Te Awarua-o-Porirua fresh water current state and scenarios: Ecological assessment	
WMU Group	Coastal catchments
WMU Name and assessment locality	Hongoeka Stream

Periphyton	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	A	A	A	A
Commentary	Problematic periphyton blooms are unlikely due to assumed naturally intermittent flow and high shading in most of this catchment. This is unlikely to change with any scenario.			

Macroinvertebrates	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	C ↑	C ↑
Commentary	The stream is not expected to support a large range of macroinvertebrates due to its assumed naturally intermittent flow. However such streams can often support less common invertebrate communities, including rare species. This could be the case for the mid and lower reaches of this stream which are mostly shaded with bush and may have suitable physical habitat for macroinvertebrates – investigation would be required to confirm this. Retirement is a big driver under the improved and water sensitive scenarios, improving nitrate and ammonia runoff from farmland and increasing the length of bush-clad riparian habitat.			

Native Fish	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	C	C
Commentary	Little is known about fish populations in this catchment. This stream is unlikely to currently have any permanent populations of fish present due to the assumed naturally intermittent flow. However it could potentially support species such as koura and it is possible that migratory species could enter from the sea during times when there is sufficient flow – investigation would be required to confirm this. Changes under the improved and water sensitive scenarios, such as retirement from grazing in the upper catchment, could potentially improve physical habitat and stream conditions for fish to occur during times when there was sufficient flow for them to migrate in from the sea.			

Te Awarua-o-Porirua fresh water current state and scenarios: Ecological assessment	
WMU Group	Taupo Stream and Swamp
WMU Name and assessment locality	Taupo Stream below the wetland

Periphyton	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	B	B
Commentary	Periphyton biomass is currently a C band and improvement to B band is predicted under either scenario. Increased shading from riparian planting and retirement will reduce water temperature and light, which contribute to reducing periphyton biomass. Riparian planting will also help to stabilise stream banks, reducing deposited sediment through erosion (especially in the grazed parts of the catchment), which can be a periphyton nutrient source. Retirement or space planting of grazed pasture in the catchment under these scenarios also contributes to reduced sediment erosion and nutrient reduction, particularly phosphorus. Improved macroinvertebrate densities may increase periphyton grazing.			

Macroinvertebrates	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	B	B
Commentary	Taupo Stream is currently assessed as C band, with improvements to B band predicted with the improved and water sensitive scenarios. Riparian planting and retirement are likely to improve macroinvertebrate health through increased shading and habitat improvements (particularly in the upper catchment), as well as reducing deposited sediment from streambank erosion. Sediment reductions from the space planting or retirement of steep grazed pasture land reduce the overall sediment load and are likely to help improve macroinvertebrate health. These sediment reductions are likely the biggest drivers for improvements. Reductions in toxicants and wastewater overflows will also improve macroinvertebrate health.			

Native Fish	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	B	B
Commentary	Taupo Stream is known to support a number of native fish species (6 are recorded in the pNRP), including the at risk giant kokopu, inanga, longfin eel and redfin bully. However it is likely the current Taupo Stream fish community is under stress and may be in decline. The scenarios are expected to improve fish health and may result in the recruitment and establishment of additional species. Retirement and riparian planting in the scenarios will help fish communities by providing shade, improved habitat and reduced deposited sediment from stream bank erosion. Reduced periphyton will reduce dissolved oxygen fluctuations (especially in the lower reaches) that can be harmful to fish. Reduced periphyton and improved macroinvertebrate densities provide more food for fish. Barriers to fish passage may currently prevent migration to some upper catchment sites. While physical restoration of any obstructions to fish passage was not part of the scenario modelling it is clear this would be an additional beneficial action for fish.			

Te Awarua-o-Porirua fresh water current state and scenarios: Ecological assessment	
WMU Group	Pauatahanui steep rural streams
WMU Name and assessment locality	Horokiri Stream in the mid-lower reaches

Periphyton	**Current state**	**What is the likely change under this scenario?**		
		BAU	**Improved**	**Water sensitive**
Overall estimated	C	C	B	B
Commentary	Periphyton biomass is currently a C band and improvement to B band is predicted under either scenario. Increased shading from riparian planting will reduce water temperature and light, which contribute to reducing periphyton biomass. Riparian planting will also help to stabilise stream banks, reducing deposited sediment through erosion, which can be a periphyton nutrient source. Retirement or space planting of grazed pasture in the catchment under these scenarios also contributes to reduced sediment erosion and nutrient reduction, particularly phosphorus. However, phosphorus reductions may also lead to a community composition shift towards toxic algae (Phormidium). Improved macroinvertebrate densities may increase periphyton grazing.			

