during rain events any exposed cut surfaces will not discharge directly to the "clean" stream floodwater.
- » Earth bunds and decanting topsoil bunds Earth bunds will be used in Willow Park to divert any overland flows towards decanting topsoil bunds and silt fencing.
- » Silt fencing To intercept any sheet flows and capture/trap fine sediments.
- » Filter socks To be installed across the stream downstream of zones where excavator and dumper trucks are working from the stream bed.
- » Stormwater inlet protections To intercept and filter any sediment-laden runoff prior to stormwater network entry.
- » Controls on machinery in the stream A maximum speed limit of 5 km/h to minimise sediment generation and damage to streambed. Use of specified, stabilised stream entry and exit points to minimise bank disturbance. Minimising trips through careful load planning.
- » Immediate short-term stabilisation of completed sections with coconut matting secured with steel pegs to provide erosion protection before initial grass stabilisation or permanent riparian vegetation has established.

#### Wet Weather Procedures

When a significant rainfall event is forecast (those with forecasted heavy rain warnings by MetService) machinery and other construction-related sources of obstruction or contamination would be removed from the stream.

## 4.2 Construction Effects

#### 4.2.1 Potential Construction Effects

#### Freshwater Habitat Disturbance

Access to the work locations will primarily be achieved through driving along the streambed. This has the potential to compact the bed substrates, reducing the interstitial spaces used by invertebrates and smaller fish, killing organisms that cannot get away from tyres and tracks in time, and will require the infilling of pools to allow a flat, safe surface for operating machinery. Two main methodologies will be employed for working from within the streambed as described in Section 4.1.2 above: Method 1 Sheet Pile Protection and Method 2 Piped Diversion. Sheet pile protection will be used only where site constraints preclude piped diversion, and will involve machinery tracking in the wetted, flowing streambed. Such tracking has a high likelihood of crushing injury and death of fish and macroinvertebrates and it has a heightened risk of mobilising fine sediments which may be transported and deposited further downstream. Piped diversion largely avoids mobilisation of fine sediments through physical separation of the flowing water from the active work site, however, will still result in mortality of fish and macroinvertebrates through dewatering of the streambed (although the adverse effects on fish can be minimised through fish relocation). At a few locations work will be conducted entirely from the banks (Willow Park, where machinery will be able to work from the bank) or offline (28 Blue Mountains Road, where a new channel will be constructed offline). A section of stream (~78 m) will be diverted and the existing channel filled in at 28 Blue Mountains Road. This will cause permanent loss of existing freshwater habitat and creation of new habitat. Further the works involves removal of existing riparian vegetation in the project area which will reduce stream shading at least until replanted vegetation reaches sufficient height.

Construction will have severe, short term effects on freshwater ecology through displacement and mortality of freshwater fauna and riparian vegetation loss. Many of these effects are unavoidable consequences of machinery working in the streambed and from dewatering via piped diversions, although some adverse outcomes can be minimised (e.g., minimise fish mortality through fish relocations). Macroinvertebrates will be recolonise any disturbed and dewatered sections of streambed quickly (weeks) by colonists from the relatively good habitat upstream of the project area. Adverse construction effects will be greatest for the sheet pile protection method due to machinery tracking in the stream, less for the piped diversion method, and least where all machinery can operate from the banks or offline (e.g. Willow Park and 28 Blue Mountains Rd new diversion channel).

#### **Disruptions to Fish Migration and Spawning Periods**

Migration and spawning periods of fish (and waikoura) in the project area cover the entire year meaning a construction period to avoid all such activities is impossible to achieve (Table 10). Further the existing piping and flood bypass of the lower Pinehaven Stream, and fish barrier at the Pinehaven Stream-Hull Creek confluence (perched drop and shallow, high velocity ramp) may already currently impact migration for certain species during certain flow conditions (for example the perched drop will be easier for some fish to pass during higher flows in Hulls Creek).

To minimise the risk of high flows from rainfall events disrupting construction and potentially mobilising fine sediments from the construction sites, the works should be completed as fast as possible and allowed to occur during suitable flow levels no matter the timing rather than focus on avoiding any particular period of fish migration/spawning. The faster the works can be completed, the faster the project area can begin recovering. With the in stream methodology construction is to be completed over an approximately two-year programme, so has the potential to disrupt up to two migration/spawning cycles, which long-term is unlikely to adversely affect the fish present in Pinehaven Stream, which are currently subject to migration passage issues.

Table 10Migration and spawning calendar for fish (and waikoura) known from or possibly present within or upstream of the<br/>Pinehaven Stream Improvements Project area. Adapted from NIWA (2015). DS = downstream; US=upstream. Light<br/>grey shading indicates ranges and dark grey peaks of activity.

					Migra	tion							
Species	Stage; Direction	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Longfin eel – known	Adult; DS												
KHUWH	Juvenile; US												
Shortfin eel - known	Adult; DS												
KHUWH	Juvenile; US												
Common	Larvae; DS												
bully - known	Juvenile; US												
Giant kokopu	Larvae; DS												
- known	Juvenile; US												
Redfin bully -	Larvae; DS												
possible	Juvenile; US												
Banded	Larvae; DS												
kokopu - possible	Juvenile; US												
Koaro –	Larvae; DS												
possible	Juvenile; US												
		1		1	Spawr	ning							
Species		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Common bully ·	- known												
Giant kokopu -	known												
Waikoura - kno	wn												
Redfin bully - p	ossible												
Banded kokopu	– possible												
Koaro - possible	9												

#### **Release and Subsequent Deposition of Fine Sediments**

The project involves significant earthworks in close proximity to and within Pinehaven Stream as well as demolition and/or removal of houses, bridges, and bank linings; activities which have a high potential to allow fine sediments to enter the water. In addition, in some locations regular tracking of machinery up and down the flowing channel is unavoidable and has the potential to release fine sediment currently entrained in the bed substrate. Data collected by Jacobs (2017) indicated sand and fine silt ranged from 16–27% cover of the streambed among the three representative sections, hence there appears to be a potential for reasonably high levels of fine sediment mobilisation. Given the moderate gradient of the stream it is possible that without sufficient controls, suspended sediment may reach at least as far as the confluence with Hulls Creek.

Suspended sediment can have a range of impacts on aquatic ecosystems including alteration of water chemistry, increasing turbidity, increasing invertebrate drift and altering community structure (Ryan, 1991). Turbidity levels as low as 5 nephelometric turbidity units (NTU) can decrease primary production (photosynthesis) by 3–13% (Ryan, 1991). High turbidity can affect the amenity value of naturally clear waterways leading to public perceptions that the water is "dirty". Several studies in the late 1990s - early 2000s investigated the sublethal effects of turbidity on New Zealand native fish. In general, many common New Zealand native fish species are relatively tolerant of elevated turbidity for short periods (Boubée et al., 1997; Richardson et al., 2001; Rowe & Dean, 1998). A further investigation into the lethal effects of suspended sediment found the survival of five insect larvae (the mayflies Deleatidium and Zephlebia, the caddisflies Polyplectropus and Triplectides, and the damselfly Xanthocnemis) koura, banded kokopu, and redfinned bullies to be not significantly different at turbidities up to c. 20,000 NTU compared to control groups in clear water under laboratory conditions (Rowe et al., 2002). While many aquatic biota are relatively tolerant of at least short-term increases in suspended sediment, the deposition of this sediment on the streambed (at rates and with quantities of smaller particles greater than the natural state) is a major stressor on waterway ecosystems through altering physical habitat (clogging interstitial spaces in the stream bed used as refugia by fish and invertebrates), altering food resources (e.g., smothering algae), and degrading sites used for egg laying by many aquatic species. Hence sediment affects the diversity and composition of algae, macrophytes, fish, and aquatic invertebrates (Clapcott et al., 2011). Pinehaven Stream and downstream receiving environments (Hulls Creek and Hutt River) have hard; stony streambeds hence are likely to have some sensitivity to increased rates of fine sediment deposition. Invertebrate taxa known from the project area that are likely sensitive to increased fine sediment deposition are the mayfly Deleatidium, the cased-caddisfly Helicopsyche, dobsonfly larvae, and waikoura. If the project was to result in fine sediments covering relatively clean stony substrates both within and downstream of the project area, then significant adverse effects could result.

Fish have differing sensitivities to suspended and deposited fine sediments as discussed above. Several studies in the late 1990s – early 2000s investigated the sublethal effects of turbidity on New Zealand native fish. In general, many common New Zealand native fish species are relatively tolerant of elevated turbidity for short periods (Boubée *et al.*, 1997; Richardson *et al.*, 2001; Rowe & Dean, 1998). NIWA (2015) included a scheme to rank freshwater fish as to the relative effects of "turbidity", "sedimentation", and "afforestation". While this was mostly geared towards the forestry industry, the "turbidity" and "sedimentation" species scores are of use here (and any project that may result in fine sediment runoff) as the mobilisation of fine sediment in Pinehaven Stream is a major project risk. Following NIWA (2015), species of interest are given sensitivity scores for a range of categories (two categories for "turbidity" and four categories for "sedimentation"): low (1-3), medium (4-6), and high (7-9) (Table 11). These scores are added up to give an overall score for each species. "Sedimentation" was given four categories (and hence a higher weighting) than "turbidity" as it was recognised the deposition of fine sediment has a greater long-term impact than periods of turbidity which are generally short in duration. NIWA (2018) considered a score of 30 or more indicative of "high sensitivity", 20-29 as a "medium sensitivity", and a score below 20 to be least sensitive/least likely to impacted by (forestry) activities that result in increased fine sediment mobilisation. Based on this scoring scheme the highly

sensitive species *known* from the project area are giant kokopu and waikoura. Species that are *possibly present* within the project area considered to be highly sensitive to fine sediment were redfin bully and banded kokopu. Hence increased levels of sediment deposition that smoother hard, stony habitats that are currently relatively clean could have significant adverse effects.

Species	Turbidity		Sedimentation				
	Migration/ Recruitment	Feeding	Reduced cover	Foraging/ Food	Spawning	Stream Morphology	Totals
Longfin eel	2	2	5	3	2	3	17
Shortfin eel	4	3	3	2	2	3	17
Common bully	3	3	3	5	5	9	28
Giant kokopu	8	7	5	5	3	5	33
Redfin bully	3	3	7	7	7	7	34
Banded kokopu	8	7	8	5	4	7	39
Koaro	2	3	7	6	5	6	29
Waikoura	3	3	7	6	3	8	30

# Table 11 Fish (and waikoura) sensitivity scores to turbidity and sedimentation. Adapted from NIWA (2015). Fish species listed are those known or expected to be found within the Pinehaven catchment.

### Water Contamination

The machinery used for demolition and construction has the potential to release contaminants into the environment where they may enter waterways (e.g., fuel, oil, grease), with a greater risk of spills as a result of the proposal to track machinery within the flowing channel. Demolition of existing in stream structures may create contaminants while many substances used during construction can contaminate waterways if used carelessly. The construction includes the installation of new bank linings and use of concrete in close proximity to the flowing water. Mortars and grouts may also be used at various locations. Concrete wash water and uncured cement-related products can harm aquatic life primarily though causing rapid pH shifts and the discharge of ammonia. Ammonia can block oxygen transfer from the gills to the blood and can cause immediate and long-term damage to the gills of fish (Ogbonna & Chinomso, 2010). The careless use of such products can result in significant fish kill events, such as that observed by EOS Ecology in Akaroa where the grout used in a culvert repair killed hundreds of fish (McMurtrie, 2014). Such adverse effects can be avoided by ensuring any concrete waste does not enter surface waters and all mortars, grouts, and other cementitious-based products used are fully cured prior to contact with water.

### 4.2.2 Required Avoidance/Mitigation/Remedy

A number of avoidance/mitigation measures are currently proposed, which will help to reduce the ecological impacts of the construction phase, including the following:

- » **ESCP:** An ESCP that includes numerous fine sediment controls.
- » Site Specific Environmental Management Plans (SSEMP): SSEMP's will be created to ensure activities and sediment controls are tailored to the unique characteristics of each stage of the project (currently seven stages).
- » **Monitoring fine sediment:** Undertaking a fine sediment monitoring programme during construction to ensure any issues are identified and corrected quickly.

- » **Habitat reinstatement:** Reinstating all pools that are infilled to their original dimensions. This will require a survey of pools prior to construction to measure their dimensions and take photos to guide their reinstatement.
- » Fish relocation: Injury and mortality of fish and larger invertebrates (i.e., waikoura) will be minimised by undertaking fish removal prior to work beginning in each stage where some bed disturbance is unavoidable. A fish relocation procedure will be included as a resource consent requirement. Where machinery will track in the stream, temporary fish barriers will be installed at the ends of active work sites to prevent re-entry by fish during construction. If temporary barriers require removal due to high flows, then the section in question will require refishing. Prior to infilling of the channel at 28 Blue Mountains Road and diversion through the new channel, fish will be relocated.
- » **SSEMPs**: Need to explicitly consider all opportunities for keeping/minimising machinery from working from the streambed, while still minimising the effects on vegetation and private property.
- » ESCP: When a significant rain event (e.g., MetService heavy rain warning or other agreed trigger) is forecast any areas of unstabilised cut surface needs be covered with a securely attached geotextile or similar to minimise erosion during high flows that breach the temporary sheet piling.
- » Monitoring of fine sediment: Submission of the sediment monitoring programme to be approved by the Regional Council prior to commencement of the works. Given the duration of works (an approximately two-year programme) the programme should include continual turbidity monitoring upstream and at increasing distances downstream of the tracked sections, as well as upstream and downstream with the confluence to Hulls Creek, with limits set for when sediment controls must be improved to meet set targets. In addition, a deposited fine sediment monitoring programme should be undertaken to determine if the works are resulting in increased fine sediment deposition in Pinehaven Stream and Hulls Creek.
- » Limiting contamination by cementitious products: for any sites that require use of wet cementitious products (including but not limited to grout, mortar, concrete) the site must be isolated from flowing water and have sufficient emergency measures in place to safely pump and remove any water contaminated with cementitious products in the case of an accident. Under no circumstances can any water that has come into contact with cementitious products be able to return to/enter the stream.
- » Monitoring of streambed compaction: A visual, qualitative assessment of compaction of the bed substrates will be undertaken by a suitable experienced person. The same person shall undertake all monitoring to avoid interobserver variation. If any compaction is identified then remediation actions occur in consultation with GWRC and only if such actions do not lead to the entrainment of fine sediments to concentrations that may breach suspended sediment consent conditions.
- » Vehicle maintenance: A higher than usual level of vehicle maintenance and cleanliness for those that will be operating within the stream channel to minimise the likelihood of contaminants entering the stream (oils, grease, etc.). Use biodegradable hydraulic fluids in machinery working from/in the streambed. There should be a regular and documented check of machinery being used in the channel, including (but not limited to) checking for possible leaks, no sediment on tires, clean machinery with no exposed lubricants on working parts that could come into contact with the water, and checking for seeds and plant material to avoid tracking weed species into the stream.
- » **Spill kit:** Ensuring a spill kit is in close proximity to all machinery and staff are trained in how to use it properly in an environment such as Pinehaven Stream.

## 4.3 Operational Effects

#### 4.3.1 Potential Operational Effects

#### **Creation of New Stream Channel**

The diversion of approximately 78 m of existing stream channel at 28 Blue Mountains Road will result in approximately 61 m of new channel being created, meaning approximately 17 m of channel is permanently lost, thus reducing the effective freshwater habitat area available to freshwater species. There is the potential to meander the low flow part of the new channel to minimise the length of channel lost. Provided that the channel is appropriately designed with ecological input, then diversion is more than likely to have permanent positive effects on Pinehaven Stream as it removes a highly modified confined reach with vertical concrete walls and grade control weirs that are likely partial fish barriers (Figure 9).



Figure 9 Existing state of Pinehaven Stream channel at 28 Blue Mountains Road showing grade control weirs and concrete block form of banks.

#### Loss of Existing Bank Habitat Complexity

The extensive bank works may permanently remove existing bank features that provide cover for fish and macroinvertebrates such as undercuts, holes, and crevices. These may have formed beneath/between existing bank protection elements (e.g., concrete blocks, rubble, gabions) or in more natural areas of bank that will be removed during the works.

#### Loss of Stream Shading

The works involve removal of all riparian vegetation between the new top of bank on each side of the channel. This will expose the stream temporarily to more sunlight, while taller riparian vegetation re-establishes. This could potentially result in increased growth of periphyton and higher water temperatures, both of which can have adverse effects on stream fauna depending on the magnitude of any increase and species-specific tolerances.

#### **Fish Passage**

It is understood any existing grade control weirs (e.g., Figure 3) will likely be damaged/removed to allow machinery access along the streambed. If these are deemed to still be required, they will be reinstated, potentially with new precast units. If new weirs are installed, then these could be barriers to fish migration.

Debris arrestors are proposed at key locations to protect infrastructure and reduce the likelihood of channel/pipe blockages. The is the potential such arrestors could make the downstream passage of large eels difficult if the bars were too close together. To avoid this debris arrestor design will require input from an appropriately qualified freshwater ecologist.

#### 4.3.2 Required Avoidance/Mitigation/Remedy

A number of avoidance/mitigation measures are currently proposed, which will help to reduce the ecological impacts of the operational phase, including the following:

- » **New channel:** The new channel at 28 Blue Mountains Road is to have a 'naturalised' profile (as opposed to concrete block walls) with appropriate riparian plantings, including bank edge plants that will overhang the channel.
- » Bank habitat: Where possible bank habitat complexity will be recreated through the use of embedded pipes, installation of stable undercuts, and placement of marginal boulders to provide fish cover. In Willow Park there is the opportunity to install embedded pipes and a stable undercut at a proposed concrete step structure. Elsewhere through the project area the ability to embed eel pipes and/or create stable undercuts on vertical walls will depend on whether there are sufficient water depths against such structures during normal/low flows. A site walkover will need to be undertaken prior to construction commencing to determine suitable locations.
- » Stream shading: Following completion of bank works, extensive revegetation of the riparian zone and new "floodplain" areas will be undertaken. Sedges and rush species are proposed for the immediate stream margins which will relatively quickly provide some marginal cover and shading. Larger shrubs and trees will be planted further up the banks, which once mature, will provide good shading to the channel.
- » New channel: Including a suitably qualified freshwater ecologist in the team designing the diversion channel at 28 Blue Mountains Road, to ensure ecological benefits of this channel are maximised. The morphology of this channel will be predominantly determined by its gradient but will ideally include zones of run, riffle, and pool habitat. Additionally, meanders should be created to minimise or negate the length of channel loss due to the diversion.
- » **Stream shading:** To ensure successful establishment of planted riparian vegetation, a monitoring and maintenance (and potentially a successional plan) will be required and implemented over many years. A vegetation maintenance scheme with clear expectations needs to be developed and implemented, including the likely requirement for successional/replacement planting of sedges/rushes with fern species once canopy shading is achieved. Such successional planting will ensure that low overhanging cover (useful for fish cover and invertebrate habitat) will remain even after tree canopy shading is achieved.
- » Fish passage: Any grade control weirs that are removed during construction should only be reinstated if absolutely necessary for the protection of any infrastructure. If any are reinstalled, they must be fully passable by all fish species and should take the form of rock ramp weirs rather than any design that results in rapid flow over a vertical surface. Their design should include input from a suitably qualified freshwater ecologist.
- » Fish passage: Debris arrestor design will include input from a suitably qualified freshwater ecologist to ensure they do not adversely affect the free passage of fish.
- » Fish passage: Downstream of the project area a partial fish barrier exists at the confluence of Pinehaven Stream and Hulls Creek (Figure 8). To maximise the benefits of the project and compensate to some extent for the ecological disturbance of the project (e.g., removal of all existing riparian vegetation where banks are being excavated,

removal of existing bank habitat features, tracking machinery along the flowing streambed, and the lag time between replanting and achieving maximum canopy cover my riparian vegetation) we highly recommend this barrier be remediated. This would more than likely involve some kind of stable rock ramp to remove the perched drop and baffles on the concrete ramp to slow water velocities and increase water depths.

## 5 OVERALL EFFECTS ASSESSMENT AND MITIGATION SUMMARY

The magnitude of effect versus ecological value matrix approach of Roper-Lindsay et al. (2018) described at the start of Section 4 was used to determine the level of effects. This was done separately for short-term construction effects and long-term/permanent operational effects. Note the determination of magnitude of effect takes assumes the confirmed avoidance/remedy/mitigation measures are adequately implemented. As outlined in Section 3.6, the overall ecological value pre-works has been determined to be "moderate" for the purposes of determining the level of effects (refer Table 8 above).

## 5.1 Construction Effects

The works impact approximately 900 m of a second order stream and involve complete removal of riparian vegetation, removal of existing bank habitat features, and machinery will be tracking along the flowing streambed over some of the project area where working in the dry is impossible because of space constraints. Table 12 summarises the main values that will be adversely affected by construction activities and the mitigation proposed. Based on Table 8, the construction of the Pinehaven Stream Improvements Project will have a magnitude of effect of "moderate". With "moderate" ecological value and a "moderate" effect magnitude the overall level of adverse effect of the construction phase will be "moderate" in terms of Table 9.

Provided the confirmed mitigation measures as outlined in Section 4.2.2 above are adequately implemented (i.e., comply with the relevant proposed consent conditions) the adverse effects of any construction can be reduced to a "minor adverse effects" level of impact to aquatic ecology (in the context of the RMA Quality Planning continuum outlined at the start of Section 4 above).

Value parameter	Value score	Adverse effect	Unmitigated magnitude of effect	Proposed mitigation	Magnitude of effect after mitigation	Residual effect	Confidence
Urban stream with stony bed; good aquatic invertebrate diversity	Moderate	Stony bed smothered by fine sediments	High	Working in the dry as far as practical; sediment controls as outlined in ESCP	Low (working in the dry); Moderate (tracking in flowing streambed)	Low	High: Where working in the dry; Moderate: uncertainty around release/controls where tracking in stream is unavoidable
Good habitat diversity for an urban stream	Moderate	Infill of pools; compaction of bed by machinery	High	Reinstatement of pool habitat; monitoring and possible remediation of any compacted streambed.	Low	Low	High: Recreating pool habitat; Moderate: uncertainty about ability to rectify any streambed compaction
Four known fish species and waikoura including presence of two "At risk – declining" fish species	High	Injury or mortality through channel dewatering and vehicle tracking	High	Fish relocation	Low	Low	High: Actively removes fish and waikoura from harm

#### Table 12 Summary of the main ecological values of Pinehaven Stream, construction phase effects of the Pinehaven Stream Improvements Project, and the mitigation proposed.

# 5.2 Operational Effects

Once riparian vegetation is re-established (which will take some years) and the wetted channel recovered from disturbance, the magnitude of effect of the Pinehaven Stream Improvements Project will be negligible based on Table 8 to potentially positive (net gain). While the low/normal flow channel will be relatively unaltered by the project in terms of geomorphology it will now have more dense marginal vegetation on the widened "floodplain", stable fish cover in the form of constructed undercuts, embedded eel pipes, and marginal boulders. Table 13 summarises the main values that will be adversely affected by operational activities and the mitigation proposed. Provided all these features can be realised in sufficient densities through the project area and the fish barrier at the confluence of Pinehaven Stream and Hulls Creek be remediated (to compensate to some extent for the lag period between replanting and achieving maximum canopy cover by riparian vegetation), then the operational effects on freshwater ecology could be considered negligible to positive. With "moderate" ecological value and a "negligible" to "positive" effect magnitude the overall level of effect of the operational phase will be "very low" to "net gain" in terms of Table 9.

Provided the confirmed mitigation measures as outlined in Section 4.3.2 are implemented adequately (i.e., comply with the relevant proposed consent conditions) the adverse operational effects on aquatic ecology can be reduced to

"less than minor adverse effects" or "nil effects" (in the context of the RMA Quality Planning continuum outlined at the start of Section 4 above).

Value parameter	Value Adverse score effect		Unmitigated magnitude of effect	Proposed mitigation	Magnitude of effect after mitigation	Residual effect	Confidence
Urban stream with stony bed and existing moderate riparian vegetation cover; good aquatic invertebrate diversity	Moderate	Loss of stream shading through vegetation removal	High	Extensive replanting of riparian zone, including immediately next the low flow channel in many locations	Low	Low	High: Stream shading will recover over time as vegetation grows
Good habitat diversity for an urban stream	Moderate	Removal of existing bank edge habitat (e.g., undercuts and holes fish hide within)	High	Incorporation of stable boulders along edge of low flow channel; installation of eel pipes where water depth allows; creation of new habitat at 28 Blue Mountains Rd diversion.	Low	Low	High: New channel section at 28 Blue Mountains Rd Moderate: Uncertainty if sufficient boulders and eel pipes can be incorporated during detailed design phase
Migratory fish present including two "At risk – declining" species	High	Impeded fish passage from existing structures	High (note the proposed works do not add additional barriers)	Remediation of barrier at Pinehaven Stream-Hulls Creek confluence; reinstatement of any weirs in project area with fish friendly designs; removal of drop structures at 28 Blue Mountains Rd permanent diversion.	Low	Low	High: proven solutions to the fish barriers present

### Table 13Summary of the main ecological values of Pinehaven Stream, operational effects of the Pinehaven Stream<br/>Improvements Project, and the mitigation proposed.