Macroinvertebrates	**Current state**	**What is the likely change under this scenario?**		
		BAU	**Improved**	**Water sensitive**
Overall estimated	C	B	B	B
Commentary	Monitoring the Horokiri Stream has classified it in B band with the model predicting near the top of the C band. The state is likely to be B band with the scenarios. Riparian planting is likely to improve macroinvertebrate health through increased shading and habitat improvements, as well as reducing deposited sediment from streambank erosion. Sediment reductions from the space planting or retirement of steep grazed pasture land reduce the overall sediment load and are likely to help improve macroinvertebrate health.			

Native Fish	**Current state**	**What is the likely change under this scenario?**		
		BAU	**Improved**	**Water sensitive**
Overall estimated	B/A	B/A	A	A
Commentary	This catchment is known to support a high number of native fish species (15 are recorded in the pNRP), including the nationally vulnerable lamprey and shortjaw kokopu, and the at risk giant kokopu, inanga, koaro, longfin eel, torrent fish and redfin bully. The scenarios will help improve these fish communities, particularly through the shading, stream bank stabilisation and improved habitat of riparian planting. Improved macroinvertebrate densities will result in greater food for fish. Barriers to fish passage may currently prevent migration to some upper catchment sites. While physical restoration of any obstructions to fish passage was not part of the scenario modelling it is clear this would be an additional beneficial action for fish.			

Te Awarua-o-Porirua fresh water current state and scenarios: Ecological assessment	
WMU Group	Pauatahanui rural streams
WMU Name and assessment locality	Pauatahanui Stream in the mid-lower reaches

Periphyton	**Current state**	**What is the likely change under this scenario?**		
		BAU	**Improved**	**Water sensitive**
Overall estimated	C	C	B	B
Commentary	Periphyton biomass is currently a C band and improvement to B band is predicted under either scenario. Increased shading from riparian planting will reduce water temperature and light, which contribute to reducing periphyton biomass. Riparian planting will also help to stabilise stream banks, reducing deposited sediment through erosion, which can be a periphyton nutrient source. Retirement or space planting of grazed pasture in the catchment under these scenarios also contributes to reduced sediment erosion and nutrient reduction, particularly phosphorus. However, phosphorus reductions may also lead to a community composition shift towards toxic algae (Phormidium). Improved macroinvertebrate densities may increase periphyton grazing.			

Macroinvertebrates	**Current state**	**What is the likely change under this scenario?**		
		BAU	**Improved**	**Water sensitive**
Overall estimated	C	C	B	B
Commentary	Monitoring in Pauatahanui Stream has classified it on the boundary of C and B bands with the model predicting C band. The state is likely to improve to B band with the scenarios. Riparian planting is likely to improve macroinvertebrate health through increased shading and habitat improvements, as well as reducing deposited sediment from streambank erosion. Sediment reductions from the space planting or retirement of steep grazed pasture land reduce the overall sediment load and are likely to help improve macroinvertebrate health.			

Native Fish	**Current state**	**What is the likely change under this scenario?**		
		BAU	**Improved**	**Water sensitive**
Overall estimated	B	B	A	A
Commentary	This stream is known to support a high number of native fish species (9 are recorded in the pNRP), including the nationally vulnerable lamprey and the at risk giant kokopu, inanga, longfin eel and redfin bully. The scenarios will help improve these fish communities, particularly through the shading, stream bank stabilisation and improved habitat of riparian planting. Improved macroinvertebrate densities will result in greater food for fish. Barriers to fish passage may currently prevent migration to some upper catchment sites. While physical restoration of any obstructions to fish passage was not part of the scenario modelling it is clear this would be an additional beneficial action for fish.			

Te Awarua-o-Porirua fresh water current state and scenarios: Ecological assessment	
WMU Group	Pauatahanui urban streams
WMU Name and assessment locality	Lower Duck Creek

Periphyton	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	C	C
Commentary	The Lower Duck Creek is assessed to currently have C band periphyton attribute state, likely due to low levels of riparian shading in this lower reach. It is likely that periphyton state is better in some of the middle parts of the catchment upstream that are bush-clad and therefore shaded. Some improvement is predicted under the scenarios, but not enough to change a band in the lower reach Reduced deposited sediment under baseflow will help to reduce periphyton biomass. Most of the retirement and riparian planting occurs in the upper catchment and is unlikely to have much benefit for periphyton biomass in the lower reaches near the mouth.			

Macroinvertebrates	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	C↑	B
Commentary	The Lower Duck Creek is currently assessed as C band. Scenario changes are likely to be limited in the lower reaches, but there may be more improvement in other parts of the catchment with reductions in periphyton and sediment, increased shading and habitat improvements. Improvements in toxicants, wastewater overflows and urban hydrology in the water sensitive scenario may improve macroinvertebrate health into the B band.			