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SCIENCE + ENGAGEMENT



## Pinehaven Stream Improvements Assessment of Terrestrial Ecology

September 2019



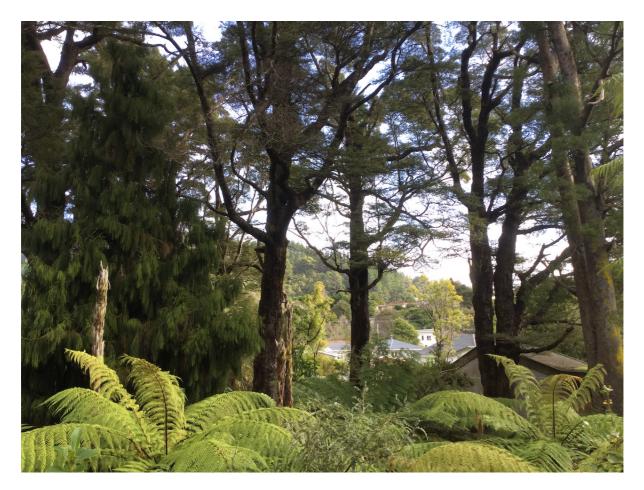






# Pinehaven Stream Improvements - Assessment of Terrestrial Ecology

Report prepared for Align and Jacobs New Zealand





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Remnant native forest within the study area (July 2019).



#### 1.0 INTRODUCTION

Forbes Ecology was engaged by Align to provide a terrestrial ecology impact assessment of the proposed Pinehaven Stream Enhancement Project, located in the suburb of Pinehaven, Hutt Valley.

A full description of the project is provided in the application document, but from a terrestrial ecology point of view, the project can be summarised as follows. The project requires a corridor within which stream improvements will be carried out to alleviate a long history of flooding within the Pinehaven suburb. Within the corridor are a number of vegetation features, most of which is planted and occurs in private gardens. Due to their planted origins, these vegetation areas are beyond the scope of a terrestrial ecological impact assessment and instead the assessment focuses on mature or remnant native trees which cannot or are unlikely to be avoided by the stream improvement works. The effect of the proposal on native birds has been assessed previously (September 2017) by Aristos Consultants and I defer to that assessment in relation to effects on bird fauna.

For mature and remnant native trees within the project area, this report describes the ecological values and statutory significance and then details the magnitude and levels of adverse effects and the effects management regime required to address those adverse effects.



#### 2.0 METHODS

#### 2.1 Site Visits

Site visits were taken to the project area on the 11 and 18<sup>th</sup> of July 2019. Site visits were undertaken in the company of Michael Hall (Project Environmental Planner) and in part with Tim Haylock (Project Engineer) and Eric Skowron (Project Manager). The site visits focused on visiting unaffected and affected trees within the project area.

#### 2.2 Ecological Values Assessment

Ecological values of terrestrial ecosystem types were assessed using current best practice methods (Environment Institute of Australia and New Zealand [EIANZ], 2018)<sup>1</sup> for evaluating ecological values of species in the impact assessment framework. Structured criteria to guide ecological values assessments are provided by EIANZ (2018; Table 5, p. 67) and these criteria formed the basis of the values assessment:

Table 1: Reproduced EIANZ Table 5 Factors to consider in assigning value to terrestrial species for EcIA

Determining factors	Value
Nationally Threatened species. Found in the Zone of influence (ZOI) either	Very high
permanently of seasonally	
Species listed as At Risk-Declining found in the ZOI either permanently or	High
seasonally	
Species listed as any other category of At Risk found in the ZOI either	Moderate
permanently or seasonally	
Locally (ED) uncommon or distinctive species	Moderate
Nationally and locally common indigenous species	Low
Exotic species including pests and species having recreational value	Negligible

The ecological values assessment was informed by data from the following sources:

- Project-related survey data (e.g., species identity and location).
- Regional and District Planning documents.
- New Zealand Threat Classification Series 22; de Lange et al, 2017.
- National level databases such as Potential Predicted Vegetation (Leathwick et al. 2004; Singers and Rogers, 2014).

<sup>&</sup>lt;sup>1</sup> See <u>https://www.eianz.org/resources/publications/2018---ecological-impact-assessment-guidelines-for-new-zealand-2nd-edition</u>



#### 2.3 Ecological Significance Assessment

The Greater Wellington Regional Council (GWRC) Regional Policy Statement (RPS) sets out policies for the management of natural resources including indigenous habitats. Policy 23 prescribes the following approach for classifying significant indigenous vegetation or significant habitats of indigenous fauna:

(a) Representativeness: the ecosystems or habitats that are typical and characteristic examples of the full range of the original or current natural diversity of ecosystem and habitat types in a district or in the region, and:

(i) are no longer commonplace (less than about 30% remaining); or

(ii) are poorly represented in existing protected areas (less than about 20% legally protected).

(b) Rarity: the ecosystem or habitat has biological or physical features that are scarce or threatened in a local, regional or national context. This can include individual species, rare and distinctive biological communities and physical features that are unusual or rare.

(c) Diversity: the ecosystem or habitat has a natural diversity of ecological units, ecosystems, species and physical features within an area.

(d) Ecological context of an area: the ecosystem or habitat:

(i) enhances connectivity or otherwise buffers representative, rare or diverse indigenous ecosystems and habitats; or

*(ii) provides seasonal or core habitat for protected or threatened indigenous species.* 

(e) Tangata whenua values: the ecosystem or habitat contains characteristics of special spiritual, historical or cultural significance to tangata whenua, identified in accordance with tikanga Māori.<sup>2</sup>

The significance assessment process is binary (either significant or not) and needing only one positive response to trigger significance under Section 6(c) RMA.

<sup>&</sup>lt;sup>2</sup> Although this is one of the RPS Policy 23 assessment criteria this is beyond my area of expertise and has therefore not been covered in this assessment.



#### 2.4 Ecological Effects Assessment

Fundamentally, the assessment of ecological effects addressed the degree to which the proposed activity would diminish the attributes that made a given feature ecologically significant. The level of effect was determined through analysis of the level of ecological value and the magnitude of adverse effect (EIANZ, 2018). Both positive and adverse effects were considered.

The assessment of magnitude and level of effect followed the EIANZ (2018) assessment criteria shown in Table 2 and Table 3 respectively. When considering the magnitude of effect, the timescale of potential effects must be considered and EIANZ (2018, Table 9) provides recommended timescales for effect duration categories, refer Table 4 below.



Magnitude	Description
Very High	Total loss of, or very major alteration to, key elements/features/ of the existing baseline conditions, such that the post-development character, composition and/or attributes will
	be fundamentally changed and may be lost from the site altogether; AND/OR Loss of a very high proportion of the known population or range of the element/feature
High	Major loss or major alteration to key elements/features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR
	Loss of a high proportion of the known population or range of the element/feature
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed; AND/OR
	Loss of a moderate proportion of the known population or range of the element/feature
Low	Minor shift away from existing baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances or patterns; AND/OR
	Having a minor effect on the known population or range of the element/feature
Negligible	Very slight change from the existing baseline condition. Change barely distinguishable, approximating to the 'no change' situation; AND/OR
	Having negligible effect on the known population or range of the element/feature

#### Table 2. Criteria for describing magnitude of effect (EIANZ, 2018).

#### Table 3. Criteria for describing level of effect (EIANZ, 2018).

Ecological value → Magnitude ↓	Very high	High	Moderate	Low	Negligible
Very High	Very high	Very high	High	Moderate	Low
High	Very high	Very high	Moderate	Low	Very low
Moderate	High	High	Moderate	Low	Very low
Low	Moderate	Low	Low	Very low	Very low
Negligible	Low	Very low	Very low	Very low	Very low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain

#### Table 4. Timescales for duration of effects (EIANZ, 2018).

Permanent	Effects continuing for an undefined time beyond the span of one human generation (taken as approximately 25 years)
Long term	Where there is likely to be substantial improvement after a 25-year period (e.g., the replacement of mature trees by young trees that need >25 years to reach maturity, or restoration of ground after removal of a development) the effect can be termed 'long term'
	Long term (15-25 years or longer – see above)
Tomporary	Medium term (5-15 years)
Temporary	Short term (up to 5 years)
	Construction phase (days or months)



#### 2.4.1 Ecological management response

Levels of effect were viewed in terms of national guidance regarding appropriate levels of ecological management response. National guidance on ecological management of effects was sourced from EIANZ (2018).

Regarding levels of effect, EIANZ (2018) recommends:

**Very High adverse**: Project effects in the 'Very High adverse' category are unlikely to be acceptable on ecological grounds alone (even with compensation proposals). Activities having very high adverse effects should be avoided. It is not the ecologist's role to make determinations with regard to project viability. The ecologist should present an objective and scientifically robust assessment of the effects of the project to assist the applicant in coming to an informed decision about project viability. Where very high adverse effects cannot be avoided, a net biodiversity gain would be appropriate.

**High and Moderate adverse**: Options in the 'High and Moderate adverse' category represent a level of effect that requires careful assessment and analysis of the individual case. Such an effect could be managed through avoidance, design, or extensive offset or compensation actions. Wherever adverse effects cannot be avoided, no net loss of biodiversity values would be appropriate.

Low and Very Low adverse: Should not normally be of concern, although normal design, construction and operational care should be exercised to minimise adverse effects. If effects are assessed taking impact management developed during project shaping into consideration, then it is essential that prescribed impact management is carried out to ensure Low or Very Low level effects.



#### 3.0 INDIGENOUS VEGETATION AND HABITATS

#### 3.1 Ecological Values

#### 3.1.1 Indigenous trees

Three indigenous tree species are affected by the proposal (Table 5). The species, number and location of each are as described and mapped in Appendix A:

- Kowhai (Fabaceae; *Sophora microphylla*) a total of eight kowhai trees at the following locations:
  - One tree at 4 Blue Mountains Road,
  - Six trees at 4 Sunbrae Drive,
  - One tree at 13 Deller Grove,
  - One tree at 48 Blue Mountains Road.
- Black beech (Nothofagaceae; *Fuscospora solandri*) three black beech trees in three locations:
  - One tree on reserve at corner of Pinehaven and Blue Mountains Roads.
     Protected tree Urban Tree Group # 102,
  - One tree at 12 Birch Grove. Protected tree Urban Tree Group # 99,
  - One tree at 14 Blue Mountains Road.
- Kahikatea (Podocarpaceae; *Dacrycarpus dacrydioides*) one kahikatea tree at 48 Blue Mountains Road.

Kowhai is a common tree endemic to New Zealand with a wide natural range through both of New Zealand's main islands but is scarce in Northland (New Zealand Plant Conservation Network [NZPCN], 2019). The species has the conservation status Not Threatened<sup>3</sup> but is important ecologically for the structure the trees provide and for the ecological resources provided during the spring flowering phase. Kowhai is readily propagated from seed and is a relatively fast-growing species meaning that lost trees are readily replaceable. It is unclear which of the affected kowhai trees are planted versus naturally established. For the purposes of this assessment all kowhai are assumed to be naturally established although in reality this is unlikely to be the case (e.g., several kowhai occur in rows). Following the EIANZ (2018) valuation process, the affected kowhai trees are of low ecological value.

Black beech is a tree found in lowland and montane forests and is endemic to New Zealand. The species has a broad national distribution, with the current northern distribution limit being Little Barrier Island (NZPCN, 2019). Black beech has a conservation status of Not

<sup>&</sup>lt;sup>3</sup> See <u>https://www.doc.govt.nz/Documents/science-and-technical/nztcs22entire.pdf</u>



Threatened. It is a species that can be readily grown from seed and is one of New Zealand's faster growing canopy tree species. The species is light demanding so it can be incorporated into restoration plantings with success, although infection of seedling roots with ectomycorrhizal fungi is essential for satisfactory seedling performance (this fungus helps the seedlings' roots extract nutrients from the surrounding soil matrix). Black beech forest is a forest type of the Hutt Valley present prior to human's arrival in New Zealand and today in the Wellington region less than 50% of the pre-human forest extent remains<sup>4</sup>. The age of the 12 Birch Grove tree elevates its ecological value from low to moderate.

Kahikatea is a long-lived conifer characteristic of alluvial sites. It has a conservation status of Not Threatened. It is relatively fast growing in the seedling and sapling phases and is light demanding and performs best on fertile fine textured soils. The species can be readily propagated from seed and its light-demanding nature means it can be incorporated into restoration plantings with success. The young specimen is possibly planted, but this is unknown, and it has been assumed to be naturally occurring and has been included in this assessment accordingly. The kahikatea is of low ecological value.

#### **Exotic trees**

A number of exotic trees are affected by the proposal (Table 5). In ecological terms these trees are of negligible ecological value and ecological effects to these specimens are therefore not assessed. For completeness, details of these trees are as follows:

- Trees numbered 8 and 9 are Oaks located at 54 Whitemans Road.
- Tree number 13 is an oak at 4 Blue Mountains Road.
- Tree number 17 is a fir located at 3 Sunbrae Road (on road reserve).
- Tree 18 is a prunus at 5 Deller Grove.
- Tree 19 is an oak at 5 Deller Grove.
- Tree 21 is a fir at 32 Blue Mountains Road.
- Tree 22 is an oak at the reserve on corner of Pinehaven Road and Blue Mountains Road.

<sup>&</sup>lt;sup>4</sup> <u>http://www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Environmental-</u> <u>Reporting/Forest-ecosytems-of-the-Wellington-region-reduced.pdf</u>



#### Table 5. Avoided and affected trees within the project area

Tree #	Address	Species	Protected (PPC 41)	Proposed removal	Tree surveyed	Field Notes			
	Avoided Trees								
1	48 Whitemans Rd	Kahikatea	N	N					
2	50 Whitemans Rd	Kahikatea	N	N	Y	Kahikatea 70 cm dbh. 1 m upstream of existing bridge.			
3	50 Whitemans Rd	Rimu	N	N	Y	Rimu next to footpath. 56 cm dbh.			
4	50 Whitemans Rd	Kowhai	N	N	Y	Photo taken from hard standing on opposite side of stream.			
5	50 Whitemans Rd	Rimu	N	N	Y	Rimu, estimated 60 cm dbh. Located immediately upstream of concrete foot bridge.			
6	52 Whitemans Rd	Black beech	N	N	Ν	Black beech 1 m + dbh. True left of stream.			
7	52 Whitemans Rd	Tītoki & hinau	N	N	N	Titoki 36.7 cm dbh. True right of stream. Next to tree 7 (titoki) is a hinau of 27 cm dbh. Approx 1.5 m upstream from titoki.			
10	56 Whitemans Rd	Rimu	N	N	Ν				
11	56 Whitemans Rd	Black beech	N	Ν	Y	Large beech			
12	56 Whitemans Rd (15 Birch Grove)	Kowhai	N	N	Y	Kowhai 35 & 31 dbh.			
26	50 Blue Mountains Rd	Black beech	Y (#99)	N	Y	Trees 26, 27, 29, 31 – all old black beech see 149 pm photo.			
27		Black beech	Y (#99)	N	Y				
28		Matai	Y (#99)	N	Y				
29		Black Beech	Y (#99)	N	Y				
30		Black Beech	Y (#99)	Ν	Y				
31		Black beech	Y (#99)	N	Y	Rimu near driveway/road.			
32		Black beech	Y (#99)	N	Y				
33		Rimu	Y (#99)	N	Y	Rimu nearest driveway.			
34	2A Freemans Way	Black beech	Y (#99)	Ν	Y	Large beech near very wooden slat fence.			
36	Pinehaven Reserve	Black beech	Ν	Ν	Y	Large black beech 1.2 m dbh + at stream confluence. New numbering, 38 on map.			



	Affected Trees							
14	4 Blue Mountains Rd	Kowhai	Ν	Y	Y	Kowhai 24.2 cm dbh. Located immediately next to black fence next to footpath.		
15	4 Sunbrae Dr	Kowhai (x6)	N	Y	Y	4 Sunbrae drive, one kowhai on true left adjacent to wing wall end. Plus, four mature kowhai along road frontage of property. Kowhai in back yard of 4 Sunbrae Drive.		
16	14 Blue Mountains Road	Black beech		Y	Y	Black beech 59.5 dbh.		
20	13 Deller Gr	Kowhai	Ν	Y	Y			
23	Reserve on cnr Pinehaven Rd/Blue Mountains Rd	Black beech	Y (#102)	Y	Y	Black beech on edge of wing wall. 2:24 pm photo.		
24	48 Blue Mountains Rd	Kahikatea and Kowhai	N	Y	Y	Kahikatea is next to black beech, see photo 2.32 pm. Kowhai 4 m downstream of kahikatea not mapped but is counted.		
35	12 Birch Grove	Black beech	Y (#99)	Y	Y	Current stream channel is in safe area of drip line but construction works to create channel will likely go right to the base of the tree.		

In summary, the number of each species affected is as follows:

- Kowhai = nine trees,
- Black beech = three trees,
- Kahikatea = one tree.



#### 4.0 ECOLOGICAL SIGNIFICANCE ASSESSMENT

#### 4.1 Assessment of GWRC RPS Policy 23

The GWRC RPS Policy 23 provides criteria for assessing the significance of, and the effects of activities on, ecological features.

Table 6 presents a summary of the assessment of the ecological significance of the affected trees. Black beech forest is scarce in the regional forest context and old trees remnant of this former forest therefore triggers the rarity criterion of Policy 23. No aspects of the kowhai or the single young kahikatea tree trigger the Policy 23 significance criteria.



Policy 23	Criteria Description	The Kowhai Trees	The Black Beech Trees	The Kahikatea Tree
Representativeness (a)	The ecosystems or habitats that are typical and characteristic examples of the full range of the original or current natural diversity of ecosystem and habitat types in a district or in the region, and (i) are no longer commonplace (less than about 30% remaining); or (ii) are poorly represented in existing protected areas (less than about 20% legally protected).	Not significant	Not significant	Not significant
Rarity (b)	The ecosystem or habitat has biological or physical features that are scarce or threatened in a local, regional or national context. This can include individual species, rare and distinctive biological communities and physical features that are unusual or rare.	Not significant	Significant "Regionally Vulnerable" <sup>5</sup>	Not significant
Diversity (c)	The ecosystem or habitat has a natural diversity of ecological units, ecosystems, species and physical features within an area.	Not significant	Not significant	Not significant
Ecological context of an area (d)	<ul> <li>The ecosystem or habitat:</li> <li>(i) enhances connectivity or otherwise buffers representative, rare or diverse indigenous ecosystems and habitats; or</li> </ul>	Not significant	Not significant	Not significant
Ecologica	<ul> <li>(ii) provides seasonal or core habitat for protected or threatened indigenous species.</li> </ul>	Not significant	Not significant	Not significant

#### Table 6. Ecological significance assessment (applying GWRC RPS Policy 23 criteria) to affected trees.

<sup>&</sup>lt;sup>5</sup> See <u>http://www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Environmental-Reporting/Forest-ecosytems-of-the-Wellington-region-reduced.pdf</u>



#### 5.0 VEGETATATION CLEARANCE EFFECTS

#### 5.1 Clearance or Modification of Indigenous Vegetation and Habitats

#### 5.1.1 Magnitude of adverse effects

All of the identified affected trees are proposed to be removed. The tree removal would be irreversible and of permanent duration. No effects are anticipated beyond the physical loss of the affected trees. For instance, there are no edge or fragmentation effects associated with the tree loss.

The loss of kowhai trees would result in a minor shift away from the existing baseline situation. The loss of the kowhai trees would be discernible at the property scale, but slight and barely distinguishable at larger spatial scales. On this basis, the magnitude of effect from the loss of kowhai would be low at the property scale and negligible within the Ecological District.

The loss of the black beech trees would be of a similar magnitude to that of the kowhai trees, resulting in low magnitude of effect at the property scale and negligible magnitude of effect at larger spatial scales.

The loss of the kahikatea tree would result in a very slight change from the existing baseline condition and the change would be barely distinguishable, approximating a no change situation. On this basis the magnitude of effect from the loss of the kahikatea tree is negligible.

#### 5.1.2 Levels of adverse effects

The level of effect from kowhai tree removal is very low adverse. This relates to a low magnitude of effect to a low value feature (Table 3). At spatial scales wider than the property level, adverse effects from the kowhai loss would also be very low.

The level of effect from black beech tree removal is low. This relates to a low magnitude of effect to a moderate value feature (Table 3).

The level of effect from the kahikatea tree removal is very low. This relates to a negligible magnitude of effect to a low value feature (Table 3).



#### 6.0 EFFECTS MANAGEMENT

#### 6.1 Mitigation and Offsetting Principles and Frameworks

#### 6.1.1 The mitigation hierarchy

Good practice effects management directs for practical steps to be taken to manage effects using the mitigation hierarchy.

As such, good practice (Business and Biodiversity Offsets Programme [BBOP], 2012) specifies that practical measures must be taken as follows:

**Avoidance**: avoid creating impacts from the outset, such as careful spatial or temporal placement of elements of infrastructure, in order to completely avoid impacts on certain components of biodiversity.

**Minimisation**: reduce the duration, intensity and/or extent of impacts (including direct, indirect and cumulative impacts, as appropriate) that cannot be completely avoided, as far as practically feasible.

**Rehabilitation/restoration**: rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/or minimised.

**Offset**: compensate for any residual significant, adverse impacts that cannot be avoided, minimised and/or rehabilitated or restored, in order to achieve no net loss or a net gain of biodiversity. Offsets can take the form of positive management interventions such as restoration of degraded habitat, arrested degradation or averted risk, protecting areas where there is imminent or projected loss of biodiversity.

In the event that residual significant adverse effects cannot be addressed through rigorous and exhaustive application of the mitigation hierarchy, a biodiversity offset may be an appropriate method of addressing residual effects. An offset is the last resort after all reasonable measures have been taken first to avoid and minimise the impact of a development project and then to restore biodiversity on-site (BBOP, 2012). For completeness the offsetting principles are appended as Attachment B.

#### 6.2 Management of Effects

Where possible, in moving forward with the detailed design, measures to avoid loss of trees should be maintained as a high priority by the project team. The avoidance of black beech trees should continue where possible. To date ten black beech trees have been retained either through property purchase or changing the channel design to remove impacts on



these trees. Three black beech trees need to be removed now, but if opportunities arise to retain these trees this should be taken.

The loss of kowhai (or any of these trees) can be managed through rehabilitation/restoration plantings. Although of low ecological value, as noted above, the kowhai provides important ecological resources and therefore replacement is reasonably necessary. There is no scientific method of formulating replacement planting ratios. Normally, factors taken into account are the ecological value, the risk of failure, and the time lag for re-attaining the stature lost. The method of accommodating shortfalls in these parameters (higher risk or time lag) is through multiplying the number of lost individuals to determine a replacement ratio (or number of replacements required).

Given that kowhai is a low risk tree to establish and is relatively fast growing, I recommend a replacement ratio of 3:1 – that is, three trees planted for every individual lost. As nine kowhai are affected, twenty seven replacement kowhai trees are required.

Given the Regionally Vulnerable status of black beech forest in the Wellington region and the mature status of the trees that are to be lost, I recommend a replacement planting ratio of 10:1 – that is, ten trees planted for each individual lost. As three black beech are affected, thirty replacement black beech trees are required.

Kahikatea is a fast-growing tree which is easily recruited into restoration plantings. I recommend a replacement planting ratio of 5:1 – that is, five trees planted for every individual lost. As one kahikatea is affected, five replacement kahikatea trees are required.

In total, the loss of thirteen native trees would be replaced by sixty two native trees.

#### 6.3 Proposed Rehabilitation/Restoration Treatments

The seedlings used for replacement plantings must be sourced from the same Ecological District<sup>6</sup>. With regard to black beech, a sufficient number of naturally established seedlings are available beneath the large affected beech tree at 12 Birch Grove and I recommend these seedlings be transplanted into pots to be grown-on in time for incorporation into the replacement plantings for the project. A local nursery could be commissioned to complete this task.

All seedlings for replacement planting should be of an advanced grade (>60 cm height at planting) and planted into appropriate soil and microclimate conditions. Kowhai and black

<sup>&</sup>lt;sup>6</sup> Wellington Ecological District.



beech will be suited to dryer sunny locations whereas kahikatea will tolerate wet soils but will require good light levels to thrive.

Planting locations should be as close to the point of loss as practicable. Group plantings at Willow Park or Pinehaven Reserve would also be appropriate.

#### 6.0 CONCLUSION

Provided appropriate replacement plantings at the recommended ratios are provided, and that those seedlings are ecosourced, of an advanced grade and are planted in appropriate positions, it is my view that the tree removals required by the project and the level of adverse effect on terrestrial ecology is low for black beech and very low for kowhai and kahikatea. Where possible, avoiding the loss of trees currently identified as being affected should be a priority, however where this is not possible, rehabilitationand restoration treaataments using replacement planting at the ratios proposed (resulting in sixty two replacements) is considered to adequately manage the loss of the thirteen native trees within the project area.



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Attachment A: Project Plans Showing Tree Numbering

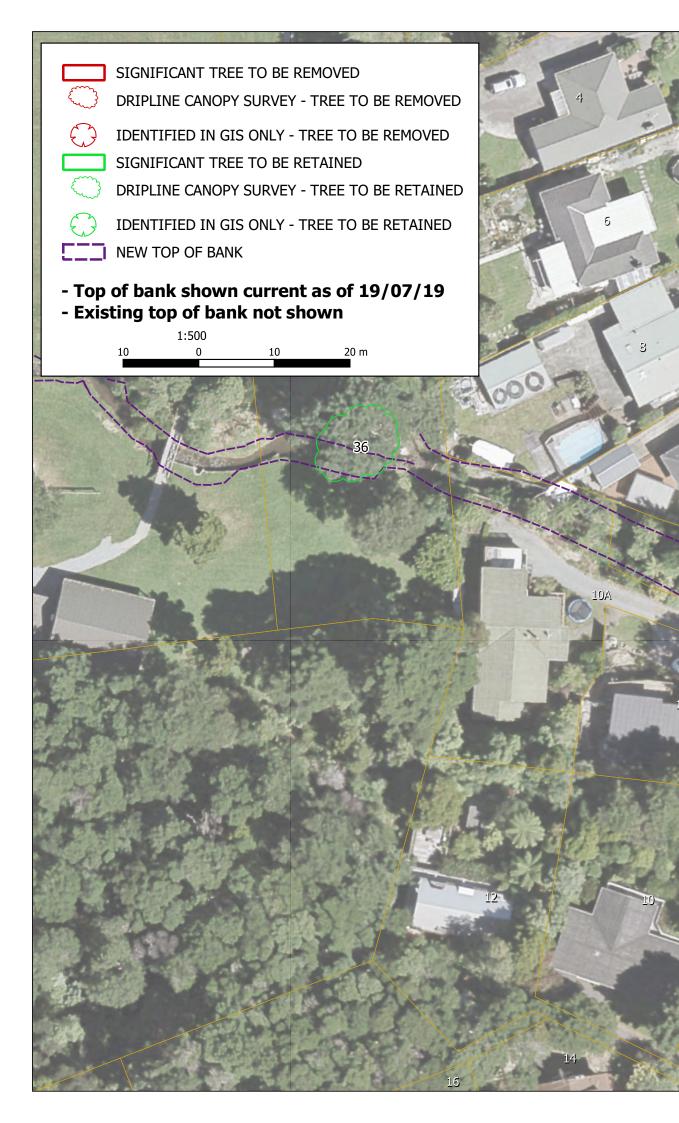














#### **Attachment B: BBOP Offsetting Principles**

The BBOP (2012) principles establish a framework for designing and implementing biodiversity offset and verifying their success. The ten BBOP (2012) principles<sup>7</sup> are as follows:

- 1. Adherence to the mitigation hierarchy: A biodiversity offset is a commitment to compensate for significant residual adverse impacts on biodiversity identified after appropriate AVOIDANCE, minimisation and on-site rehabilitation measures have been taken according to the mitigation hierarchy.
- 2. Limits to what can be offset: There are situations where residual impacts cannot be fully compensated for by a biodiversity offset because of the irreplaceability or vulnerability of the biodiversity affected.
- 3. Landscape context: A biodiversity offset should be designed and implemented in a landscape context to achieve the expected measurable conservation outcomes taking into account available information on the full range of biological, social and cultural values of biodiversity and supporting an ecosystem approach.
- 4. **No net loss**: A biodiversity offset should be designed and implemented to achieve in situ, measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity.
- 5. Additional conservation outcomes: A biodiversity offset should achieve conservation outcomes above and beyond results that would have occurred if the offset had not taken place. Offset design and implementation should avoid displacing activities harmful to biodiversity to other locations.
- 6. **Stakeholder participation**: In areas affected by the project and by the biodiversity offset, the effective participation of stakeholders should be ensured in decision-making about biodiversity offsets, including their evaluation, selection, design, implementation and monitoring.
- 7. **Equity**: A biodiversity offset should be designed and implemented in an equitable manner, which means the sharing among stakeholders of the rights and responsibilities, risks and rewards associated with a project and offset in a fair and balanced way, respecting legal and customary arrangements. Special consideration

<sup>&</sup>lt;sup>7</sup> Where capitilisation occurs below, it is as per the source.

should be given to respecting both internationally and nationally recognised rights of indigenous peoples and local communities.

- 8. **Long-term outcomes**: The design and implementation of a biodiversity offset should be based on an ADAPTIVE MANAGEMENT approach, incorporating MONITORING AND EVALUATION, with the objective of securing outcomes that last at least as long as the project's impacts and preferably in PERPETUITY.
- 9. **Transparency**: The design and implementation of a biodiversity offset, and communication of its results to the public, should be undertaken in a transparent and timely manner.
- 10. **Science and traditional knowledge**: The design and implementation of a biodiversity offset should be a documented process informed by sound science, including an appropriate consideration of traditional knowledge.



Pinehaven Stream Improvements Assessment of Ecological Effects: Avifauna – for the Pinehaven Stream

September 2017







Final

Prepared by: Alison Davis, Aristos Consultants Ltd

Reviewed by: Paul Blaschke

Date: September 2017,



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# 1.0 Introduction

A Floodplain Management Plan (FMP) for the Pinehaven catchment was finalised in 2016 by Greater Wellington Regional Council (2016). The FMP establishes goals and objectives to manage flood issues in the catchment, and proposes a series of methods including their implementation to reduce the risk of flooding damaging assets and temporarily affecting access to properties. There was significant feedback from the community living in the catchment in the development of the plan. Responsibility for implementing the plan includes both Greater Wellington Regional Council and Upper Hutt City Council (UHCC).

Methods to manage flooding include a combination of structural (physical works), nonstructural (planning controls, community awareness and preparedness) and river management (day-to-day maintenance of the watercourses). The structural methods focus on the stream channel where physical works will be undertaken to increase the capacity of the channel to cope with water flows, reduce blockages to water flow and manage flows on the floodplain.

The implementation of structural works requires a resource consent application that includes an assessment of environmental effects for the proposed methods and mitigation opportunities. This report assess the potential effects of structural works on birdlife habitat and populations within the project area of the Pinehaven Stream, and proposes opportunities for mitigating unavoidable adverse effects.

# 2.0 Background

# 2.1 Pinehaven catchment and bird habitat

The approximately 450 ha Pinehaven catchment is located in the eastern hills of Upper Hutt, and the Pinehaven Stream flows from the hills in the upper catchment, through the residential community of Pinehaven and then to Silverstream before reaching Hulls Creek and finally the Hutt River.

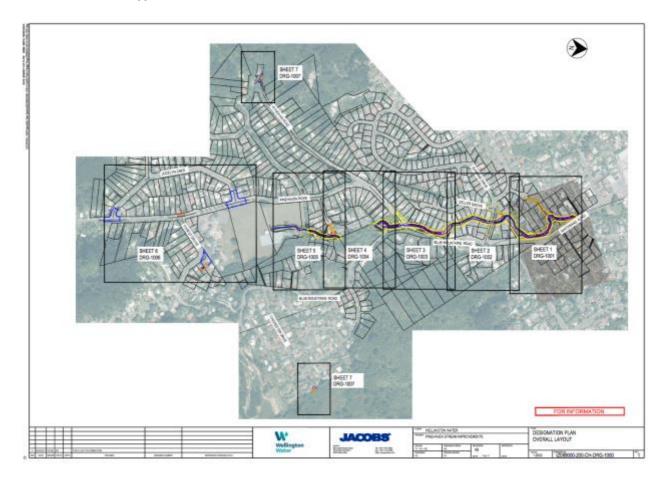
The land cover varies in the catchment; production pine forest grows in the hills of the upper catchment, the Wi Tako Scenic Reserve with its regionally significant lowland podocarp and beech forest and native bird communities is in the mid-catchment, and residential areas with a mosaic of remnant native forest and specimen trees, exotic trees, exotic and native shrubberies, weedy vegetation, gardens and lawns is in the lower catchment. There are several urban parks in the lower catchment with the Pinehaven Stream flowing through Willow Park and Pinehaven Reserve. There is a small urban centre and commercial area at the bottom of the catchment. The riparian margins of the Stream provides a mosaic of habitat types for birdlife that is predominantly tree or shrub covered. This forms a continuously linked 'wooded habitat' from the top of the catchment down to the Hutt River in the valley floor.

## 2.2. Proposed stream works

The design of the proposed works in the project area is described in the resource consent application, including where removal of existing vegetation and post-works landscape planting is proposed. Works will be undertaken within construction and operational designations. Figure 1 shows the location and general nature of the works in the Pinehaven stream.

(TO BE UPDATED AS MORE INFORMATION ON ENGINEERED WORKS IS MADE AVAILABLE)

Figure 1: Proposed works in the Pinehaven Stream to reduce flood risk. Prepared by Jacobs (Draft, September 2017). The sheets refer to detailed drawings showing the location and nature of the works, and are presented in the resource consent application.



# 3.0 Methods

#### 3.1 Field survey

A field survey to record the characteristics of bird habitat and bird populations was carried out in 2015 when the investigation for proposed solutions to mitigating flood risk began.

The project area was revisited on two occasions in mid-2017 when preparation of the resource consent application commenced. No significant change in habitat including within the watercourse of the Pinehaven Stream or its riparian margins were observed, nor any larger-scale land use changes in the catchment. The information on bird habitat and bird populations gathered in 2015 is regarded as still being relevant to the current situation.

Eight bird count stations were undertaken in areas where construction works were thought to be likely as suggested in the Flood Management Plan (2016), and as close to mature trees, as possible, with a preference given to stands of native trees (Figure 2). The location of these stations are within the area of proposed stream works shown in Figure 1 (with the exception of the Wi Tako station). Mature trees are expected to contain the best habitat for native birds. The coordinates of the count sites were recorded to enable repeatable counts should monitoring be required in the future. Bird counts at the stations were carried out using the standard five-minute bird count method (after Hartley and Greene, 2012). Two bird counts were carried out at each count station, within 10-15 minutes of each other. All counts were carried out on one day, the 16 March 2015.

At each station five minutes was spent recording the number of individuals of all bird species seen or heard from the count station. Care was taken not to record the same bird twice during a count.

## 3.2 Literature search & other information sources

A search was made for published records of birds present in the Pinehaven catchment, or any bird survey and monitoring data. Greater Wellington Regional Council have published reports on their bird monitoring of Upper Hutt reserves with mature bush areas that include Wi Tako Reserve. The Atlas of Bird Distribution in New Zealand published by the Ornithological Society in 2007 provides bird distribution data from 1999-2004, and is supplemented by more recent data from the websites eBird (http://ebird.org/) and Nature Watch (http://naturewatch.org.nz/). Both tui and kereru were commonly noted as being present in the Pinehaven catchment including around the sites surveyed in this investigation.

Resident observations including information supplied in a submission to the draft Pinehaven FMP (2014) provides further information on birds in the catchment.

#### 3.3 Data analysis

Data from the bird count stations was entered into an excel spreadsheet using a standard five-minute bird count data template. From this the total number of bird species and mean number of individuals detected at each count station was calculated. The mean number of individual birds detected shows each bird species' conspicuousness, and provides a measure of species relative abundance. The data from the counts within the stream reaches was compared to the count undertaken at Wi Tako reserve as well as from the results of the Greater Wellington monitoring programme at this reserve. With its mature native forest habitat and pest control programme in place, Wi Tako Reserve provides a reference site for what to expect for a healthy native bird population in the district. This Reserve has some of the highest recorded native bird diversity in Upper Hutt City (see Section 4.1).

Data from the field survey is not robust enough for statistical analysis. Observations were only undertaken for one day, and in case seasonal variations in bird conspicuousness would be expected. Should a programme be set up to monitor trends in bird populations in habitats along the Pinehaven Stream then a baseline has been established through this survey. As bird conspicuousness varies depending on a number of variable including time of the year, time of the day, weather conditions and the surveyor/observer it is important that any monitoring programme is designed to standardize these variables or sample the range of variation.

Figure 2: Location of bird count stations in the Pinehaven catchment.



# 4.0 Results & discussion

### 4.1 Field survey

Within the project area Pinehaven Stream is mostly an open channel with piped culverts under roads and driveways. Much of the watercourse has been realigned and in places the banks are lined with concrete or wooden retaining walls. In the upper reaches of the Stream within the Project area the watercourse is in a more natural state.

Vegetation growing on the riparian margins is a mix of mown grass or lawn, residential gardens, exotic and native shrubberies, large exotic and native trees and revegetation plantings. In the upper reaches of the Stream within the project area the riparian vegetation includes areas of native forest. Here, and in various locations along the watercourse there are mature forest canopy trees that represents the original vegetation cover (such as rimu, matai, black beech). Mature exotic trees are mostly oak, sycamore, willow and various conifers with the largest density of mature trees downstream of Sunbrae Drive and in Willow Park. These mature native and exotic trees provide habitat for native birds, including a source of seasonal food. Willow Park and Pinehaven Reserve have areas of mown grass beside the Pinehaven Stream, as have a number of private properties. These areas are of less value as native bird habitat. Where accessible the length of the stream was walked to detect the presence of any waterfowl such as ducks. No waterfowl were observed in the watercourse during survey. It is likely that mallard ducks would use the watercourse for feeding as part of a wider foraging area. Mallard duck were observed in the upper part of the Pinehaven Reserve (beyond the project area).

Results of the bird count stations are shown in Table 1.

#### Table 1: Bird species encountered at five-minute bird count stations in the lower Pinehaven catchment.

Bird Species	No. Individuals Encountered							
	54 Whitemans Road (1)	54 Whitemans Rd (2)	Willow Park (1)	Willow Park (2)	4 Sunbrae Dve (1)	4 Sunbrae Dve (2)	41 Blue Mts Rd (1)	
Native Species:								
Bellbird								
Greywarbler					1	1		
Kereru/NZ pigeon					1	1		
Kingfisher								
NZ fantail				1	1			
Silvereye	5+	2		5+				
Tomtit								
Tui	4	5	9	7	5+	4	1	
Exotic species:								
Blackbird	2	1	6	2	2	1	1	
Chaffinch								
Eastern rosella				2	1			
Greenfinch								
House sparrow			1				5+	
Song thrush			1					
Starling	1				2	1	1	

Two counts were made at each station on the 16 March 2015.

**Bird Species** 

	41 Blue Mts Rd (2)	1 Pinehaven Rd (1)	1 Pinehaven Rd (2)	10B Birch Grove (1)	10B Birch Grove (2)	Pinehaven Rve – lower (1)	Pinehaven Rve - lower (2)
Native Species:							
Bellbird				2		1	1
Greywarbler						1	
Kereru/NZ pigeon		1					
Kingfisher				1			
NZ fantail				1	1	1	1
Silvereye	2			1	1	4	4
Tomtit					1		1
Tui	2	2	2			2	2
Exotic species:							
Blackbird	1	1	2	1	2	3	3
Chaffinch							
Greenfinch						1	
Eastern rosella							
House sparrow	5+	5+			5+		
Song thrush							
Starling	2	2		3	3	1	2

## 4.2 Bird records from the Pinehaven catchment

#### 4.2.1 Wi Tako reserve

Greater Wellington Regional Council undertake regular bird monitoring in the Wi Tako scenic reserve, which is in the lower Pinehaven catchment and in close proximity to the five-minute bird stations established for this survey (Appendix 1). The 59 ha Wi Tako Reserve has original stands of beech-podocarp forest and areas of regenerating kanuka forest.

Wi Tako Reserve, along with Keith George Memorial Park is regarded as two of the most important reserves for native birds in the Upper Hutt area (McArthur, Moylan and Crisp, 2012). The two reserves support diverse native bird communities with silvereye, grey warbler and tui being the most frequently encountered bird species. Whitehead and tomtit, both scarce species in the Upper Hutt area, were frequently encountered in the Wi Tako reserve, and kakariki, bellbird and rifleman were all detected for the first time in Wi Tako reserve in 2011. Blackbird, chaffinch and eastern rosella were found to be the most frequently encountered exotic bird species in Upper Hutt reserves.

Native birds recorded in the Wi Tako reserve are likely to regularly move into adjoining areas, primarily in search of food sources. This may be to visit seasonal flowering or fruiting native species such as kowhai, rimu and kahikatea, to feed on new shoots of exotic trees species such as willow or on insects that proliferate on exotic trees at certain times of the year.

The high number of tui feeding on insects inhabiting the mature willows within Reach 1 were observed to be flying between this location and the Wi Tako Reserve. Pinehaven residents report seeing abundant numbers of tui and kereru feeding on kowhai flowers and shoots in the spring. A submission on the draft Pinehaven FMP makes the following observation:

#### "I have counted 21 tui in one tree one day.

The Kereru also use this area and feed on some of the trees along this corridor. There are 4 mature kowhai trees on the stream area just by our place alone as well as various other species that tui, wax eyes, fantails and kereru feed on and use". (Lyn Baines).

The apparent high population numbers of these two native bird species living along the Pinehaven watercourses would be supported by habitat from a wider area in the catchment including the Wi Tako reserve.

Whitehead, bellbird, tomtit and rifleman are less likely to inhabit the riparian margins of the Pinehaven watercourse, preferring contiguous areas of native forest habitat rather than fragmented mixed native and exotic vegetation such as found along the majority of the riparian margins. Also, bellbird, tomtit and rifleman are very susceptible to predation from rodents, mustelids and cats, and have only re-established in Wi Tako Reserve after a sustained predator control programme here (McArthur, Moylan and Crisp, 2012). These pests are more prevalent in residential areas.

The bellbird and tomtit encountered at Birch Grove and Pinehaven Reserve were heard at some distance from the count stations (and the streamside) in an area of beech forest that is contiguous with the Wi Tako reserve. A bird count station was undertaken on the southern side of Wi Tako Reserve (Figure 2) to enable a comparison of birds encountered in a relatively large area of contiguous native forest habitat compared to the fragmented mixed exotic-native vegetation in the stream sides in the lower Pinehaven catchment. Birds encountered here are shown in Table 2.

Table 2:Bird species encountered at five-minute bird count stations at Wi Tako reserve in the lower Pinehaven catchment. Two counts were made at the station on the 16 March 2015.

Bird Species	No. Individuals Encountered						
	Stream Reach 3						
	Wi Tako Reserve (1)	Wi Tako Reserve (2)					
Native Species:							
Bellbird		1					
Grey warbler	2	1					
Kereru/NZ pigeon		1					
Sacred kingfisher							
Silvereye	5+	5+					
Tomtit	1	1					
Tui	2	1					
Exotic species:							
Chaffinch	1	1					
Common starling	1						
Eurasian blackbird	1	1					

#### 4.2.2 Pinehaven catchment

A relatively high cover of wooded vegetation, both native and exotic tree species grow in the Pinehaven catchment, and along with shrubberies in residents gardens and revegetation plantings along the stream provide good habitat for both native and exotic bird species.

Bird species observed in the wider Upper Hutt area that would be expected in the Pinehaven catchment have been collated from the Atlas of bird distribution in New Zealand 1999–2004 (Robertson, Hyvönen, Fraser, & Pickard, 2007), and NZ birds online (2015) and eBird (2015) online records (Table 3).

Table 3: Bird species recorded in the Upper Hutt area that are likely to inhabit or visit the Pinehaven catchment.

An assessment of the likelihood of their presence along the Pinehaven streamsides is made. Sources: Atlas of bird distribution in New Zealand 1999–2004 (Robertson, Hyvönen, Fraser, & Pickard, 2007), and NZ Birds online (2015) and eBird (2015) online records.

			Presence along the Pinehaven
Common Name	Scientific Name	Conservation status	watercourse
Australasian harrier	Circus approximans	Not Threatened	Possible in open areas
Australian magpie	Gymnorhina tibicen	Introduced and Naturalised	Possible (if present in catchment)
Bellbird	Anthornis melanura	Not Threatened	Observed during field visit 15/3/15
Blackbird	Turdus merula	Introduced and Naturalised	Observed during field visit 15/3/15
Chaffinch	Fringilla coelebs	Introduced and Naturalised	Observed during field visit 15/3/15
Dunnock	Prunella modularis	Introduced and Naturalised	Likely
		Introduced and	
Eastern rosella	Platycercus eximius	Naturalised	Observed during field visit 15/3/15

Common Name	Scientific Name C	onservation status	Presence along the Pinehaven watercourse
	Scientific Ivallie G	Introduced and	watercourse
Goldfinch	Carduelis carduelis	Naturalised	Likely
Ooldinen	Carddens carddens	Introduced and	Observed during field visit
Greenfinch	Carduelis chloris	Naturalised	15/3/15
Greeninion		i vatar anoca	Observed during field visit
Greywarbler	Gerygone igata	Not Threatened	15/3/15
		Introduced and	Observed during field visit
House sparrow	Passer domesticus	Naturalised	15/3/15
Kakariki/Red-			
crowned parakeet	Cyanoramphus novaezelandiae	Relict	Possible (occasional visitor)
Kakariki/Yellow-	2 1		, , , , , , , , , , , , , , , , , , ,
crowned parakeet	Cyanoramphus auriceps	Not Threatened	Possible (occasional visitor)
			Observed during field visit
Kereru/NZ pigeon	Hemiphaga novaeseelandiae	Not Threatened	15/3/15
			Observed during field visit
Kingfisher	Todiramphus sanctus	Not Threatened	15/3/15
Little shag	Phalacrocorax melanoleucos	Not Threatened	Possible (occasional visitor)
Long-tailed cuckoo	Eudynamys taitensis	Naturally Uncommon	Possible (seasonal visitor)
		Introduced and	Observed during field visit
Mallard	Anas platyrhynchos	Naturalised	15/3/15
Morepork	Ninox novaeseelandiae	Not Threatened	Likely
NI Kaka	Nestor meridionalis	Nationally Vulnerable	Possible (occasional visitor)
NZ falcon	Falco novaeseelandiae	Nationally Vulnerable	Possible (occasional visitor)
INZ IAICULI	I AICU HUVAESEEIAHUIAE	INALIONALLY VULLETADLE	Observed during field visit
NZ fantail	Phinidura fuliginosa	Not Threatened	15/3/15
	Rhipidura fuliginosa	Not mieateneu	Possible in open areas near
Paradise shelduck	Tadorna variegata	Not Threatened	stream
Pipit	Anthus novaeseelandiae	Declining	Unlikely
три	Antinus novaeseelandiae	Deciming	Possible in open areas near
Pukeko	Porphyrio melanotus	Not Threatened	stream
		Introduced and	Stroam
Redpoll	Carduelis flammea	Naturalised	Likely
Rifleman	Acanthisitta chloris	Declining	Unlikely
Tallerhan		Introduced and	Possible (if present in
Rock pigeon	Columba livia	Naturalised	catchment)
Shining cuckoo	Chrysococcyx lucidus	Not Threatened	Likely (seasonal)
	e		Observed during field visit
Silvereye	Zosterops lateralis	Not Threatened	15/3/15
,0		Introduced and	
Skylark	Alauda arvensis	Naturalised	Possible in open areas
<i>,</i>		Introduced and	Observed during field visit
Songthrush	Turdus philomelos	Naturalised	15/3/15
Spur-winged plover	, Vanellus miles	Not Threatened	Possible in open areas
		Introduced and	Observed during field visit
Starling	Sturnus vulgaris	Naturalised	15/3/15
~			Observed during field visit
Tomtit	Petroica macrocephala	Not Threatened	15/3/15
	·		Observed during field visit
Tui	Prosthemadera novaeseelandiae	Not Threatened	15/3/15
Welcome swallow	Hirundo neoxena	Not Threatened	Likely
Whitehead	Mohoua albicilla	Not Threatened	Possible (occasional visitor)
		Introduced and	()
Yellowhammer	Emberiza citrinella	Naturalised	Likely

## 4.3 Bird species diversity and relative abundance

Bird species diversity at the bird count stations varied between four and eight species, with native bird species dominating at five of the eight stations (Table 4). The relatively high diversity at Pinehaven Reserve, which equaled that of the mature native forest habitat at Wi Tako Reserve, was due to the proximity of the remnant native forest at the count station in the Pinehaven Reserve. Birds moved between this remnant and the count station located in the open area beside the Pinehaven Stream, and could also be heard calling from the remnant forest.

A mean of 3.14 native bird species was detected from the count stations along the stream reaches, which compares favorably with a mean number of 3.28 native birds detected from monitoring birds in a network of Upper Hutt bush reserves in 2011 (McArthur, Moylan and Crisp, 2012).

However, by comparison 12 native bird species were detected in the Wi Tako Reserve from the same monitoring programme (this was the highest number of native bird species recorded for any of the Upper Hutt reserves where monitoring took place), which shows the number of bird species in the lower Pinehaven Stream reaches is considerably lower than it could potentially be with suitable habitat quality and pest control.

Table 4. Rird species diversity at	count stations along the Pinehaven	Stream within the project area
Tuble 4. Dif a species alversity at	count stations along the Finenaven.	su eum within the project urea.

Bird Species Diversity Pinehaven Stream - Project Are						Reference site			
	54 Whitemans Road	Willow Park	4 Sunbrae Drive	41 Blue Mts Rd	1 Pine- haven Rd	10B Birch Grove	Pinehaven Reserve	Wi Tako Reserve	
No.native									
bird species	2	3	4	2	2	4	5	5	
No. exotic bird species	2	2	3	3	3	3	3	3	
Total species	4	5	7	5	4	6	8	8	

Counts were undertaken on the 16 March 2015

Among the native bird species tui followed by silvereye were the most commonly detected bird species at the count stations along the lower Pinehaven Stream reaches (Table 5). Tui were moving to locally abundant food sources; at this time of the year this was for insects on crack willows that can reach high population densities in the late summer/early autumn. As there was competition to access this food source tui were very vocal as they fought to obtain and guard this food. Silvereye are known to form post-breeding flocks in late summer and the autumn, and numbers of individuals in these flocks can reach in excess of 100 birds (pers.obs.). Tui and silvereye were also the most widespread of the native bird species.

From the monitoring of birds in a network of Upper Hutt bush reserves in 2011, silvereye, grey warbler and tui were found to be the most frequently encountered native forest bird species (McArthur, Moylan and Crisp, 2012). Greywarbler, while inhabiting areas of exotic vegetation, are also found in high densities in native bush.