Native Fish	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	B	B	B	A
Commentary	Lower Duck Creek is an Inanga spawning site and known to support a high number of native fish species (10 are recorded in the pNRP), including the nationally vulnerable lamprey and the at risk giant kokopu, inanga, koaro, longfin eel, and redfin bully. Although the current state presence of species is excellent, it is likely the fish communities are under stress and may be in decline. The water sensitive scenario will help improve these fish communities with less improvement likely through the improved scenario. Retirement and riparian planting will help fish communities through shading, stream bank stabilisation and improved habitat, particularly in the upper reaches. Reduced periphyton biomass in the upper catchment and improvement in macroinvertebrates in some parts of the catchment will result in greater food for fish. Barriers to fish passage may currently prevent migration to some upper catchment sites. While physical restoration of any obstructions to fish passage was not part of the scenario modelling it is clear this would be an additional beneficial action for fish. Protection and/or enhancement of inanga spawning habitat would benefit inanga populations.			

Te Awarua-o-Porirua fresh water current state and scenarios: Ecological assessment	
WMU Group	Onepoto steep rural streams
WMU Name and assessment locality	Takapu Stream

Periphyton	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	B	B
Commentary	Current state of periphyton at bottom of Takapu Stream is C band. This could become B band under improved/water sensitive scenarios due to riparian planting (decreased sediment through stream bank erosion, increased shading, reduced water temperature and light and reduced periphyton). Retirement from and/or planting of grazed pasture under the improved and water sensitive scenarios will contribute to reduced sediment and nutrients (particularly phosphorus) and increased macroinvertebrate densities leading to decreased periphyton biomass.			

Macroinvertebrates	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	B	B
Commentary	Current state of macroinvertebrates is C band. This could move to B band under improved and water sensitive scenarios due to reduced periphyton and sediment, increased shading and habitat improvements from riparian planting.			

Native Fish	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C?	C?	B	B
Commentary	Little is known about fish populations in this catchment. It is likely that any fish in Takapu Stream are under stress and limited in population due to degraded habitat, sediment and limited shading. Aspects of the improved and water sensitive scenarios, such as reduced periphyton and improved macroinvertebrate densities are positive for fish. Mitigations such as riparian planting provide habitat and shading, stream bank stabilisation and associated reduced sediment may result in improved resilience of existing fish species, as well as increased recruitment and establishment of additional fish species. Physical restoration of fish passage would be beneficial.			

Te Awarua-o-Porirua fresh water current state and scenarios: Ecological assessment	
WMU Group	Onepoto rural streams
WMU Name and assessment locality	Stebbings Stream

Periphyton	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	B	B
Commentary	Current state of periphyton is C band. This could become B band under improved/water sensitive scenarios due to retirement of most of the grazed pasture and substantial riparian planting. This will contribute to decreased sediment through stream bank erosion, increased shading, reduced nutrients (particularly phosphorus) reduced water temperature and light, all of which reduce periphyton growth.			

Macroinvertebrates	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	B	B
Commentary	Current state of macroinvertebrates is C band and this could become B band under improved/water sensitive scenarios due to retirement of most of the grazed pasture and substantial riparian planting as mentioned above. This will contribute to more stable streams banks and better habitat, decreased deposited sediment, increased shading and reduced water temperature, all of which improve invertebrate health However, gains may be offset somewhat by urban development; less so under the water sensitive scenario.			

Native Fish	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	B	B	A	A
Commentary	Little is known about fish populations in this catchment. The stream appears suitable for banded kokopu, koaro, eels and even giant kokopu and red-fin bully. If these species are present it is likely they are under stress and limited in population due to degraded habitat, sediment and limited shading. Aspects of the improved and water sensitive scenarios, such as reduced periphyton and improved macroinvertebrate densities are positive for fish. The multiple habitat benefits from riparian planting mentioned above may result in improved resilience of existing fish species, as well as increased recruitment and establishment of additional fish species. Physical restoration of fish passage would also be beneficial.			

Te Awarua-o-Porirua fresh water current state and scenarios: Ecological assessment	
WMU Group	Onepoto small urban streams
WMU Name and assessment locality	Mahinawa Stream

Periphyton	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	A	A	A	A
Commentary	Current state of periphyton is A band. The lower reach of the Mahinawa Stream is piped and hence there are no issues with periphyton in that reach. The middle and upper reaches are A band due to the catchment being almost entirely bush, almost fully shaded and likely having healthy macroinvertebrates that graze on periphyton.			

Macroinvertebrates	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	B/A	B/A	B/A	B/A
Commentary	While the lower piped reach near the mouth clearly has no macroinvertebrate habitat, current state is likely B or even A in the middle and upper reaches which are in bush. In these reaches there will be almost full shade, good habitat with woody detritus, low levels of sediment and very low levels of contaminants. The only change that occurs under the improved and water sensitive scenarios is a decrease in zinc (potentially from treatment of runoff from roofs, paved surfaces and roads) in the lower piped reach.			