Blackbird and starling were the most commonly detected exotic species, and also the most widespread species being detected at all count stations. Blackbird was also the most frequently encountered exotic bird species in the Upper Hutt reserves in 2011 (McArthur, Moylan and Crisp, 2012), but chaffinch and eastern rosella were the next most commonly detected exotic species. Both chaffinch and eastern rosella favour native forest habitats, while starling is far more common in mixed native/exotic vegetation and gardens.

Table 5: Conspicuousness or relative abundance of bird species at count stations along the Pinehaven Stream within the project area.

#### Counts were undertaken on the 16 March 2015

Native	Mean No. Individuals Encountered							
species								Reference
conspicuous-			Pinehaver	n Stream - Pr	oject Area			site
ness or	54			41 Blue	1 Pine-	10B		
relative	Whiteman	Willow	4 Sunbrae	Mts	haven	Birch	Pinehave	Wi Tako
abundance	s Rd	Park	Dve	Road	Road	Grove	n Reserve	Reserve
Bellbird						1	1	1
Greywarbler			1				0.5	1.5
Kereru/NZ								
pigeon			1		0.5			
NZ fantail		0.5	0.5			1	1	
Kingfisher						0.5		
Silvereye	3.5	2.5		1		1	4	5
Tomtit						0.5	0.5	1
Tui	4.5	8	4.5	1.5	2		2	1.5
Whitehead								2.5

Exotic bird			Mea	an No. Individ	uals Encounter	ed		
species							F	Reference
conspicuous-			Pinehaver	n Stream - Pro	oject Area		S	site
ness or	54				1	10B		
relative	Whiteman	Willow	4 Sunbrae	41 Blue	Pinehave	Birch	Pinehave	Wi Tako
abundance	s Rd	Park	Drive	Mts Rd	n Road	Grove	n Reserve	Reserve
Blackbird	1.5	4	1.5	1	1.5	1.5	3	1
Chaffinch								1
Eastern								
rosella		1	0.5					
Greenfinch							0.5	
House								
sparrow		0.5		5	2.5	2.5		
Song thrush		0.5						
Starling	0.5		1.5	1.5	1	3	1.5	0.5

#### 4.4 Effects of proposed structural works on bird ecology

#### 4.4.1 48 Whitemans Rd to Willow Park (Sheet 1)

#### Works proposed include:

For this section of Pinehaven Stream it is proposed to widen the stream channel to accommodate increased water flow and remove blockages to flows. The channel will remain more or less in its existing path. At Willow Park in addition to widening of the channel the riparian margins on the true right will be reshaped to accommodate flood waters. This will extend over most of the Park area. Removal of low growing shrubs, herbaceous plants, grass and early stage revegetation plantings will occur during construction.

Eight larger trees will be removed, including mature rimu, kahikatea and kowhai (Table 6). Three oak trees will be removed. Five mature native trees growing on the stream edge will be retained.

## Effects on birds include:

Loss of the mature native trees in this stream section will lead to the loss of feeding, roosting and possibly breeding habitat for native (and exotic) birds. At 54 Whitemans Rd the mature kowhai trees provide a seasonal food source for kereru and tui, as would rimu and kahikatea during fruiting. However, in the wider catchment including in other sections of the Pinehaven Stream these tree species as well as other native flowering and fruiting plant species are relatively common, and it is expected birds would switch to alternative sources. Exotic oak trees may be of value to native birds with new leaves in spring providing a source of food for kereru, and insects on new growth (aphids, mealy bugs) for insectivores such as greywarbler. Tui are also likely to feed on insects on oak foliage. The loss of trees as well as other lower stature vegetation growing in this stream section would open up a small gap in the mostly intact wooded corridor down the Pinehaven Stream. While this could be a problem for the movement of some native insects and reptiles it would not create a barrier to the movement of native birds present in the catchment.

The removal of willow trees at Willow Park will result in a loss of a seasonal feeding source for kereru, tui and possibly insectivorous native birds including fantail and greywarbler. However, in the wider catchment including in other riparian areas of the Pinehaven Stream willow as well as native flowering and fruiting plant species are relatively common, and it is expected birds would switch to alternative sources.

Adverse effects on native birds from the loss of the mature native trees and willows is not regarded as significant in the long-term, although there will be minor medium-term adverse effects from the loss of some food sources.

#### Avoidance and mitigation measures suggested include:

Removal of mature native trees especially podocarp species and kowhai that provide seasonal food sources will be avoided as far as possible.

Revegetation of the riparian margins following works is proposed for this stream section. This would provide the opportunity to improve the habitat for native birds by providing a greater diversity and number of future native canopy and understorey species, and facilitating natural regeneration processes.

At a number of locations there is the opportunity for an increased corridor width of native vegetation to be established improving resilience of native vegetation from weed invasion.

Planting of future canopy species including kahikatea and rimu, plants that fruit heavily such as hinau and karamu, flower heavily such as kowhai and flax, or host abundant insects such as lacebark should be included in revegetation plantings.

With increasing maturity the revegetation plantings will provide improved habitat quality for native birds such as tui, kereru, greywarbler and fantail.

Removal of existing weeds including on-going weed control would improve the quality of the native vegetation and avoid disruption of natural regeneration processes.

Consideration to delaying removal of willow trees until revegetation plantings are wellestablished provide alternative food sources should be considered.

Pest control including of mustelids and rodents, and encouraging responsible cat ownership in the catchment would reduce threats to native birds, and could led to the re-establishment of less common native birds – such as bellbird, rifleman and kakariki in the riparian margins along the Stream.

At Willow Park extensive native plantings are proposed in the broad area established to accommodate flood flows. There is the opportunity to increase habitat diversity by establishing wetland habitat. Birds such as pukeko would benefit from creation of this habitat.

## 4.4.2 4 Sunbrae Drive to 40 Blue Mountain Rd (Sheet 2 and part Sheet 3)

#### Works proposed include:

A new bridge is proposed to be constructed where the Pinehaven Stream currently flows in a culvert under Sunbrae Drive. Here the stream channel will be widened and realigned, blockages in the channel removed and secondary flow paths cleared of woody vegetation. The channel will remain more or less in its existing path. Beyond Sunbrae Drive to 40 Blue Mountain Road the Stream will be widened and where there are engineered stream bank linings these will be removed to restore natural banks. At 26 and 28 Blue Mountains Rd the stream course will be realigned to reduce the curve of the bend in addition to being widened considerably.

Removal of low growing shrubs, herbaceous plants, grass and a limited area of established revegetation plantings will occur during construction. Five larger trees will be removed, including two kowhai and three exotic trees (Table 6). Two of the exotic trees are an oak and a Prunus sp. That may be of value to native birds for a food source. Much of the vegetation growing in the stream section is a younger age than the downstream section, and is predominately exotic species.

#### Effects on birds include:

Habitat for native birds is only of moderate quality in this section – relatively young revegetation plantings are establishing on the south bank while a mix of exotic trees, some self-established native shrubs and weeds grow on the north bank.

Loss of kowhai would remove seasonal food sources for tui and kereru, but kowhai is common in the Pinehaven catchment including among garden plantings. Loss of the oak and Prunus sp. will also remove a possible food source. As the species to be removed are common in the catchment it is expected birds would switch to alternative sources.

Adverse effects on native birds in the catchment from the loss of the mature native trees and willows is not regarded as significant in the long-term, although there will be minor medium-term adverse effects from the loss of some food sources.

Gaps in the mostly intact wooded corridor down the Pinehaven Stream would be created. While this could be a problem for the movement of some native insects and reptiles it would not create a barrier to the movement of native birds present in the catchment.

The modifications to the streamside vegetation in this section would have less than minor adverse effects on native birds.

#### Avoidance and mitigation measures suggested include:

Revegetation of the streamside following works is proposed for this stream section. This would provide the opportunity to reinstate the revegetation plantings and increase the proportion of native tree species. This would provide an increased habitat area for native birds and improve the wooded link down the length of the Pinehaven Stream. As with the downstream section planting of species that fruit heavily or host abundant insects should be included in revegetation plantings.

Weed and pest animal control for this section of the Pinehaven Stream would produce similar benefits to the downstream section.

# 4.4.3 1 Pinehaven Rd to 12 Birch Grove (part Sheet 3 and Sheet 4)

#### Works proposed include:

It is proposed to upgrade the bridge where the Pinehaven Stream crosses the start of Pinehaven Road. Immediately upstream of the bridge for approximately 80m the stream will be widened and a secondary channel created where a dwelling will be removed. Four larger trees will be removed, including a large black beech, a rimu and matai that are yet to reach maturity and a large oak tree (Table 6). Understorey shrubs and ground cover that is a mix of native and exotic weeds will be removed during construction. Seven mature native trees, mostly black beech growing near the channel edge will be retained.

Upstream of these works the stream that will be left undisturbed until where it passes Birch Grove.

## Effects on birds include:

Vegetation growing here is a mix of mature native trees including a stand of beech trees, maturing native revegetation plantings and various exotic trees and shrubs that is of good quality habitat for native birds. Removal of the mature trees will result in loss of feeding, roosting and possibly breeding habitat for native birds.

Gaps in the mostly intact wooded corridor down the Pinehaven Stream would be created. While this could be a problem for the movement of some native insects and reptiles it would not create a barrier to the movement of native birds present in the catchment.

Adverse effects on native birds from the loss of the mature trees and opening up of the wooded canopy is not regarded as significant in the long-term, although there will be minor medium-term adverse effects from the loss of bird habitat.

Construction of the secondary channel will have no effect on terrestrial native birds, but could benefit the exotic mallard duck by providing increased instream habitat.

Avoidance and mitigation measures suggested includes:

Clearance of mature native trees will be avoided where possible – for instance, seven mature native trees will be retained at the work site. These include black beech, matai and kowhai. The latter two species provide season I food sources for kereru and tui, while black beech provides sources of food for native birds including honeydew from beech scale insects especially in winter and seeds especially in mast years. Revegetation of the streamside following the works is proposed. Planting of future canopy species including kahikatea and rimu, plants that fruit heavily such as hinau and karamu, flower heavily such as kowhai and flax, or host abundant insects such as lacebark should be planted in cleared areas. Black beech should also be planted to replace the mature tree that is removed at 1 Pinehaven Rd. There will be a lag time to replace the loss of the three mature native trees, so an appropriate compensation for this may be to undertake weed and pest control along the length of Pinehaven Stream from its headwaters to 48 Whitemans Rd and/or extend revegetation plantings through Pinehaven Reserve (see below).

Weed and pest animal control for this section of the Pinehaven Stream would produce similar benefits to the two downstream sections.

# 4.4.4 12 Birch Grove to Pinehaven Reserve (Sheet 5)

#### Works proposed include:

At 12 Birch Grove it is proposed to widen the stream channel to accommodate increased water flow and remove blockages to flows. The channel will remain more or less in its existing path. The engineered stream bank linings here will be removed to restore natural banks.

Removal of low growing shrubs, herbaceous plants and grass will occur during construction. No trees will be removed that includes six mature native trees (black beech, kowhai) growing on the stream edge or side channels will be retained (Table 6).

No works are proposed for Pinehaven Reserve.

#### Effects on birds include:

Habitat for native birds is of moderate to good quality in this section. There are mature native canopy trees in places on the north bank, but the south bank has mixed shrubberies and grass areas. Loss of vegetation will be restricted to low stature shrubs, smaller garden tree specimens and grass areas, while mature trees will be retained. The modifications to the streamside vegetation in this section would have less than minor adverse effects on native birds.

## Avoidance and mitigation measures suggested include:

Clearance of mature native trees will be avoided – for instance six mature native trees will be retained at the work site. These include black beech and kowhai that provide food sources, roosting and breeding sites for native birds.

While no structural works are proposed in the Pinehaven Reserve there is an opportunity to enhance the ecological values of the Pinehaven Stream and its riparian margins by revegetation plantings. Currently the riparian margins is mostly mown grass. Extending planting to connect native riparian vegetation with native bush on the boundary of the Pinehaven Reserve would establish a physical link between the Wi Tako Reserve and the wooded stream corridor.

The Wi Tako Reserve has the highest native bird species diversity among reserves in the Upper Hutt district and could be considered a source of native birds to populate the lower value habitat in the rest of the Pinehaven catchment.

# 4.4.5 Jocelyn Crescent (Sheet 6) and Wyndham and Chichester (Sheet 7)

Due to the nature of the works at the three sites no effects on bird habitat or populations are anticipated.

Table 6: Larger trees within the Pinehaven Stream project area – proposed to be removed or retained

Pinehaven Tree notation and assessment summary (Paul Blaschke July 2017)				
No. of Tree on Plan Sheets (Jacobs Sept 2017)	Species	Bird Habitat Quality	Further Notes from Design Received 12 Sept 17	
1	Kahikatea	Mature tree - autumn food source for tui, kereru, silvereyes	Retain	
2	Kahikatea	Mature tree - autumn food source for tui, kereru, silvereyes	Remove	
3	Rimu	Medium maturity - not fruiting yet so full value to be realised?	Retain	
4	Rimu	Mature tree - autumn food source for tui, kereru, silvereyes	Remove	
5	Black beech	Mature tree - food source for birds, honeydew from beech scale insects especially in winter, seeds especially in mast years, insects	Retain	
6	Titoki	Medium maturity - not fruiting yet so full value to be realised?	Remove	
7, 8	Oaks (2)	Possible value to birds - new leaves in spring, insects on new growth (aphids, mealy bugs)	Remove	
9	Kowhai	When flowering important nectar source for tui, and shoots for kereru. Also, insects for insectivores e.g. greywarbler. However, kowhai is common in gardens in PinehavenRemove		
10	Rimu	Medium maturity - not fruiting yet so full value to be realised	Remove	
11	Kowhai	When flowering important nectar source for tui, and shoots for kereru. Also, insects for insectivores e.g. greywarbler. However, kowhai is common in gardens in Pinehaven		
12	Black beech	Mature tree - food source for birds, honeydew from beech scale insects especially in winter, seeds especially in mast years, insects	Retain	
13	Oak	Possible value to birds - new leaves in spring, insects on new growth (aphids, mealy bugs)	Remove	
No numbers allocated	Several crack willows	Willow - key food source for tui (insects) and kereru (leaf shoots), native - immature, less importance, gum - negalible importance to birds	Remove	
14	Kowhai	When flowering important nectar source for tui, and shoots for kereru. Also, insects for insectivores e.g. greywarbler. However, kowhai is common in gardens in Pinehaven	Remove	
15	Fir	No value as a food source	Remove	

16	Prunus sp.	Possible value - insects	Remove
17	Oak	Possible value to birds - new leaves in spring, insects on new growth (aphids, mealy bugs)	Remove
18	Kowhai	When flowering important nectar source for tui, and shoots for kereru. Also, insects for insectivores e.g. greywarbler. However, kowhai is common in gardens in Pinehaven	Remove
19	Fir	No value as a food source, would provide roosting habitat	Retain
20	Oak	Possible value to birds - new leaves in spring, insects on new growth (aphids, mealy bugs)	Remove
21	Black beech	Mature tree - food source for birds, honeydew from beech scale insects especially in winter, seeds especially in mast years, insects	Remove
22	Rimu	Medium maturity - not fruiting yet so full value to be realised?	Remove
23	Matai	Medium maturity - not fruiting yet so full value to be realised?	Remove
24	Black beech	Mature tree - food source for birds, honeydew from beech scale insects especially in winter, seeds especially in mast years, insects	Retain
25	Black beech	Mature tree - food source for birds, honeydew from beech scale insects especially in winter, seeds especially in mast years, insects	Retain
26	Black beech	Mature tree - food source for birds, honeydew from beech scale insects especially in winter, seeds especially in mast years, insects	Retain
27	Matai	Mature tree - food source for tui, kereru, silvereyes	Retain
28	Black beech	Mature tree - food source for birds, honeydew from beech scale insects especially in winter, seeds especially in mast years, insects	Retain
29	Several kowhai	Mature tree - food source for tui, kereru, silvereyes	Retain
30	Black beech	Mature tree - food source for birds, honeydew from beech scale insects especially in winter, seeds especially in mast years, insects	Retain
31	Black beech	Mature tree - food source for birds, honeydew from beech scale insects especially in winter, seeds especially in mast years, insects	Retain
32	Black beech	Mature tree - food source for birds, honeydew from beech scale insects especially in winter, seeds especially in mast years, insects	Retain
33	Kowhai (3)	When flowering important nectar source for tui, and shoots for kereru. Also, insects for insectivores e.g. greywarbler. However, kowhai is common in gardens in Pinehaven	Retain

# 4.0 Summary and recommendations

For an urban catchment, the lower Pinehaven catchment has a large percent in forest, both native and exotic species. There is regionally significant lowland podocarp and beech forest, as well as remnant native tree stands and specimens in parks and reserves, as well in residential gardens. Overall there is good quality native bird habitat in the lower catchment, and the Wi Tako reserve has arguably the highest quality native bird habitat in the district.

The Pinehaven Stream as it meanders through the lower catchment is largely an open channel although in many places the stream banks have been altered or engineered with a combination of natural banks and lined banks. The largely continuous corridor of wooded vegetation (native and exotic plant species) from the upper to the lowest reaches of the catchment where the stream is piped provides an excellent opportunity to connect the larger forested areas in the upper catchment with the Hutt River in the valley floor. The stream corridor provides habitat for native birds and a means to move to seasonal food sources in the catchment and dispersal beyond this.

Sixteen species of birds (nine native, seven exotic), were encountered in the Pinehaven stream reaches and streamside during the field survey, and the native bird density is similar to that found in a range of bush reserves in the Upper Hutt district. Further surveys in the Pinehaven Stream corridor would likely detect more species of birds - in total there are 39 species of birds known or likely to be present in the Pinehaven catchment. Tui and silvereye were the commonest native birds detected during the survey, and blackbird and starling the commonest exotic birds. Again, this is a similar pattern to that found by bird monitoring in the Upper Hutt bush reserves.

The effects of works proposed to reduce the risk of flooding in the catchment on bird habitat and populations was assessed, and it was concluded that no more than minor or less than minor effects on bird habitat and populations. Although there will be short-to medium-term loss of seasonal food supply, and creation of open canopy until native vegetation plantings re-establishes and matures.

Recommendations are made on how to lessen adverse effects on native bird habitat from the works including opportunities to improve native bird habitat.

These include avoiding the removal of mature native tree species such as kowhai, rimu and totara where possible as they are important seasonal feeding sources for native birds in the catchment, delaying the removal of mature crack willow trees, which are an important a seasonal feeding source for tui and kereru in particular, and replacing vegetation removed for works with native plant species that are typical of the location and provide high quality feeding source for birds.

Although no works are proposed for Pinehaven Reserve this area presents an ideal opportunity to improve bird habitat along the Pinehaven Stream (and for other ecological in-stream benefits) and close one of the open 'gaps' in the wooded vegetation along the stream corridor.

Weed and pest animal control is proposed to realise the full benefit of the revegetation planting proposed for the stream corridor.

In the longer-term revegetation planting will impede habitat for native birds, increased diversity and proportion of native species compared to exotic species, improved resilience to weed invasion and strengthening ecological connectivity down the stream corridor by a more intact native tree canopy. With the proximity of the Wi Tako reserve with its high native bird diversity nearby there is the potential opportunity for rare birds such as bellbird and rifleman to establish in the stream corridor.

# 5.0 References

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# 6.0 APPENDICES

# Appendix 1: Birds recorded in the Wi Tako Reserve, Pinehaven hills

Source: McArthur, N., Moylan, S. and Crisp, P. 2012. State and trends in the diversity, abundance and distribution of birds in Upper Hutt reserves, June 2012. Greater Wellington Regional Council, Publication No. GW/EMI-T-12/200, Upper Hutt.

#### Wi Tako Reserve

Scientific Name	Common Name	Threat Ranking	2009	2010	2011
Acanthisitta chloris	rifleman	DE			Р
Anas platyrhynchos	mallard	1	Р		
Anthornis melanura	bellbird	NT			P
Carduelis carduelis	goldfinch	I			Р
Chrysococcyx lucidus	shining cuckoo	NT	Р	Р	Р
Circus approximans	swamp harrier	NT	Р		
Cyanoramphus sp (novaezelandiae?)	kakariki	RE			Р
Fringilla coelebs	chaffinch	1	Р	Р	P
Gerygone igata	grey warbler	NT	Р	Р	P
Gymnorhina tibicen	Australian magpie	I	Р	Р	
Hemiphaga novaeseelandiae	New Zealand pigeon	NT	Р	Р	Р
Larus dominicanus	black-backed gull	NT	Р	Р	Р
Mohoua albicilla	whitehead	NT			Р
Passer domesticus	house sparrow	1			P
Petroica macrocephala	tomtit	NT	Р	Р	P
Platycercus eximius	castern rosella	I	Р	Р	Р
Porphyrio porphyrio	pukeko	NT	Р	Р	Р
Prosthemadera novaeseelandiae	tui	NT	Р	Р	Р
Prunella modularis	dunnock	1			Р
Rhipidura fuliginosa	fantail	NT	Р	Р	P
Sturnus vulgaris	starling	I	Р	Р	
Tadorna variegata	paradise shelduck	NT	Р	Р	P
Todiramphus sanctus	New Zealand kingfisher	NT	Р	Р	P
Turdus merula	blackbird	I	Р	Р	Р
T. philomelos	song thrush	I	Р	Р	Р
Vanellus miles	spur-winged plover	NT	Р		
Zosterops lateralis	silvereye	NT	Р	Р	Р

# Appendix 2: Upper Hutt District Plan - Chapter 27A: Urban Tree Groups and Indigenous Vegetation Removal

# 27.17 Rare or threatened indigenous vegetation and fauna2) Indigenous fauna (in Upper Hutt District)

Species	Common Name	Presence in Project Area
Chalinolobus tuberculata	Long-tailed bat	Possible – suitable habitat exists, roost in larger trees especially trees with cavities
Botaurus poiciloptilus	Australian bittern	No
Phalacrocorax carbo novaehollandiae	Black shag	Possible – occasional visitor using stream corridor
Falco novaseelandiae <b>'bush'</b>	Bush falcon	Likely – occasional visitor from wider native forest areas
Anas superciliosa superciliosa	Grey duck	Possible – in less modified upper stream reaches
Eudynamys taitensis	Long-tailed cuckoo	Likely – occasional visitor from nearby native forest areas
Poliocephalus rufopectus	New Zealand dabchick/ weweia	No
Hemiphaga novaseelandiae	New Zealand pigeon/kereru/kukupa	Yes – relatively common, resident population, seasonal visits for food sources
Nestor meridionalis septentrionalis	North Island kaka	Possible – very occasional visitor from wider native forest areas
Porzana tabuensis plumbea	Spotless crake	No
Cyanorhamphus auriceps	Yellow-crowned kakariki	Likely – occasional visitor from nearby native forest areas
Hoplodactylus pacificus (Dactylocnemis pacificus)	Pacific gecko	Upper Hutt only, forest habitat, arboreal. Pacific geckos were recorded in Upper Hutt-Blue Mountains (1965) & Pinehaven (1965) but there are no recent records. There is some debate about whether these reports are of natural occurring populations or captive escapees. Unless more recent sightings are reported it is unlikely that this species is present in the Pinehaven catchment.
Naultinus e. punctatus	Wellington green gecko	Widespread in Wellington Region, shrubland & scrub (kanuka, manuka) habitat, arboreal. Possibly present in low numbers in more open shrubby areas along the Pinehaven Stream. If present would be threatened by predation from cats and rats.
Hoplodactylus 'southern North Island forest gecko' (Mokopirirakau "Southern North Island")	Southern North Island forest gecko	Widespread in Wellington Region, forest habitat. More likely to be present in mature forest, but are found in scrubland. Likely to be present in mature native trees/areas of forest along the Pinehaven Stream. Because of the predation pressures from cats and rats population are likely to be low.
Oligosoma lineoocellatum	Spotted skink	Sparse, scattered populations in Wellington Region. No records from the Pinehaven catchment. While can live in a range of native habitat types most sightings are in rocky habitat, probably refugia for remnant populations.



# Appendix T. Archaeological Assessment



# **Pinehaven Stream Improvements** Archaeological assessment of Pinehaven Stream Floodplain Management

July 2017







# Archaeological assessment of Pinehaven Stream Floodplain Management for Jacobs Ltd



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Wellington 15 July 2017

# Caption frontispiece:

Pinehaven c. 1969 viewed from the north. Trentham camp mid-left, St Patricks (Silverstream) College at right. Pinehaven Stream runs across the centre of the photograph. Source: Hutt City Library.

# **EXECUTIVE SUMMARY**

This assessment reviews the risk of there being archaeological sites as defined in the Heritage NZ Pouhere Taonga Act 2014 in the vicinity of the works proposed for the Pinehaven Stream.

The geomorphology of the area has been reviewed to determine whether there are older land surfaces that would have been suitable for pre-European or 19th C settlement. Remnant forest trees indicate several areas of older but low-lying (flood-prone) surfaces but field inspections indicate no archaeological sites.

A review of earlier (1943) aerial photographs and 19<sup>th</sup> C survey plans indicate no reasonable cause to suspect that there will be archaeological sites.

A settlement established in 1837 by Te Kaeaea of Ngati Tama in the general area of St Patricks College Silverstream is more or less on the outwash plain of the Pinehaven Stream. The fan north of the college is heavily cut into by the edge of the Hutt valley flood plain. This is the only historically documented 19<sup>th</sup> C Maori settlement on the Pinehaven Stream fan but it is outside the area of proposed works.

Another broad class of archaeological site may be earlier forms of infrastructure on the stream such as dams, mills, races, bridges, abutments, and logging and rail infrastructure. No such infrastructure works of sufficient age to be classified as archaeological sites have been identified in the Pinehaven Floodplain Management area.

Overall there is no reasonable cause to suspect that archaeological sites will appear in the areas proposed for works for the Pinehaven Stream Floodplain Management Project.

There is therefore no need to apply for an authority under the relevant provisions of the Heritage NZ Pouhere Taonga Act 2014.

# **INTRODUCTION**

This archaeological assessment has been commissioned by Jacobs New Zealand Limited, consultants to the Greater Wellington Regional Council.

The site area is the immediate environs of the lower to middle course of the Pinehaven Stream to the intersection of Dowling Grove and Whitemans Valley Road where the steam is fully culverted and eventually passes under the main commercial area of Pinehaven, a suburb of Upper Hutt (Fig. 1). The area has bene subjected to surface flooding on several occasions. The grid reference is NZTM E1771630 N5474331. The street address is much of the length of Whitemans Valley Road and the north-western section of Blue Mountains Road.

Legal description is mainly stream and road reserve with minor areas of numerous private properties.

This report is an archaeological assessment to advise whether an authority or authorities are needed under the Heritage New Zealand Pouhere Taonga Act 2014.

This assessment does not cover Maori values or wahi tapu.

Setting (Figs 1, 2)

The site area is the valley floor and lower valley flood plain of the Pinehaven Stream and its various tributaries east of the main shopping area. The works proposed are improved channelling, culverting and bridging of the stream and narrowly focused on the course of the stream and its tributaries. The problem areas do not extend out on to the main flood plain of the Hutt River.

#### Statutory definitions and protection of archaeological sites

There are two main pieces of legislation in New Zealand that control work affecting archaeological sites. These are the *Heritage New Zealand Pouhere Taonga Act 2014* (HNZPTA) and the *Resource Management Act 1991* (RMA).

Heritage New Zealand Pouhere Taonga administers the HNZPTA. The HNZPTA contains a consent (authority) process for any work affecting archaeological sites, where an archaeological site is defined in s. 6 as:

subject to section 42(3),—

(a) any place in New Zealand, including any building or structure (or part of a building or structure), that—

(i) was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and
(ii) provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and

(b) includes a site for which a declaration is made under section 43(1)

Under s. 42, Archaeological sites not to be modified or destroyed.

(1) Unless an authority is granted under section 48, 56(1)(b), or 62 in respect of an archaeological site, no person may modify or destroy, or cause to be modified or destroyed, the whole or any part of that site if that person knows, or ought reasonably to have suspected, that the site is an archaeological site.

In addition, any person who intends carrying out work that may damage, modify or destroy an archaeological site, or to investigate a site using invasive archaeological techniques, must first obtain an authority from Heritage New Zealand Pouhere Taonga. The process applies to sites on land of all tenure including public, private and designated land. The HNZPTA contains penalties for unauthorised site damage or destruction including criminal offences.

Authority means an authority granted by Heritage New Zealand Pouhere Taonga under sections 48, 56, or 62 to undertake an activity that will or may modify or destroy 1 or more archaeological sites.

There are three types of authority:

- To undertake an activity that will destroy or modify sites within a specified area of land
- Similar to above except that the effects on sites will be no more than minor as set out in s. 47 (5)
- To undertake a scientific investigation.

S. 47 (5) (the minor effects clause) states that in the case of an application made under section 44(b), without limiting the matters that Heritage New Zealand Pouhere Taonga may have regard to for the purpose of determining whether an application meets the requirements of subsection (1)(a)(ii) of this section, it must have regard to—

- (a) the significance of a site or sites in relation to evidence of the historical and cultural heritage of New Zealand; and
- (b) the extent to which the proposed activity will modify or destroy the site or sites.

HNZPT may return an application for an authority that is deficient in documentation.

The archaeological authority process applies to all sites that fit the HNZTPA 2014 definition, regardless of whether:

- The site is recorded in the NZ Archaeological Association Archsite (on-line Site Recording Scheme) or registered by the Trust,
- The site only becomes known about as a result of ground disturbance, and/ or

• The activity is permitted under a district or regional plan, or a resource or building consent has been granted.

#### Heritage places under consideration

This assessment covers the possibility pre-European archaeological sites on the Pinehaven stream fan where it has formed at the margin of the Hutt Valley floor, and the possibility that there may be surviving areas of bridge structures and base course of the old Whitemans Valley Road (surveyed by 1877, formed probably in the 1880s).

# METHODOLOGY

This assessment involves both desktop research and field inspection of the main engineering sites proposed on the Pinehaven Stream.

#### Geomorphology of the Pinehaven valley and likelihood of early settlement

In general, a stream like the Pinehaven will have an outwash plain or fan where it debouches on to the main river terraces of the Hutt River. The soils here may have very old surfaces that have been flood-free for centuries. Although no such soils have been mapped for this area, it is this type of soil surface where pre-European and 19<sup>th</sup> C archaeological sites are most likely to have been.

There are also likely to be soils that will have formed on slowly accumulating sediments with a steady formation of topsoil, over time forming very deep topsoils. Elsewhere in the North Island such soils were attractive for pre-European Maori settlement. However, in Wellington, where pre-European population density was low, the risk of pre-European settlement this far inland is low.

#### Early survey plans

The early SOs (survey office plans) show the following:

Hutt Sections (89 and 102 - collectively known as Mauihakona), were purchased by the New Zealand Government c. 1860 for the Ngati Tama chief Te Kaeaea (also known as Wikitoa Turanga Kuri, or 'Dog's Ear') (see Archsite R27/520 below).

SO 11265 dated 1877 (Fig. 3) shows No. 1 Line on line of Whiteman Road (it is stopped today at the intersection of Whiteman and Chatsworth Roads). No subdivision is shown. Blue Mountain and Pinehaven Roads were originally called Whitemans Valley Road and the route surveyed by this time.

SO 17009 dated 1915 (Fig. 4) shows Trentham Military Reserve and several rifle ranges to the east of Pinehaven (where Rimutaka prison is today). There are subdivisions off No. 1 Line (now Whitemans Road and the eastern side of Blue Mountains Road. This is the earliest map of subdivision in the Pinehaven valley and indicates that all of the existing houses post-date 1915, unless there were older structures such as farmhouses on much larger blocks. If so, there is no cadastral record of them.

Overall, the early survey plans show that there was little or no European settlement in the eastern Upper Hutt hills until the era of World War I.

#### Aerial photographs (Figs 5, 6)

I have reviewed aerial photograph (NZ Aerial Mapping RN 183/20 19 May 1943) with its stereo pair. This shows the stream course that is now culverted to the north of Whitemans Road and the few remnants of beech forest in the valley floor. NZ Aerial Mapping RN 183/20 19 May 1943 shows the upper valley and the remnant forest in the Pinehaven Reserve area. This photo shows the 1930s subdivisions of the upper valley.

Neither photograph shows any sites or buildings that may be archaeological sites.

#### **Documentary research**

#### Maori settlement

Whanganui a Tara and the Heretaunga valley had a low to moderate density of pre-European occupation, compared with the northern regions of the country. The iwi which occupied the area in late pre-European times was Ngati Ira who had married into Ngai Tara. In the musket wars era the Amio Whenua raids of 1821-22 (chiefly Ngati Whatua and Ngati Maniapoto) appear to have dispersed Ngati Ira. The village of Haukaretu at what is now Maoribank was dispersed (see Upper Hutt District Plan 2001).

Ngati Toa also had come to the Cook Strait and western Wellington region in the 1820s from the coastal Waikato. An important series of actions in the musket wars in Taranaki involved Te Atiawa, Ngati Tama and Ngati Mutunga opposing the Waikato tribes including Ngati Toa, as result of which some Te Atiawa, Ngati Tama and Ngati Mutunga moved south to Cook Strait and what is now the wider Wellington region. Shortly after Ngati Mutunga embarked for the Chatham Islands (Smith, 1910: 209 – 216).

The only pertinent written references to Ngati Tama in the Hutt Valley are to a chief named Te Kaeaea.

Kelleher (1971: 93) notes that Turingakuri, i.e. Te Kaeaea, had a pa in 1837 on the southeast corner of the land that is now St Patricks, Silverstream. This is prior to the arrival of the NZ Company in Wellington and prior to commencement of the surveys of the Hutt valley, so this location has to be regarded as insecurely documented. By the 1840s and the advent of the threat of the NZ Company settlers and militia, Te Kaeaea must have moved down the valley in a defensive posture.

When the disputes arose as to the ownership of the Hutt Valley, "Dog's Ear" [Te Kaeaea] and his people cut a line through the bush as a boundary dividing the lower valley from the Upper Hutt, contending that the upper part should be reserved for Ngati-Tama and their friends Ngati-Rangatahi. In 1842 he built a village called Makahi-nuku, fortified with palisades, on the banks of the Hutt about two miles above the present Lower Hutt Bridge [see <a href="http://mp.natlib.govt.nz/detail/?id=32847&l=mi">http://mp.natlib.govt.nz/detail/?id=32847&l=mi</a>] and cleared and cultivated part of a section purchased from the [New Zealand] Company by Mr. Swainson. This section became the chief centre of contention between the whites and the natives. In this action "Dog's Ear" was supported by the direct instructions of Te Rauparaha and Te Rangihaeata. (Cowan 1955 Ch. 10).

The narrative above about Te Kaeaea can be reconciled with the account given in Archsite R27/540 (below). He appears to have occupied land in the 1830s at what is now Silverstream and was fighting at Lower Hutt in the 1840s. Decades later (in the 1860s) he was offered parcels of land at Wallaceville in the Upper Hutt area. Te Kaeaea's life is summarised in the Dictionary of NZ Biography.

https://teara.govt.nz/en/biographies/1t38/te-kaeaea

#### Early European settlement and timber exploitation

There are no names or coverage of the Pinehaven or Whitemans valley area on Elsdon Best's (c. 1910) *Map of the Wellington Country Districts*. The location of the Wallaceville Blockhouse is shown (see below). This is confirmed in Walton (2003). (http://ndhadeliver.natlib.govt.nz/delivery/DeliveryManagerServlet?dps\_pid=IE236653).

Blue Mountains Road was once Whitemans Valley Road and may have been an original accessway to Whitemans Valley (it is so marked on SO 11267 dated 1877) which is some 6 km to the north-east of Pinehaven. If so, some features on the road such as bridge abutments, road cuttings or road basement may pre-date 1900. Another possibility is that the Pinehaven Stream may have had a mill dam, mill race and mill somewhere on its course. This would normally have been where the terrain suited such construction such as a steep drop on a bend in the river bed. No flour mill is recorded in the Upper Hutt area; the only known examples are the mills at Korokoro Stream and what is now Percy Reserve west of Petone.

By 1865, Lawrence and Robinson had established a sawmill at Wallaceville but I can find nothing further on this topic.

Cruickshank's second sawmill (Kelleher 1971: 21) was on the road of the same name at Maoribank just north-east of Silverstream and took its water via a tunnel from the Mangaroa valley. David Castle notes:

In my opinion "Cruickshank's Hill" is a heritage site and should be preserved. In 1857 a water tunnel was built to take water to what was then called the the Fernground Saw Mill. In 1875 a rail tunnel was built. The rail tunnel was at a higher level than the water tunnel and crossed it near the western end of the rail tunnel. The water tunnel was replaced with a 3 ft brick culvert where the railway crossed it. A weir in the Mungaroa River (as it was then called) directed water to the water tunnel. In 1921 it was proposed to use the water tunnel to supply a power station 200ft below on the floor of the Hutt Valley.

In 1881 the Railways Department built a dam in the water race (western side) to supply water to Upper Hutt Station via a pipe along the railway formation. Near the western portal of the rail tunnel a bridge carried a tramway over the railway.

Both the rail tunnel and the water tunnel are extant, although the latter is silted up. It is possible that the dam in the water race still exists - I have a report of it being seen in the 1980s. It is also possible that parts of the tramway formation may exist above the rail tunnel portals provided they have not been destroyed by logging. Open sections of the water race are extant. http://uhcl.recollect.co.nz/nodes/view/22062

I have quoted this at length because it shows the complexity of archaeological sites that may remain in the Upper Hutt western hills.

The earliest European settlers in Whitemans Valley and Blue Mountains valley will have accessed their properties through Pinehaven. The following is an excerpt from the Cyclopedia of New Zealand, Wellington Provincial District (1897) (http://nzetc.victoria.ac.nz/tm/scholarly/tei-Cyc01Cycl-t1-body-d4-d70-d5.html).

Whiteman, George, Sheep farmer, Whiteman's Valley, Upper Hutt. This old settler, who was born in Sussex, in 1828, accompanied his father and brother in the barque "Gertrude" to Port Nicholson, in 1841. He has gone through all the hardships which the early settlers endured, and has lived on the land he now owns for about twenty-five years [i.e. he settled there in the 1860s].

In the late 19<sup>th</sup> century, from Blue Mountains valley and Whitemans valley, the timbercutters, the Prouse brothers:

... laid a tramway over the hill [to Blue Mountains] from a base in the vicinity of the later Silverstream railway station. The timber, mostly rimu, was lowered by cable system into the glen now known as Pinehaven, and trucked along to the mill (Kelleher 1971: 21).

The SOs indicate that a No. 1 Line was surveyed in a straight line south-east from what is now Whitemans Road. 'No. 1 Line' suggests a forestry or forest-clearance boundary of

some kind. By 1900 there were seven sawmills in the Upper Hutt area but none were in Pinehaven or at Silverstream (Kelleher 1971: 23). There was possibly a saw mill in Whitemans valley c. 1900.

https://natlib.govt.nz/records/22438815?search%5Bi%5D%5Bprimary\_collection%5D=T APUHI&search%5Bi%5D%5Bsubject%5D%5B%5D=Employment&search%5Bi%5D% 5Bsubject%5D%5B%5D=Sawmills&search%5Bpath%5D=items

Housing subdivisions were created in the northern part of Pinehaven by 1915 (see SOS above), probably part of the planning for the military camp, but actual house construction appears to have started in the 1930s on land cleared some decades earlier for dairying (Kelleher 1971: 94). The housing may have been an early Labour government initiative of that era.

Beech Dale is an historic property on the eastern side of the Pinehaven Stream at 50 Blue Mountains Road. It was built in 1936. There is unlikely to be an archaeological site in this vicinity.

#### Archaeological sites recorded on Archsite in the vicinity

Archsite (the online archaeological site recording system) indicates that there are no recorded sites in the Pinehaven valley. The following sites are in the wider Hutt valley in vicinity of Pinehaven:

- R27/520 in Wallaceville near Ward Street, known as Dahl's houses, a pre-1900 building complex on Hutt sections 89 and 102 originally given to the Ngati Tama chief Te Kaeaea (see above).
- R27/146 is the Wallaceville Blockhouse (and reduced redoubt), off McHardie Street.
- R27/535 by the Hutt River is the former railway bridge crossing.
- R27/459 at Taita is Christ Church (built 1854) one of Wellington's earliest churches.

The site records show that there is potential for early European sites in the Upper Hutt valley. Pre-European archaeological sites are non-existent in the records but there is a slight chance that they may be there.

## Heritage New Zealand list

The only listed property near the Pinehaven Stream is 1 Chatsworth Road, Cat 2 no. 4146. This is a Chapman-Taylor Arts and Crafts style house built in 1939.

# **Upper Hutt City District Plan maps**

No heritage features are shown on the pertinent maps.

# FIELD VISIT

I visited the sites of the principal works on Pinehaven Stream on 16 May 2017 and 12 July 2017. The main objective was to look for older land surfaces adjacent to the stream that could have archaeological features, or structures in the stream course such as older bridge abutments or bridge piles where there are or have been steam crossings.

The stream is divided into three reaches and an upper catchment area (Figs 7 - 10), beginning in Whitemans Road where the stream enters a long culvert that takes it to the north of the road and under the Pinehaven shopping area. The works are in the open parts of the stream upstream of the long culvert.

In the 1940s aerial photographs (Figs 5, 6) the stream crosses Whitemans Road and runs to the north-east across the old fan service. At 48 - 50 Whitemans Road (a school), this old stream course has been culverted since the 1970s with concrete intake structures. The low-lying land at the culvert entrances has been raised in small stop banks with fences for public safety. The soil surfaces here are too flood-prone to have archaeological sites, despite the presence nearby of 200 year old black beech. This culvert entry is to be reengineered to increase its capacity and provide better safety and debris barriers.

In reaches 1 and 3 there are occasional specimens of older black beech trees (perhaps 200 years old) (Fig. 11), remnants of an older beech/podocarp forest cover. There are also small areas with typical elements of native riparian trees such as 60-80 year old kanuka and kowhai and kowahai re-planting of recent years. Although this ancient forest and shrubland pattern indicates that there will be old soil surfaces (older than 200 years) the surviving trees are all on very low-lying ground and subject to flooding throughout their lives. The risk of there being archaeological sites other than stream infrastructure is low.

At 54 Whitemans Road a culvert will be enlarged and a small point in the stream course lowered to create a secondary path (Fig. 13, hatched on Fig. 7). This point seems to be recent flood sediments although no test pits have been dug.

At 8-15 Blue Mountains Road (Reformed Church of Silverstream) crossing structures and banks will be raised to above 25 year return flood levels. There are park-like areas by the stream between 8 and 10 Blue Mountains Road (Fig. 12). The soils are low-lying and recent with little topsoil development and will not have had settlement on them. On reach 2, at Sunbrae Road an 1800 mm culvert (possible 1970s construction) will be replaced. This is the type of area where older bridge abutments *may* occur. They might have supported crossings on the former Whitemans Valley Road and been buried when the culvert was installed. There is no evidence that this has happened, however.

From 20 Blue Mountains Road to the intersection with Pinehaven Road there will be recontouring and widening between the banks and raising of some domestic bridge crossings (see Fig. 14).

At the intersection of Pinehaven Road and Blue Mountains Road a concrete box culvert will be replaced. This is another area where older bridge abutments *may* occur. They might have supported crossings on the former Whitemans Valley Road and been buried when the culvert was installed. There is no evidence that this has happened, however.

On reach 3 at 48 Blue Mountains Road there is a point in the river that will have a lowered secondary path at its base (hatched within red on Fig. 9). On field inspection visit 12 July 2017, I dug a test pit on this point NZTM E 1769021 N 5442006. It had a thin topsoil with road metal mixed in and 40 cm of yellow-brown silty clays to 40 cm and base of cut (Fig. 15). This is the type of point where a mill dam and race could have been constructed. However, there is no archaeological or documentary evidence of a mill dam, race or mill structure here.

Just upstream within the boundary of 50 Blue Mountains Road (Beech Haven) the stream banks are fairly clear and show a 1-m-depth of yellow-brown silt clays. A small exposure of topsoil buried 1 m below surface and at stream level is exposed here on the true right. It is a grey clay loam with many angular stone fragments (Fig. 16). This is possibly from a slip into the older stream bed but it is more likely to be an older soil surface that has been buried by a surge of flood sediments perhaps in the late 19<sup>th</sup> C.

About 80 m upstream on the true left is a fire-damaged 200 year-old beech tree with its ancient root base in the stream bed and new supporting roots growing into the modern soil surface about 80 cm above the stream bed. This tree probably grew on the same buried topsoil as that described above. These are natural features of interest but they are not archaeological sites.

On the true right of the stream at the foot of a steep slope rising to the Beech Haven homestead, is a linear ornamental pond about 8 m wide and 100 m long (Fig. 17). There is a concrete weir at the downstream end and the pond was fed by a 4-inch cast iron pipe that must have carried in water from a weir about 150 m upstream. The nature of the concrete construction (3 inch slabs, poor, rounded aggregate) and strap iron control structures on the weir suggest an age of the 1930s to 1950s for this rather charming pond construction and it is not an archaeological site under the statutory definition.

From 12 Birch Grove to the open areas of Pinehaven Reserve, the channel will be reformed and all access structures raised above 25-year return floods. In the Pinehaven Reserve, the surviving 200 year old beech trees have grown on lowlying clay subsoils with no topsoils or surviving duff layers (Figs 18, 19). There is little likelihood of archaeological sites in this part of the stream course.

From the Pinehaven Reserve south along the former Whitemans Valley Road (now Pinehaven Road) there are three places where secondary overflow paths will be established, a need created by drainage from the southern part of the catchment and come down via Jocelyn Crescent. These overflow paths take water across Pinehaven Road on to the Pinehaven Reserve (Fig. 20). The reserve area here is an artificially levelled surface (possibly fill from the Jocelyn Cres subdivision area) and is unlikely to have any archaeological sites under it.

#### Constraints and limitations of this report

With the exception of the test pits in the vicinity of 148 Blue Mountains Road and exposed stream banks there, this assessment is for the most part based on experience of the range of natural alluvial surface features and on the evidence of older cadastral plans which show no reason to believe that there is pre-1900 construction in the Pinehaven area. The settlement of Te Kaeaea of Ngati Tama in the 1830s at what is now St Patrick's College is not very fully documented but is in any event not in the floodplain management area. Limited evidence has been recovered for of early timber hauling in the area. If there was timber hauling or flood-borne timber in the stream, the routes would long have been obscured by flooding.

## ASSESSMENT OF EFFECTS OF DEVELOPMENT

There is little risk that there are any archaeological sites in the Pinehaven Stream.

## CONCLUSIONS AND RECOMMENDATIONS

- 1. There is no reasonable cause to suspect that archaeological sites exist in the Pinehaven Stream in the areas east of the shopping area.
- 2. There is no need for Jacobs to apply for an authority to modify or destroy archaeological sites under s. 42 of the Pouhere Taonga Heritage NZ Act 2014.

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## **FIGURES**

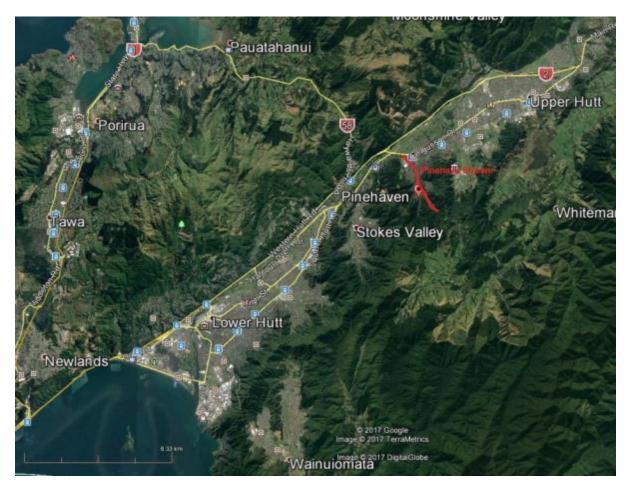


Fig. 1. Location of Pinehaven Stream (in red).

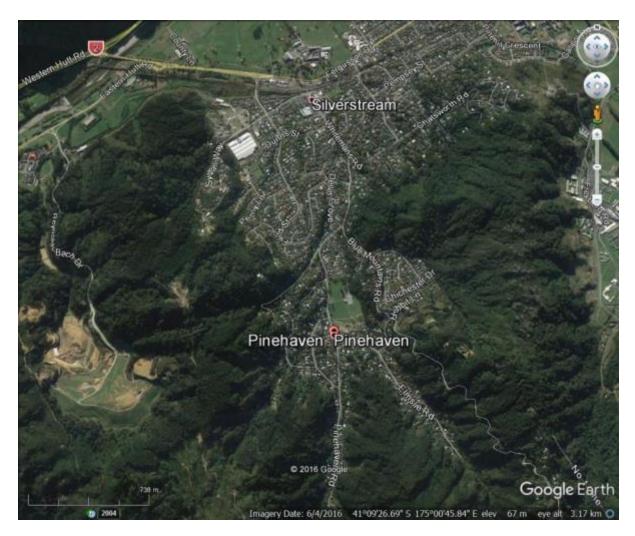


Fig. 2. Pinehaven valley. Source: Google Earth.

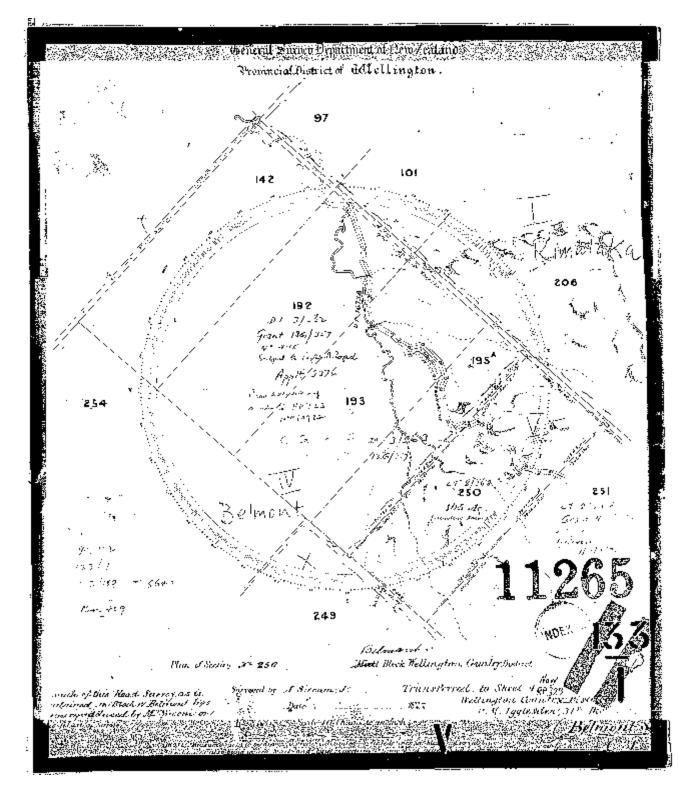


Fig. 3. SO 11265 dated 1877, showing the numbers of the Hutt Valley sections but no features that could be archaeological sites, other than the general alignment of the railway line. Course of the Pinehaven Stream is prominent.