Native Fish	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	C	C
Commentary	There are no fish records available for Mahinawa Stream. However if adequate fish passage exists through the lower piped section, we would expect to find species such as eel, banded kokopu, koaro and koura in the middle and upper reaches. Inanga should also be found but due to lack of passage and limited vegetation this is currently unlikely. Physical restoration of obstructed fish passage and repair of inanga spawning habitat would be key to any future improvements for fish in this catchment.			

Te Awarua-o-Porirua fresh water current state and scenarios: Ecological assessment		
WMU Group	Kenepuru Stream	
WMU Name and assessment locality	Kenepuru Stream in the mid-lower reaches	

Periphyton	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	C	C
Commentary	Kenepuru Stream has a C band periphyton state in the lower reaches, though shaded areas such as in Bothamley Park may be B band. Nutrients are quite high and support rapid growth, though frequent flushing flows help keep periphyton from being worse than it is. Areas that aren't shaded by riparian planting or the trees in Bothamley Park are likely to experience periphyton blooms during long dry periods. The scenarios are likely to have little influence on periphyton in the lower reaches, though riparian planting and improved urban hydrology may help reduce deposited sediment in the catchment by stabilising stream banks. Retirement and riparian planting in upper parts of the catchment may improve periphyton levels in the upper catchment towards a B band.			

Macroinvertebrates	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	C ↑	C ↑↑
Commentary	Kenepuru Stream is currently assessed as C band. In the bottom reaches of the Kenepuru Stream, frequent flashy flows from urban areas cause stream bank erosion, poor habitat and high levels of deposited sediment. Flood erosion mitigations, such as rock baskets, also result in decreased macroinvertebrate habitat. Improved urban runoff management in the infill development areas of the catchment help reduce the frequency of bed disturbing flows and smaller frequent flows. This is expected to be positive for macroinvertebrate communities with the greatest benefit under the water sensitive scenario. There are significant reductions in wastewater overflows and may be some improvements for zinc toxicity, which would bring some benefits for macroinvertebrate health, but limited change in other toxicants.			

Native Fish	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	B	C/B	C/B	C/B
Commentary	The Kenepuru Stream supports good native fish population, however, they are likely under stress and may be in decline in the lower reaches due to habitat loss and modification, deposited sediment, toxicants and wastewater overflows. The mid reaches and side tributaries, where there is more riparian planting, better habitat and less deposited sediment, are likely to support healthier fish communities. The bottom of the Kenepuru Stream near the Porirua Stream confluence is also an Inanga spawning site, providing there is appropriate vegetation for inanga to spawn in. While physical protection and/or restoration of inanga spawning habitat was not an explicit part of the scenario modelling this would be a beneficial action for fish in this catchment.			

Te Awarua-o-Porirua fresh water current state and scenarios: Ecological assessment	
WMU Group	Porirua Stream
WMU Name and assessment locality	Porirua Stream in the mid-lower reaches

Periphyton	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	B	B	B↑	B↑
Commentary	The current state is at poorer end of the B band and we are likely to see improvements within the band under either scenario. Increased shading and reduced temperature from riparian planting contribute to reduce periphyton. This will be more effective in the narrower upper reaches of the catchment, but less so in the wider lower reaches. Reduced nutrients, particularly phosphorus, will help to reduce growth rate and maximum biomass. Riparian planting and reduced sediment at normal flows will help to reduce deposited sediment, which can be a nutrient source for periphyton.			

Macroinvertebrates	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C	C	C ↑	C ↑
Commentary	Porirua Stream is currently C band. MCI may improve within the band from changes in the scenarios, such as decreases in deposited sediment, toxicants and wastewater overflows and improved shading and edge habitat from riparian planting. However, given the lack of channel sinuosity, elevated toxicants (particularly ammonia) and homogenous habitat (e.g., straightened, channelised and/or concrete edged - especially in the lower reaches) it is unlikely there will be any further significant improvements than this.			

Native Fish	Current state	What is the likely change under this scenario?		
		BAU	Improved	Water sensitive
Overall estimated	C/B	C/B	B	B
Commentary	The main-stem of Porirua Stream supports a high number of native fish species (11 are recorded in the pNRP), however, populations are likely limited and under stress from the straight channel, limited riffle-run-pool sequences, minimal shading, elevated toxicants and homogenous habitat. Riparian planting in the scenarios will help fish communities by providing some shade and some improvement in habitat complexity, and improvements to macroinvertebrate communities will result in more food for fish. The upper catchments of the Porirua Stream are likely to have more sustainable fish populations, where there is better habitat, better potential for improving shading by riparian planting and water quality improvements. However barriers to fish passage may currently prevent migration to some upper catchment sites. While physical restoration of any obstructions to fish passage was not part of the scenario modelling it is clear this would be an additional beneficial action for fish.			