Fig. 4. SO 17009 dated 1915, showing Trentham military camp, Pinehaven and Whitemans Valley Road (now Blue Mountains Road and Pinehaven Road) and the No. 1 Line. Early sections are subdivided off Whitemans Road and Blue Mountains Road.



Fig. 5. Northern part of Pinehaven, stream course (now culverted) above centre in open grassland. Whitemans Road is the prominent straight line. NZ Aerial Mapping RN 183/20 19 May 1943 cropped.

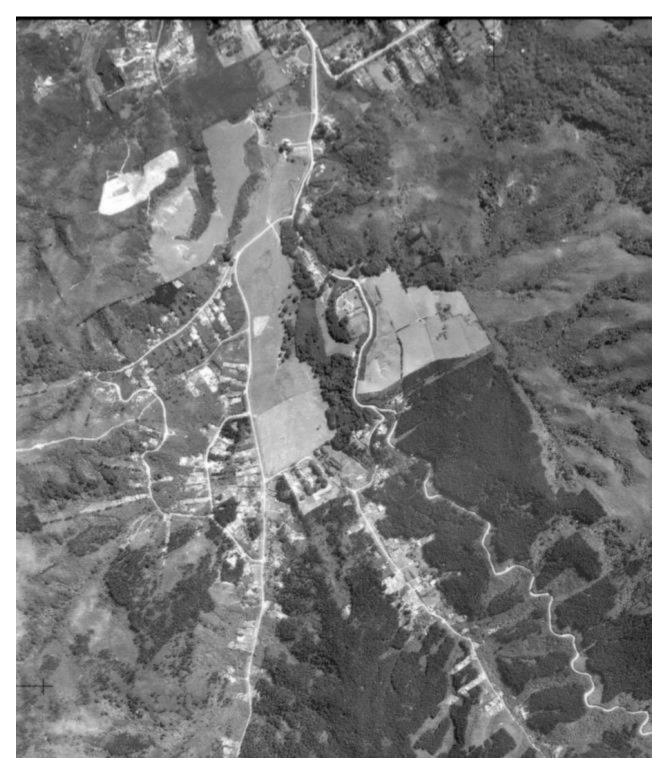


Fig. 6. Southern part of Pinehaven. The route of No. 1 Line is clear. NZ Aerial Mapping RN 182/22 13 Feb 1943 cropped.

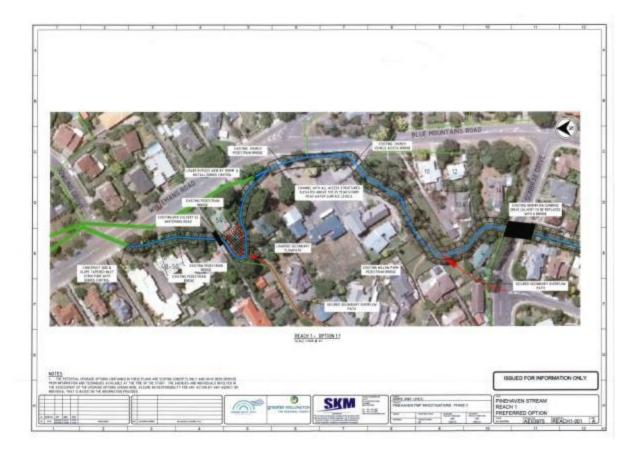


Fig. 7. Reach 1 with development proposals.

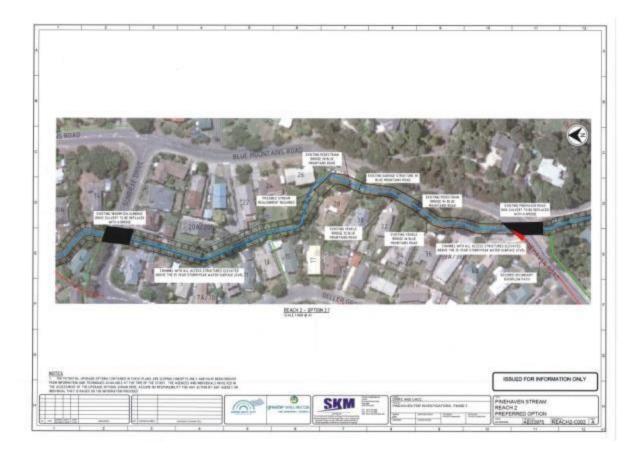


Fig. 8. Reach 2 with development proposals.

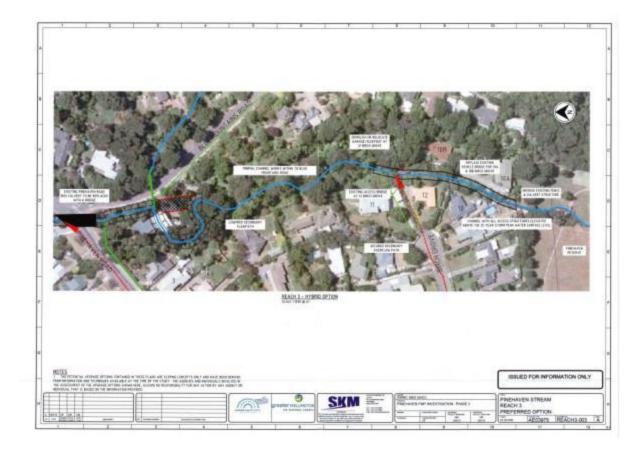


Fig. 9. Reach 3 with development proposals.

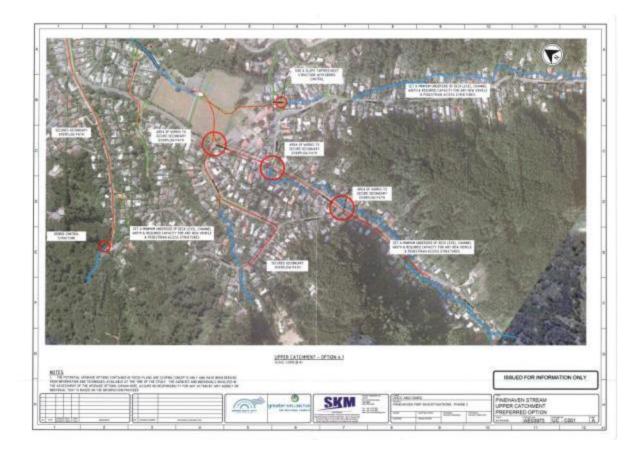


Fig. 10. Upper catchment, Pinehaven Reserve at centre.



Fig. 11. Main culvert entry at 48-50 Whitemans Road. Beech trees c. 250 years old indicate an older soil surface but the fence (with child behind) is on a small stop bank built on low-lying soils.



Fig. 12. Park-like area by stream between nos 8 and 10 Blue Mountains Road. The soils are low-lying and recent with little topsoil development.



Fig. 13. Culvert under Sunbrae Drive to be replaced by a bridge. This runs off the line of Blue Mountains Road and will be a twentieth-century construction.



Fig. 14. Sunken bed of stream at 28 Blue Mountains Road.



Fig. 15. Soils in secondary overflow path at 48 Blue Mountains Road. This topsoil with road gravels on silty clay flood sediments.



Fig. 16. Buried soil horizon 1 m below surface at boundary of 148 and 150 Blue Mountains Road.



Fig. 17. Linear ornamental pond with downstream concrete weir and overflow channel at 150 Blue Mountains Road.



Fig. 18. Western end of Pinehaven Reserve, a remnant black beech on silty clay sediments, a typical forest soil with the the beech root having lain in a duff layer long since washed away.



Fig. 19. Pinehaven Reserve, view to the south and the saddle to Blue Mountains valley. The black beech trees may be 150 years old and the soils are low-lying with limited topsoil development.



Fig. 20. Secondary overflow channel over Whitemans Road with possible minor earthworks required on Pinehaven Reserve. This upper part of the reserve area is artificially levelled.



# Appendix U. Flood Hazard Assessment



# Pinehaven Stream Improvements Flood Hazard Assessment

September 2019









# **Pinehaven Stream Improvements**

Wellington Water Ltd

## **Flood Hazard Assessment**

IZ089000 250 NW RPT 0002 | D

19 September 2019

#### Document history and status

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#### **Pinehaven Stream Improvements**

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# **Executive Summary**

Flood hazard in the Pinehaven Stream (the Stream) has been assessed for the works proposed under the Pinehaven Stream Improvements project in the reach between 48 Whitemans Road and the Pinehaven Reserve. This assessment supports the design and the statutory approvals for the works proposed under the project and considers the effects of the proposed works on flood extents and depths.

The Pinehaven Stream has a long history of flooding, including significant flood events in December 1976 and July 2009. A Floodplain Management Plan has been developed through a partnership between the Upper Hutt City Council and Greater Wellington Regional Council. The Pinehaven Stream Floodplain Management Plan proposes a combination of structural and non-structural measures to managing flood risk in the Pinehaven catchment. The Pinehaven Stream Improvements project will further develop and implement structural measures proposed within the Floodplain Management Plan.

The objectives of the Pinehaven Stream Improvements project are:

- To provide improved capacity and effective and efficient functioning stormwater infrastructure in the stream and its tributaries to a 4% AEP (1 in 25 year return period) flood event level, which will also contribute to the management of flood risk to habitable floor levels up to the predicted peak 1% AEP (1 in 100 year return period) flood level;
- To reduce the risk of injury or harm from fast or deep flowing water in Pinehaven Stream and its tributaries;
- To integrate overland flow paths into the wider stormwater network; and
- To enable efficient and effective construction and ongoing maintenance of all structures and stream improvements.

The proposed works principally comprise:

- Increasing the main channel capacity of the stream in three reaches:
  - 48 Whitemans Road to Sunbrae Drive (Reach 1);
  - Sunbrae Drive to Pinehaven Road (Reach 2); and
  - Upstream of 2A Freemans Way to Pinehaven Reserve (Reach 3).
- Increasing the capacity of two road culverts (both are separately consented) at:
  - Sunbrae Drive, and
  - Pinehaven Road
- A flood wall within Willow Park along the boundary of 10A Blue Mountains Road
- Bank improvements downstream of 48 Whitemans Road.

In two sections of the project reach no increase in channel size is proposed - downstream of the Whitemans Road diversion structure in Reach 1 and between 48 Blue Mountains Road and 2A Freemans Way in Reach 3.

A hydraulic model of the Pinehaven Stream and stormwater network in the Pinehaven catchment has been used to assess the flood hazards. The model simulates flood flows in the catchment and has been used to calculate the flood extents and water depths for the "baseline" or existing arrangement of the catchment and with the proposed works in place. The benefits and effects of the proposed works have been assessed by comparing model results for the baseline condition and model results with the proposed works in place. The model has been used to simulate both the 4% AEP and 1% AEP floods, including recommended allowances for the potential effect of future climate change on rainfall depths.



The flood hazard assessment shows that within the overall project reach from 48 Whitemans Road to the Pinehaven Reserve:

- The existing or baseline situation is that the Pinehaven Stream is not contained within the main channel in the 4% AEP flood and spills from the channel enter private properties on both sides of the channel. In the reaches where channel works are proposed there are 80 habitable floors within the flood extents in the 1% AEP event.
- the Pinehaven Stream Improvements project will contain the 4% AEP flood within the Pinehaven Stream channel in all the sections of the Stream in which channel works are proposed and will protect all habitable and non-habitable buildings in the project reach from fluvial flooding for the design flood (4% AEP);
- the Pinehaven Stream Improvements project will not increase fluvial flood hazard and will have a
  positive effect on habitable floor flooding from the Stream within the project reach for the 1% AEP
  flood, reducing the number of habitable floors within the floodplain by 57, from 80 currently to 23
  once the works are completed and reducing the number of flooded non-habitable floors by 27,
  from 33 down to six. There are no buildings which will experience increased flooding as a result of
  the proposed works.

The proposed works increase the size of the Stream in most of the project reach. This will allow more flow to be carried within the Stream, so preventing or reducing flooding. Although flow is increased, water levels in the Stream are, in general, reduced with the proposed works in place because of the proposed increase in channel size.

In the two sections of the project reach where no increase in channel size is proposed – downstream of the Whitemans Road diversion structure in Reach 1 and between 48 Blue Mountains Road and 2A Freemans Way in Reach 3 – the water levels and/or flood depths are increased in these parts of the Stream as a result of the proposed works, as set out below:

- Downstream of the Whitemans Road flow diversion structure, water levels are increased for both the 4% AEP and 1% AEP floods as a result of the proposed works. However, for the 4% AEP flood, the water levels are below the existing adjacent ground levels and for the 1% AEP flood the water levels are below the level of proposed improvements to the banks of the Stream at this location such that there is no need for a wider channel.
- At 48 Blue Mountains Road water levels for both the 4% AEP flood and the 1% AEP flood are
  reduced due to the proposed increase in capacity of the Pinehaven Road crossing. However, this
  property is to be acquired by Greater Wellington Regional Council and the buildings demolished as
  part of the project. Reprofiling and lowering of the ground levels associated with the proposed
  demolition will result in an increase in the extent and depth of flooding outside the existing Stream
  channel for both the 4% and 1% AEP floods. However, flooding is contained within the property by
  natural high ground levels and the resulting flood depths will be no greater than the existing flood
  depths in the Stream.
- Between 50 Blue Mountains Road and 2A Freemans Way water levels are increased for both the 4% AEP and 1% AEP floods as a result of the proposed works. Water levels for both the 4% AEP and 1% AEP floods are well below the level of the buildings on the true right bank and there is only a minor increase in flooded area on this side due to the steep gradient of the natural ground.

The proposed works reduce the risk of injury or harm from fast or deep flowing water by reducing the overall flood extents and will include controls such as physical barriers to reduce ease of unsafe access and warning signage.

The proposed works integrate overland flowpaths into the wider stormwater network by:

- Eliminating overland flowpaths at Sunbrae Drive and Birch Grove
- Reducing the flowrate and frequency of operation of the existing overland flowpath in Wyndham Road
- Reshaping the ground to contain the overland flowpath in Clinker Grove



The Pinehaven Stream Improvements project will also consider existing erosion problems in the Stream within the project reach and includes measures to manage existing erosion and mitigate any effects of the proposed works on erosion of the Stream.

The project will also consider the effectiveness of the drainage network within the project reach and identify improvements to reduce flood risk from the network. These do not compromise the project objectives, and they are not addressed in this flood hazard assessment report.



#### Important note about your report

The information within this report has been prepared for the sole purpose of presenting the findings of the flood hazard assessment carried out by Jacobs New Zealand Ltd (Jacobs) for Wellington Water. This report, maps and spatial files were produced in accordance with and are limited to the scope of services set out in the contract between Jacobs and the Client.

The findings presented in this report, maps and spatial files are based upon information and data provided or made available between 2008 and 2017 by Wellington Water or Greater Wellington Regional Council such as LiDAR, asset data, catchment characteristics, aerial photography, historical flood records, topographic survey, models and model outputs. Jacobs has relied upon and presumed that this data is accurate. Except as otherwise stated, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete or if site conditions change then it is possible that the maps and spatial data provided may change.

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Jacobs has prepared this report and supporting data in accordance with the usual care and thoroughness of the consulting profession and by reference to applicable auditing procedures and practice at the date of issue. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made for this data, to the extent permitted by law.

This report should be read in full with no excerpts to be considered representative of the findings.

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# **1. The Pinehaven Stream Improvements project**

## 1.1 Pinehaven Stream

The Pinehaven Stream catchment lies on the eastern side of the Hutt Valley, to the south of the Hutt River. The catchment is located to the southwest of the main urban area of Upper Hutt and runs from the Pinehaven Hills down to Hulls Creek. It includes the suburbs of Pinehaven and part of Silverstream and is bordered by the catchments of the Mangaroa River to the south, Stokes Valley stream to the west, and Trentham to the east.

The Pinehaven Stream flows from the upper catchment in the southern Pinehaven Hills, to its confluence with Hulls Creek in the north. The Stream has three main tributaries in the steeper upper catchment area in the vicinity of Wyndham Road, Pinehaven Road and Elmslie Road. The Stream flows as a single channel from the Pinehaven Reserve to the Whitemans Road / Dowling Grove intersection, at which point the Stream is piped to its confluence with Hulls Creek near the Whitemans Road / Gard Street intersection.

Within the project reach from 48 Whitemans Road to the Pinehaven Reserve much of the Pinehaven Stream channel is located within private property, with many structures located within and above the stream such as private bridges and culverts. Two significant road crossings are also located in the lower catchment, at Pinehaven Road and Sunbrae Drive.

## 1.2 Why improvements are needed

The Pinehaven Stream has a long history of flooding, including significant flood events in December 1976 and July 2009.

A Floodplain Management Plan has been developed for the Stream through a partnership between the Upper Hutt City Council and Greater Wellington Regional Council (Pinehaven Floodplain Management Plan, Upper Hutt City Council and Greater Wellington Regional Council, March 2016). The Floodplain Management Plan proposes a combination of structural and non-structural measures to managing flood risk in the Pinehaven catchment:

- 1. Structural measures: Physical works to manage flood risk associated with the stream channel (increasing stream capacity, reducing the risk of blockages and managing floodplain flows);
- 2. Non-structural measures: Planning controls for development in the catchment, community awareness and preparedness, and emergency procedures;
- 3. River management measures: Maintenance of the stream to avoid blockages, maintain capacity and minimise erosion.

The Pinehaven Stream Improvements project will further develop and implement structural measures proposed within the Floodplain Management Plan.

#### 1.3 Outcomes sought

The project objectives that have been defined for the Pinehaven Stream Improvements project in relation to the Resource Management Act (1991) are:

- To provide improved capacity and effective and efficient functioning stormwater infrastructure in the stream and its tributaries to a 4% AEP (1 in 25 year return period) flood event level, which will also contribute to the management of flood risk to habitable floor levels up to the predicted 1% AEP (1 in 100 year return period) flood level;
- To reduce the risk of injury or harm from fast or deep flowing water in Pinehaven Stream and its tributaries;
- To integrate overland flow paths into the wider stormwater network; and
- To enable efficient and effective construction and ongoing maintenance of all structures and stream improvements.



#### 1.4 **Proposed works**

The design of the Pinehaven Stream Improvements project consists of works within three reaches of the Pinehaven Stream between Whitemans Road and the Pinehaven Reserve. Figure 1 shows the project area and the locations of the three reaches.

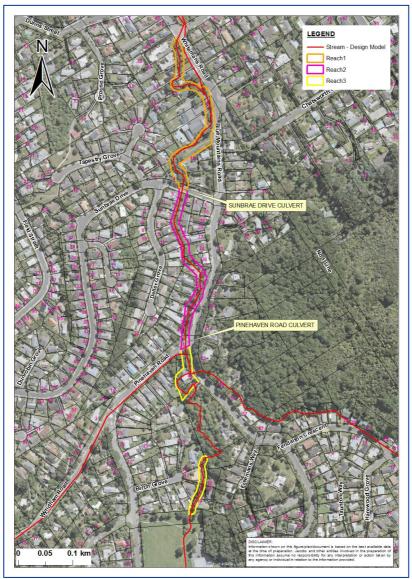


Figure 1: Locations of the proposed works

The works primarily involve increasing the size of the river channel to convey the 4% AEP flood entirely within the Stream as follows.

**Reach 1: Sunbrae Drive to Whitemans Road:** Stream widening in the reach upstream of the Whitemans Road flow diversion structure, a flood wall along the boundary of 10A Blue Mountains Road at Willow Park, replacement of culvert at Sunbrae Drive, minor raising of the top of the channel bank downstream of 48 Whitemans Road.

*Reach 2: Pinehaven Road to Sunbrae Drive:* Stream widening in the entire reach, replacement of culvert at Pinehaven Road.

**Reach 3: Pinehaven Reserve to Pinehaven Road:** Stream widening (except for the reach between 48 Blue Mountains Road and 2A Freemans Way), overland flow path from Birch Grove to the Stream.



## 1.5 Assessment of effects

A hydraulic model of the Pinehaven Stream and stormwater network in the Pinehaven catchment has been used to assist in the design of the proposed works. The model simulates flood flows in the catchment and can be used to calculate the flood extents and water depths for different magnitudes of flood and for different design options, including the "baseline" or existing arrangement of the catchment.

The model was originally developed by SKM (now Jacobs) for Upper Hutt City Council and Greater Wellington Regional Council in 2010 for the 2010 Flood Hazard Assessment. This model included the main stream channel and significant tributary channels, major culverts, road bridges and parts of the pipe network that were identified as being key components of the stormwater system and was used to develop and inform the Pinehaven Catchment FMP. As part of the Pinehaven Stream Improvements project, the model has been updated and improved and new survey data, including LiDAR data for the floodplain, has been incorporated.

The model simulations include recommended allowances for the potential effect of future climate change on rainfall depths (Climate Change Effects and Impacts Assessment: A Guidance Manual for Local Government in New Zealand, Ministry for the Environment, 2008).

Model simulations have been performed for the 4% AEP flood and 1% AEP flood for both the baseline condition and for the proposed works. The benefits and effects of the proposed works have been assessed for each of these floods by comparing model results for the baseline condition and model results with the proposed works in place.



# 2. Flood hazard assessment: 4% AEP flood

The effect of the proposed works on flood hazard and their contribution to meeting the project objectives in relation to the 4% AEP flood have been assessed from the results of the model simulations.

The overall extent of flooding for the 4% AEP flood for the full project length is presented in Figure 2 which shows the model flood extents for the baseline condition and with the proposed works design in place. Detailed maps showing the model flood extents, water depths and the changes in flood depth resulting from the proposed works are provided in Appendix A of this report.

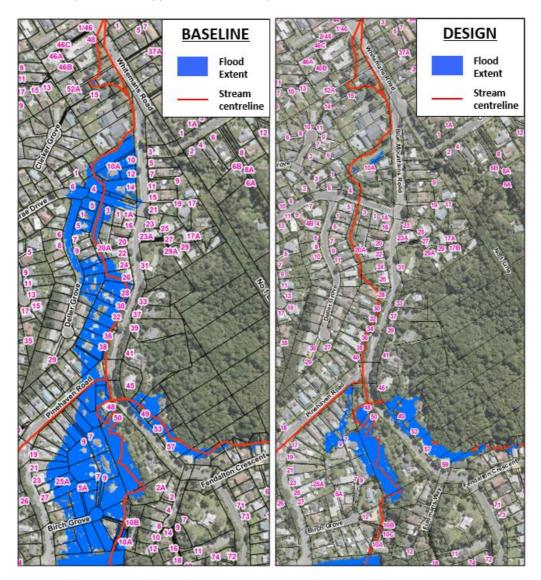


Figure 2: Effect of the proposed works on the extent of flooding within the project area for the 4% AEP flood (including climate change allowance)

The benefits and impacts of the proposed works on flood hazard are discussed further below, based on the results of the hydraulic model simulations of the 4% AEP flood for the baseline condition and with the proposed works.



#### 2.1 Reach 1 – 48 Whitemans Road to Sunbrae Drive

#### 2.1.1 Reach 1 – Benefits

With the proposed works, flood flow is entirely contained within the Stream and flooding of properties and Sunbrae Drive is prevented.

#### 2.1.2 Reach 1 – Impacts

Design flood water levels in the lower part of this reach are slightly higher than the baseline due to an increase in maximum flow with the proposed works.

Downstream of the flow diversion structure at Whitemans Road the maximum increase in water level in the Stream is 0.06m, at 54 Whitemans Road. Upstream of the diversion structure the maximum increase in water level is 0.03m. Flood hazard is not increased in the reach since the design water levels are well below the adjacent ground levels.

Further upstream of the diversion structure the water levels are reduced by the proposed works and at Sunbrae Drive the design maximum water level is 0.43m lower than the baseline.

#### 2.2 Reach 2 – Sunbrae Drive to Pinehaven Road

#### 2.2.1 Reach 2 – Benefits

With the proposed works, flood flow is entirely contained within the Stream and flooding of properties and Pinehaven Road is prevented.

#### 2.2.2 Reach 2 – Impacts

With the proposed works, water levels are between 0.19m and 1.02m lower than the baseline water levels.

#### 2.3 Reach 3 – Pinehaven Road through the Birch Grove area to Pinehaven Reserve

#### 2.3.1 Reach 3 – Benefits

With the proposed works, flood flow is entirely contained within the Stream from the Pinehaven Road culvert to the upstream boundary of 48 Blue Mountains Road.

A section of stream from the upstream boundary of 48 Blue Mountains Road to the upstream boundary of 2A Freemans Way is excluded from channel works. However, some observed stream erosion in this area has been identified for mitigation.

With the proposed works, flood flow is entirely contained with the Stream between Birch Grove and the Pinehaven Reserve.

#### 2.3.2 Reach 3 – Impacts

Flood water levels at 48 Blue Mountains Road and between this property and Pinehaven Road are lower than the baseline water levels, mainly due to the increased capacity of the Pinehaven Road culvert. The property at 48 Blue Mountains Road will be acquired and the buildings will be demolished as part of the project. Ground levels within this section will be reduced following demolition of the property. This will result in an increase in the depth and extent of water at this location. However, flooding is contained within the property by natural high ground levels, the resulting flood depths will be no greater than the existing flood depths in the Stream.

At 50 Blue Mountains Road and 2A Freemans Way, flood water levels are higher than the baseline. This is primarily due to an increase in the flow in the Stream due to the proposed channel improvements between Pinehaven Reserve and 50 Blue Mountains Road. Enlargement of the channel in the upper section of Reach 3



(between Pinehaven Reserve and 50 Blue Mountains Road) prevents overland flow from the Stream to Birch Grove. Despite higher flows at 50 Blue Mountains Road and 2A Freemans Way, the flood levels at these properties are below the levels of buildings.

Address	Change in W	Change in floodplain area		
	Minimum	noouplain area		
2A Freemans Way	0.09m increase	0.26m increase	0.21m increase	Nil
50 Blue Mountains Road	0.32m decrease	0.13m increase	0.01m decrease	28m <sup>2</sup> net increase

Table 1: Changes to flood depths and areas at 2A Freemans Way and 50 Blue Mountains Road in the 4% AEP event

The depth of flooding at 2A Freemans Way increases by up to 0.26m, with the maximum values adjacent to the stream bank at a bend near the downstream end of the channel on the property. There is no net increase to the floodplain area due to the steep nature of the terrain on the true right bank of the main stream channel in 2A Freemans Way.

The depth of flooding at 50 Blue Mountains Road increases at the southern end of the property by up to 0.13m. At the northern end of the property, the works at Pinehaven Road have a positive effect and reduce flood depths. Changes to floodplain area are only assessed for the true right bank of the stream in 50 Blue Mountains Road because this is the only side that can be used safely during a flood event and because the true left bank is completely flooded in both the baseline and the design. The net increase in floodplain area on the true right bank of the stream is 24m<sup>2</sup>, which is made up of a 68m<sup>2</sup> increase in floodplain area at the southern end of the property and a 44m<sup>2</sup> decrease in floodplain area at the northern end. The estimated existing area of the floodplain on 50 Blue Mountains Road is 2,600m<sup>2</sup>, so the net increase in floodplain area in the design flood is approximately 1.1%.



### 3. Flood hazard assessment: 1% AEP flood

The effect of the proposed works on flood hazard and their contribution to meeting the project objectives in relation to the 1% AEP flood have been assessed from the results of the model simulations.

The overall extent of flooding for the 1% AEP flood is presented in Figure 4 which shows the model flood extents for the baseline condition and with the proposed works design in place. More detailed maps showing the model flood extents, water depths and the changes in flood depth resulting from the proposed works are provided in Appendix A of this report.

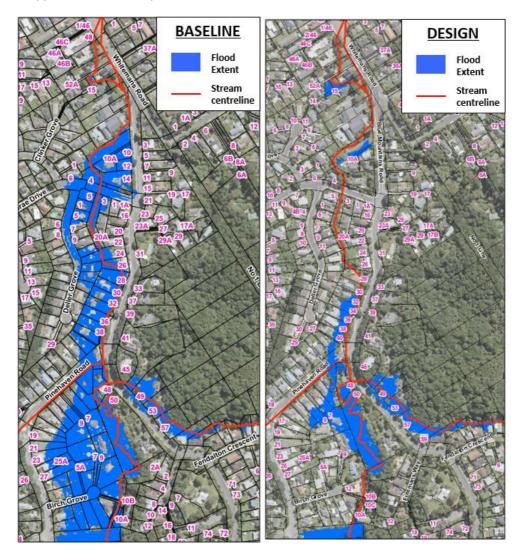


Figure 4: Effect of the proposed works on the extent of flooding within the project area for the 1% AEP flood (with climate change allowance)

The benefits and impacts of the proposed works on flood hazard are discussed further below, based on the results of the hydraulic model simulations of the 1% AEP flood for the baseline condition and with the proposed works.



#### 3.1 Reach 1 – 48 Whitemans Road to Sunbrae Drive

#### 3.1.1 Reach 1 – Benefits

In the baseline condition, 11 habitable floors and four non-habitable floors are within the extent of the design exceedance flood for this reach. Model results show that by implementing the proposed works, there will be six habitable floors and one non-habitable floor within the design exceedance flood extent. The proposed works will therefore remove five habitable floors and three non-habitable floors from the 1% AEP flood extent in this reach.

#### 3.1.2 Reach 1 – Impacts

Of the six habitable floors that remain within the 1% AEP flood extent:

- The proposed works reduce flood levels at three of the habitable floors;
- There is no significant change in flood depth for one habitable floor;
- The proposed works increase flood levels at two habitable floors flood levels increase by 0.04m at both 54 Whitemans Road and 56 Whitemans Road.

At 54 and 56 Whitemans Road the properties will be protected by works at the top of the bank of the Stream. The protection works will raise the ground level at the locations where the increases in flood depth are predicted so that flooding will no longer occur in the 1% AEP event.

#### 3.2 Reach 2 – Sunbrae Drive to Pinehaven Road

#### 3.2.1 Reach 2 – Benefits

In the baseline condition there are 24 habitable floors and 14 non-habitable floors within the extent of the design exceedance flood for this reach. Model results show that by implementing the proposed works there will be four habitable floors and no non-habitable floors within the 1% AEP flood extent.

#### 3.2.2 Reach 2 – Impacts

Design flood water levels are lower than the baseline water levels throughout the reach for the design exceedance flood.

#### 3.3 Reach 3 – Pinehaven Road through the Birch Grove area to Pinehaven Reserve

#### 3.3.1 Reach 3 – Benefits

In the baseline condition there are 45 habitable floors and 14 non-habitable floors within the extent of the design exceedance flood for this reach. Model results show that by implementing the proposed works, there will be 13 habitable floors and five non-habitable floors within the 1% AEP flood extent. The design therefore removes 32 habitable floors and nine non-habitable floors from the 1% AEP flood extent in this reach.

#### 3.3.2 Reach 3 – Impacts

For the 13 habitable floors remaining within the 1% AEP flood extent, the model results shown no change in flood depth at five of the properties and a decrease in flood depth at six of the properties. Design flood water levels are higher than baseline water levels for habitable floors at:

- 9 Birch Grove, by up to 69mm
- 7 Pinehaven Road, by up to 37mm

#### **Flood Hazard Assessment**



Model results show an increase in flood depth at the location of one other existing habitable floor. However, this property, at 48 Blue Mountains Road, has been purchased by Greater Wellington Regional Council and the buildings will be demolished as part of the project. Although flood level is reduced at the location as a result of the proposed works, the depth of flooding will increase due to lowering of the ground levels following demolition.



## 4. Summary

Flood hazards for the works proposed under Pinehaven Stream Improvements project have been assessed using a detailed hydraulic model of the Pinehaven catchment.

The proposed works increase the size and capacity of the Stream channel in the full project reach (48 Whitemans Road to the Pinehaven Reserve) except for two sections – downstream of the Whitemans Road diversion structure and between 48 Blue Mountains Road and 2A Freemans Way. The works allow more flow to be carried in the Stream, so preventing or reducing flooding while increasing the flow in the Stream. Despite this increase in flow, water levels in the Stream are, in general, reduced with the proposed works in place because of the proposed increase in channel capacity.

The assessment shows that the proposed works meet the project objectives to increase the capacity of the Stream to the 4% AEP flood flow and to contribute to the management of flood risk to habitable floor levels up to the 1% AEP flood level.

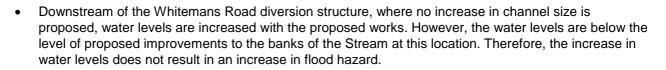
For the 4% AEP flood, including an allowance for climate change effects, model results show that:

- Flow is contained within the banks of the Stream throughout the project reach (48 Whitemans Road to the Pinehaven Reserve) except for the section between, and including, 48 Blue Mountains Road and 2A Freemans Way. In this section the natural high ground on the true right bank means that no flooding of buildings occurs.
- Downstream of the Whitemans Road diversion structure, where no increase in channel size is proposed, the increase in flow in the Stream with the proposed works in place results in an increase in water levels and flood depths. However, the flood water levels are below the existing adjacent ground levels and therefore the increase in water levels does not increase flood hazard.
- At 48 Blue Mountains Road the flood water level is reduced due to the proposed increase in capacity of the Pinehaven Road culvert. Reprofiling and lowering of the ground levels associated with the proposed demolition of the existing buildings at this location will result in a greater extent and depth of flooding outside the existing Stream channel. However, flooding is contained within the property by natural high ground levels, the resulting flood depths will be no greater than the existing flood depths in the Stream and no buildings will be located in the property.
- Between 50 Blue Mountains Road and 2A Freemans Way flood levels are increased as a result of the proposed works. Flood hazard is not increased at this location since the water levels are well below the level of the buildings on the true right bank and there is only a minor increase in flooded area on the true right bank (1.1% at 50 Blue Mountains Road, nil at 2A Freemans Way).

For the 1% AEP flood, including an allowance for climate change effects, model results show that:

 The effect of the proposed works on Habitable Floor flooding in the entire project reach is summarised in Table 2. The number of habitable and non-habitable floors flooded in each reach are reduced and no properties or buildings are flooded which previously were not flooded. Two properties will experience increased peak flood water depths.

Reach	Name	F	labitable F	loors	Non-Habitable Floors			
		Existing	Design	Improvement	Existing	Design	Improvement	
1	48 Whitemans Road to Sunbrae Drive	11	6	5 fewer	4	1	3 fewer	
2	Sunbrae Drive to Pinehaven Road	24	4	20 fewer	14	0	14 fewer	
3	Pinehaven Road to Pinehaven Reserve	45	13	32 fewer	14	5	9 fewer	
	Total	80	23	57 fewer	32	6	26 fewer	



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- At 48 Blue Mountains Road the flood water level is reduced due to the proposed increase in capacity of the Pinehaven Road crossing. Reprofiling and lowering of the ground levels associated with the proposed demolition of the existing buildings at this location will result in a greater extent and depth of flooding outside the existing Stream channel. However, flooding is contained within the property by natural high ground levels, the resulting flood depths will be no greater than the existing flood depths in the Stream and no buildings will be located in the property.
- Between 50 Blue Mountains Road and 2A Freemans Way flood levels are increased as a result of the proposed works. Flood hazard is increased at this location.

For fast and deep floodwaters:

- The model results show the Stream has fast and deep water in the baseline and with the proposed design in place.
- The model results show the risk of injury or harm is reduced because the flood extents are reduced.
- The risk of injury or harm will be further reduced by the inclusion of physical and non-physical controls on access to the Stream.

Overland flowpaths will be integrated into the stormwater network by:

- Eliminating the overland flowpaths at Sunbrae Drive and at Birch Grove.
- Significantly reducing the size and frequency of occurrence of the overland flow in Wyndham Road.
- Reshaping the ground to contain the overland flowpath in Clinker Grove.

The proposed design achieves the relevant objectives relating to flood management for the 4% AEP event, the risk of injury or harm from fast or deep flowing water and integrating overland flowpaths into the wider stormwater network, and it reduces the risk to people and property from flooding.

The proposed design generally achieves the objective of contributing to the management of flood risk to habitable floor levels up to the predicted 1% AEP flood level.



## 5. Definitions

#### Annual exceedance probability (AEP)

Expressed as a percentage, it gives the chances of a flood of that size or larger occurring in any given year. It is equal to the inverse of the "return period" that is also used to describe flood probability. For instance:

- A "1% AEP flood" means a flood with a 1% or 1 in 100 chance of occurring in any given year. This is equal to a "100-year return period flood event". On average, this is expected to occur once in 100 years, based on past flood records, though in reality it could happen at any time.
- A "4% AEP flood" means a flood with a 4% or 1 in 25 chance of occurring in any given year. This is
  equal to a "25-year return period flood event".

#### Catchment

The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.

#### **Design standard**

The standard of the flood management methods designed to contain a flood of a certain size (e.g. the height of river stopbanks).

#### Flood

A relatively high river flow that overtops the natural or artificial banks in any part of a watercourse

#### Flood defences

Physical structures that keep floodwaters in the river corridor. They include stopbanks and flood walls (see structural measures).

#### **Flood extent**

Base model extent of flooding in a rainfall event with a 1% AEP, incorporating climate change to 2090

#### Flood hazard

The potential for damage to property or people due to flooding and associated erosion.

#### **Flood hazard effects**

The negative impacts of flooding caused by fast flowing or deep ponded flood waters. Fast flowing or ponded flood waters are dangerous for people, becoming more severe where floods affect urban areas. These effects also include damage to the flood protection system, and other structures and buildings by water and debris, or by erosion.

#### Floodplain

The low-lying portion of a river valley, adjacent to the river corridor, which is covered with water when the river overflows during floods.

#### **Habitable Floor**

A building that may contain habitable space as defined in the Building Regulations, based on a desktop assessment to identify buildings with a floor area greater than 40m<sup>2</sup>.



#### Hazard

A hazard refers to the potential for flooding and erosion to affect floodplain. See flood hazard effects.

#### Land

This includes land covered by water.

#### Lidar

Light Detection And Ranging: a surveying method used to measure ground levels by directing laser light at the ground surface from an aircraft and measuring the reflected light with a sensor. The ground level relative to the aircraft is calculated from the time of travel and differences in emitted and return wavelengths of the reflected light.

#### Mitigation

For this guideline, the act of moderating or reducing the effects of the flood hazard or flood protection works

#### **Non-Habitable Floor**

A building that is not expected to contain habitable space as defined in the Building Regulations, based on a desktop assessment to identify buildings with a floor area equal to or less than 40m<sup>2</sup>.

#### Riverbed

Riverbed is defined in the Resource Management Act 1991: "In relation to any river, the space of land which the waters of the river cover at its fullest flow without overtopping the banks."

#### **River corridor**

Includes land immediately adjacent to the river. It is the minimum area able to contain a major flood and enable the water to pass safety to the sea. Because of its location, the river corridor represents a significant flooding and erosion hazard to people and structures, including the flood defences, sited in the corridor. The depth and speed of flood waters are such that existing development in the corridor could sustain major damage, and there is a potential danger to life. Water may rapidly rise, evacuation of people and their possessions would be extremely difficult, and social disruption and financial loss could be very high.

#### Risk

Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. In this context it is the likelihood of consequences arising from the interaction of floods, communities and the environment.

#### **Upper catchment**

The generally hilly and mountainous areas in the headwaters of a catchment.

#### Zone/zoning

Areas of land classified for a certain range of land-uses; e.g. residential zoning specifically provides for residential homes as well as associated structures such as garages and storage sheds



## **Appendix V. Landscape and Visual Impact Assessment**



## Pinehaven Stream Improvements Landscape and Visual Impact Assessment

September 2019









## PINEHAVEN STREAM IMPROVEMENT WORKS

WELLINGTON WATER / JACOBS

Landscape and Visual Impact Assessment

Project No. 2017\_009 | 9

FINAL ISSUE 18 SEPTEMBER 2019

#### PINEHAVEN STREAM IMPROVEMENTS

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## EXECUTIVE SUMMARY

DCM Urban Design Limited has been commissioned by Wellington Water and Jacobs New Zealand Limited to prepare a landscape and visual impact assessment for the proposed stream improvement works for Pinehaven Stream, Upper Hutt City. The project involves improvement works along the Pinehaven Stream alignment from 48 Whitemans Road upstream to Pinehaven Reserve. The proposal seeks to widen the banks of the stream to improve capacity, remove constraints, and reduce potential flood hazard. The works include earthworks, stream bank retention structures, vegetation removal, bridge removal and replacement, flood walls, and the removal of three residential dwellings acquired by the Greater Wellington Regional Council where their retention is not possible. A Landscape Concept Plan has been prepared for Willow Park which seeks to improve accessibility and amenity of the reserve while achieving necessary hydraulic requirements. Landscape planting plans have also been prepared for the full alignment to mitigate potential adverse effects resulting from stream improvement works, where possible.

The report addresses the likely landscape and visual effects of the proposal on the existing receiving environment and provides an assessment of the likely effects. These are considered in the context of Part 2, Sections 6 and 7 of the Resource Management Act 1991 (RMA / the Act) and the relevant sections of the Upper Hutt City Council District Plan. It was considered that the proposals are consistent with the values and objectives outlined in the various plans in relation to landscape matters.

The report assesses the likely effects on the landscape character in which the works will be undertaken and the effects, both during construction and after mitigation, will have on the area's topography, vegetation, waterways and built form. It is considered that effects will be predominantly more than minor at most during construction. In all cases the residual effects will reduce to less than minor following mitigation and construction. This is largely due to mitigation measures proposed to reduce landscape and visual impacts which are shown in the Landscape Concept Plans appended to this report.

In terms of landscape elements and character, residual effects (with mitigation) will be less than minor. There will be some loss of vegetation, including some larger trees, and modification of stream banks. The quality of the receiving environment is mixed, with areas of well-established native vegetation but also areas where there is a high level of modification and infestation of weed species. The proposed landscape works combined with the engineering works will improve the amenity of the corridor over time but there will be short term effects (up to 5 years) when vegetation is initially removed during construction, and before new plantings become established. There are some positive outcomes likely with the removal of some existing bridges and structures on the stretch of stream between 28 and 40 Blue Mountains Road. This will open up the stream corridor and allow for additional landscape planting. The exact design is yet to be finalised but the concept of residents sharing accessways and associated stream crossings is considered to be a positive outcome from an amenity perspective.

The proposal will have less than minor adverse effects on landscape values as identified in the District Plan. The site is not located in an area with a landscape overlay. Notable Trees identified in the District Plan will not be affected by the proposal. One Black Beech within Urban Tree Groups 99 at 12 birch Grove will be removed.

In terms of visual effects, the proposal will have the greatest visual effects on the residents of 26 and 28 Blue Mountains Road and 10-12 Birch Grove who will all experience significant adverse effects during construction with the loss of vegetation and significant encroachment on to their properties. With mitigation, the residual effects will reduce to minor once vegetation is established after approximately 5 years, but there will still be some loss of flat land which cannot be mitigated. All other residual visual effects are minor or less than minor.

## 1. INTRODUCTION AND PROPOSAL

DCM Urban Design Limited has been commissioned by Wellington Water and Jacobs New Zealand Limited to prepare a landscape and visual impact assessment for the proposed stream improvement works for Pinehaven Stream, Upper Hutt City.

The improvement works are proposed along the stream alignment from 48 Whitemans Road upstream to Pinehaven Reserve. The proposal seeks to widen the banks of the stream to improve capacity, remove constraints, and reduce potential flood hazard. The works include earthworks, stream bank retention structures, vegetation removal, bridge removal and replacement, flood walls, and the removal of three residential dwellings acquired by the Greater Wellington Regional Council. Plans of the project site are included in the figures appended to this report.

Twelve (12) large trees are required to be removed as part of the improvement works, being:

Tree no.	Address	Species	Listed in District Plan
8	54 Whitemans Road	Oak	No
13	4 Blue Mountains Road	Oak	No
14	4 Blue Mountains Road	Kowhai	No
15	4 Sunbrae Drive (in stream reserve)	Kowhai	No
16	14 Blue Mountains Road	Black beech	No
17	Near 3 Sunbrae Drive (on road reserve)	Fir	No
18	5 Deller Grove	Prunus	No
19	9 Deller Grove	Oak	No
20	13 Deller Grove	Kowhai	
21	32 Blue Mountains Road	Fir	No
24	48 Blue Mountains Road	Kahikatea	No
35	12 Birch Grove	Black beech	No

For Willow Park a landscape concept plan has been developed to incorporate the property of 4 Sunbrae Drive which has been purchased by Greater Wellington Regional Council to allow for the improvement works. It is proposed to close the existing walkway through to Tapestry Grove to improve urban design outcomes, with a new bridge providing pedestrian and cycle access through to Sunbrae Drive. The existing timber bridge is to be removed. Two concepts for the park have been developed for consultation purposes and are included in the attached figures. These will be subject to community consultation and Upper Hutt City Council approval. Option A proposes a path

along the boundary of 10a Blue Mountains Road at an elevation above a 1 in 25-year flood event and would include a section of solid fencing along this property to maintain privacy for residents. Option B proposes a path in the middle of the park on a similar alignment to the existing path which would be subject to inundation during flood events. Both options would provide recreational access to the stream. Habitat for eels will be included during detailed design.

## 2. METHODOLOGY

This landscape and visual impact assessment considers the likely effects of the proposal in a holistic sense. There are two broad components to the assessment:

- The landscape assessment addresses whole-of-landscape issues, particularly those identified by Sections 6 and 7 of the RMA. The landscape assessment consists of two components: a descriptive component that defines landscape character, natural character (s6(a)), and landscape values outlined in the District Plan including outstanding natural landscapes (ONL)(s6(b)); and an evaluative component that addresses the effects on identified District Plan landscape values and landscape character.
- 2. The visual impact assessment addresses the effects of the proposal on visual amenity and people (s7(c)), evaluated against the character and quality of the existing visual catchment.

#### 2.1 LANDSCAPE ASSESSMENT METHODOLOGY

The landscape assessment will draw upon landscape assessment theory, professional best practice, the requirements of the RMA (particularly with regard to matters of national importance identified in Part 2 Section 6), and procedures and principles established through case law in the Environment Court.

#### 2.1.1 Landscape Character

The general methodology applied is that described by Peart (2005)<sup>1</sup>, whereby the landscape unit of analysis is first described in terms of its landscape character, with any value or significance then identified.

The framework for describing landscape character is divided into the categories of topography; land cover; built form, structures, and human elements; and natural character. Section 6(a) of the RMA requires natural character, which for the purposes of this report can be seen as a subset of landscape character, be subject to specific analysis.

In this framework, natural character is a narrowly defined aspect of landscape character. In simple terms it is an assessment of the degree to which a given landscape is the product of nature, as opposed to cultural intervention. It can be assessed along a continuum of states from pristine wilderness, where no evidence of human intervention is apparent, to wholly developed, where scant evidence of natural elements, patterns, and processes

<sup>&</sup>lt;sup>1</sup> Peart, R. (2005).Landscape planning guide for peri-urban and rural areas. Environmental Defence Society, Auckland

remains. It is important to emphasise that natural character is not an absolute quality that either exists or is absent, but rather occurs across a continuum in matters of degree. Human interventions may diminish natural character, but do not necessarily eliminate it altogether. The highest degree of natural character (greatest naturalness) occurs where there is least modification. Natural character is generally understood to be determined by the extent to which natural elements, patterns and processes occur in the landscape, and the extent to which they are modified by human interventions.

- Natural elements: these are the products of ecological, erosional and depositional processes; the biophysical characteristics of the landscape, such as landforms, rock outcrops, hydrological features and vegetation communities.
- Natural patterns: patterns are formed through the interactions between landscape elements and the processes operating on them. Patterns are apparent through the interactions of plants, soils, aspect and slope, or through the erosion of the coastline through wave action. The regimented character of a forestry plantation or apple orchard compared with the apparently random patterns of trees in an indigenous forest, illustrates how natural and unnatural patterns might be understood.
- Natural processes: Natural processes are the dynamic processes at work on the biophysical landscape, shaping landform and vegetation communities through processes of erosion and deposition, soil forming processes, colonisation and succession, regeneration and energy and nutrient flows.

#### 2.1.2 Landscape Value / Significance

Following the descriptive phase of landscape assessment, an evaluative phase is undertaken whereby values or significance is ascribed to the landscape.

Where the landscape value of the site is not identified in the District Plan under Section 6(b) of the RMA (i.e. as a mapped outstanding natural feature or outstanding natural landscape), the criteria identified in *Wakatipu Environmental Society Inc. & Ors v QLDC* [2000] NZRMA 59 (generally referred to as the modified *Pigeon Bay* criteria) are used. The modified *Pigeon Bay* criteria include natural science factors, aesthetic value and the methods and techniques to be used. A professionally based evaluation has been applied to the task of assessing aesthetic value, drawing upon the theoretical work of Kaplan and Kaplan (1989)<sup>2</sup>.

Where the District Plan has identified Outstanding Natural Features or Landscapes, the objectives, policies and rules contained within the plan are used as the basis for determining landscape significance or value, and it is these values which the proposal is assessed against. Where there is some uncertainty of the landscape value, such as when the District Plan has a broad description of an Outstanding Natural Landscape (ONL), but it is not site specific, or the site neighbours an ONL, it is often necessary to complete an assessment against the values of the District Plan for the sake of completeness.

<sup>&</sup>lt;sup>2</sup> Kaplan, R., Kaplan, S. (1989). The Experience of Nature – A Psychological Perspective. Cambridge University Press, Cambridge

In the case of Upper Hutt City Council's District Plan, areas of "High Landscape Value and High Visual Value" are mapped on the Urban and Rural Southern Hills Maps (Southern Hills Overlay Area) with objectives, policies, methods and rules contained within Chapter 12: Landscape and Ecology. The key value of the Southern Hills Overlay Area Landscape is to provide a largely undeveloped 'green' backdrop to the City with areas with high levels of naturalness, being high quality landcover, largely unmodified landform and the absence or unobtrusiveness of built elements. The works are located within Maps 41 and 46 of the District Plan which are shown combined on Page 5 of the attached figures. The works are not within a landscape protected area.

However, Objective 12.4.7 is considered relevant to this project which states:

To protect trees of ecological, biophysical, historic, cultural or botanic value, or significant visual amenity value in both public and private ownership from activities which may result in adverse effects on these trees.

#### 2.2 VISUAL ASSESSMENT METHODOLOGY

In response to section 7(c) of the RMA, an evaluation was undertaken to define and describe visual amenity values within the project area. As with aesthetic values, with which amenity values share considerable overlap, this evaluation was based on a professional assessment, using current and accepted good practice, rather than being community-based (i.e. established through consultation). Amenity values are defined in the Act as "those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes." The visual assessment looks at the sensitivity of receptors to changes in their visual amenity through the analysis of selected representative viewpoints and wider visibility analysis. It identifies the potential sources for visual effects resulting from the project and describes the existing character of the area in terms of openness, prominence, compatibility of the project with the existing visual context, viewing distances and the potential for obstruction of views.

The visual assessment involved the following process:

Identification of key viewpoints: A selection of key viewpoints was identified and verified for selection during the site visit. The viewpoints are considered representative of the various viewing audiences within the receiving catchment, being taken from public locations where views of the proposal were possible, some of which would be very similar to views from nearby houses. The identification of the visual catchment was prepared as a desktop study in the first instance using Council GIS for aerials and contours. This information was then ground-truthed on site to determine the key viewpoints and potential audience. Depending on the complexity of the project a 'viewshed' may be prepared which highlights the 'Theoretical Zone of Visual Influence' (TZVI) from where a proposal will be theoretically visible from. It is theoretical as the mapping does not consider existing structures or vegetation, so is conservative in its results (i.e. will tend to show the TZVI as greater than it might be in reality). In this project, given the scale of the works and limited audience, a viewshed was not prepared.

Assessment of the degree of sensitivity of receptors (viewers at the identified viewpoint) to changes in visual amenity resulting from the proposal: Factors affecting the sensitivity of receptors for evaluation of visual effects include the value and quality of existing views, the type of receiver, duration or frequency of view, distance from the proposal and the degree of visibility. For example, those who view the change from their homes may be considered to be highly sensitive. The attractiveness or otherwise of the outlook from their home will have a significant effect on their perception of the quality and acceptability of their home environment and their general quality of life.

In contrast, those who view the change from their workplace are only moderately sensitive as the attractiveness or otherwise of the outlook will have a less important, although still material, effect on their perception of their quality of life. The degree to which this applies depends on whether the workplace is industrial, retail or commercial. Those who view the change whilst taking part in an outdoor leisure activity may display varying sensitivity depending on the type of leisure activity. For example, walkers in open country on a long-distance tramp are considered to be highly sensitive to change while other walkers in a more urbanised environment may not be so focused on the surrounding landscape. Those who view the change whilst travelling on a public thoroughfare (public road or footpath) will also display varying sensitivity depending on the speed and direction of travel and whether the view is continuous or occasionally glimpsed.

#### 2.3 EFFECTS ANALYSIS METHODOLOGY

Analysis of the existing landscape and visual environment is focused upon understanding the functioning of how an environment is likely to respond to external change (the proposal). The assessment considers the resilience of the existing character, values or views and determines their capacity to absorb change, or sensitivity to change. The proposal is assessed first in its 'unmitigated' form, and then following proposed mitigation to determine the likely residual effects. The analysis identifies opportunities, risks, threats, costs and benefits arising from the potential change.

Assessing the magnitude of change (as a result of the proposal) is based on the NZILA Best Practice Guide – Landscape Assessment and Sustainable Management (02.11.10) with a seven-point scale, being:

#### EXTREME / VERY HIGH / HIGH / MODERATE / LOW / VERY LOW / NEGLIGIBLE

In determining the extent of adverse effects, taking into account the sensitivity (low, medium, high) of the landscape or visual receptor combined with the Magnitude of Change proposed, the level of effects is along a continuum to ensure that each effect has been considered consistently and in turn cumulatively. This continuum may include the following levels of effect (based on the descriptions provided on the Quality Planning website (ref: <a href="http://www.qualityplanning.org.nz/index.php/node/837">http://www.qualityplanning.org.nz/index.php/node/837</a> - Determining the Extent of Adverse Effects):

• Indiscernible Effects No effects at all or are too small to register.

- Less than Minor Adverse Effects Adverse effects that are discernible day-to-day effects, but too small to adversely affect other persons.
- Minor Adverse Effects Adverse effects that are noticeable but will not cause any significant adverse impacts.
- More than Minor Adverse Effects Adverse effects that are noticeable that may cause an adverse impact but could be potentially mitigated or remedied.
- Significant Adverse Effects that could be remedied or mitigated An effect that is
  noticeable and will have a serious adverse impact on the environment but could
  potentially be mitigated or remedied.
- Unacceptable Adverse Effects Extensive adverse effects that cannot be avoided, remedied or mitigated.

Identification of potential mitigation or offsetting measures: These may take the form of revisions/refinements to the engineering and architectural design to minimise potential effects, and/or the implementation of landscape design measures (e.g. screen tree planting, colour design of hard landscape features etc.) to alleviate adverse urban design or visual effects and/or generate potentially beneficial long-term effects.

Prediction and assessment identification of the residual adverse effects after the implementation of the mitigation measures. Residual effects are considered for assessment five years after the implementation of the proposed mitigation measures, allowing for planting to get established but not to a mature level.

#### 2.4 PHOTOGRAPHY METHODOLOGY

All photos are taken using a Fujifilm FinePix \$5600 digital camera with a focal length of the equivalent of 28 millimetres. No zoom was used. In the case of stitched photos used as the viewpoint images, a series of 4 portrait photos were taken from the same position to create a panorama. The photos were stitched together automatically in Adobe Photoshop to create the panorama presented in the figures.

# ASSESSMENT OF EFFECTS 3.1 EXISTING LANDSCAPE CHARACTER

#### 3.1.1 Landscape Character

The landscape character of Pinehaven is typical of many low-density residential suburbs in New Zealand. The density is low, with a mix of single and two storey dwellings on mid-sized sections. There are some multi-unit developments, but typically most dwellings are single units on a single lot. In general, the existing urban character, while being residential, has an eclectic range of building styles, setbacks and orientation with little cohesion. Well established landscape planting helps to 'tie' all the disparate elements together.

Vegetation in the valley is well established with numerous trees, both native and exotic, over twenty metres in height. Undergrowth is also well-established. The stream runs through the middle of the suburb and is sometimes highly visible, but in most situations is hidden from public view either by vegetation, buildings, topography or a combination of all three. Each of the landscape elements which make up the landscape character are described in further detail below.

#### 3.1.2 Topography

The topography of the receiving environment is typical of a stream valley catchment that has been modified for residential development, with the stream corridor limited to a relatively narrow corridor. The topography on the edges of the stream (banks) is modified in most instances with the installation of timber or concrete retaining walls. There are pockets where the stream banks are less modified, such as immediately south of the intersection with Pinehaven and Blue Mountains Road where there are natural banks, but for the most part the edges of the stream have been modified.

Overall, it is considered that the topography has a **low-to-medium** sensitivity to change given the suburban character, and the degree of modification that has occurred, for most of the receiving environment.

#### 3.1.3 Vegetation

The vegetation varies along the stream corridor, with pockets of well-established native vegetation through to areas of weed dominated sections.

The section between Sunbrae Drive and 26 Blue Mountain Road (refer to Section 1 on Figure 7 of Appendix One) has not been surveyed, except visually from Sunbrae Drive, as this is on private property. This section appears to be a mix of exotic and native species, but of no major note. Key areas of native vegetation occur at the northern edge of proposal, adjacent to Whitemans Road where there are several well-established kowhai (*Sophora microphylla*) and native black beech (*Fuscospora* solandri) trees more than 20 metres in height. The beech trees are visually dominant in the area and create important local landmarks as well as having ecological value.

The next section of well-established native trees is south of the Pinehaven Road and Blue Mountains Road intersection through to the back of the property at 11 Birch Grove (refer to Viewpoint 2 on Figure 7 of Appendix One). There is a good variety of species in this location including pongas (*Dicksonia squarrosa*), rangiora (*Brachyglottis repanda*), kowhais (*Sophora microphylla*), cabbage trees (*Cordyline australis*), five finger (*Psuedopanax arboreus*) and more large beech trees (*Fuscospora* solandri). Through this stretch, the undergrowth is dense and provides good shading for the stream, as well as good canopy trees for native bird habitat.

Within Willow Park, the character of the stream corridor is open with largely mown grass banks and large willow trees. The character of this stretch is poor with limited diversity.

None of the trees to be removed are identified as Notable Trees or within an Urban Tree Group in the District Plan. However, the ecological assessment undertaken for the proposal has identified 25 trees with ecological or amenity values that require removal for the project. These are located in various places along the stream corridor.

Overall, the sensitivity to change of the existing vegetation is **medium** due to the presence of large, well-established trees and their influence on the character of the receiving environment.

#### 3.1.4 Waterway and Natural Character – Pinehaven Stream

The waterway has 'pockets' or stretches where it has a moderate level of natural character with natural processes, patterns and elements clearly visible. Banks have natural, steep contours where erosion is readily visible or where they have been colonised by mosses and ferns. Overhanging native trees provide shade and filtered light through to the stream bed which consists of a mix of stones and mud. The channel meanders, with small eddies and pools present. In other locations the stream has been channelised using either timber or concrete retaining walls. In Willow Park, the banks are soil but have been modified with regular mowing of the grassed edges. In this location, the stream is open with limited shading and little variation or diversity. From Sunbrae Drive through to Pinehaven Road, the stream runs through a channelised section with linear edges and a mix of vegetation types. The character of this stretch is highly modified with limited natural character. Past the Pinehaven Road and Blue Mountains Road intersection, the stream is more naturalised until the back of 11 Birch Grove where it is channelised again between residential properties.

Overall, the stream has a **medium** sensitivity to change due to the presence of natural elements and processes in some sections of the stream.

#### 3.1.5 Built Structures

The built form of the alignment generally consists of individual houses constructed in the 1950-60s onwards, either single or two storeys but predominantly standalone detached houses. Material use is mixed but there are many weatherboard houses with gable roofs. There are few modern houses in the area (i.e. constructed since 2000 onwards). Setbacks from roads vary but are generally five to six metres with a suburban built character. Roads are typically 20 metre corridors with some wider portions along the alignment.

Overall, the built form of the alignment has a **low** sensitivity to change due to the eclectic and varied style of housing in the receiving environment, allowing for changes to be readily absorbed.

#### 3.2 EFFECTS ON LANDSCAPE VALUES AND CHARACTER

The construction works associated with the stream works are likely to involve the following:

- 1. The removal of 3 houses acquired by Greater Wellington Regional Council;
- 2. Removal and/or replacement of existing bridges over the stream;
- 3. Clearance of existing vegetation, both native and exotic, and including some large well-established trees;
- 4. Earthworks to reshape and widened the stream channel. This may require the removal of existing structures which are currently stabilising the stream banks or disturbance to the stream bed; and
- 5. Construction of stream bank retaining structures in some locations

The operational phase of the stream improvement works will involve:

- 1. Reinstatement of bridges over the stream. A new shared access road is proposed for properties 30, 32, 34, 36, 38 and 40 Blue Mountains Road to reduce the number of private bridges crossing the stream from 5 to 1;
- 2. Planting of stream banks with native species, including a large number of tree species; and
- 3. Redevelopment of Willow Park to potentially provide all-weather access through the space and a new bridge across Pinehaven Stream. The existing path through to Tapestry Close is to be closed with a new path created following the stream alignment to exit onto Sunbrae Drive

#### 3.2.1 Effects on Landscape Values

Landscape values of the receiving environment are taken from the objectives and policies outlined in the Upper Hutt City Council District Plan.

The proposed works are not located in an Outstanding Natural Landscape, with works located in the Residential, Open Space and Residential Conservation zones of the Upper Hutt City Council District Plan. The project footprint comes close to an Urban Tree Group area, which is within 50 Blue Mountains Road and 2A Freemans Way and adjacent to 11 Birch Grove. One Black Beech within Urban Tree Groups 99 at 12 birch Grove will be removed.

The matters listed for consideration for any resource consent application under the District Plan provide useful guidance when considering the effects of tree removal. These require consideration of:

- > The contribution the tree makes to the amenity of the area.
- > The health of the tree.

- > The function the tree may have in an ecosystem or habitat.
- Whether the tree is causing or is likely to cause significant damage to buildings, structures or utilities.
- Significant adverse environmental effects caused by the tree and the nature of works proposed to avoid, remedy or mitigate them.

The southern section of the works, past the intersection with Pinehaven and Blue Mountains Road, is located in the Residential Conservation Area. Some trees will be removed as part of the works in this area, including some well-established native trees. However, given the scale of the proposed works and the large number of plants which are proposed as mitigation (refer to the Landscape Concept Plans in the appendix for details), there will be only a minor, short term effect on amenity, which reduces to less than minor once planting becomes established. There are several mature native trees in the immediate area which will not be affected by the works and can be retained to ensure the amenity of the wider area is maintained.

As noted above, the project does not affect any trees identified as a Notable Tree, or within an Urban Tree Group as identified in the District Plan.

#### 3.2.2 Effects on Landscape Character

The effects of the proposal on landscape character elements are summarised in Table 2 below. The magnitude of change is assigned a rating on a seven-point scale as described in section 2.2 above (note that the magnitude of change is separate from how adverse the change will be).

Prior to mitigation the effects on Landscape Character will be minor overall resulting from localised vegetation clearance, earthworks and removal of three dwellings. However, the (short term) effects on vegetation will be more than minor, reducing to less than minor with the proposed planting.

Overall, the stream works are considered to have less than minor effects after mitigation on the existing landscape character and landscape elements along the alignment. The quality of the receiving environment is mixed with areas of well-established native vegetation but also areas where there is a high level of modification and infestation of weed species. The proposed landscape works combined with the engineering works will improve the amenity of the corridor over time but there will be short term adverse effects when vegetation is initially removed, and before new plantings become established. Refer to Section 5 below for details on the proposed mitigation measures.

#### Table 1: Assessment of Effects on Landscape Character and elements

Landscape Character / Element	Sensitivity to Change	Magnitude of Change	Adverse Effects (before mitigation)	Residual Adverse Effects (5 years after mitigation)	Comment
Character	Medium	Low	Minor	Less than Minor	For much of Pinehaven, the landscape character will not change because of the stream improvements works. There will be some loss of larger specimen trees which will be noticeable in the short term, but over time the loss will be remedied by new plantings. The residual effects on landscape character are less than minor.
Topography	Low to Medium	Low	Less than Minor	Less than Minor	The works will result in a low change to topographical features as the stream channel is widened to accommodate larger flows. The banks are already modified from residential development with the use of timber or concrete retaining walls. The proposed changes are considered to have less than minor residual adverse effects.
Vegetation	Medium	Moderate	Minor	Less than Minor	There will be the loss of some large specimen trees, particularly at the northern end close to Whitemans Road where there are large beech and kowhai trees which will be required to be removed. The willow trees are also to be removed in Willow Park. During construction there would be more than minor effects, but with the proposed plantings these will reduce to less than minor as planting establishes.
Waterways	Medium	Moderate	More than Minor	Less than Minor	The waterway will be enhanced with the proposed improvement works given the modified nature of some stream reaches. An open channel will be maintained, with no parts of the existing open stream proposed to be piped. There are some locations (south of the Pinehaven / Blue Mountains intersection) where the banks are somewhat naturalised and rocks in the stream bed are visible.
Built Structures	Low	Moderate	Minor	Less than Minor	The proposal will not affect the current suburban character of the receiving environment apart from the loss of 3 dwellings at 28 and 48 Blue Mountains Road, and 4 Sunbrae Drive. The footbridge crossing the stream in Willow Park will also be removed but it will be replaced, maintaining connectivity in the area. With the replacement of the footbridge, the residual effects will be less than minor.

#### 3.3 VISUAL EFFECTS

Table 2 below outlines the potential visual effects each visually sensitive receptor might receive and how the effects may potentially be mitigated:

#### Table 2: Assessment of Effects on Visually Sensitive Receptors

Viewpoint (refer Figure 7)	Visually Sensitive Receptors	Distance from Proposal	Type of View	Description of existing view	Sensitivity of VSR	Magnitude of Change	Adverse Effects (before mitigation)	Description of Effects	Mitigation Measures (refer Section 4 below)	Residual adverse Effects (5 years after mitigation)
1. 52 Whitemans Road looking northwest	Residents of 48, 50, 52, 54 Whitemans, 14,15 Clinker Grove	0m	Open	Views of the stream are open with large, well established native trees lining the banks of the stream, including kowhai and beech. Views of the water are largely screened by the steep banks or existing vegetation. The quality of the views is considered moderate to high due to the quality of the native trees	High	High	Minor	The residents will experience temporary views of earthworks, and some loss of vegetation, but generally the works in this stretch are limited in their scope. There will be the loss of some existing trees but the majority are to be retained.	MM1-MM4	Less than Minor
2. Silverstream Reformed Church	Church goers	0m	Open	Views of the stream are open with large, well established trees lining the banks of the stream. The quality of the views is considered moderate due to the quality of the trees but reduced by the presence of weed species and unkept character of the stream edge. The stream edge is of mixed quality.	Medium	Low	Minor	The widening works will result in the removal of existing vegetation for the widening of the stream channel and a small encroachment into the carpark. The loss of vegetation will result in less than minor effects following mitigation.	MM1-MM4	Less than Minor
3. Willow Park	Park users	0m	Open	Open views of the stream are available with open grass banks which are relatively shallow compared to other stretches of the stream. Views are possible of the large willows and there are some native species on the northern side of the stream, adjacent to the church. Some properties have	Medium	Moderate	Minor	The widening works will result in the removal of existing vegetation for the widening of the stream channel. The loss of vegetation, including the willows, will result in less than minor effects following mitigation.	MM1-MM6	Less than Minor
	Residents surrounding Willow Park	0m	Open, partial and screened	solid fencing adjoining the park restricting views in.	High	Low	Minor	The widening works will result in the removal of existing vegetation for the widening of the stream channel and a small encroachment into their properties. The loss of vegetation will result in less than minor effects following mitigation.	MM1-MM6	Less than Minor
4. Sunbrae Drive looking west	Motorists using Sunbrae Drive	10m	Partial	Views of the stream are largely screened due to the large berms on either side of the road and the depressed nature of the stream.	Low	Low	Less than Minor	Views will be possible during construction works and due to the loss of vegetation. With mitigation planting, effects are considered to be indiscernible, possibly even positive with greater views of the water possible.	MM1-MM4	Indiscernible
	Residents at 14 Blue Mountains Road	Om	Open	Views of the stream are open and partial with a mix of vegetation types and fences lining the stream corridor. Views of the water are largely screened by the steep banks or existing vegetation or fences. The quality of the views is considered moderate due to the high-quality of the native trees.	High	Moderate	More than Minor	The widening works will result in the removal of existing vegetation for the widening of the stream channel and a small encroachment into their properties. The loss of vegetation will result in less than minor effects following mitigation.	MM1-MM4	Less than Minor

	Residents at 4 Sunbrae Drive (Council owned and to be removed – not assessed)	0m	Open		House to be	e removed.				
	Residents backing onto the stream between Sunbrae Drive through to 24 Blue Mountains Road	0m	Open and partial		High	Moderate	More than Minor	The widening works will result in the removal of existing vegetation, including a large stand of bamboo which affords privacy to residents, for the widening of the stream channel and a small encroachment into their properties. The loss of vegetation will result in less than minor effects following mitigation.	MM1-MM4	Less than Minor
	Residents at 26 Blue Mountains Road	0m	Open		High	High	Significant	The widening works will result in the removal of the loss of existing vegetation and a significant amount of their backyard and fencing for the widening of the stream channel. The loss of land and the proximity of works to existing buildings will result in more than minor effects following mitigation.	MM1-MM4	Minor
5. 28 Blue Mountains Road Iooking north	Residents at 28 Blue Mountains Road (Council owned and to be removed – not assessed)	0m	Open	Views of the stream are open with large, well established trees lining the banks of the stream. The quality of the views is considered moderate due to the quality of the trees but reduced by the presence of weed species and unkept character of	House to be	e removed.	1			
	Residents 30-38 Blue Mountains Road	0m	Open	the stream edge. The stream edge is of mixed quality.	High	High	Significant	The widening works will result in the removal of the re-design and relocation of bridges and garages, existing vegetation and fencing for the installation of small retaining walls, new bridges and the widening of the stream channel. The loss of land and the proximity of works to existing buildings will result in more than minor effects following mitigation.	MM1-MM4	Minor
6. 40. Blue Mountains Road looking north	40 Blue Mountains Road	0m	Open		High	Moderate	More than Minor	Loss of vegetation and creation of swale along frontage with new access bridge, with mitigation planting the residual effects will be less than minor	MM1-MM4	Less than Minor
7. Pinehaven / Blue Mountains Road intersection looking south	Residents at 48 Blue Mountains Road (Council owned and to be removed – not assessed)	0m	Open	The house currently sits over the stream and is surrounded by well-established vegetation, including several large native trees.	House to be	e removed.	1			1
	Residents at 1 and 3 Pinehaven Road	0m	Open	In most cases views of the water are screened due to the steepness of banks, boundary fences and vegetation at the rear of the sites. The boundary is currently well vegetated with mostly native species.	High	Moderate	More than Minor	The widening works will result in the removal of existing vegetation for the widening of the stream channel and a small encroachment into their properties. The loss of vegetation will result in less than minor effects following mitigation.	MM1-MM4	Less than Minor
8. Pinehaven Reserve looking north	Residents at 10 and 12 Birch Grove	0m	Open	In most cases views of the water are screened due to the steepness of banks, boundary fences and vegetation. Weed species are common. The quality of the existing view is considered mixed.	High	High	Significant	The widening works will result in the removal of existing vegetation and fencing for the installation of small retaining walls and the widening of the stream channel. The loss of land and the proximity of works to existing	MM1-MM4	Minor

							buildings will result in more than minor effects following mitigation.		
Residents of 8, 10a-c, 11 Birch Grove	0m	Open / partial	In most cases views of the water are screened due to the steepness of banks, boundary fences and vegetation. Weed species are common. The quality of the existing view is considered mixed.	High	Moderate	More than Minor	The widening works will result in the removal of existing vegetation and fencing for the installation of small retaining walls and the widening of the stream channel. The loss of vegetation will result in less than minor effects following mitigation.	MM1-MM4	Less than Mir
Park users	0m	Partial	Park users have partial views of the stream where it enters the narrow corridor between properties. Within the park the banks are relatively steep and have a mix of grass and shrub coverings. Where the stream enters the corridor, views are restricted by fencing and vegetation.	Medium	Low	Less than Minor	The proposed stream works will partially open the stream which is considered positive in terms of views. Retaining walls will be installed which in the short term reduce the amenity of the stream but overtime, with planting, views will appear like pre- construction with indiscernible residual effects for park users.	MM1-MM4	Indiscernible

## 4. MITIGATION MEASURES

The following mitigation or remediation measures are necessary to either avoid, remedy or mitigate any potential effects on Landscape Values, Character or existing Visual Amenity:

MM1	The retention of existing large trees within the designation, where possible. Refer to the landscape plans for those trees which are to be retained.
MM2	Planting of disturbed areas with either riparian or buffer species as per the landscape plans, 2017_009 /L101-108 revision 2 dated 7 August 2019. All native species are to be eco-sourced where possible.
MM3	Planting is to occur in the first available planting season following completion of the stream improvement works. All areas to be planted are to have at least a 300-millimetre depth of topsoil. A 24-month establishment period is recommended to ensure good plant growth is achieved and any failed plantings can be replaced.
MM4	Replacement of existing bridges where shown on the engineers' drawings to ensure connectivity (e.g. pedestrian access) is maintained.
MM5	Construction of a boardwalk through Willow Park as shown in the landscape plan, L102-103, to provide an all-weather access route through to Sunbrae Drive and Tapestry Grove. The finished height of the boardwalk is to be above the 25-year flood event with a new pedestrian bridge required to cross the stream.
MM6	Willow Park is to be planted with a mix of exotic and native species to reduce maintenance costs for grass mowing as well as to mitigate for the loss of the willow trees.

## 5. CONCLUSIONS

It is considered that the project will have the following residual effects (after mitigation, measured around 5 years after the works are complete) on landscape values, character and visual amenity:

In terms of landscape elements and character, residual effects (with mitigation) will be less than minor. There will be some loss of vegetation and modification of stream banks. The quality of the receiving environment is mixed, with areas of well-established native vegetation but also areas where there is a high level of modification and infestation of weeds species. The proposed landscape works combined with the engineering works will improve the amenity of the corridor over time, but there will be short term adverse effects (up to 5 years) when vegetation is initially removed during construction, and before new plantings become established. There are some positive outcomes likely with the removal of some existing bridges and structures on the stretch of stream between 28 and 40 Blue Mountains Road but will result in the loss of some land for these properties. The works will open up the stream corridor and allow for additional landscape planting. The exact design is yet to be finalised but the concept of residents sharing an accessway and associated stream crossings is considered to have positive effects from an amenity perspective.

- The proposal will have less than minor adverse effects on landscape values as identified in the District Plan. The site is not located in an area with a landscape overlay, or Notable Trees or Urban Tree Groups identified in the District Plan affected by the proposal.
- In terms of visual effects, the proposal will have the greatest visual effects on the residents of 26-40 Blue Mountains Road and 10-12 Birch Grove who will all experience more than minor residual adverse effects (i.e. with mitigation) due to their proximity to stream widening works. The proposal to create a shared or partially shared accessway (design yet to be finalised) which will, in my opinion have a positive effect on the character of the stream and Blue Mountains Road but will reduce the size of these
- Residents at 10, 12 Birch Grove, 26 Blue Mountains, will all experience significant effects during construction with the loss of vegetation and significant encroachment on to their properties. With mitigation, the residual effects for these residents will reduce to minor once vegetation is established after approximately five years, but there will still be some loss of flat land. All other residual visual effects are minor or less than minor.

Dave Compton-Moen



## Appendix W. Erosion and Sediment Control Plan